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CONTENTS.

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DAHLIA CONFERENCE.

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A CONFERENCE on Dahlias was held at the Chiswick Gardens on Tuesday, September 23. The chair was taken by HARRY TURNER, Esq., F.R.H.S., President of the Conference, who in opening the proceedings said that, looking at the number of the papers which were to be read that afternoon and the high authority with which the several readers of them would speak, he as Chairman would be consulting the best interests of all concerned by making no opening address, but by simply calling on Mr. Shirley Hibberd to read the first paper.

THE ORIGIN OF THE FLORIST'S DAHLIA.

By the late Mr. SHIRLEY HIBBERD, F.R.H.S.

THE formation of a florist's flower affords so much direct information on the biology of vegetable reproduction that any searching study of the subject is likely to be well rewarded. The late Mr. Charles Darwin necessarily gave the subject some attention, but, being far removed in his pursuits and tastes from floriculture, he depended much more upon replies obtained to questions he proposed to a few distinguished florists than to any observations of his own. Even by this slender second-hand system he acquired a vast amount of knowledge, which he employed to good purpose in those masterly generalisations that render his books of present value and immortal fame. If he had applied his penetrating genius to the subject before us, many points that are now obscure would doubtless have been made plain, and the little that I can

attempt would have been rendered superfluous. And it is but little, for I make no pretence here to penetrate below the surface of any part of the interesting subject proposed to me. The exigencies of daily life leave no margin for a serious inquiry into the full meaning of the changes effected in any flower by the work of the florist; but in a discourse of half an hour, with the help of a few drawings and with examples of living flowers, I may at least be enabled to entertain my friends with a slight attempt at a scientific treatment of the subject.

Wherein consists the difference between the Dahlia as it is found growing wild in its native land, and the Dahlia that embodies in it both the governing idea and the results of the patient work of the florist? An appropriate reply would be that in the hands of the florist it has changed from an open star to a closely packed rosette, while in size it has been enlarged and in colour greatly diversified. A more comprehensive reply would consist in saying that the florist began with a single flower and endeavoured to obtain a double flower. In that he has succeeded, and the task now before him is to advance the double flower to a certain ideal standard of form and proportion, and when he has attained to a realisation of his ideal his work as a florist will have been completed.

In considering the bearings of the primary question, the subject naturally divides, on the historical side in one direction and the biological in another. We must begin somewhere, and history only can teach us where and how. I therefore invite your attention first to a hasty review of the facts, as in various ways recorded, of the introduction and progress of the Dahlia as a garden flower in Europe, to the point where the florists appear to have influenced it in view of their model of what it should be to gratify their tastes and compensate them for its cultivation. A fuller history than I shall now attempt formed the subject of a discourse at the opening of the Dahlia Conference of the National Dahlia Society, and may be found in the *Gardener's Magazine* of September 7, 1889. To that I refer the curious in the matter of historical facts, while for present purposes I shall hope to leave nothing unsaid that in any way bears on the question that is immediately before me.

The first description of the Dahlia occurs in Francisco Hernandez's treatise on "The Plants and Animals of New

Spain," published at Madrid in the year 1615. The several editions of this important work are described in the infallible "Thesaurus" of Pritzel. For 130 years we hear no more of the Dahlia, when it turns up again in 1787 in connection with an interesting event. Nicholas Joseph Thierry de Ménonville was sent to America by the French Government of Louis XVI. to obtain the cochineal insect and the plant it subsisted on. His instructions were that he was to secure it; and the ethics of the case appear to have been of the ancient diplomatic order. The expedition was successful; the cochineal was secured, and in 1787 Ménonville published an account of it, adding many particulars of other things he had seen or heard of. Amongst events of interest, he had seen, in a garden at Guaxaca, flowers that he described as large as Asters, on stems as tall as a man, with leaves like those of the Elder-tree. Clearly he had seen single Dahlias in Mexico, and the florists of that place and time were content to grow single flowers, and possibly doted on them.

It may be said that the combined labours of Hernandez, Ménonville, and others had created amongst the botanists of Europe a craving for this great Mexican Aster; and, if the cochineal could be secured, so might the less profitable—but no less interesting—Aster-like flower. Spain, as by right, obtained the first gratification of the new desire, for in 1789 a parcel of seeds of the coveted plant was sent to Madrid by Vincentes Cervantes, Director of the Botanical Gardens of Mexico, to be grown by the Abbé Cavanilles, Director of the Botanical Garden at Madrid. Then it was that England secured a share of the prize, and the name of Lady Bute was immortalised in connection with the introduction of the beautiful novelty to English gardens.

It is fortunate we have nothing to do with politics in this history, for although they might come in, and a mixture of French Revolution, Pitt, Burke, Bute, and even the Bastille might follow, we can avoid them all by remembering that Lady Bute, to whom we are in this matter peculiarly indebted, was an enthusiastic gardener, and obtained seeds of the new plant from Lord Bute, who was then diplomatically employed at Madrid; and thus the first cultivator of the Dahlia in England was a lady, who, so far as I know, is as yet uncommemorated, except in some such poor way as the mention of this circum-

stance. Lady Bute followed the horticultural rule of her day, which was that all foreign plants required to be suffocated in a close plant-house; and, accordingly, the Dahlia was lost to cultivation in this country within two years of its introduction. Kew obtained it about the same time, and lost it in the same way. Being a foreigner it was suffocated.

But the plant had travelled to Paris, for in the year 1802 the Abbé Cavanilles communicated seeds from Madrid to the Jardin des Plantes at Paris, and to M. de Candolle at Montpellier, and thus the flower was somewhat diffused in Europe. From Paris seeds of *Dahlia coccinea* were obtained in 1802 by John Fraser, nurseryman, of Sloane Square, who flowered them in a greenhouse in 1804; and from those flowers the first figure published in England was prepared, this being No. 762 of the venerable *Botanical Magazine.*

In 1791 was published at Madrid the "Icones et Descriptiones Plantarum" of the Abbé Cavanilles, and in it were figures and descriptions of Dahlias, for Cavanilles is the author of the genus which he dedicated to the memory of André Dahl, a Swedish botanist and author of a work on the Linnæan system published in 1784. Humboldt has the credit of introducing the Dahlia from Mexico in 1789, but this is a falsification of facts, because Humboldt did not set foot on the American continent until February 1800, soon after which he did see Dahlias in gardens in Mexico, and was greatly rejoiced thereat.

The chronology sets before us two species of Mexican Acoctli figured by Hernandez in 1615, and respectively named by Cavanilles, in 1791, *Dahlia pinnata* and *Dahlia coccinea.* The first of these became the Dahlia of the garden; it is now known by the appropriate name of *D. variabilis*, for it is beyond doubt one of the most variable flowers in cultivation. In the production of the garden flower, then, we begin with the achievement of Cavanilles, who kept his flowers while other cultivators lost them, and in the year 1791 had the good fortune to publish a figure of the first double flower of which we have certain record, he having obtained this as the result of his successful cultivation. The now universally recognised generic name *Dahlia* was for a time put aside, owing to a misapprehension, by Professor Willdenow of Berlin, and the name *Georgina* was substituted in commemoration of Professor Georgi of St. Petersburg. So late as the year

1832, I find this name in use in Loudon's *Gardener's Magazine*, but after that date I find no record of it except as a matter of history. For, indeed, the year 1832 was a year of reform, and the original name "Dahlia" was finally established through the action of Mr. H. Reynard, President of the Beverley Horticultural Society, who justified it on the ground of priority, and since then it has not been disturbed.

The flower having advanced in Madrid to the important stage of doubling, had made no such progress elsewhere. In London, Paris, Brussels, and Berlin it was valued for its beauty, and the cultivators were of one mind in striving after double flowers, but entirely without success until 1813, when M. Donkelaar, of the Botanic Garden, Louvain (in whose honour a celebrated Camellia has been named), secured a near approach to the coveted prize, and a year or two afterwards obtained flowers perfectly double and with the promise in them of what we understand by the term "floral quality." The year 1814 was one of great events, and, as I may not touch politics, I will proclaim it a great year in the garden, for it saw the realisation of the hopes of the early florists in respect to this flower, for in that year Donkelaar had many double blossoms, and to him belongs the honour of laying the foundations of this branch of the noble art of Floriculture. Of him we may speak as being the Father of the Dahlia as a florist's flower, and in that capacity he is entitled to the reverence of all true florists. Camellia Donkelaari is therefore a kind of monumental flower.

The incoming of the Dahlia coincides with the first French Revolution, and the establishment of double flowers with the prelude to the battle of Waterloo. In all the plant-growing centres of Europe it was now attracting attention, and the British amateurs who followed the allied armies to Paris found there a considerable variety which were valued chiefly for their distinctive colours. Through M. Lelieur, a noted French amateur of Sèvres, French varieties were imported into England, and in due time furnished subjects for figures in the *Botanical Magazine*, which afford us a clear idea of the garden Dahlias of that date, and the taste that prevailed in selecting them. The celebrated figures published by Dr. John Sims in 1817 represent the flower then known under the Linnæan name *Dahlia superflua*, the fertile-rayed Dahlia, which at that time had

for synonyms *Georgina superflua* and *Georgina variabilis*. The modest double purple flower there represented would contrast strangely with one of our huge show flowers of the present day, but it displays in elementary form all the properties that have been sought, and in some part attained, in the progressive development of the florist's flower. The magnificent single scarlet flower of *Dahlia superflua* figured in the *Botanical Register* of 1815 (plate 55 of the first volume of that work) affords a pleasing illustration of its variability, and may with advantage be compared with the *Botanical Magazine* figures of the same thing by those who hold to the opinion that our garden Dahlias represent several species fused into a new individuality by what is colloquially termed "hybridisation."

The progress of the Dahlia as a florist's flower from 1820 to 1850—a run of thirty years—was marked by advance in every desirable quality; and with each decided gain in fulness, smoothness, symmetry, and refinement of petal there was a corresponding advance in popularity, so that the prices of new varieties not unseldom ranged from twenty to thirty shillings for a plant. The first volume of the "Dahlia Register," published in 1836, contains advertisements of Dahlias, the prices of which range from 3*s*. 6*d*. to 21*s*., the principal trade cultivators of that time being Brown, of Slough; Harris, of Upway; Heale, of Calne; Saunders, of Jersey; Wheeler, of Warminster; and Glenny, of Isleworth. A fair collection of that time would run to 3,000 varieties; at all events Mr. Glenny reported that he had made a selection from that number. In recent years Mr. Charles Turner, of Slough, regularly advertised new Dahlias at 15*s*. each. Referring to Mr. Cannell's last catalogue, I find that the highest-priced Dahlia is the Cactus-flowered variety, Prince of Wales, priced 4*s*., while the general average price of plants is only a few shillings per dozen.

From about 1850 the popularity of the flower declined to this extent, that the exhibitions were fewer in number; but there was really no pause in the work of improvement, as a comparison of the best varieties of successive years clearly shows. With the establishment of the National Dahlia Society, in the year 1870, there came a decided and extensive revival, for all the several classes of Dahlias were recognised as proper exhibition subjects, and their properties were established on the broad

foundations that have within recent years obtained favour with florists. In the golden days of the flower the single varieties were inadmissible, and the Cactus group was unheard of, though it cannot be said to have been non-existent, because the beautiful *Juarezii* was a genuine introduction from Mexico in the year 1872, and a suggestion of its possibility—one might almost say a forecast of its coming—was seen in a variety known as Brown's Glowworm, that was in high favour in the year 1836.

The species of Dahlia number at least a dozen, if we reckon by names. It is a question if we really know of more than two. *Dahlia imperialis* is undoubtedly distinct from *D. variabilis*, and may be dismissed as, for the present at least, having no direct or immediate relation to the florist's flower. *D. frustranea* is the barren-rayed, and *D. superflua* the fertile-rayed; they rank as species and the names are Linnæan. But you will find no essential or specific distinctions that will suffice to separate them. *Coccinea*, *crocata*, *crocea*, *lutea* and *aurantia* are names founded on colour alone, and it would only be waste of time to discuss their claims to recognition. *D. Barkeriæ* is simply a narrow-rayed form of the single Dahlia of gardens. *D. Cervantesi* is a neat scarlet-rayed single of no special character. *D. excelsa* makes a tall stem, and *D. scapigera* has flower-stems of great length. *D. glabrata* compels one to pause in this kind of generalising, but a careful diagnosis will make it nothing more nor less than a miniature form of our familiar plant. If *glabrata* is a distinct species, then we must assign specific rank to Bantam fowls and Shetland ponies; and all our small editions of favourite plants, that we have ourselves secured by breeding down and successively selecting, will properly clamour to rank as new creations. There is not one essential character in any of these that can separate it from *Dahlia variabilis*, a plant so appropriately named that it compels us to acknowledge that common sense obtrudes occasionally even in botanical nomenclature.

Composite flowers differ from other flowers only in the close association of many florets in one head on a common receptacle, surrounded by an involucre of whorled bracts. The Dahlia belongs to the first sub-order, *Tubuliflorœ*, the fertile florets of which are tubular, and its immediate alliance is with Aster, Bellis, Inula, and Telekia. It is a matter of importance to ob-

serve that while the flowers of these plants differ from others in the aggregation of many in one head, they are each in all essential particulars the same as other flowers; there is absolutely no departure from the prevailing construction and the distinction of the several parts. Thus in a Dahlia a number of flowers that are called florets are associated in a cluster, forming what may be termed a floral star. The several flowers in that star consist of a calyx, a corolla of one petal, stamens, stigmas, and a one-celled inferior ovary, containing one ovule. In examining a single Dahlia we are immediately struck by the conspicuousness of the external or ray florets, which encircle a closely packed central disk, in which the stamens make themselves known by their golden colour. If we pull a flower to pieces we discover that the ray florets are tubular at the base only, where they present occasionally aborted pistils, telling us that in acquiring a larger size than the rest they have exhausted their powers, and are incapable of producing either stamens or stigmas. The outer florets are in every sense sterile, and mere adornments, although in that sense probably of vital importance, as attracting insects to the flowers to effect fertilisation. The inner florets forming the disk are minute, distinctly tubular, and in each is a closely packed bundle of stamens that may be likened to the Roman *fasces*, from the summit of which protrudes the pistil, divided into two or three stigmas. Each of these central fertile florets terminates in an ovary, to which the calyx adheres so as to be indistinguishable from it, and the result of fertilisation is a cluster of dry seeds on the receptacle known to cultivators as a "pod." The doubling process consists in the multiplication of ray florets and a corresponding suppression of disk florets; or we may popularly describe the process by saying that the short corollas of the disk are converted into the prolonged corollas of the ray, and correspondingly the organs of fertilisation are suppressed also, so that in place of the productive flowers of the disk we have the unproductive flowers of the ray, a conversion of obscure fertile into conspicuous infertile flowers.

The process of doubling consists, therefore, in the simultaneous growth of ray florets at the expense of seed production; the flower becomes aristocratic, and ceases to be so productive as when in its more humble form, and ends in becoming at once splendid and sterile, in part or altogether.

The history of the flower discloses the fact that the Dahlia, in common with other pets of the florist, has attained to its grandeur of complete doubleness by degrees. There is no instance known of a florist's flower becoming such by one change only, for the remodelling to which the florist subjects his chosen subjects, is a slow, and in some respects a tedious process, demanding immense patience and perseverance, and constituting thereby a mental discipline of the highest value imaginable, one parallel fact being that florists are good men, and have ever been such; there is no example of an exception, unless it be that of a man who has fallen from his high estate through decline of sympathy for his once favourite flowers.

It is a custom with a certain class of persons, who appear incapable of grasping more than half an idea at any time, to rail at the florists and their flowers, the first as a kind of malefactor engaged in suppressing vegetable vitality, the second as the monstrous products of misdirected and perhaps iniquitous zeal. If it be legitimate to ask, "Why alter the natural form of any flower?" it cannot be illegitimate to ask, "Why cultivate any flower, seeing that cultivation will inevitably alter it, and is *intended to do so?*" It is in the nature of man to impress upon the forms of things he is interested in his own idea of what they ought to be. We are not satisfied with wild Asparagus or wild Roses; we alter them by cultivation. The architect imitates the forms of trees in his stone constructions, and the mason who gives the finishing touch to the Corinthian capital adds an Acanthus leaf in a fashion of his own, and not as it appears in nature. The artist who excels in painting flowers according to nature mixes the flowers of spring with those of autumn in order to secure certain effects, while for decorative purposes he conventionalises, or, in other words, presents them in impossible attitudes, with fantastic variations of form, and wins the praises of those same sublime æsthetes who denounce the florists and their flowers. The life of floriculture is in the changes it effects, but these are subject to rules that have nature for their foundation; and the double Dahlia illustrates the whole case, for cultivation only encourages nature in certain directions, and selection does the rest.

The achievements of the florist involve him in a complication of difficulties. The perfect Dahlia—supposing such a thing to

exist—will be so crowded with prolonged florets as to be incapable of expanding symmetrically, and we come near to this in what are called hard-eyed flowers, in which the central florets are so closely packed and crowded that the outer parts of the flower become aged ere the central parts are matured. And another consequence of perfection, or even any near approach to it, is complete sterility. As the production of new varieties is in one sense at least the life of floriculture, the attainment of its one great end, the perfect florist's flower, is accompanied with a kind of death warrant for the extinction of the art itself. But the dreadful doom is not impending; the best flowers we possess are far from perfect, and the occurrence of flowers with eyes, in other words with a few central fertile florets, is sufficiently frequent to ensure, even from the named varieties of highest quality, a certain amount of useful seed.

A few dissections of show Dahlias will show that the Linnæan name *superflua* is not altogether fanciful; for although we have in the double flower a rosette composed of ray florets, it will be found that towards the centre of the flower many of these have a kind of potentiality of fertility that accidents may promote to the status of facts. Often the fertile florets form a dense ring around the centre, and in a hot, dry season the reproductive organs assert themselves, fertilisation takes place, and there is a good harvest of seed. In days when I grew Dahlias it was the practice with a few successful raisers to cut out the centres of flowers from which it was desired to obtain seed. This relieved the nutritive organs from the task of perfecting the central florets and increased the opportunities of the fertile florets that remained, thus accomplishing a saving of time as well as increasing the probability of the production of seed. In cutting out, the basis or receptacle should not be injured; just enough of the central florets should be removed to afford increased room for those next adjoining them to expand and push upward their stamens, which are on elastic filaments and have to push through the five-valved membrane which opposes their outlet at the summit. While the flower is intact it is often so crowded, and the florets so pressed together, that the stamens cannot rise, and hence much seed that might be secured is lost, through neglect of the cutting out to make room for these movements. As regards the original potentiality, that may be the same in a cold and damp as in a

dry and warm season, but the circumstances do not arise to convert it into actuality.

The beginning of the doubling process is amusingly illustrated in a Dahlia shown in the present exhibition by Messrs. Harkness & Son, of Bedale, Yorkshire. It is classed with the single flowers, and its name is "John Burns." It is, however, not properly a single flower, for it presents two or three rows of florets in the ray, and these of necessity encroach on the disk and mark the commencement of the sterilising process concurrently with the advance of the flower towards floral perfection.

If it be again asked, as it has been a thousand times already, whether the doubling of flowers is a sign of an augmentation or a diminution of inherent vigour, I reply that it is neither; it is a sign only that the flower is adapting itself to changed conditions, for while there is less seed production, and consequently less consumption of material to that end, there is increased consumption in respect of the outward adornments; and often the total of flowers produced is far greater in the double than in the single varieties. But in considering this question we encounter something that may be fancifully likened to an exercise of reason in plants. We find that in nearly the same proportion that man takes care of them they cease to take care of themselves. Discovering that the race will now be perpetuated through the arts of their human admirers, they yield to the persuasions of vanity, deck themselves more gaily, give up all notions of family cares, and, as true aristocrats, devote themselves to mere display and the advertising of their superiority. The explanation is almost too simple to be worth attempting, but to complete this paragraph I may remark that men preserve and find means to multiply the flowers that please them. And if double flowers find favour, the process of doubling will be encouraged, and it follows that sterilisation is one of the veritable results of prevailing tastes in the flower-garden. But nature after all is never entirely thwarted, and so it happens that from all our finest flowers, whether Dahlias, Hollyhocks, Carnations, Pelargoniums, or Chrysanthemums, to obtain seed is always possible, and the problem for the practical man is to know how to do it.

It is not an easy matter to convey an idea of the capability of the Dahlia for variation. The Mexican gardens have given us many of the most diverse and distinctive forms, and the

variety of conditions that prevail in Mexico favour the establishment of typical variations of one and the same species; and specific rank may fairly be claimed for them until cultivation has revealed their consanguinity. Between *frustranea* and *variabilis* there appears to be a great gulf fixed, but it narrows rapidly under the observation of the cultivator. As regards their relative fertility there is no essential difference, and *frustranea* proves at last to be simply a more slender form than the other, with a narrower foliage, a smaller flower, and a more conspicuous coating of whitish hoary efflorescence like the bloom on fruit. In some such terms it is distinguished in the note accompanying the beautiful figure of *D. superflua* in the *Botanical Register* of 1815. When the Dahlia was as yet a rare thing in the garden, it commonly grew to a height of six to ten feet. Continued selection has enlarged the flower and dwarfed the plant, but the bushy growth of three to four feet that renders the plant at once stately and manageable is the result in great part of the cultivation. In the old times the roots were saved and planted entire, and the plants possessed enormous vigour; but now we strike cuttings from the first shoots, and take cuttings from these again, and the result is a diminution of vigour and growth; but with this desirable accommodation of habit we have an augmentation of the size and fulness of the flowers. I remember well certain Dahlias in a garden that were thought much of because of their exceeding tallness, for some of them made stems fully ten feet high and required the support of stout hop-poles. And once on a time some of them overhung a fence on a road, and some boys were ambitious to obtain them, because, perhaps, they were so far beyond their reach. But there came along a party of acrobats, and with them a clown on very tall stilts, and he plucked a number of these sky signs and threw them to the boys, and secured for his company a few coppers and many loud cheers that ensured the performers a welcome in the next street. We do not see such plants at the present time, but they could be reproduced in two or three years were they needed and one step towards this undesirable end would be the planting of whole roots and giving encouragement to free growth, with suitable support for protection against wind.

But the stature is much more determined by selection than by cultivation. The raisers have favoured a dwarf, free habit,

and have secured plants of such varying stature that they now range in height from nine to fifty inches, these being nearly, if not exactly, the two extremes. Nine-inch Dahlias are the very latest novelties in the way of habit; and a race of plants bearing single flowers, and ranging from nine to twelve inches, has been obtained by Mr. T. W. Girdlestone, of Sunningdale, and are to be brought before the public as "Tom Thumb Dahlias." Surely, if we consider the immense range of variation in both flowers and plants, it must be agreed that *Dahlia variabilis* is appropriately named, for it is probably the most variable plant in cultivation.

A walk through a few acres of Dahlias of the several classes now cultivated will impress the observer with a notion of infinite variation, and yet further observation will show that the range of variation is somewhat closely fenced in by the essential characters of the species. To find two or three distinct characters in flowers on the same plant is no uncommon occurrence. We may even find flowers of two colours, say white and red, so arranged as to produce the effect of two exact halves of flowers of different colours united, the effect being ludicrous when the colours strikingly differ. As to flowers with stripes and tips, they vary in every imaginable way. The colours change places, or one colour predominates, and we have selfs where we should have stripes; and odd blotches of strange colours appear, apparently without any reason or purpose whatever. One of the most interesting of many strange things I remember in Dahlia culture occurred in the case of the variety known as Jupiter, which appeared in the year 1858. It electrified the Dahlia world, and men travelled miles to see it. The late Mr. Charles Turner placed a bloom on the table at the great Dahlia show in St. James's Hall, September 23, 1858, and averred that he valued it at £5, and that it was worth more than that amount to him as an exhibition sample. This wonder was a dark flower, as dark as another favourite of that day called Erebus. But Jupiter was tipped pure white, and with such regularity, brightness, and purity as to have more the appearance of a geometrical model painted with the severest precision than a flower of any kind. But this wonder, though it was allowed to exist for a few years, was true to its character for one season only. When that particular season was past its glory was over; for the next year it presented more self-coloured

than tipped flowers, and those that were tipped were irregular and deficient in purity. It was a nine days' wonder, but while it lasted it was a real wonder and a memorable Dahlia.

The florist's Dahlia is in a peculiar sense the creation of the florist. Not one of the many other flowers on which he has operated with an ideal form in view, has been so distinctly modified and removed to a distance from its original state as this, and it is amusing at least, whatever else may be said about it, to see that the work of a hundred years is threatened with annihilation by the growth of a preponderating taste for the simpler forms that most truly represent nature's idea of a perfect Dahlia. But we need not fear for our grand show flowers; they will always command admiration, and will be worth keeping if only to illustrate the power of man in modifying organic forms, and of impressing on the world around him visible embodiments of his own abstract notions.

SINGLE AND DECORATIVE DAHLIAS.

By Mr. T. W. Girdlestone, M.A., F.L.S., F.R.H.S.

There is always a danger in regard to florist's flowers, that the florist, raising and selecting seedlings with one aim and object only in view, may effect the development of the flower in the matter of size or form at the expense of other essential qualities in the plant. No one who has ever cultivated so-called florists' flowers of any kind whatever, will have the least difficulty in recalling numerous instances in which varieties, whose individual flowers may have been all that the specialist could desire, nevertheless proved anything but decorative garden plants. The Dahlia has not entirely escaped this danger, for although, owing to the naturally abundant vitality of the plant, Dahlias of weak constitution are practically unknown, yet in some cases the strength of the flower-stem has been unable to keep up with the development in size and rotundity of the flowers, so that those assuming a more or less pendulous position are quite ineffective on the plant, and for the same reason are even more top-heavy and undesirable in the cut state.

It was probably owing to some extent to this cause that a

sudden reversion was made a few years ago to the cultivation of the lighter and more elegant Single Dahlia, which quickly became very popular. The extreme facility with which Single Dahlias may be raised from seed and flowered the same season caused their culture to spread at once with immense rapidity, but ultimately, no doubt, proved very inimical to their reputation; for many gardeners, growing nothing but a few chance seedlings, which may all have been worthless—of poor habit, perhaps, or producing coarse, weak-stemmed flowers—nevertheless from these formed their estimate of Single Dahlias as a class. It is never worth while to grow bad varieties of any plant when good varieties exist, and Dahlias, of course, to be seen at their best, must be as carefully selected as any other flowers; but it is incontestable that the first-rate varieties of Single Dahlias which now exist constitute a group of decorative garden plants which are hardly surpassed for their brilliant and continuous display throughout the late summer until cut off by autumn frosts.

For producing a good decorative effect in the garden the essential qualities, for Dahlias of any class, are an erect and bushy habit of growth, freedom in flowering, and the possession of abundant and well-coloured foliage. The flowers should be stiff-stemmed, in order that they may be carried erect, and so well displayed on the plant; telling in colour; and, if variegated at all, whether striped, edged, or tipped, the variegation should be constant and clearly defined. Where Dahlias are only required as cut flowers, and that with comparatively short stalks, the quality and disposition of the foliage are of course not very material, and consequently raisers of Dahlias of the Show type have never troubled themselves much about these points; but their importance in regard to the production of a decorative effect in the garden is very considerable. Plants are liable to look very "lean" whose pairs of leaves occur only at long intervals upon the stems; and of the undesirability of pale yellowish foliage, which unfortunately disfigures a good many varieties in all classes, it is only necessary to grow the two well-known white Decorative Dahlias, Constance and Henry Patrick, side by side, to be assured.

To ensure a brilliant display in the garden, the plants, whatever their class, must be well cultivated. They should be planted in a border that has been well dug and manured; they should be

liberally watered in the event of hot, dry weather; they should be protected from the depredations of slugs early and of earwigs later in the season; and each plant must be provided with a stout stake. Single and Pompon Dahlias need nothing further for the production of a telling mass of bloom; but many, if not most, of the Cactus Dahlias require the additional operation of disbudding, in order to bring their flowers into view above the foliage. For it must be regretfully admitted that many of the so-called Decorative Dahlias are not Cactus, while not a few of the Cactus are anything but Decorative, owing to the fact of their flowers being concealed by their own foliage. For in these cases, when the terminal bud on each shoot has developed to a certain extent, two other buds, one on each side, start into growth, and increase so rapidly that they overtop the terminal bud, which, in consequence, by the time it has developed into a bloom, is hidden from view by the leafy flower-stems that have grown up beside it. The original Cactus Dahlia (*Juarezii*) is not exempt from this objection; but the most conspicuous example is the more recent variety, Amphion, whose flowers are almost as retiring as those of the modest violet. The only way to remedy this defect is to "disbud" freely—that is to say, to pinch out the side-buds as soon as the terminal bud is clearly visible—and then in due time the flowers will be well displayed above the foliage.

With a view to making a telling effect of colour it is best, where space affords, to grow several plants of a variety grouped together, rather than to plant mixed groups in which each plant is of a different variety. Comparatively few varieties, boldly massed, will produce a more decorative effect than a general collection containing but one or two examples of each of many sorts. Then again, unless for special purposes or situations, it is generally desirable to cultivate varieties that do not grow too tall. Dahlias of all classes have greatly improved in this respect of late years, and there has doubtless for a long time been a tendency towards a dwarfer and more bushy habit. Indeed, among Single Dahlias a race of quite "Tom Thumb" varieties, some of which will probably be distributed next spring, has been raised during the last few years, and is likely to furnish a valuable addition to popular bedding plants; the general character of the tribe being to produce a sturdy, bushy plant of from nine inches to a foot

high, covered early and continuously with large substantial flowers of brilliant colours.

As cut flowers, perhaps Dahlias of the true Cactus type are the most valuable; next, the Singles; and then the Pompons. It has sometimes been said that Single Dahlias are too fugitive to be of value for cutting, but this is by no means the case if they are cut in the proper state. People who complain of Single Dahlias falling as soon as cut are generally those who cut the flowers without much regard to the time they have been expanded, or to their condition at the time of cutting. In this matter the central disk affords absolutely reliable information: if the flowers are cut before the central or disk florets have begun to shed their pollen, they will last admirably in water: and, in fact, exhibitors of Single Dahlias do not need to take "spare" blooms with them when travelling to a show, so long as the bunches can be secured from rubbing against each other or the sides of the box in transit, as flowers cut young never shatter even with the shaking incident to a long railway journey.

In selecting Dahlias of whatever class for the purpose of affording a supply of cut flowers, it is of vital importance to secure varieties whose flowers are stiff-stemmed, so that the blooms may remain erect when placed in water, and not, from the weakness of their stalks, tumble about in all directions in the vases. So important is this point that it would probably be found a useful plan if exhibitors of Decorative Dahlias of any class, whether Single, Pompon, or Cactus, were required to stage, in addition to the usual bunches, at least several *unwired* blooms.

During recent years, and especially during the past season, in addition to growing thousands of plants, very careful note has been taken, in visiting the nurseries of leading Dahlia-growers, of the most conspicuous varieties in each section; and taking into consideration also the varieties exhibited at the exhibition of the National Dahlia Society at the Crystal Palace, at the meetings of the Royal Horticultural Society, of the National Chrysanthemum Society, and at the present Conference, lists have been prepared, which it may be of interest to give, of the best and most reliable kinds of Single, Pompon, Cactus, and Decorative Dahlias. It will not be worth while to give the description of

each variety, as that can be easily obtained from any catalogue; but the lists are briefly as follows:—

Twenty-four of the best Single Dahlias.—Eclipse, Amos Perry, Kate, Victoria, Northern Star, Enchantment, Cetewayo, Excelsior, Gulielma, Marion Hood, Miss Roberts, Sunningdale White, Mrs. J. Coninck, Marie Linden, Mr. Kennett, Miss Henshaw, Mikado, Duchess of Albany, Sunningdale Yellow, James Scobie, Walter Ware, W. C. Harvey, Duchess of Westminster, Paragon.

There are a good many varieties (not included in this list) with flowers of great excellence of form, but of questionable or dreary colours. It has been sometimes suggested that it is desirable to grow some of these doubtful colours to show up by contrast the brighter and more beautiful varieties to even greater advantage; but the morality of knowingly allowing a rogue to be at large, solely for the purpose of making conspicuous the honesty of other men, can hardly be admitted.

Twenty-four of the best Pompon Dahlias.—Phœbe (of most excellent habit, freedom, &c.), Fashion (very bright, and not tall), Darkness, Fairy Tales, Little Duchess, White Aster (of which Guiding Star is a synonym), Grace, Whisper, Golden Gem, Janet, Isabel, Iseult, Eurydice, Ariel, Vivid, Ernest, Leila, Gem, Mabel, Lothair, Red Indian, Don Juan, Lady Blanche, Admiration.

The best of the Pompon Dahlias produce a most gay and decorative effect in the garden, but in the cut state the flowers cannot be entirely acquitted of a certain primness and formality —having neither the grace and lightness of the Single, nor the brilliance of the Cactus Dahlias.

Twelve of the best Cactus Dahlias.—Panthea (at present the most beautiful and effective, whether in the cut state or in the garden, of all the Cactus Dahlias), Juarezii, Mrs. Hawkins, Delicata, Professor Baldwin, Honoria, Asia, Duke of Clarence, Lady Brassey, Amphion, Glory of Swanley, Robert Maher.

Of the above, as has been already mentioned, Amphion hides its fine flowers among its foliage, and if the selection be made with a view only to effect in the garden, Amphion might be replaced by King of Cactus, which is very showy on the plant, though rather coarse for use in the cut state.

Twelve of the best Decorative Dahlias.—Glare of the Garden

(small, but always a mass of bloom), Empress of India, Constance (hardly so pure a white as Henry Patrick, but making a handsomer plant in the garden), Charming Bride, Cochineal, William Raynor, Mrs. J. Douglas, Lady Marsham, William Pearce, Henry Patrick, Mrs. E. Hunt (small, good for cutting), Mrs. L. Shuter.

These so-called "Decorative" Dahlias form a sort of transition group, which will probably be allowed to disappear when varieties of the true Cactus form are obtained with all the good points of colour and habit which now characterise some of the Decorative Dahlias. For instance, Empress of India, in spite of its half-quilled petal and of its often having too much green visible in the flower, is wanted until there is raised a true Cactus variety of similar colour which shall be equally effective both in the garden and in the cut state; Constance and Henry Patrick cannot be discarded until the arrival of a pure white Cactus; and William Raynor, although its brilliant salmon and orange flowers are of the wrong type and are nearly always cross-eyed, nevertheless in the garden produces the most telling effect, which is only surpassed by Glare of the Garden.

Of Dahlias of the Show type, the flowers are generally too ponderous to be very valuable in the ordinary way as cut flowers, but a good many varieties of bushy habit that have stiff, sturdy flower-stems are decorative enough in the garden; such, namely, as John Bennett, Cardinal, Mrs. Langtry, Lustrous, Gaiety, Rifleman, H. Glasscock, Willie Garratt, and others.

It will thus be seen that the term "Decorative Dahlias" includes in reality a considerable number of each and every section; and while the attention of raisers may well be specially directed to the extension of that very beautiful section, the true Cactus Dahlias, it is to be hoped that the general culture of the Dahlia—perhaps the most useful of all autumn-flowering plants—will continue greatly to extend throughout the country.

Discussion.

Mr. Shirley Hibberd, in reference to the height to which Dahlias grow, said that the dwarf forms were praised, and rightly so. The Dahlia had been dwarfed and improved, not as the result of breeding, but as the result of cultivation. In

the days when he grew these flowers it was the custom to plant strong roots, and from these, plants to the height of eight or twelve feet were produced. If plants like this were wanted now the same means should be adopted. The plants are dwarfed by being obtained from cuttings, this method imposing a check on the growth.

Mr. E. Mawley, F.R.H.S., said: I think we are all indebted to Mr. Girdlestone for his excellent paper. I took a great interest in the Dahlia for some time, and I think it is very important to consider as to what are the best qualities of the plant. I am afraid we are not quite in agreement as to what they are in the Cactus or Single types. Mr. Girdlestone is the Secretary of the Dahlia Society, and it would be well to bring out a catalogue of the best Dahlias in all the sections, and then we should be in a better position to know them. There is one point I should like to draw attention to in connection with the Single Dahlias, and that is that by taking off the seed-pods as they appear the plants are kept in a better condition, and will continue to bear a mass of bloom until the frosts destroy them.

Mr. Girdlestone, replying to the remarks of Mr. Hibberd as to plants being larger if grown from the root-stocks, said that had not been his experience. The height of Dahlias did not always depend on the method of propagation, and he had abundant evidence of this in his own garden. Plants are propagated from cuttings and from seed in the spring, and there is no distinction between the plants to show which were propagated from cuttings and which from old roots. The stature of a variety is inherent in it, and if it grow to a certain height it will always retain it, the variability being exceedingly small. If you observe a number of Dahlias of one kind in a row, you can place a rod all along, and it will touch each plant. He was of opinion that the Dahlia had been dwarfed by cultivators. In reference to taking off the seed-pods, as mentioned by Mr. Mawley, he said that if the single-flowered Dahlias were allowed to carry their seed-pods the plants would go quite to rest in the endeavour to ripen up the seeds.

Mr. Cheal said his experience of Dahlias was that seedlings increased in height for the first year or two, and then remained at the point they had reached. We hear that the Dahlia is a variable plant, and it has been proved to be so. Those of us who

raise new varieties take much pleasure in watching the changes which take place. And when we have a number of seedlings what a pleasure it is to go out and inspect them in the hope of something new turning up. At the same time he would not recommend everyone to go in for the raising of seedling Dahlias, for, as Mr. Girdlestone observed, an enormous number must be raised before a few good varieties are obtained. There is great variety in the different types of Dahlias, and cultivators are mostly aiming at certain definite objects. In the Cactus varieties we want the points of the petals drawn out more, but in the Singles it is our object to obtain just the opposite—the petals more flat and rounded at the point, and overlapping each other. He thought there was still a great future in store for Dahlia-growers, and there was plenty of room for work in developing these fine flowers.

SHOW DAHLIAS.

By Mr. Walter H. Williams, F.R.H.S.

Since the centenary of the Dahlia last year so much has been said and written on the Show Dahlia that I trust you will pardon me if I wander over somewhat the same ground, and, after all, give you very little information that can be considered new.

Perhaps the only line of thought which has not been so fully discussed with regard to this flower, is, the Show Dahlia from an æsthetic point of view. Is it essentially beautiful? For my own part I find in the perfect development of a noble flower a *different kind* of pleasure, though not one less intense, than I derive from a single flower, provided, of course, that its colour is artistic and full of harmony. In nature and in art we find many different kinds of true beauty. Because we admire the simple loveliness of the fertile valley, we do not condemn the rugged vastness of the barren mountain gorge. Each has its own peculiar charm. So is it with the Dahlia. In the single flower we have the charm of simplicity; in the double the intense complex perfections which lead us into realms of delightful wonder.

We admire not only the result but the skill and patience of the man who has chiselled out of the rude rock a form divine whose lovely lines and curves give ravishment to the eye. So

may we admire the patient care and untiring cultivation which has transformed the Dahlia from her flower of half a dozen florets, into one with a perfect maze of numberless florets—all these florets arranged in the exact position for which they are intended, not one too long or one too short, the whole being of perfect symmetry and outline, and yet with an infinite variety of colours, some of which might charm the senses of a god.

Mr. Shirley Hibberd has told us about the development of the double Dahlia out of the single form. I may be wrong, but I believe that there are still vast possibilities of improvement in this noble flower. Probably advance will be slow in the future; still it would be absurd for us to think the climax has been reached in such varieties as Mrs. Gladstone.

It is interesting to note that three of the Dahlias that stand very near the top of the tree in Mr. Mawley's valuable Analysis (see page 36) have been in cultivation for upwards of twenty years. These varieties are Mrs. Saunders, Rev. J. B. M. Camm, and James Cocker. Other and perhaps more pleasing varieties have been introduced, but they have not stood the test of years. "They have their day and cease to be." Consequently it is necessary to be continually bringing a fresh stock of new varieties into the world, or else in a few years our Dahlias would speedily deteriorate.

In the future we must endeavour to get varieties which possess *all* the best qualities. In addition they should be hardier, to confront the frosts which of late years have come so early as to cut down the glory of our gardens almost before they have developed into perfection. If we could only do this we should at once ensure a much greater demand for the Dahlia.

That it would be possible to raise a hardier race of Dahlias seems likely from the results of the frost on September 1 this year. On that fateful day the thermometer at Salisbury four feet from the ground registered three degrees of frost. Among my own plants the large Show varieties were far the most damaged, while the Pompons and Cactus, excepting Juarezii, escaped almost without harm. Frequently seed has developed on these two types when the large ones were entirely destroyed. Consequently I am led to believe that the Pompon and Decorative types are better able to resist frost than the Show type. Among the large type, the low-growing varieties suffered much more severely than the taller ones. Naturally this is accounted

for by the fact that the frost is always more severe near or on the ground than it is three or four feet from it.

Of late years we have prided ourselves on having reduced the height of the plants, but we must admit that, though much has been gained, something has been lost by bringing the blooms and more tender shoots and leaves nearer the frosts.

According to the Darwinian theory, any useful variation of which the plant is capable can be perpetuated by careful selection. If we find any one plant, either among the named varieties or in our seed-beds, which, though subjected to exactly the same influences as its neighbours, in the least degree withstands the frosts better, we should grow that variety purposely for seed. By such means we should in time gain the end in view. Certain of the cabbage tribe have been much improved in this direction.

But perhaps a still more needful improvement lies in the more careful selection of colours. Dahlia raisers must remember that, if they wish to perfect their art, a large share of attention must be paid to colour. What applies to the horse, of whom it is said if he is a good horse he must be a good colour, will not apply to the Dahlia. I contend that some Dahlias are positively ugly. Some Fancy varieties and all magentas and puces are included in this condemnatory clause.

Is there anyone brave enough among our cultivators to once more start at the beginning with original single varieties, and, through years of patient labour, again go over the well-trodden ground, and, by careful cultivation and selection, watch for useful variations of different types?

We are doing this to some extent. Already we have four distinct types. Is it not quite possible to raise as many more? Of course it would be difficult to imagine what they would be, but this is no argument against the possibility, for it must have been difficult at one time, when only the large Double type was grown, to imagine a Pompon type, or that a Cactus could be considered beautiful.

The bee is a great friend of the Dahlia-grower, in promoting the fertilisation of the flowers; but by artificial fertilisation we may to some extent control the colours of the seedlings. It is useless to attempt this unless circumstances are particularly favourable, and the flower so fully developed as to show its centre, containing the essential organs in a ripe condition.

If new and improved varieties are to be raised, we should work from the very best only.

The cultivation of the Show Dahlia is not difficult, though if the object of the cultivator is to enter the lists in competition he must be prepared to give a considerable amount of attention and care to his plants. Skill is required in tying, disbudding, and preparing his blooms for exhibition, but to my mind there are few plants which repay more for the trouble expended on them than the Dahlia.

The well-known golden rules for successful cultivation are: Grow your plants as large and sturdy as possible before planting out. Plant out the first week of June in well-worked, heavily manured soil. Keep down the slugs. Water when required, and then do so thoroughly. Disbudding, which can only be learned by practical experience, should be done judiciously. Keep your shoots well tied up, and secure the blooms from wind.

Perhaps the only essential difference practised in the Salisbury nurseries from most of the other Dahlia grounds is that we never bag and never shade the blooms.

If I am asked for the best varieties, I should refer to Mr. Mawley's list (page 33), for you may depend upon it that most of those exhibited are the most useful varieties for the purpose.

The drawback to the Show Dahlia lies in the fact that it has no great ancestral genealogical tree like the Narcissus, the Rose, or the Apple. It has no stately ancient legends. Its hundred years are not much longer than the average life of a man. Not having the flavour of age, it does not so well suit the public palate.

Poets have scarcely had time to sing its praises; perhaps even the name is not rhythmical enough for them. And yet it is too old to be the rage of fashion. Still what we claim for the Dahlia is, that in its own season it certainly wears the regal crown among early autumn flowers. No other plants at this time of year fill our gardens with so much glory. The Dahlia, coming as it does in its freshness and beauty after most of the other flowers are over, gives colour and magnificence to the otherwise over-blown garden. As long as the weather remains at all genial, so long will its splendour last.

The popular impression that the Show Dahlia is only useful for exhibiting in long and straight lines on green boards was

surely disproved last year in some of the exhibits in the Centennial class, where Show Dahlias were arranged for decorative effect. For extensive decoration few flowers can be made to present a more effective appearance if they be cut with long leafy stalks and arranged in tall vases.

Discussion.

Mr. George Paul said he was pleased to hear Mr. Williams refer to one thing in his paper, namely, the endeavour to obtain a hardier race of Dahlias to withstand frost. There was no doubt that the early frosts of late years had been very detrimental to Dahlias, and had cut them off just when they were on the point of showing their beauty. He would suggest that growers should try to raise an earlier flowering Dahlia, in the same way as they would seek to infuse increased hardiness into varieties. During the last few years the best flowers had been lost through being nipped by the frosts, and his experience pointed out that the old Show Dahlias were more tender than the Single kinds.

Dr. Hogg, F.L.S., said he had listened with great pleasure to the various papers which had been read, and he was sure that, if all present shared his feelings, they would not depart without giving their best thanks to the readers. He said there was a great deal of invaluable matter in Mr. Shirley Hibberd's paper, and also in those of Mr. Girdlestone and Mr. Williams, and on behalf of the Conference he had great pleasure in proposing a hearty vote of thanks to those gentlemen.

Mr. Cannell, in seconding the vote of thanks, said he was highly pleased with the Conference and the papers read thereat, inasmuch as he was one of the first to raise single and decorative varieties of Dahlias from artificially fertilised seed.

Mr. Shirley Hibberd thanked the meeting on behalf of himself and the other lecturers for the compliments paid to them, and said he was pleased that his remarks were not quite agreed to. Besides, it would be folly to have a Conference if there was not some discussion or dissension. They all remembered the time when Dahlias were so tremendously tall, and Mr. Girdlestone gave the raisers great credit for reducing their height; but in old times, when many planted roots, the plants obtained were much taller than now.

A question as to self-fertilisation having been asked, Mr HIBBERD said he did not intend to convey the idea of self-fertilisation in its literal sense, for everyone could see the busy bee in its work of fertilisation. But he was sure there was a great deal of self-fertilisation going on among Dahlias, and this might also be seen among Hollyhocks.

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CULTIVATION OF THE SHOW DAHLIA.

Communicated by Mr. J. T. West.

Let it be at once understood that I do not attempt to tell the trade growers anything but what they are fully conversant with already. The purpose of this paper is to throw out a few practical suggestions that may be of use to some of my brother amateur growers, and perhaps incite others to take up the culture of the Dahlia. I do not propose touching upon the propagation of the Dahlia, as probably most amateur cultivators depend upon the trade grower to supply plants in the spring. I will further add that I only give my own experience in growing for exhibition, which, of course, is of a very limited character.

In the cultivation of the Show Dahlia, the first thing is to make up one's mind not to be baffled by the many obstacles that stand in the way ere success is attained. Probably no florist's flower has more enemies than the Dahlia, nor requires more constant attention. Let none think that Dahlia-growing is merely a hobby, that can be attended to by just a casual glance round at them. It means real hard work and worry day and night, and unless this is done no success will be achieved, and the flower will be given up in disgust.

On the other hand, no flower pays more liberally for proper attention and care than the flower which is the subject of discussion to-day. In the first place, let those who propose growing the Show Dahlia in the future make up their minds as to the number they are likely to grow, so that they can prepare the ground during the winter months by deep trenching, and digging in plenty of manure. Let the soil be laid up in a rough state, so that the frosts, rains, and snows may pulverise and fertilise it and help to keep the vermin down. This I consider far better than to begin in April or May, as if suddenly remembering there is such a flower as the Dahlia, and commencing then to dig and manure to a great extent. Really, in my opinion, this is courting failure. Though the Dahlia is a great feeder, I do not consider it wise to give it a lot of manure to come into contact with, as that has a great tendency to make the plant grow rank, and throw coarse and rough blooms, thus spoiling all chance of success.

The plan I follow is, after the autumn digging, and some time before planting, to dig out holes for each plant, and put in say half a peck of good old rotted manure, thoroughly mixed with the soil. This I find sufficient to give the plant a good start, and to support it until it commences to flower. If a grower does not grow his own plants it is best to give his orders in to the trade as early as possible, so as to ensure sufficient of the sorts required, for many sorts are shy workers, consequently the stock of many of the best varieties is soon sold out.

Early in May the plants will be despatched to their various destinations; probably little sturdy stuff in thumb-pots. When received, put them into a warm frame or house for a few days, until they are nicely rooted round the pots. Then pot into 5-inch or 7-inch pots in good loam and dung, with a little sharp sand. Place

them back in the frame or house until they show they are at work; then give plenty of air to keep the plants sturdy and strong, and to prevent their being drawn up, which is very undesirable at any time. By the end of May the lights can be drawn off all day, and put on again at night, with air at the back, until two or three days before planting out, when the lights can be removed entirely.

The first week in June is a good time to put the plants out in the ground, or in the holes prepared for them, taking care that the ground is not too wet, or it is likely to give the plants a check and to cake round the roots. A good distance, where one has plenty of room, is six feet from row to row, and five feet from plant to plant in the rows. Of course, all are not so favoured as to have so much room, but it pays in the long run, for the plants grow stronger and more robust; and besides, it is more convenient to get amongst them, especially when the weather is wet, for if they are planted thickly one gets wet round the knees in gathering the flowers or otherwise looking after them. But we cannot draw a hard-and-fast line in planting, but must plant to some extent according to the space at our disposal.

When the Dahlias are planted, plant some Lettuces between them; these will act as a decoy for slugs, which will eat the Lettuces instead of the Dahlias. What are left will come in for the table, as they are sure to be crisp and good, owing to the goodness of the ground the Dahlias are planted in. It is also advisable to put a little lime or soot round each plant, as prevention is better than cure; the ground vermin have fastidious palates, and will in one night often spoil the most valuable varieties by eating round the bark of the plant, thus weakening it, and rendering the blooms too late for exhibiting. In a few days they will commence to grow and will want their stakes, which should be as strong and neat as possible, taking care to give long stakes to the tall growers, and *vice versâ*. As the staking proceeds, have some raffia fibre ready to tie the plants to the stakes as you go along; also a basket filled with small pots, with a little moss or hay inside, so that they can be put upon the top of the stakes as a trap for earwigs, which will soon commence to devour the plants unless kept down by constant care. The pots should be taken off every morning or evening, to see if there are any earwigs lurking inside the moss. Have a

piece of stick in the hand, and kill all intruders. This is the quickest and most effective way; better, I think, than shaking them out into hot water, as many escape by that method.

The course above recommended has its disadvantages, for the earwigs smell very unpleasant; but still the Dahlia-grower is not as a rule very fastidious so long as his plants are doing well.

While I am speaking of insect plagues, I might as well mention that if the weather is very dry the black-fly often makes its appearance at the end of June or early in July. This is a sad scourge, and taxes our patience as much as anything. Syringing of an evening with tobacco water, or quassia, is a very good plan, also to dust the affected plants over with snuff or tobacco powder; either will certainly act as a check upon them.

By the middle of July it will be necessary to thin out some of the branches, as too much growth prevents the production of fine flowers. This operation must be regulated by the nature of each variety. Some sorts are apt to become large and coarse; from such we must cut away very little, or perhaps not any. The smaller varieties must be cut somewhat severely. When this is done, put side stakes to the plants, one to each branch, to prevent the wind breaking them. Four side stakes and one central one are generally sufficient. A good mulching of dung, straw, or anything that will prevent the evaporation of the moisture that is now necessary to the Dahlia, must be given before the plants get too large. This plan is also useful for another reason: you can walk upon the ground better, as it will not pick up so, or cling to the feet and convey loose soil on to the paths, which would otherwise be the case after a heavy rain or watering, for now the plants will want plenty of water; hard-eyed flowers, such as George Rawlings and Prince Bismarck, will want an extra dose.

Many varieties will now begin to show their buds; these must be picked off, unless wanted for very early shows. These early blooms weaken the plants and are mostly poor, even if left on. Early Dahlia blooms are really not wanted in the garden, for they are badly shaped and with nothing special in colour to recommend them. This remark refers to Show varieties only, not to Cactus or Pompon Dahlias. If the centre buds are picked off, the side branches will soon begin to show buds. These can be left, and as soon as they grow as large as a pea can be thinned to one on a branch, or rather sub-branch, for the plants by

this time will have broken into perhaps ten or twelve branches, and you may leave one bud to each.

In many varieties, perhaps, the plant had better be thinned out to six or eight branches to get the blooms fit for the exhibition table. Such varieties as Bendigo and King of the Purples may be cited in illustration; while varieties like T. J. Saltmarsh, John Standish, or Mrs. Langtry may be allowed to carry twelve or more. Many amateurs find a difficulty to know what buds to leave in thinning, but I have found from the time the bud first shows itself to the time it is ready for cutting a month is just sufficient. I find sprinkling with a rose-can overhead very helpful after a hot, drying day, as it assists the plants to recover the loss they have sustained during the day.

When the petals of the buds are beginning to show, then the earwig begins his depredations in earnest. What is more trying than to find promising young buds completely spoilt by being gnawed all round the edges by these pests? A piece of wadding tied loosely round the stalk of the buds will be a great check, also liquid india-rubber put on the stalks of the buds. This is made by holding a piece of pure rubber on a wire, letting the liquid fall into a small jar or tin vessel. The rubber is soon ignited by lighting a match and applying it. This, however, is rather dangerous if used too freely, for the sun sometimes heats the rubber and burns through part of the stalk, making it fall over spoilt. But then any remedy must be tried. Many bag their buds with bags made of muslin, but I do not particularly like them, as they often cause the petals to hug one another when they are fully out. The best flowers are those which have come out in the natural way with the softening influence of the dews, and no check to interfere with nature's plan of perfecting beauty. The grower must make up his mind to lose many buds under any circumstances.

About twelve or fourteen days before the show it will be advisable to pot up a few buds—that is, place an inverted 32-size pot over them; this is done by having a stake put in the ground and a piece of wood a little larger than the pot, with a slit in it for the stalk of the bud, the wood to be lifted up to the height of the bud, and then made secure to the stake. The pot will get warm by the sun's rays, and will be a little forcing house for the bud. Take care to stop up all the crevices, as the

earwigs will otherwise think the pots are put there for their benefit.

Should the buds look as though they will be too forward after four or five days, take the next forward buds, and do as in the former case; but be very careful over those that have been taken out of the pots, as with care many will be very useful. Put some wadding round them, and shade or otherwise try and keep them. In selecting the buds, choose always those with little pin-holes in them, as they always make the best blooms. There is one thing putting buds under pots will do—that is, it will make light flowers purer in colour, also tips more distinct; for instance, Mrs. Gladstone will come nearly white, and such as Mrs. Saunders clear and cleanly tipped.

As the flowers begin to come out, it will be often necessary to cover with shades, worked on the same system as the boards for potting the buds. This will retard the flowers, and also protect them from damage by sun and drying winds. Take care the flowers are made secure, otherwise they will chafe. By no means let the plant suffer for water, as now it will want plenty; perhaps a weak stimulant will be required for some sorts. But if the plants have been well looked after in their earlier stages, they will do without it. Stimulants at this period often excite the plants, and cause them to throw out unshapely petals, or perhaps even to cast them all. There will not be much peace for the grower, as the blooms will require constant attention by night and day, or caterpillars and other insects will soon ravage the lot. Take a lantern out at night and there will be seen earwigs and other marauders busily engaged in their destructive work.

The morning before the show it will be wise to go over the blooms, and if there are any doubtful ones not likely to stand the full time, cut them and put in a cool and dark place without water. By this process many valuable blooms will be saved. Never cut when the blooms are soft, as they shrink up when the sun is out. Cut early in the morning, or late at night, when they are stiff and fresh. It is surprising how they will open after a little shower or heavy dew.

When cutting have tubes, corks, and boxes all ready, that the flowers can be put right away without much handling, as they do not improve by being pulled about. But it is needless for

me to go any further, as the grower is quite conversant with the cutting and staging of his blooms.

I have given briefly my experiences in these few remarks, trusting they may benefit some and interest them to grow the noble Queen of Autumn, which we must be ever grateful to Lady Bute for introducing a hundred years ago.

AN ANALYSIS OF THE DAHLIAS SHOWN AT THE CONFERENCE.

By Edward Mawley, F.R.H.S., Chairman of Committee, National Dahlia Society.

List 1.

Show Dahlias.

Position in analysis	Name	Number of times shown	Position in analysis	Name	Number of times shown
1	Mrs. Gladstone	14	24	John Henshaw	6
1	Colonist	14	24	Mr. G. Harris	6
3	Harry Keith	12	24	Mrs. G. R. Jefferd ...	6
3	James Cocker	12	24	Mrs. W. Slack	6
3	J. T. West	12	24	Nellie Cramond ...	6
3	Miss Cannell	12	24	Shirley Hibberd ...	6
7	R. T. Rawlings	11	24	Willie Garratt	6
7	William Rawlings ...	11	37	Diadem	5
9	Mrs. G. Rawlings ...	10	37	Glowworm	5
9	Queen of the Belgians ...	10	37	Hope	5
11	Prince Bismarck ...	9	37	Imperial	5
12	Goldfinder	8	37	Maud Fellowes	5
12	Henry Walton	8	37	Mrs. F. Foreman ...	5
12	James Stephen	8	37	Richard Dean	5
12	John Standish	8	37	T. J. Saltmarsh ...	5
12	Mr. Glasscock	8	37	William Jackson ...	5
17	Constancy	7	37	William Keith	5
17	Crimson King	7	47	Agnes	4
17	Ethel Britton	7	47	Buttercup	4
17	Lord Chelmsford ...	7	47	Crimson Globe	4
17	Mrs. Langtry	7	47	Flag of Truce	4
17	Prince of Denmark ...	7	47	H. W. Ward	4
17	T. S. Ware	7	47	Joseph Ashby	4
24	Clara	6	47	Julia Wyatt	4
24	Countess of Ravensworth	6	47	Sunrise	4
24	Gloire de Lyon	6	47	Thomas Hobbs	4
24	Harrison Weir	6	47	Burgundy	4
24	Hon. Mrs. P. Wyndham	6	47	Mrs. Shirley Hibberd ...	4
24	James Vick	6			

There are several excellent sorts which (owing to the late date at which the Conference was held, or other causes) do not, unfortunately, find places in the above list. Among these may be mentioned Mrs. Harris, Vice-President, Purple Prince, Mrs. Dodds, J. N. Keynes, and G. Rawlings.

Some idea of the representative character of the Conference Exhibition may be formed when it is stated that no fewer than 130 different varieties were staged in this section alone.

List 2.

The best Show Dahlias, arranged according to colour.

White and Blush.—Mrs. Gladstone, Flag of Truce, Queen of the Belgians, Mrs. J. Laing.

Yellow and Orange.—Goldfinder, R. T. Rawlings, Vice-President, Harrison Weir, John N. Keynes, Mrs. G. R. Jefferd, James Stephen.

Crimson and Scarlet.—Shirley Hibberd, Willie Garratt, Joseph Ashby, Mr. Harris, Crimson King, W. H. Williams.

Purple and Maroon.—Harry Keith, James Cocker, William Rawlings, Prince of Denmark, Prince Bismarck, James Vick, Purple Prince, Burgundy, Imperial, George Rawlings.

Tipped or Shaded.—Hon. Mrs. P. Wyndham, Henry Walton, Ethel Britton, Mrs. W. Slack, Mrs. Harris, Mrs. Langtry, J. T. West, T. J. Saltmarsh, Mrs. Dodds, Miss Cannell, Mrs. S. Hibberd, J. Bennett.

Other colours not represented above.—Colonist, Clara, Hope, Mrs. F. Foreman, Earl of Ravensworth, Thomas Hobbs.

This table will no doubt prove a more useful one to non-exhibitors than the first one. In it an endeavour has been made to place the different varieties in the order of their reliability.

List 3.

The Show Dahlias mentioned in List 2, arranged in the order of their dates of introduction.

1868. Flag of Truce, Vice-President.
1871. James Cocker, John N. Keynes.
1873. Henry Walton, Mrs. Harris.
1875. John Bennett.
1877. Burgundy, Mrs. S. Hibberd.
1879. Clara, Joseph Ashby, Prince Bismarck.

1880. Ethel Britton.
1881. Goldfinder, Hon. Mrs. P. Wyndham, James Vick, Miss Cannell, Mr. Harris, Mrs. Dodds, Prince of Denmark, Shirley Hibberd, W. H. Williams, William Rawlings.
1882. George Rawlings, James Stephen.
1883. Earl of Ravensworth, Harrison Weir, Hope, Imperial. Mrs. J. Laing.
1884. Mrs. F. Foreman, Mrs. Gladstone, Mrs. G. R. Jefferd.
1885. Mrs. Langtry, T. J. Saltmarsh.
1886. Harry Keith, Mrs. W. Slack, R. T. Rawlings, Thomas Hobbs.
1887. Colonist, Crimson King, J. T. West, Queen of the Belgians, Willie Garratt.
1888. Purple Prince.

This list is one of much interest, as it clearly indicates what rapid advances have been made in this section in recent years. Out of the 45 choice varieties named above, no fewer than 33, or about four-fifths, have made their appearance during the last ten years, while about half of these are only six or less years old.

List 4.

Fancy Dahlias.

Position in analysis	Name	Number of times shown	Position in analysis	Name	Number of times shown
1	Gaiety	11	15	Edmund Boston ...	4
1	Mrs. J. Downie	11	15	Flora Wyatt	4
1	Mrs. Saunders	11	15	Hugh Austin	4
1	Rev. J. B. M. Camm ...	11	15	Matthew Campbell ...	4
5	Pelican	9	15	Prince Henry	4
6	Frank Pearce	8	15	T. W. Girdlestone ...	4
7	Duchess of Albany ...	7	21	Charles Turner	3
7	Henry Eckford	7	21	John Forbes	3
7	Henry Glasscock ...	7	21	Lotty Eckford	3
7	Mrs. N. Halls	7	21	Peacock	3
11	George Barnes	6	21	Plutarch	3
11	Madame Soubeyre ...	6	21	Professor Fawcett ...	3
13	Buffalo Bill	5	21	Sailor Prince	3
13	Grand Sultan	5			

Chorister, Fanny Sturt, Rebecca, and General Gordon, not tabulated above, are also among the best Fancies. There were 57 Fancy varieties shown in all.

List 5.

The Show and Fancy Dahlias arranged together.

Position in analysis	Name	Number of times shown	Position in analysis	Name	Number of times shown
1	Mrs. Gladstone	14	23	Mrs. N. Halls (F.) ...	7
1	Colonist	14	23	Prince of Denmark ...	7
3	Harry Keith	12	23	T. S. Ware	7
3	James Cocker	12	34	Clara	6
3	J. T. West	12	34	Countess of Ravensworth	6
3	Miss Cannell	12	34	George Barnes (F.) ...	6
7	Gaiety (F.)	11	34	Gloire de Lyon	6
7	Mrs. J. Downie (F.) ...	11	34	Harrison Weir	6
7	Mrs. Saunders (F.) ...	11	34	Hon. Mrs. P. Wyndham	6
7	Rev. J. B. M. Camm (F.)	11	34	James Vick	6
7	R. T. Rawlings	11	34	John Henshaw	6
7	William Rawlings ...	11	34	Madame Soubeyre (F.)...	6
13	Mrs. G. Rawlings ...	10	34	Mr. G. Harris	6
13	Queen of the Belgians ...	10	34	Mrs. G. R. Jefferd ...	6
15	Pelican (F.)	9	34	Mrs. W. Slack	6
15	Prince Bismarck ...	9	34	Nellie Cramond ...	6
17	Frank Pearce (F.) ...	8	34	Shirley Hibberd ...	6
17	Goldfinder	8	34	Willie Garratt	6
17	Henry Walton	8	49	Buffalo Bill (F.) ...	5
17	James Stephen	8	49	Diadem	5
17	John Standish	8	49	Glowworm	5
17	Mr. Glasscock	8	49	Grand Sultan (F.) ...	5
23	Constancy	7	49	Hope	5
23	Crimson King	7	49	Imperial	5
23	Duchess of Albany (F.)	7	49	Maud Fellowes	5
23	Ethel Britton	7	49	Mrs. F. Foreman ...	5
23	Henry Eckford (F.) ...	7	49	Richard Dean	5
23	Henry Glasscock (F.) ...	7	49	T. J. Saltmarsh ...	5
23	Lord Chelmsford ...	7	49	William Jackson ...	5
23	Mrs. Langtry	7	49	William Keith	5

List 6.

Pompon Dahlias.

1	Leila	6	10	Rosalie	4
1	Little Duchess	6	14	Cupid	3
1	Whisper	6	14	Favourite	3
4	Darkness	5	14	Fairy Tales	3
4	E. F. Junker	5	14	Golden Gem	3
4	Eurydice	5	14	Janet	3
4	Grace	5	14	Karl of Goldenberg ...	3
4	Isabel	5	14	Mabel	3
4	Lady Blanche	5	14	Red Indian	3
10	Admiration	4	14	Sunshine	3
10	Dora	4	14	The Khedive	3
10	Gem	4			

White Aster, also known as Guiding Star, is likewise deserving of a place in any select list. Eighty different varieties of Pompons were to be seen at the Conference Exhibition.

List 7.

Cactus and Decorative Dahlias.

Position in analysis	Name	Number of times shown	Position in analysis	Name	Number of times shown
1	Panthea	13	12	William Rayner ...	5
2	Mrs. Hawkins	11	15	Asia	4
3	Amphion	10	15	Beauty of Brentwood ...	4
4	Empress of India ...	9	15	Charming Bride ...	4
5	Professor Baldwin ...	8	15	General Gordon ...	4
6	Honoria	7	15	Marchioness of Bute ...	4
6	Juarezii	7	15	Zulu	4
8	Henry Patrick	6	21	Annie Harvey	3
8	King of Cactus	6	21	Centenary	3
8	Lady Marsham	6	21	Mr. Douglas	3
8	Sidney Hollings ...	6	21	Mrs. G. Reid	3
12	Cochineal	5	21	William Darvill ...	3
12	Mrs. Tait	5			

Constance, Lady Kerrison, and Prince of Wales are also good varieties. As many as 67 different sorts were altogether exhibited. Judging by the number of novelties sent out during the last few years, and how well they were represented at the Conference, this section promises to become an increasingly popular one.

List 8.

Single Dahlias.

There were a large number of Single Dahlias set up at the Conference Exhibition, but, unfortunately, no record was taken of the varieties shown. This is much to be regretted, as it would have been interesting to see what types of flower found most favour with the leading growers. The list appended to Mr. Girdlestone's paper on Cactus and Single Dahlias (page 18) will, however, indicate the kinds most deserving of general cultivation.

List 9.

This list, and the following one of Fancy Dahlias, were compiled for the *Journal of Horticulture* from returns spreading over seven years; and afterwards appeared in the Centenary Report of the National Dahlia Society. It is thought useful to append them to the Conference lists, as they will emphasise those lists in all points of agreement, and may serve to indicate possible errors wherein they differ materially from them.

Show Dahlias.

Position in analysis	Average number of times shown in the seven years	Number of times shown in 1889	Name	Date of introduction	Raiser's or introducer's name	Colour
1	42·8	45	Mrs. Gladstone.....	1884	Hurst ...	pale blush
2	26·0	35	Harry Keith	1886	Keynes ..	rosy purple
3	22·4	22	James Cocker	1871	Keynes ..	purple
4	21·7	28	William Rawlings ...	1881	Rawlings	crimson-purple
5	21·0	10	Hon. Mrs. P. Wyndham	1881	Keynes ..	pale yellow and rose
6	19·6	11	Henry Walton	1873	Keynes ..	pale yellow and scarlet
7	17·5	22	Ethel Britton	1880	Keynes ..	white and purple
7	17·5	7	Goldfinder.....	1881	Fellowes.	yellow and red
9	17·3	17	Mrs. W. Slack	1886	Keynes ..	blush-white and purpl
9	17·3	28	R. T. Rawlings	1886	Rawlings	clear yellow
11	17·0	19	Colonist.....	1887	Keynes ..	chocolate and fawn
12	16·4	16	Prince of Denmark ...	1881	Fellowes.	dark maroon
13	16·2	8	Mrs. Harris	1873	Harris ...	white and lilac
14	15·6	18	Prince Bismarck	1879	Fellowes.	puce
14	15·6	25	Shirley Hibberd	1881	Rawlings	dark crimson
16	15·3	14	Mrs. Langtry.....	1885	Keynes ..	cream and crimson
17	15·0	11	J. T. West.....	1887	Rawlings	yellow and purple
17	15·0	8	T. J. Saltmarsh	1885	Rawlings	yellow and chestnut
19	13·5	15	Willie Garratt	1887	Garratt..	bright cardinal
20	13·4	4	Joseph Ashby	1879	Turner...	shaded orange
21	13·3	5	James Vick	1881	Keynes ..	purplish maroon
22	12·0	6	Flag of Truce	1868	Wheeler.	white and lilac
22	12·0	2	Vice-President	1868	Keynes ..	orange
24	11·8	18	Clara	1879	Rawlings	rosy peach
24	11·8	17	Harrison Weir	1883	Rawlings	yellow
26	11·0	11	Purple Prince	1888	Turner...	rosy purple
27	10·9	9	Mrs. Dodds	1881	Keynes ..	blush and lilac
28	10·8	11	John N. Keynes	1871	Keynes ..	yellow
29	10·6	6	Burgundy	1877	Turner...	dark puce
30	10·0	14	Imperial	1883	Keynes ..	purple, shaded lilac

List 10.

Fancy Dahlias.

Position in analysis	Average number of times shown in the seven years	Number of times shown in 1889	Name	Date of introduction	Raiser's or introducer's name	Colour
1	18·0	22	Mrs. Saunders	1872	Turner...	yellow and white
2	16·5	12	Gaiety	1879	Keynes ..	yellow, red, and white
3	15·6	16	Rev. J. B. M. Camm...	1873	Keynes ..	yellow and red
4	12·1	7	Chorister	1881	Keynes ..	fawn and crimson
5	12·0	16	Henry Eckford	1886	Rawlings	yellow and red
6	10·6	16	Duchess of Albany ...	1884	Turner...	orange and crimson
7	10·5	12	Flora Wyatt	1871	Keynes ..	orange and red
8	10·0	1	Mrs. N. Halls	1881	Rawlings	scarlet and white
9	9·9	14	Hugh Austin.....	1881	Keynes ..	orange and red
10	9·6	10	George Barnes	1878	Keynes ..	lilac and crimson
10	9·6	1	Peacock	1877	Turner...	maroon and white
12	9·3	4	Fanny Sturt	1868	Pope ...	red and white
13	9·2	6	Professor Fawcett.....	1881	Keynes ..	lilac and brown
14	8·5	4	John Forbes	1882	Keynes ..	maroon
15	8·3	5	Henry Glasscock	1875	Keynes ..	buff and crimson
16	7·8	6	Rebecca	1883	Keynes ..	lilac and crimson
17	7·7	3	General Gordon	1885	Keynes ..	yellow and scarlet
18	7·1	6	James O'Brien	1881	Keynes ..	yellow and crimson
19	7·0	7	Dorothy.....	1888	Keynes ..	fawn and maroon
20	6·7	3	Egyptian Prince	1873	Keynes ..	orange and red
21	6·6	1	Miss Browning	1880	Keynes ..	yellow and white
22	6·3	0	Miss Lily Large	1876	Keynes ..	yellow and crimson
23	6·0	9	Edmund Boston	1887	Keynes ..	orange and crimson
23	6·0	1	Hercules	1877	Keynes ..	yellow and crimson

GRAPE CONFERENCE.

SEPTEMBER 24, 1890.

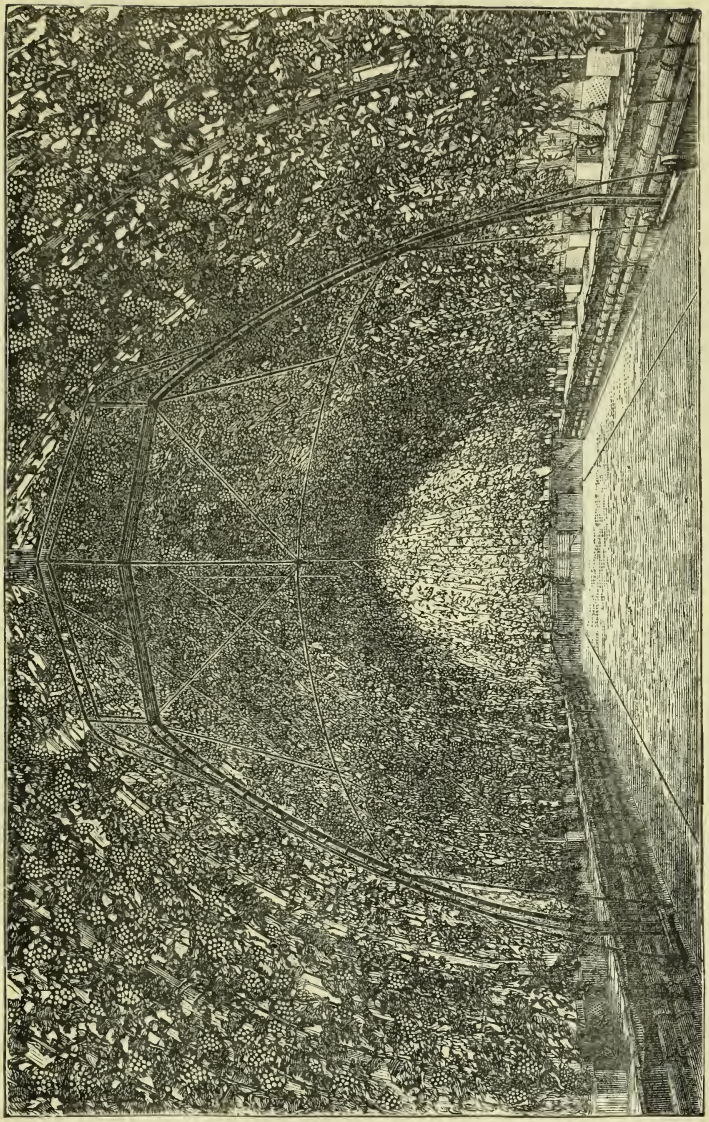
A CONFERENCE on Grapes was held at the Chiswick Gardens on Wednesday, September 24.

The chair was taken by Dr. HOGG, F.L.S., F.R.H.S., President of the Conference, who, in opening the proceedings, said: This is one of a series of Conferences in which we are interested. The object of these Conferences is to get as many subjects as possible together, in order that we may be able to compare their merits one with another. I think we have had about seven or eight of these Conferences, all of which have been remarkably successful, and the results of some of them have been embodied in those very valuable works on British Apples and Pears, Orchids, and others in the Society's Journal. I am rather disappointed we have not a larger collection of Grapes here to-day. On former occasions we have had a larger number of varieties, but to-day we are confined more to the commercial aspect. Instead of having a number of the smaller dessert Grapes, we seem to abound more in those which are valuable from a commercial point of view. One reason of this may be the tendency to grow large instead of small Grapes. Formerly we used to see Frontignans—Grizzly Frontignans, Black Frontignans, and White Frontignans; they were largely grown, and it is impossible to have more delicious Grapes. Why they are not now more grown I cannot tell, unless it is because of their size, and I must say it is a pity that horticulture should tend in the direction of slavery to mere size. However, I shall not take up your time any longer, as we have some able readers of papers here.

FRONTIGNAN GRAPES.

By Mr. T. FRANCIS RIVERS, F.R.H.S.

THE Hérault department, which has lately been visited by very disastrous and deplorable inundations, once formed part of the ancient province of Languedoc, and has always been famous for



The Great Vinery at Chiswick, in which the Grape Conference was held.

the sweet and rich wines made from the Grapes of which some very excellent specimens are shown here to-day. The principal wines of the department are Beziers, Lunel, and Frontignan or Muscat—sweet and luscious wines, which in hot seasons are almost liqueurs ; consequently they have never been popular as ordinary beverages, and in the department do not appear to have been considered as a profitable industry. In a list of these wines published in 1863 seven varieties are named; these are Bassan, Beziers, Cazouls, Frontignan, Maraussan, Pommerols, and Sauvian—a proof that the demand for the produce of these delicious Grapes is not large enough to tempt the owners of vineyards to incur the expense of cultivating them to any great extent. In fact, according to a recent writer, the old vineyards have been replanted with the ordinary and popular sorts, principally the Gamais, from which a common red wine is made fit for everyday consumption. Although the Grapes are too luscious for wine, they are very popular for the table, and are much and justly appreciated for their fine flavour throughout France. They will ripen in the open air from Paris to the Mediterranean, the time of maturity varying with the degrees of latitude, and they can be grown on trellises as easily as we grow Currants.

Neither the bunches nor the berries of the Frontignans are large, and no sort of culture appears to increase the size of the berries. They possess, however, a delicate and refined flavour which is singularly grateful, and which does not exist in any other class of Grape, the so-called Muscat or Frontignan flavour predominating. The skin is tender, the juice abundant and sugary, and the flesh crisp. The varieties which I have grown and found to succeed well in cool houses are the Muscat Précoce de Saumur, a very early sort, ripening in September ; the Muscat Précoce de Smyrne, or Isaker Daïko or Daioiko ; the Muscat Précoce d'Auvergne; the Muscat Bifère (Early Silver Frontignan); the Muscat Primavis ; the Muscat Tokai, said to be identical with Chasselas Musqué, the variety which I have under this name differing very considerably, as it will ripen in a cool house. These sorts are all white, and with good culture attain the size of the Royal Muscadine. The Muscat Citronelle and the Ascot Frontignan are very early, but very small. The Muscat Trouveren is large and late, with a strong Frontignan flavour ; but the berries are rusty, and it will not ripen without strong heat. The Chasselas

Musqué (fig. 1), a very old Grape, possessing a string of synonyms like all good fruits, cannot be successfully grown without the temperature required for the Muscat of Alexandria (fig. 3), and the same remark applies to the White Frontignan and Dr. Hogg.

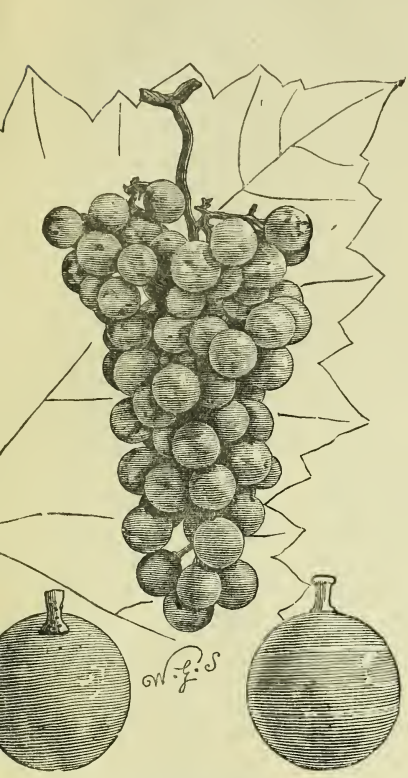


Fig. 1.—Chasselas Musqué.

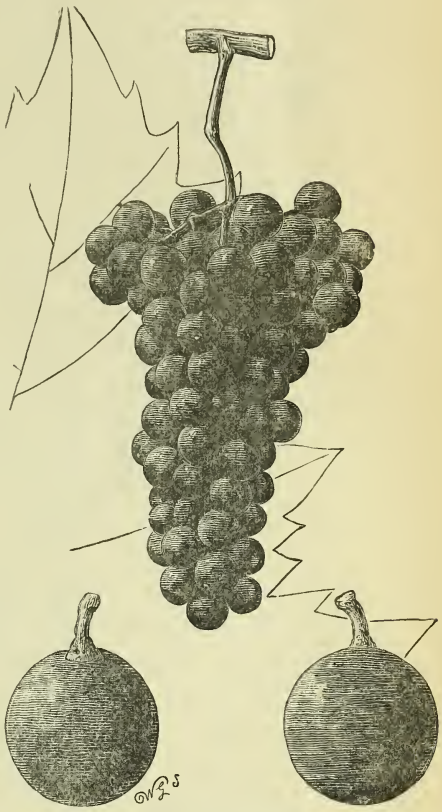


Fig. 2.—Black Frontignan

The Black Frontignan Grapes are similar in flavour to the white and amber-coloured, and some will ripen under the same conditions. The Muscat Noir (Black Frontignan) (fig. 2), the Muscat de Sarbelle, the Muscat Lierval, the Muscat Noir d'Angers, the Muscat d'Août, the Muscat de Jura, the Muscat Caillaba, small, but early, will ripen in a cool vinery, but are too small in bunch and berry to command a place in an important vinery. They are, however, easily cultivated in pots, and will then repay the trouble

Figs. 1, 2, 3 are from Mr. Barron's work on the Vine.

taken with them. The Purple Constantia is a decided improvement in size. The bunches are well-shaped, and the berries a fair size. To succeed with it the temperature required for the Muscat of Alexandria is absolutely necessary. The Constantia vineyards at the Cape of Good Hope were at one time very celebrated for the wine made from this Grape. It has been a long time grown in England, but does not appear ever to have become very popular in our vineries.

The Grizzly or Red Frontignan is a very delicious Grape, having a strongly marked Frontignan flavour; it requires a warm vinery to bring it to perfection. The bunches are loose and irregular, and the colour of the berries is not well defined. I have named enough sorts to give an amateur a good succession of these Grapes from August to October. They are, however, the Grapes of an amateur only, and, unless the public taste alters very much, it is quite out of the question to recommend them for the market. They have been known for many years in England, and evidently some good reason exists for the dislike of Grape-growers to cultivate them for profit. I have invariably heard the remark "What delicious Grapes!" from all who taste them, and for my own part I admire them above all. As they are not exacting, and can be grown in cool houses (with some exceptions), a small house might, with advantage, be devoted to their culture. If not large enough for the dessert of a formal dinner, they would be heartily welcomed at breakfast or at luncheon, and received with rejoicing at the dinner-table of the children.

THE ENEMIES OF THE VINE.

By Mr. R. D. Blackmore, F.R.H.S.

Those who understand my subject a great deal better than I do will probably be inclined to laugh at some of these sad experiences. If they do so, I grudge them not, but am glad to produce some merriment out of lugubrious matter. Over and over again I have had the fortune, or misfortune, to lay before the learned a fine sample of my woes, and receive the benefit of their sympathy,

Fig. 3.—Muscat of Alexandria.

and upon some occasions sound advice to try remedies long ago tried in vain.

More frequently it has been my lot to be assured that such things are impossible under proper cultivation. To this there can be no reply; and yet the course of time has answered it. The proper cultivator has reappeared, before growing visibly older, infected with his own impossibility. But these remarks are beside the mark, and are only offered in proof of my sense that for the present honour I am indebted to no kind of merit, but rather to every kind of misfortune. With the one exception of *Phylloxera*, my Vines have been visited by every evil which the flesh of Grape is heir to; and thus the subject has forced itself on the penitent but patient cultivator.

With the general treatment of the Vine—the planting, pruning, training, watering, giving of air, and such like—this little paper has no concern. We suppose the fair subject to have fair play, so far as mankind can ensure it; and then when it tries to be good and grateful, it falls among alien enemies. Everyone knows the fair beauty of the Vine—the kindest, most elegant, clinging, and trustful of all the good creatures that adorn our life, and therewith one of the most useful. And when tribulation falls upon it, the gardener, who loves it as his own child, is afflicted as with a home-sorrow. But he must not fold his hands and weep, nor even run for a fashionable doctor. Without loss of a moment he must fall to, find the mischief, and try the remedy.

This is more easily said than done. The mischief is manifold; the cause mysterious, at least in some of the cases now considered. Science—the knowledge of cause, and therefore of effect—is coming to our aid, slowly but surely, as its character requires. In a few more years we (or our successors) shall have finer instruction than the light of nature, trimmed by the longest experience, can afford. But science, to most of us, as yet means little but experiment *versus* experience.

Treading in the ancient ways, and under feeble rule of thumb, we may divide the foes aroused by the popularity of the Grape mainly into two bad classes—those which are of *vegetable order*, chiefly fungoid, and those of animal existence, *insects*, devouring insects; while enemies that cannot be referred to either class may frankly be called *miscellaneous*.

I. Regarding the question broadly thus, without keener

attempt at precision—for the division does not hold good throughout—we find the enemies of fungoid race manifold, and hard to be defined, even by the skilled mycologist. We, the ordinary gardeners, know that they are a Protean multitude ; and, knowing little more than that, we treat them, according to their choice of aggression, as *mildew*—of the roots, of the shoots and foliage, or of the bunch and berry. Of fungoid inroad on the *roots* of the Vine I have had very little experience, having only discovered it once or twice, and then it was not extensive. It appeared to exist in places only, where the roots had missed their proper share of moisture, and upon this point—unless I am mistaken—theory accords with practice.

But upon mildew of the foliage and berry, pages have been written, and to better purpose than can be presented here. It is plain that there are many forms of mildew, nicely discerned by the microscopist, and requiring to be dealt with according to their sort. But with one and all, the great rule is—have at them at once, and be as quick as they are. In nine cases out of ten the evil is caused by want of genial warmth—that is to say a soft glow of moisture, that seems to suckle the lambent growth, and crisp it with the sparkling gems of health.

Perhaps there has been a little creeping draught, or a sudden fall of temperature, or something in the air that seems to send a shiver through the foliage, and stroke it against the grain, as when a hat is brushed against the nap—*horridus* is the Latin word for this condition, I believe—and then the sad grower, in the early morning, espies the first symptom of mildew. It is but a little grey breath, perhaps, on the under side of some young leaf, or a dull curl at the very top of the shoot; but it means to the eye of experience the vanguard of an army of pestilence. In vegetable, even more than in animal existence, " Hit him while he's down " is the ignominious law. The unnumbered idle spores that are for ever wandering in the ambient air have found a weak spot to fasten on, and suck, and grow, and propagate. Cold-blooded creatures as they are, let them have a hot reception. At once raise the temperature of the house, stop every crevice of draught, and, if there be no young grapes to forbid it, fill the air with a moist exhalation of sulphur and quick-lime painted on the pipes. Also the leaves where the inroad has begun should be dipped in a slush of sulphur, and the border where the Vines are

growing syringed with what one of my men used to call a "weak delusion" of soft-soap and sulphur. But if the sensitive berries are set, these strong measures must be modified, and the treatment prolonged in a milder form, lest haply our Grapes should colour prematurely.

And this leads me to suggest (with great diffidence, as becomes a mere empiric) that the Oïdium which fastens on the foliage is a fungus not only distinct, but also fostered by different conditions from those which assault the stalk and berry. The attack upon the berry is even more pestilent and hard to deal with; but I have never yet seen it proceed directly from the affection of the foliage. I do not mean to say that if the latter is neglected it may not extend to the other—indeed it would be pretty sure to do so; but, so far as my own observation goes, the assaults are not simultaneous. Mildew on the foliage is bad enough, but mildew on the berry is far worse, being so much less accessible. Sulphuring the bunch, and then dipping it when ripe in a bucket of clean water—a course which has been even lately recommended—is a very poor proceeding, and the Grapes are not fit to be looked at. The proper course is to remove every berry that shows the fatal pearliness, or the whole bunch, if it can be spared; take it out of the house, and burn it. Then change the conditions which have bred the evil, soak the soil with water almost hot, close every ventilator, fill the house with warmth, and syringe the floor with soft-soap and sulphur mixed, if you fear to paint the pipes with it.

Every gardener knows all this; but some young gardeners seem not to know the very great danger of "giving bottom-air"—as the expression goes—too soon. I am sure that, in the main, these sudden attacks of mildew arise from chill, from ungenial currents of air, which check the rapid growth and prepare the surface for receiving the hovering enemy. Every grower of Grapes has his own crotchet, or, as he would rather have it called, his own enlightened theory; and in these delights I join him. Grapes are grown well, as many of us have observed, under different and sometimes diametrically opposite systems; but, in spite of all that, there comes a time when principles reassert themselves, and the innovator scratches a too fertile head.

Why is it almost impossible now to ripen a crop of comely

Grapes in the open air of England, although in good summers it used to be done, even in the time of Clement Hoare, and more freely in the ancient days? Nearly forty years ago, without the doubtful blessing of experience, I could grow very fine bunches of Black Hamburgh against an unprotected wall—not, of course, such Grapes as we see here, but far above any that I ever see now as products of the open. There is no failing in the average summer heat, as any meteorologist will prove to us; the cause of the failure is mainly, I believe, to be found in that pestilence—mildew. This has discouraged folk even from trying; for, as sure as eggs are eggs, open-air Grapes are now attacked with Oïdium. And that stopped my further attempts in that line.

Before quitting this branch of my subject—with which I fear to be sadly wearisome—I am bound to refer to a special evil, to which (as out of every evil cometh good) I chiefly owe the honour of being here. A certain malady, comparatively new, or at any rate not yet investigated duly and scientifically, has visited my Vines for some years now, and proved fatal to not a few of them. Mr. Barron, in his admirable work upon the Vine, has kindly inserted a few remarks which I ventured to offer about it. Others, no doubt, are acquainted with this pest; but the doubtful honour belongs to me of being the first in the country to sing out about it. It is not unknown at Chiswick now, though I have not seen the instances. There is a violent and virulent disease of fungoid nature described in the first edition of Mr. Barron's book, and there entitled *Anthracnose*; elsewhere, I think, called *Melanitis*. That great mycologist, Mr. Berkeley, believed it to be identical with the "Black-spot" of Australia and the "Black-rot" of America. My tormenter resembles this more nearly than any other I can find described; yet the symptoms are not identical. In the cases I am familiar with no blackness is apparent until the last stage of the disease is reached. The tip of the shoot is first attacked, and the crinkle of the unexpanded leaf, which becomes of a dirty wash-leather colour and loses its pellucidity. Then the leaves that are expanded further down the shoot become cupped and concave on the lower side, convex on the upper, and lose their grailing. All the shoot becomes dull, and its crispness is gone; and, if pinched, it indents without breaking. The disease—unless checked at the outset—descends the stem very quickly, runs into the older wood, and destroys the Vine.

When first I wrote upon this subject the disease had attacked my young Vines only, especially those that were grown in pots; but within the last two years I have found it suddenly invade established Vines, in the prime of their strength and luxuriance; but as yet it has confined its sphere of operations to Vines with thick and tomentose foliage, such as Gros Colmar, Black Alicante, and Gros Maroc. I have never yet seen it on Black Hamburgh, Chasselas Musqué, or Black or White Muscat.

To me it appears to be akin to the disorder which often attacks the young shoots of certain Pears, notably Louise Bonne and Beurré Superfin; these are struck with it in July or August, even in warm weather, and the tip of the shoot is the first to be touched. The young leaves are edged with a deepening line of black, then the disease descends the shoot, which becomes opaque and black and fluted.

"Search the roots" is the gardener's law in the usual post-mortem; and "Something the matter with the roots," instead of "Death from natural causes," is generally the verdict. Over and over again I have searched the roots and found them healthy, the side-shoots also, and lower foliage in full vigour, till the plague descends. Sulphur in every form I have tried, quassia, tobacco-water, and the like. Until the last year or two I believed that the only course was to cut well below the evil on its first appearance. But seeing by chance a can of strong liquid (brought from the manure-yard to be diluted), I plunged an infected shoot in that, on the principle of "kill or cure." To my surprise there was no kill, neither any sudden cure, but a speedy arrest of the evil, and, after two or three dippings, a renewal of sound growth. This year I have stopped the plague by dipping every shoot that showed it in stuff even blacker than it meant to be.

II. Passing other fungoid torments, I come to those even viler creatures which have life enough to know better. Who shall tell their names without requiring a muzzle for the sake of his friends, or to save the fissure of his own jaws? For this, however, there is no help. And to the general gardener, even in this "highly cultured" age, it is more important to be able to punish than to pronounce them. With the pile of good books now within his reach the fault is his own if he cannot do that; and possibly he finds yet quicker ways by dint of his own observation. These live enemies pass into three divisions according

to their "sphere of influence," though some of them operate in all three districts.

(*a*) The enemies of root or stem. First and most fatal the *Phylloxera*, of which I have no knowledge. Then the larvæ of the cockchafer, the Elater or wireworm, and the Daddy-long-legs, also of the Cetonia and other beetles, especially those of the weevil race, which have persecuted me beyond reason. The cockchafer grub, though most destructive, has not to my knowledge done much havoc of late, because he has not mustered in sufficient force. But we read of frightful ravages by him in old time, and he may yet renew them. Nothing is sacred from the wireworm, and in early days he teased me much, but by pegging at him constantly we quenched him, as well as the genial Daddy (or *Tipula oleracea*). The *Cetonia aurea* is comparatively scarce with us, and has never done much harm, though the beautiful beetle is a great gourmand.

But of the weevil (*Curculio vitis*, alias *Otiorhynchus vastator*, *picipes*, or *sulcatus*), could I only speak as he deserves, our language would again be vigorous. Little did I think, five-and-twenty years ago, when first I saw a scolloped leaf, very early in the morning, what a monstrous cantel would be cut out of all the joys of the vintage. I found him then, and admired his incisors, and treated him also to some incision. The partner of his joys was not far off, and we made her the partner of his sorrows. In those days this Curculio was apparently a monogamist, perhaps by force of circumstance, and when we found one we always hunted for his bride ; but now they have lost even that good trait.

The first year we killed about six pairs, and felt a kindly interest in them, as a boy does in a cockchafer. But the following year they increased apace, and forfeited all our sympathies. But as yet their attacks upon the roots had not become perceptible, and, being no entomologist, I paid little heed to their babyhood.

But this I had to do with a vengeance by-and-by ; for although we knew well that they were dangerous, and hunted them by day, and by night as well, in the fashion most accredited, the miscreants grew apace upon us, and made their way into the adjoining house, then devoted to pot Vines. And here the more serious plague began ; for although they had injured the established Vines, by scolloping the leaves, and sometimes nipping a young shoot off, they had done no perceptible damage to the

roots, albeit in the larva form they must have lived upon them. But the pot-Vines having no such spread of fibre, and being much smaller in their strand of root, could not hold out against these rodent larvæ. One after another they ceased to grow, the foliage turned yellow, and the young bunch flagged, and there was no hope left for that poor Vine. Upon turning up the pots we found sometimes the plant reduced to a tripod, just able to stand on its stumps, and feebly trying to tiller again from them. The ball would be thoroughly honeycombed, and the cells filled with fat curled larvæ, of a bluish white in the younger stage, of a yellowish tint when fully grown, and turning in the pupa state to a dirty red. How long they stay in the larva condition I know not, but a few days suffice for the *status pupillaris*, and I doubt whether entomologists are right in allowing them three years underground, for I have found them in the pupa stage when repotting Vines in February, which had been raised from the eye the previous year. Before leaving this maggot (as the gardeners call him) I may mention that I have taken more than seventy from a single 16-pot, and that the eggs—if I have identified them—are laid in a cluster in the earth, and are very large in proportion to the insect.

Now for the cure. This is very difficult, and only to be compassed by much patience. Prevention is the proper remedy; that I was partly aware of, and yet failed to ensure it. Last year we collected in the weevil form a good-sized pickle-bottle full; this year, by removing the top soil of the vinery, which we always do on that account every winter, and by perpetual persecution, we are certainly getting ahead of them. But perhaps we owe the reduction mainly to the clearing out of all pot-Vines, in which they seem to wax most fat, as well as to the constant searching of some hundred pots of Adiantum, placed as a treacherous home for them. Every morning we could shake out six or seven from the niches of old Adiantum crowns and transfer them to our bottles. These, of course, were in the imago form, and many in that stage were also taken in decayed Potatoes, Carrots, Apples, &c. The great difficulty with this creature is the resemblance of his colour to that of the soil; also the fact that he is very cunning, and not to be trapped with dainties, like the slug, or even wood-louse. I think that he lives on green food only during his weevil career, and goes to the Carrots and Potatoes rather for lodging than for board, and therefore would

just as lief sleep in a clod. Formerly I advised that Ferns and such-like shelter should not be allowed in the vinery; but since then I have employed them as traps, and found them very useful; only the strict search every morning, and the inversion of the pot over a newspaper, must never be neglected, if anyone is unlucky enough to suffer as I have suffered. I have never found them nip the fronds of the Fern as they scollop the Vine-leaf, and even gash the tender shoot; but the eggs are laid also

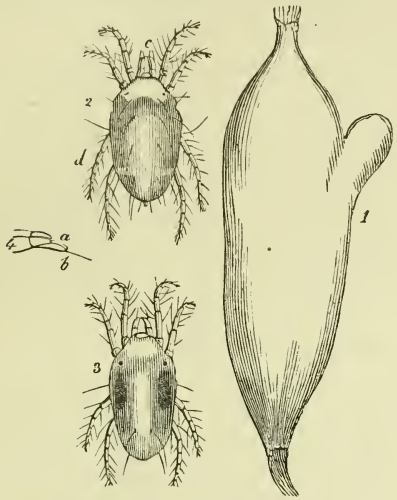


Fig. 4.—(1) Nest of Red-spider reduced; (2) Insect magnified, showing pair of two-jointed feelers (*c*), and pair of legs (*d*) developed after change of skin; (3) a smaller form; (4) Rostrum with two lateral valves (*a*), enclosing two fine bristles (*b*).

Fig. 4.—Red-spider. (From the *Gardeners' Chronicle.*)

among the Fern, and the larvæ thrive there as well as on the Vine; of course they do great injury there, but I have never known a Fern destroyed by them, though dozens of Cyclamens have been reduced to a dead skin by a grub suspiciously like my Curculio, but smaller. The time of activity is from the first awakening of the Vine to the maturity of the leaf. I have never seen the weevil in late summer, though I dare say he might be found somewhere; but human nature may hardly suffice for one perennial weevil-hunt.

(*b*) Concerning the enemies of the shoot and foliage I have nothing to say that every gardener does not know, and mention them chiefly to complete my list, though none of them has failed to visit me. Worst of them probably is the red-spider, *Acarus*, or, as he now seems to be called, *Tetranychus telarius* (fig. 4).

Virgil speaks of the *putris tela* (the mouldering web), and this is what he weaves. He produces a short dry staple out of the juiciest and most buxom leaf before we have time to cry "duck him." Not many things at the present time amaze a ripe Grape-grower; but hoariness falls upon him less unwitting than on the growth he sees not in the looking-glass. The residue of his hair stands up at the mischief done since last he shaved, and he uses a shorter ejaculation than *Tetranychus telarius*. "This remedy, applied with perseverance, will be sure to destroy it," says Mr. Barron, and he never speaks in vain.

The thrip—*Thrips minutissima* (fig. 5), also called, if I remember rightly, *Phlæothrips coriacea*, a member of the Thysanoptera—is a very striking but rarer plague. He certainly arises less directly from the will of the Almighty, and more from the degeneracy of Adam, who brings into the vinery trees forbidden—Azaleas, Abutilons, and the like. When once set up, he is even swifter in circulation than red-spider, and he seems to dwell in a mackintosh, for no syringing disturbs him. Sponge, soft-soap, tobacco-water—every hand must be in use at once, if thy desire is to see thy Vine leaves ripen properly.

Again, there is the mealy-bug—*Coccus adonidum* (fig. 6) he was called, now *Dactylopius adonidum*—a frightful pest, if he once gets in, and always eager for admission. The emmets may be seen in early spring, fingering something daintily, perhaps on the stem of the Vine, perhaps in the tangle of set berries. A closer gaze will show what they are about; they have brought a little soft white atom, and they are establishing a baby-farm. Their object, however, is impurely selfish. They hope to suck fatness by-and-by from the exudations and secretions of this unwelcome little stranger. With a pointed stick, and perhaps an eyeglass—if he has seen too much of the world already—the lover of the Grape must fetch out every one of these woolly molecules, for if once they flourish in the bunch he will have a mealy mass of filth, instead of goodly berries; and then let him search every cranny of the Vine for the rest of the loathsome family.

Of the Vine-scale, another of the Coccus race, I have not had much experience. A tooth-brush, dripping with strong insecticide, will give them their meed, if applied at once. But I fear to have trespassed too far already on the province of the entomologist.

(*c*) My catalogue should have exhausted already the many bitter enemies of our innocent, lovely, and grateful friend; but

unhappily, there still remains a host of miscellaneous evils, such as scorching, sunstroke, spot upon the berries, cracking, rust, and, worst of all, shanking. But time would fail me to enlarge on these, and they form quite a separate subject. Shanking especially (which some believe to be a local disease of the footstalk, while others refer it to failure of the supply of nourishment in the final effort) is a malady not as yet understood, or at any rate not yet thoroughly explained, by the most accomplished vinitor. I speak in the presence of many far better entitled to speak than I am, but I think they will all agree with me that it seldom or never attacks the produce of a young luxuriant Vine, well treated and wisely restricted in its generous endeavours.

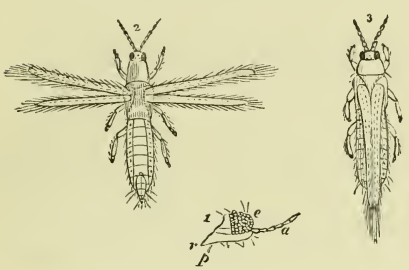


FIG. 5.—THRIPS.

1. Head in profile—antennæ (*a*), compound eye (*e*), beak (*r*); one of four feelers (*p*); 2 and 3, Thrips magnified.

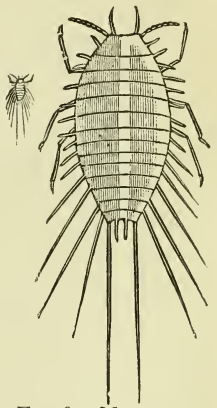


FIG. 6.—MEALY-BUG.

Fig. 5. From the *Gardeners' Chronicle*.
Fig. 6. From Mr. Barron's work on the Vine.

Finally, lest I shank myself, I beg to be taken within my limit, and as offering only my own crude fruit; for I write from recollection only, without opening a book, except Mr. Barron's. And if I have added to no man's knowledge, I may have suggested to more than one to put into better and larger form the results of his deeper experience.

DISCUSSION.

Dr. MASTERS said that Mr. Blackmore had painted the enemies of the Grape-vine in a most able manner, and he was sure that all had listened with the greatest pleasure while he had done so in his humorous way. As to these pests, he said that gardeners were able to continually watch the Vine, and thus learn everything about them, but beyond this very little information was

obtainable from anyone else. Scientists had very little opportunity of tracing the origin of the diseases of the Vine, and to do so it would be necessary for them to grow the plants and keep a constant look-out. If this were done they would be in a position to treat the enemy in a proper manner. One remedy Dr. Masters recommended to kill Vine-disease, namely, sulphate of copper. He said sulphur by itself was of little use, but sulphate of copper in solution would at once check the ravages of the disease. It was tried in many parts of France, and has also been tried in the gardens at Chiswick successfully.

SOILS AND MANURES FOR GRAPES.

By Mr. W. Thomson.

The subject assigned to me for the paper I am now about to read before you is, as you are aware, "Soils and Manures" suitable for the cultivation of the Grape-vine, and I know I shall consult your convenience if I make my paper as brief as the nature of my subject will admit.

For the substance of what I mean to bring before your notice I will draw entirely on my own experience—I am sorry to say not a short one now. In the first place I will treat of soils, and in the second of manures. The soil in which the Vine grows with the greatest vigour, produces the best crops, and maintains its fruitfulness the longest—other treatment being judicious—is old turf, cut from a calcareous soil not more than four inches deep. Where there is any suspicion that wireworm is present, I have found it an advantage to cut the turf and throw it grass-side down, and leave it so till it gets a sharp touch of frost; this drives the wireworm to take shelter in the deeper soil, and the frost has a beneficial influence on the soil itself. Where it can be got, I would give the preference to soil from off the old red sandstone, next from limestone; at the same time there is an excellent soil for Grape cultivation to be had both in Middlesex and Hertfordshire, from a subsoil of clay, or clay and gravel mixed. Such soil should consist of about 65 per cent. of sand, 30 per cent. of clay, and 5 per cent. of chalk. The ingredients that should

be added to it will depend on whether clay or sand predominates. If clay is in excess, add to the soil one cartload in ten of old lime and brick rubbish, or burned clay; charcoal is an excellent addition to a soil where clay is in excess, but it is costly. When it is not convenient to procure any soil except that in which sand is greatly in excess, I would, if possible, procure a portion of pure clay, and let it get frosted, after which I would mix it with the sandy soil, to bring it up to the standard I have given.

The handling of soil for a Vine-border should always take place in dry weather, for if it is put together wet the results will not be satisfactory. It was at one time a common practice to mix large quantities of farmyard manure with soil for Vine-borders; but feeling convinced that it was a mistake to do so, when it was desired that the vines should continue for many years to produce good Grapes, I have discontinued the practice for a dozen years, and am every day more and more convinced of the wisdom of doing so. There is only about 3 per cent. of plant food in such manure, and even that does not become readily available when it is buried deep in the soil, as a large portion of it must be in a Vine-border; and a wide distinction must be made between the effects of farmyard manure applied to garden crops in the open quarters of the garden, where the soil can be turned up annually and get exposed to the ameliorating influences of air and frost, and that buried in the depths of a Vine-border, where, if it gets dry, it may breed fungus, and where if it does not it will act as a sponge and retain an excess of moisture, becoming, in fact, a sort of sour, inert matter like humus, and in every sense an evil. A case of this description gets aggravated by pouring quantities of muddy liquid manure on the border; the whole mass then becomes what gardeners call sour and impervious to the beneficial action of the air. The only remedy I know, short of clearing out the entire soil and replacing it by new—and it is but a partial one—is to fork a good dressing of hot lime, newly slaked, into the surface of the border.

Having said all that seems to fall to my province under the head of "Soil for Vines," I now proceed to consider the second branch of the subject assigned to me, namely, Manures. I have found in my own experience that phosphatic manures are most essential, if the Vine is to be kept in permanent health and fruitfulness. These should be in various stages of solubility,

and I give the preference to those from the best quality of bones over those from dissolved coprolites. Care is necessary in using either in a dissolved state, for at times the acid solvent is in excess of what is safe; and seeing that bones are more costly than the acid, this is very likely to take place, and when it does, injury to the roots is very certain.

Potash is an element without which the Vine cannot bear fruit. It is present to some extent in most soils, but to make sure of its presence in the border a percentage should be added to all Vine manures, either of nitrate or muriate of potash.

Sulphate of ammonia should be represented, but not necessarily in large proportion, as the Vine is not so dependent on ammonia as many other plants.

Sulphate of lime should be represented, as it has not only a directly beneficial action, but a reflex one, making some of the other ingredients more active than they would be without it.

These are the four elements most essential in the composition of a good safe manure, and I have found it of great importance that especially the phosphates should be in forms that will come into action one after the other, and go on doing so for years. Such is the composition of the manure we have used with good results for a dozen years, and our Vines are more fruitful now than they were at any date during the last twenty years.

If I had to make up a new border I would add half a hundredweight of such manure as I have indicated to the cartload of soil, and follow that up by forking a portion of it into the surface of the border annually, so as to keep the roots near the surface, where they can be easily fed, and where they will be in wholesome, well-aerated soil, instead of diving down to the bottom of the border, as we but too frequently find them doing, with very bad results to the fruit.

I know of no treatment likely to do Vines greater harm than pouring quantities of muddy liquid manure on the borders, and especially if soot is mixed with it, as I have sometimes seen recommended. This seals up the pores of the surface of the border, and prevents the salutary influence of the air on the soil. At the same time, liquid manure from cow-sheds and stables may be used with very great advantage, if necessary precautions are adopted. It should be mixed with an equivalent

of water, and stand in a tank for at least a week before it is used, and be filtered through sand, burned clay, or charcoal. During the week a process of decomposition will take place, the result being that the liquid will contain ammonia, phosphates, and potash in proportions that may vary with the food the cattle are fed on, that from the stables being by far the richest in ammonia.

I cannot too strongly condemn the practice of placing large quantities of rank dung on Vine-borders where the Vines are to be forced early, either for the purpose of enriching the border or warming it. It most effectually sours the border, and does much harm in a manner which time will not allow me to explain.

Where Vines are to be forced early, and the roots are in an outside border, I advise that dry leaves be first laid on the surface of the border and then thatched with reeds or straw. This retains the heat the border got from the autumn sun, and does the soil no harm.

During hot, dry weather, and where the soil of the Vine-border is on the side of being light, I advise that a couple of inches in depth of well-prepared farmyard manure be laid on the surface of the soil. It will prevent the over-rapid evaporation of moisture, while it will not prevent the beneficial action of the air on the soil.

I have now dealt with the subjects you have assigned to me, as fully as the portion of your time I feel warranted in occupying will admit.

I have endeavoured to avoid all technical and purely scientific terms as far as possible, believing that the primary object of such papers is to popularise the subjects of which they treat.

PACKING GRAPES.

By Mr. W. Coleman, F.R.H.S.

The packing of Grapes for transit by rail, often to a considerable distance, is a matter which requires a greater amount of attention than is frequently given to it. Many cultivators produce

excellent fruit, but very often damage or completely spoil it through not knowing how to pack it. The great art of packing, not only Grapes, but all sorts of tender fruit, either for market or private use, is more than half attained when the young beginner gets over the fear of packing too tightly; for if once allowed to move or change their position, after the boxes are handed over to the tender mercies of a railway company, the contents suffer to an extent that greatly depreciates their value. Some growers use baskets that will hold from eighteen to twenty pounds each, and four of these, when packed in a case of suitable size with handles at each end, make up a weight that protects them from being turned over by the railway porters. For private growers, boxes of uniform size that will hold from eighteen to twenty pounds each are best; indeed, boxes that will just hold the quantity required are preferable to baskets, as they do not so readily give way to pressure. These should be made of half-inch deal, twenty-four inches long, fourteen inches wide, and six inches deep. The best material for general packing is soft, dry moss, of which a large supply should be obtained when the weather is fine, thoroughly dried, and beaten with sticks to destroy the harshness and free it from dust. Having the boxes and moss at hand, proceed by placing a layer an inch or more thick evenly over the bottom of the box, the sides, ends, and bottom of which should be lined with a double thickness of cap-paper and a single thickness of silver paper, allowing one half of the sheets to hang over the sides for turning over when the packing is finished. Weigh the box, carry it to the vinery, placing it in a slanting position by raising one end to an angle of 45°. Commence packing by placing good bunches in each of the lower corners, keeping the shoulders well up to the level of the sides; select a third bunch that will fit in tightly between the other two. Proceed in this way until the box is half full, then raise the box to a sharper angle, and press the bunches still closer together. Finish cutting, reserving three short clumpy bunches for the last row. Return to the Grape-room, take the gross weight, deduct the weight of the box, and write the net weight on a card. Place the box flat upon the table; get a supply of moss near the right hand, and commence wedging the Grapes away from the sides by the introduction of small quantities of moss into the cavities formed by

drawing the three thicknesses of paper inwards ; gradually work round, constantly drawing the paper inwards until the berries begin to show signs of rising out of the box. Strain a sheet of paper over the top; secure the card containing the weight with a tack. Turn up the paper from the outside, and secure the lid. Some gardeners place moss or wadding over the paper, and thus take all the bloom off the shoulders. Nothing more than a sheet of paper should be placed between the Grapes and the lid ; the pressure of the elastic moss keeps every berry in its place, prevents the loss of bloom by friction, and the stalks which stand upwards prevent the shoulders from touching the lid.

The preceding directions apply to Hamburghs; Muscats, being more tender, require greater care, and the less they are handled the better, as any undue pressure or friction causes them to change colour when opened and exposed to the air. They must, however, have sufficient packing to prevent them from moving in transit. If the bunches are very large it may be necessary to use wider boxes, but they need not be deeper. Having prepared the box by laying two inches of moss at the bottom, line the sides and ends with strips of wadding folded in silver paper, and proceed as before by tilting the box to a sharp angle. Place a double sheet of silver paper in the lower angle, allowing two-thirds to run along the bottom. Cut the first bunch, lay it lengthwise across the box, turn up the ends of the paper, and draw them with both hands over the bunch towards the lower end. Then take a strip of wadding, four inches by twelve, and place it against the bunch to form a division ; lay in another double sheet of paper, and proceed by laying the next bunch with the shoulders in the opposite direction. Turn up the ends of the paper as before, and draw the second bunch close to the first. Add another strip of wadding, and repeat until the box is full, when by raising it to a sharper angle, the weight of the fruit, aided by very slight pressure with the fingers, will make room for another bunch. Fill all vacancies round the sides by forcing moss between the wood and the lining ; fold the upstanding ends of the paper evenly over the fruit, and secure the lid with two small nails. Enclose the record of the weight, and cord each box singly or two together. Wadding must be used with great care, and on no account be put in contact with the Grapes.

Lady Downes, Alicantes (fig. 7), and other kinds having long tapering bunches may be treated as Muscats, placing them transversely across the box; but it is not necessary to place

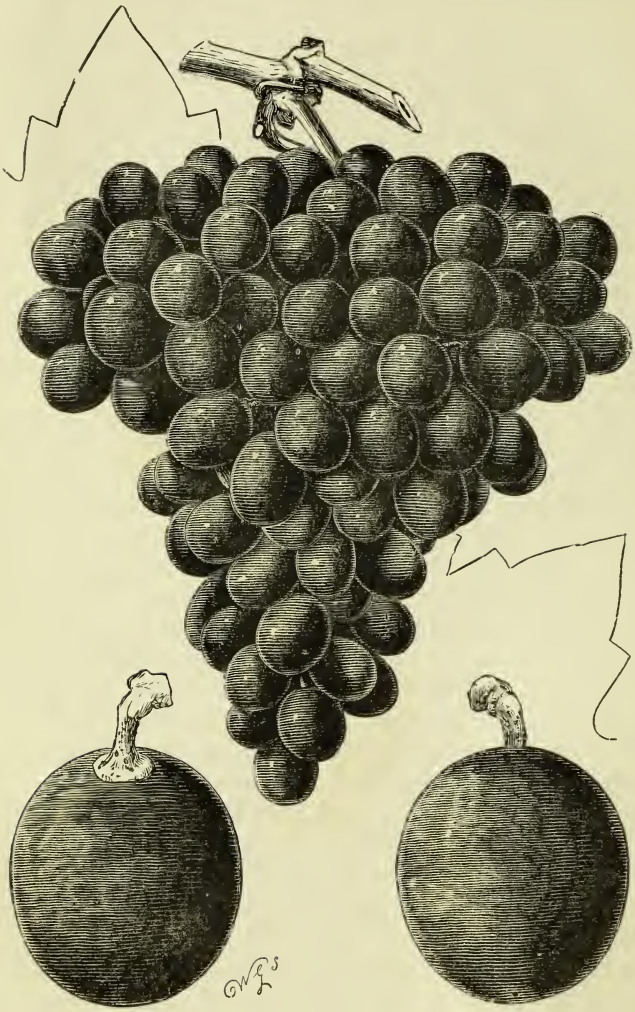


Fig. 7.—Alicante. (From Mr. Barron's work on the Vine.)

anything between them, as they are less susceptible to bruising. Indeed, the tighter and closer these kinds are pressed together the better they travel. Lady Downes (fig. 8), unless very fine indeed,

do not require a six-inch box; but it simplifies the matter of packing if all the boxes are of uniform size, and the unnecessary depth may be reduced by increasing the thickness of the layer

FIG. 8.—LADY DOWNES GRAPE. (From Mr. Barron's work on the Vine.)

of moss at the bottom. The bunches of the kinds that are laid transversely across the box should not, however, touch the paper, which should be drawn tightly over the top of the box and retain its position by being nailed down with the lid.

The keystone of success in adopting the foregoing system lies in the use of dry, soft moss, the cheapest and best material for general packing, and this should be forced down between the sides of the box and the paper until it begins to form an arch near the lid, when the boxes may be turned upside down without injury to the Grapes.

PACKING PEACHES AND FIGS.

By Mr. W. Coleman, F.R.H.S.

Here, as in the packing of Grapes, the secret of success consists in the use of a soft, elastic material, which will keep each fruit in its place until it reaches its destination. Various materials have been recommended, such, for instance, as bran, wood-wool, wadding, and moss, all of which I have used extensively in my time, but for many years past I have confined myself to soft, dry moss—the best and cheapest of all packing materials. If properly beaten and prepared, it is soft and elastic, and never heats in the boxes. Be careful in the use of bran—an excellent thing if pressed very tight; but having a tendency to sink in bulk when shaken on the journey, the Peaches become loose, separate from the packing, and arrive in a bruised and worthless condition. Never use wadding—the worst of all packing materials for soft, perishable fruit—as it absorbs moisture, becomes very hard, and heats on the journey. Avoid using large boxes; 24 × 14 × 4½ inches is a suitable size for twenty to twenty-four fine fruits. Always have the lids in one piece, and cord two or more boxes together. Place the direction-label and one marked "Fruit with care, this side up," on the top, to be met at the terminus. Always gather in close at the end of the week, and never send away later than Friday morning. Although Peaches may be sufficiently advanced for sending away, their hold is too firm to admit of their being plucked from the tree without injury by the pressure of the fingers; but if a piece of wadding be taken in the left hand, with which the Peach is firmly grasped, and a pair of finely pointed scissors are used with the right, it may be detached without being bruised. It should then be placed on a piece of tissue-paper nine

inches square, and laid in a shallow basket containing a good bed of moss. When gathering, which should always be performed in the morning, is finished, prepare the boxes by lining the sides and ends with paper, allowing the half of each sheet to hang over the sides for turning over the top when all is finished. Then place a good layer of moss evenly over the bottom, slightly elevate one end, and commence by folding the fruit in the sheets of paper on which they are resting. Shake a little moss along the lower end of the box, and place the first Peach in the left-hand corner, keeping it in its place with the left hand; follow with more moss and fruit, never removing the hand until the first row of four fruits is finished; form a division with more packing, and proceed until the box is full. Each Peach will then be resting in a soft bed of moss, an inch from the bottom, and the same distance from the adjoining fruits. Continue the introduction of packing until every fruit is quite firm in its place; spread a layer of moss over the top, turn up the half sheets, and put on the lid. A little judgment is needed in putting on the last layer of moss, as safety in transit depends upon the tightness secured in putting on the lid. If moss cannot be obtained, and bran is used, the boxes should be well lined with plenty of paper to turn over the top, to prevent it from working out. Make a good bed, as fruit is often spoiled by being placed too near the bottom; place all the Peaches on this bed, keeping them half an inch from the sides and an inch apart; fill up with bran and shake it down, but do not trust to shaking only, as shaking on the railway soon reduces the bulk, and in nine cases out of ten, where bran is used, the Peaches work up to the top or one end, and the bran going in another direction, they arrive in a bruised condition. An abundance of bran should be worked into the corners and between the fruit, and well pressed down with the fingers until every part is firm, and a little higher than the sides of the box; then turn over the paper and nail down the lid. When packing for market, always make "firsts" and "seconds," and place record of quantity on the lid.

When large ripe Peaches have to be packed for immediate use, they should be gathered a day or two before they are wanted, and placed upon squares of paper on hair sieves. Great care must be observed in moving them, with pads of wadding in the hands, and an extra quantity of moss should be placed under

them in the boxes. The folding of these and all tender fruit is best performed on a sheet of wadding spread upon the table, and they should be packed with the points upwards. Nectarines can be packed in shallower boxes ; in other respects they should be the same size, as a number of boxes can then be corded together.

Packing Figs.

The packing of ripe Figs for transit to a distance requires great care, particularly when they are quite ripe. For market purposes they should be gathered as soon as they are well coloured and show a tendency to open at the apex, when they can be packed without injury, and will keep for a few days after they are received. If the house is kept thoroughly dry and well ventilated, the fruit can be gathered in much better condition than when it is charged with moisture.

For private purposes they should be gathered and despatched on the day they are required for use, care being taken that each fruit is wrapped in or two soft, dry vine-leaves, to prevent the adhesion of the tissue-paper. With this additional precaution, they are packed in precisely the same way as Peaches, but the boxes for Figs need not be quite so deep, neither should they be so large, at least without having divisions placed across them. A box 4 inches deep, 24 inches long, and divided into three compartments by two transverse divisions, is a good size where large quantities are grown. When large extra-ripe Figs are packed for immediate use, some growers use boxes divided into squares just large enough for a single fruit. In every other respect the *modus operandi* is precisely the same as that already described. The secret of success in packing all kinds of tender fruit consists in keeping it free from bruise or taint, and in using non-odorous elastic materials that will prevent the slightest movement in transit.

Wood-wool, recently introduced, is a good substitute for moss; but, non-odorous materials being absolutely necessary to the preservation of delicate flavour, its manufacture from resinous timber should at once be discontinued. If the introducer could see his way to the conversion of lime-tree, willow, or poplar into wood-wool, it might be used by all who cannot obtain good moss for packing purposes.

CRINUMS.

By Sir Charles W. Strickland, Bart., F.R.H.S.

[Read October 14, 1890.]

In the remarks that I am going to make upon the plants of the genus *Crinum* with which I am acquainted I do not intend to deal in any way with the naming of them. Many of those that I know have had two or more different names given to them, and a large number of the names that I know have been applied to two or more different plants. All that I propose to do is to try and arrange in some kind of order those plants which I have had in cultivation; but as this includes only a part of those described by Mr. Baker and others, it must be understood that a fuller acquaintance with all the recorded species might materially alter this arrangement. I divide the genus into two large groups, which are very distinct from one another both in their habit of growth and in the form of the flowers. The first has columnar, leafy bulbs like a Leek, evergreen leaves, for the most part erect and spreading, and perfectly even, symmetrical, star-shaped flowers on the top of straight, upright tubes, and with upright, spreading, usually straight stamens. This group includes Mr. Baker's sub-genera of *Stenaster* and *Platyaster*, between which I cannot see any sufficiently marked line of distinction. A large part of this group comes from Asia, Australia, and the South Sea Islands, especially those with very narrow petals. A few very beautiful forms with wider petals come from tropical America. The other group is the same as Mr. Baker's sub-genus *Codonocrinum*. These are very different in character from the first group. They have round bulbs like an Onion, many of them are deciduous, and others which are not quite deciduous grow in a similar manner to the deciduous ones. The tube of the flowers is curved, and the flowers are nodding, bell-shaped, and more or less ringent, and with broad petals. The stamens are curved, often lying close together. There appear to be a few species which are more or less intermediate between the two great groups. There are only two or three of these which I have any acquaintance with, but I think that most of the species which I have not seen, which are figured, may be arranged in one of the two groups.

Of the plants with very narrow petals, I have examples bought under various names, *e.g.*, *asiaticum*, *latifolium*, *pedunculatum*, *procerum*, *pedunculatum* from Lord Howe's Island, species from South Sea Islands, species from Japan, *sumatranum*, *bracteatum*, &c., all of them large plants with thick, columnar, leafy bulbs, large, upright, spreading leaves, and with heads of rather insignificant flowers with purple style and stamens, and all equally with short peduncles, which vary in length in the same head of flowers. Some of these are very near to one another, the plants especially being undistinguishable. The plant from Japan differs from the rest in having very short, broad leaves, and short, blunt petals. The plant I have under the name of *procerum* is figured in the *Botanical Magazine*, 2231, as *C. declinatum*; it is a very tall plant with broad, wavy leaves and very small flowers. *C. sumatranum* (*Bot. Reg.* 1049) has longer and wider (not upright) petals, and is easily known by the dull, darkish green of its broad, stiff leaves. *C. bracteatum* (*Bot. Reg.* 179) is a similar plant with leaves of a brighter green and more shining; a short scape and large head of flowers, with much broader, more upright, pure white petals. In *C. amabile* the bulb becomes conical and less leafy, resembling rather more a tall bulb than a column of leaves. So also in *C. erubescens* the column approaches a short conical bulb. In form and habit, and in being stoloniferous, this approaches *C. americanum*, and like that species comes from tropical America. It is easily known by its very dark green foliage, and the scape being mottled like Snakewood. I have three or four varieties of *C. americanum* under various names—*americanum*, *Carolinianum*, *pratense* from Florida, and *Careyanum*, the last being a large form and *Carolinianum* a somewhat smaller one, all equally beautiful. A plant from the sea-shore, Jamaica, resembles these, but with a very long coloured tube, and buds which are upright before expanding. In this respect it rather resembles the small plant from Fernando Po, *C. purpurascens*, which has flower-tubes longer than the scape. These are the principal of the star-shaped Crinums with which I am acquainted.

There are two very distinct species which are intermediate in habit and form of flowers between the star-shaped and campanulate Crinums which I have in cultivation. One named *crassipes* by Mr. Baker, from a plant of mine, has a thick,

conical bulb, very thick, broad, upright leaves, ending in a long point, a short scape, and a few upright flowers, not opening wide, and slightly ringent. It differs much both in habit and form of flowers from any of the species which are described and figured. Unfortunately I cannot say whence it comes. I bought it many years ago at Henderson's, where it was growing in a very cold house, and I grow it with the deciduous Crinums from the Cape, which are nearly hardy. Then, *C. pratense* has a distinct bulb, round at the base, with a tapering neck, very long, narrow-pointed, deeply channelled leaves, growing straight upright, and a head of few upright flowers, more campanulate than star-shaped, on a short scape. Some of the Australian Crinums seem to be allied to this, as far as I can judge from figures.

Of the second great group with round bulbs and campanulate flowers, *C. giganteum* and its allies approach most nearly in habit to the former group. They have evergreen lanceolate leaves. In *C. giganteum* and the plant sold by Mr. Bull as *C. nobile*, which appears to be a highly coloured variety of *giganteum*, the leaves are spreading immediately above the bulb, very wavy, and the plant altogether hardly distinguishable from that of *C. zeylanicum*, figured in the *Botanical Magazine*, 2466, as *C. Careyanum*; but there is another form of *C. giganteum*, with upright, petiolate leaves, with a stout midrib and thin blades, varying very much in width. *C. podophyllum* has the appearance of a starved variety of this form.

Allied to these in habit comes the finest of the whole genus, well known as *C. Moorei*, figured and described also under the name of *C. Macowani*. It is quite distinct from all others in having a long, narrow neck above its large round bulb, crowned with thin, broad, lanceolate leaves, with a thick midrib, springing, not in a line with the neck, but at a very obtuse angle. It has very large campanulate flowers, with broad petals, varying from pink to nearly white. The Glasnevin plant (*Botanical Magazine*, 6113) has the flowers darker pink than I have ever seen them, arising possibly from being grown out of doors.

We now come to the deciduous Crinums and those allied to them. These make three or four fresh leaves every year, which last for three years, dying down more or less completely in the winter, so that the three or four middle leaves are the middle

part of last year's leaves, and the three or four bottom leaves are the base of the leaves of the year before. They all have campanulate nodding flowers, with the ends of the petals more or less rolled back, and with a more or less bright red stripe down the middle of each petal. I believe that all of these very beautiful plants are African. From *C. Kirki* of Zanzibar to *C. longifolium* at the Cape and *C. yuccæflorum* of the West Coast a series of intermediate forms are found. One rather extreme form is Mr. Baker's *C. pauciflorum*, with two flowers with very long tubes, which I have from Lake Nyassa. I have two or three forms from the Upper Zambesi, varying in the colour and width of the leaves and the length of the tube; and as the interior of Africa becomes better known, no doubt we shall obtain from thence a great variety of forms of this beautiful plant, which may be called varieties of one species, or a dozen or more different species, according to the fancy of the botanist who describes and names them. They all have nodding campanulate flowers, with the ends of the petals more or less rolled back, and with a more or less distinct purplish red stripe along the middle of each petal. Towards the West Coast of Africa are some forms with somewhat narrower petals, less rolled back, and with a very bright stripe. *C. scabrum*, from Brazil, and a plant that seems to be common in Jamaica, resemble these closely. I suppose that they have been brought from Africa by slave ships.

In the largest of the deciduous Crinums that I have—coming I believe, from Natal or thereabouts—the bulb is five or six inches in diameter, the leaves four or five inches wide in the second year, more in the third year; a large head of nearly white, bell-shaped, nodding flowers, with the tips of the petals rolled back. I have had it under the name of *campanulatum*, which well describes it; and as the plant generally known as *campanulatum* is figured in the *Botanical Magazine*, 2352, as *C. aquaticum*, which describes it far better than *C. campanulatum* does, it might perhaps be as well to keep this name for the large kind.

Another similar large bulb has shorter flowers, with much more colour. Mr. Baker thought the flower the same as that of *C. Forbesi*, but it is not the same as the plant at Kew of that name.

Another extreme form of the deciduous Crinums is *C. campanulatum*, or *aquaticum*, a swamp plant, with cylindrical, very deeply channelled leaves, and flowers very like those of the flowering Rush (*Butomus umbellatus*). I will now only notice two interesting species with which I am only very imperfectly acquainted: *C. brachynema*, with small, beautiful, creamy white flowers, with round petals and very short stamens—the flowers are symmetrical, and it comes from India, so I suppose that its affinities are with the columnar, star-shaped group, although it has a round bulb—and *C. Balfourii*, which has a round bulb and flaccid, shining, strap-shaped leaves, so that no doubt its relations are African; but it has pure white flowers, and seems to differ rather widely from them.

TREES AND SHRUBS FOR LARGE TOWNS.

By Dr. Maxwell T. Masters, F.R.S.

[Read October 28, 1890.]

In introducing this subject the speaker briefly adverted to the necessity for securing open spaces in our large towns, and to the importance of planting from a sanitary as well as from an æsthetic point of view. A thousand houses per month, it is roughly estimated, are added to this overgrown metropolis of London, every one of the five million inhabitants of which is continually polluting its atmosphere, to say nothing of the defilement arising from factories and chimneys. The necessity of securing open spaces, and of planting them appropriately, is, therefore, a matter of urgency. But these considerations, vast as their importance is, were only incidentally adverted to, as they are for the most part beyond the control of the gardener. The speaker desired to confine his remarks almost entirely to matters in which gardeners are directly concerned, and in which they can, if permitted, render good service.

The conditions unfavourable to the growth of trees and shrubs in large towns, such as over-drained and otherwise unsuitable soil, the relative absence of light, the mechanical impurities of the atmosphere, which obstruct and cripple healthy action, or chemical contaminations, such as acid vapours, which,

by actually destroying the tissues, render leaf-action impossible, were likewise merely mentioned incidentally, as they also are, for the most part, beyond the power of the gardener, as such, to prevent or improve.

Nor was it considered necessary on this occasion to allude to the decoration of streets, squares, or parks by means of plants in tubs or pots, or by the aid of shrubs removed when rendered unsightly, to be replaced by others in the following spring.

Turning to the kind of assistance which gardeners are able to render in the purification and adornment of our crowded cities and thoroughfares, the speaker first of all alluded to the question of soil. In most cases, when streets were originally planned and buildings erected, no provision at all was made for the planting of trees and shrubs in their immediate vicinity, and, even now, in the formation of streets and gardens attached to houses in suburban districts, the first care of the builder is to remove the good soil, if there be any, to sell it, if possible, and to supply the deficiency by brickbats, mortar-rubbish, broken bottles, tin cans, and similar refuse, by means of which the levels can be raised to the desired height, without a thought of the nurseries for disease-germs which are thus established. In streets of older date the conditions are even worse, from the infiltration of gas, the scanty provision for the access of air and water to the roots, or even the positive exclusion of those necessary compounds by asphalte or other impermeable road-coverings. The first thing, therefore, for the street-planter to do, when once the area at his disposal is decided on, is to ascertain the nature of the soil, and, in case of need, to remove that which is unsuitable, and replace it with that which is fit for the growth of plants. So far as circumstances will allow, he will also take measures to avoid or to remedy the other evils alluded to.

It is but rarely, in street-planting in old towns, that any special provision for drainage is necessary, one of the commonest evils in such instances arising from over-drainage. In the case of squares and gardens formed in areas not previously built over, of course the first thing the planter will do will be to secure adequate drainage by the ordinary methods. In street-planting a hole not less than five or six feet across, and three or four feet in depth, should be dug, the unsuitable soil removed

and replaced by good loam, with which sand or road-scrapings may be incorporated in quantity proportionate to the density of the loam. A small quantity of leaf-mould may also be added, but, as a rule, the most experienced planters deprecate the employment of manure, at least in the first instance. Disconnected pits or holes are commonly the only possible means, but in laying out new streets it would be far better, wherever possible, to form a continuous trench, removing the bad soil and supplying its place with good.

The distance to be secured between tree and tree is dependent upon the size the tree is likely to attain. Generally from thirty to forty feet is allowed in street planting. The necessity of taking precautions that the roots are not injured by gas leakage is obvious. This may be effected by interposing slabs of slate between the tree and the pipes. The fact that trees will grow if they have a chance is too often overlooked, and we find, as on the Thames Embankment, forest trees of large dimensions planted much too closely, as if the ultimate object were to obtain scaffold-poles or ships' masts. There are various ways of obviating or overcoming the evils of overcrowding (which, by the way, is even more frequent in shrubberies), as, for instance, by the Hibernian method of avoiding them altogether, by the selection of low-growing trees and shrubs that if planted sufficiently far apart will never encroach upon and weaken each other; by timely thinning—a process usually quite neglected in towns; and lastly, and least scientifically, by periodically pruning and reducing the dimensions of the tree. This last is the plan followed on the Thames Embankment, with the result that the trees are made to resemble those toy-trees with which we were familiar in our childhood, but which can scarcely be held up as models for imitation except by those who prefer conventional to natural forms.

In planting in towns the same precautions are required as in ordinary cases elsewhere. The trees should have been previously transplanted in the nursery, so as to secure the formation of a good "ball" of fibrous roots, which will not only facilitate transplantation, but also increase the feeding capacity of the tree, and if the soil be good there will be no temptation for the roots to wander in search of food.

Some practitioners recommend that the trees should be

selected from some nursery where the conditions of life, at least as far as exposure and temperature are concerned, are less favourable than they are in the locality to which they are to be transplanted. Certainly the converse is true, as no one would, on principle, willingly expose to the hurtful agencies of the streets plants taken from more sheltered and wholesome situations.

Nevertheless, in practice, it is not always possible to avoid this, and such is the accommodating nature of plants, that, granted an ordinary amount of judgment in the selection, adequate care in preparing the soil for their reception, and due provision for their welfare after planting, a difference of a few degrees of latitude or of a few hundreds of feet of altitude will practically make no difference.

In planting care should be exercised in spreading the roots, so that they may not become entangled one with another, but may grow evenly on all sides, and thus be enabled to avail themselves of food in every direction.

The error of too deep planting should also be avoided.* The tree should be firmly planted, and supplied with a stake to prevent rocking and displacement until the roots have grown into the soil, and are enabled to "hold on." The stake should be high enough to prevent the head of the tree from being snapped off by a gust of wind—a circumstance very likely to happen if the stake be too short in proportion to the trunk.

In attaching the tree to the stake, the tie, of whatever nature it be, should be elastic or loosely applied, so as to "give" a little under pressure and allow of a little swaying motion. Inattention to these matters is very likely to result in the breaking away of the head from the trunk of the tree. The woodcuts, borrowed from the pages of the *Gardeners' Chronicle*, will illus-

* In the neighbourhood of London several instances are familiar to the speaker which seem to show that deep planting and the exclusion of air are not so injurious as generally supposed. In one case the trunk of a Laburnum is, and has been for thirty years, buried in a bank of earth nearly to the point where the first branches are given off. In another case a Maple (*Acer monspessulanum*), formerly growing in a garden, now finds itself in the footpaths of a street with the flag-stones close to its base. A Pear-tree is in like case, but neither seems the worse. The explanation probably is that the feeding root-fibres are far away beyond the obstruction, and where access of air and water is not precluded.

trate these matters. In fig. 9 the stake is too short and too tightly affixed to the trunk; in fig. 10 it is also too short, but as it is looser there is less risk of the head snapping off. Fig. 11 shows a young tree on the Thames Embankment too much restricted.

A very suitable description of tie is one that the lecturer first saw in use in the gardens of Mr. Warren, of Handcross Park, Sussex. It was made of straw, and its construction can readily be understood from the annexed woodcuts (figs. 12 and 13). Another method of affixing a tree loosely but securely is shown in fig. 14.

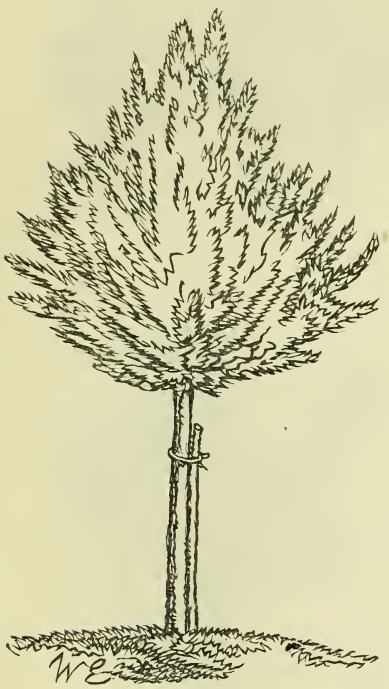


Fig. 9.

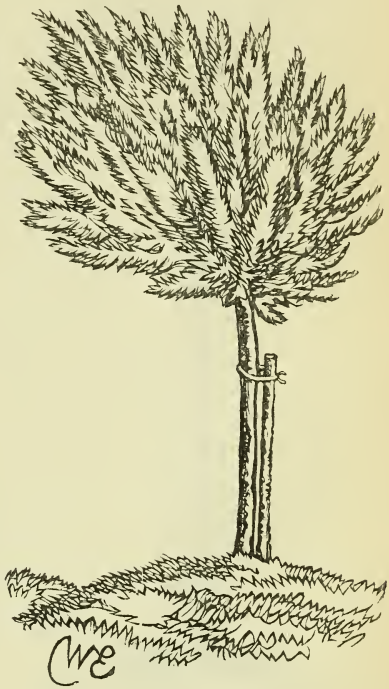


Fig. 10.

Where circumstances permit of its being carried out, a better plan than staking is to drive into the ground in an oblique direction, pointing outwards, three stakes at equal distances from the base of the tree, so as to form a triangle. The tree itself, at a height of four or five feet, is encircled by a ring of felt or

matting, round which a hoop of galvanised wire is placed, the stakes being connected with the hoop by wires. Or the plan recommended by Mr. Mills, of Enys Gardens, and shown at figs. 15 and 16, may be adopted where space permits. If a proper

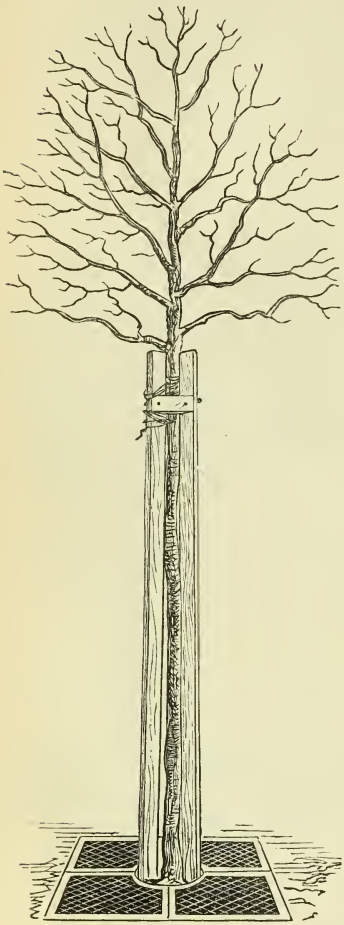


Fig. 11.

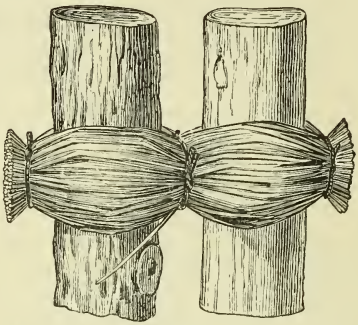


Fig. 12.

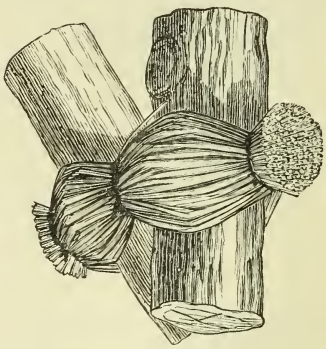


Fig. 13.

tree-guard be used, however, no staking at all is required. In the Royal Gardens, Kew, a tree-guard of iron rods is made use of. At the upper and inner part of the cylinder so formed a ring of old indiarubber hose-pipe is attached, which forms a circular

cushion around, but at some distance from the trunk. A mulching around the roots, kept in place by the grating, in that situation is of great benefit to the tree by retaining the moisture of the soil, and may be renewed from time to time.

Supposing the tree to have been suitably planted and protected, it still demands occasional attention. Town gardeners too often ignore the circumstance that occasional inspection is necessary, and that a timely application of the hose to the roots in time of drought, or the frequent use of the spray to the leaves to ensure their periodical cleansing, are of the greatest possible benefit to the trees and shrubs condemned to grow within the limits of wind-swept or dirt-polluted towns. The injury that may be inflicted by the steam-roller should not be overlooked, the speaker instancing a street in Chelsea, and another in Southwark, where the roots of the tree had been massacred by this instrument, and where the trees in consequence had well-nigh perished, and would probably soon do so utterly.

These and other practical details are well understood by trained gardeners, and it is a misfortune when the management of town trees and of town gardens is confided to persons destitute of the necessary knowledge and experience. At the same time even trained gardeners are too apt to allow themselves to be trammelled by long-established, but unintelligent, routine, and to pay scant attention to the mode of growth, habits, and requirements of individual plants. The thoughtless treatment of shrubberies and shrubbery borders, the ruthless disturbance of the roots, the mutilation and massacre of the branches and trunks that go on under the name of pruning and "tree-cutting," may be seen in every suburban road. The hideous deformities into which trees are converted by the knife and saw are mostly the outcome of previous neglect and inattention. For want of occasional attention and regulation of growth, by means of disbudding or the removal of young shoots, trees are allowed to overgrow their limits, or to become misshapen and unsymmetrical. When this happens the trees become, as was once observed to the speaker by a gardener, "hugly things!" As a matter of fact not a few town dwellers never have an opportunity of seeing the noble grandeur of an unmutilated tree, nor of studying the manifold ways in which trees, each according to its kind, adapt

themselves to circumstances, and yet examples are not wanting in the parks, and even in the squares of London. The gardener to whom allusion has been made was adding to the ugliness of the trees by the mutilation he was practising. Happily nature does much in a few short months to conceal the deformity, and although the original beauty and individuality of form may be destroyed beyond power of recovery, yet after a time the deformity becomes concealed and the degree of ugliness abated. If trees of the right kind and dimensions, trees of form appropriate to the surroundings, be made use of and properly planted, and if their subsequent welfare be attended to, this rude surgery will be found, for the most part, unnecessary. The kind of surgery employed should be that known to the faculty as "preventive" and "conservative," and should comprise the occasional suppression of buds or the removal of misplaced, diseased, or over-luxuriant shoots, as recommended by one William Shakespeare in the following terms :—

> Cut off the heads of too fast-growing sprays,
> . . . . superfluous branches lop away.

These measures, if carefully carried out in accordance with the natural shape and mode of growth of the tree, will eventually secure a well-grown specimen, and will obviate the necessity for those barbarous practices which in most of our suburbs do really render trees in the winter season objects of aversion rather than of gratification.

Of course, pruning and training of trees into unnatural shapes are necessitated for special purposes. Those who have sought refuge from the autumn sun and dust under the avenues and pergolas of an Italian or Swiss town will be disposed to thank the pruner for the welcome roof of foliage he has provided, rather than blame him for the contortions and deformities of the branches he has been the means of developing. These, moreover, do not obtrude themselves till the winter season, when the traveller is no longer there to see them.

But even in such cases the desired effect could be secured without mutilation and distortion, by the simple means of employing broad-leaved creepers like the Vine, *Aristolochia Sipho*, and other plants of like habit.

In too many cases the selection of subjects for town gardens

is entrusted to some person unacquainted with trees and shrubs, or a contract is given to a nurseryman by which he binds himself to furnish a certain number of trees, or to plant a certain area at the lowest remunerative cost. The consequence is that little or no care is exercised in selecting appropriate plants properly prepared for removal. The nurseryman—very pro-

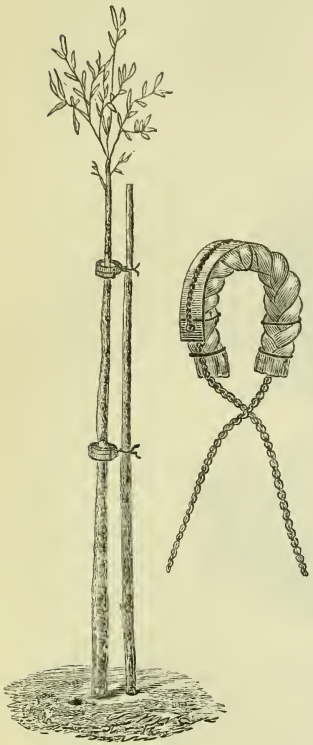


Fig. 14.

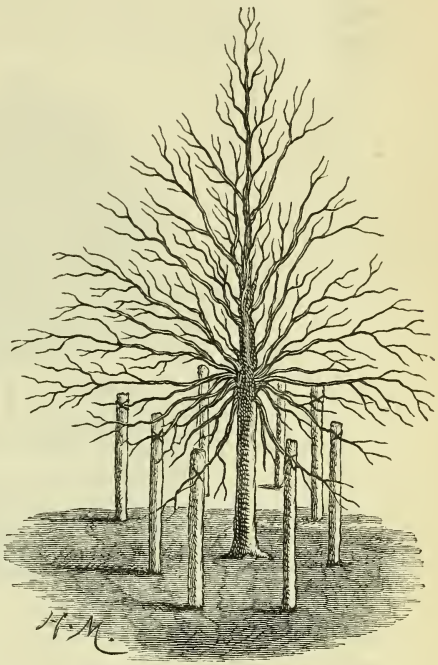


Fig. 15.

perly from his point of view—avails himself of the opportunity to clear off his refuse and surplus stock. The fault here rests with the ignorance and false economy of the purchaser.

In selecting suitable subjects for planting, the circumstances of each case must first of all be taken into consideration, such as the climate and general atmospheric and terrestrial conditions; the nature of the locality in which the planting is to be carried

out—whether in a street, in the form of avenues, in immediate association with architectural objects, and if so of what style, or in town squares of large dimensions, in narrow courts, as specimen trees on lawns, or as groups in plantations or shrubberies. These are obvious truisms, but how often do we see them ignored in practice! In ordinary street-planting it is desirable to employ trees whose form will associate fitly with the architectural features, and it is not desirable to select trees that will attain the largest dimensions. The object, independently of the purification of the atmosphere, is to secure shade

Fig. 16.

and an agreeable outlook for the inhabitants and passers-by, not to exclude the light and air from the upper stories of the houses, nor to render them damp. The general use of the Plane is to be deprecated for this reason. Where there is abundance of space at command no nobler or more suitable tree can be found; notice, for instance, the

Brotherhood of venerable trees

to be seen in Berkeley Square—a magnificent group in the centre of the town. But trees of such dimensions and of spreading habit lining the sides of a street would be highly inconvenient. If planted at all in such situations, constant pruning and regulating are necessitated, with the result of producing an artificial and constrained appearance.'

On the other hand, there are plenty of trees of moderate dimensions and of habit of growth suitable for association with architectural features of whatever style, harmonising or contrasting with them as may be desired. The difficulty in many cases arises from the circumstance that, owing to the small demand for them, nurserymen do not grow them in sufficient quantities. But if a demand were to spring up, commercial instincts may be trusted to supply the requirements with very little loss of time. Another difficulty, perhaps even more prevalent, but one, fortunately, capable of more ready solution, is the general ignorance of the extent and variety of our resources. How many town gardeners and professional planters visit the arboretum at the Royal Gardens at Kew with the object of gaining information on these points? Not many, it is to be feared. They will flock to see an excruciatingly glaring bit of bedding-out, they will admire a blaze of Rhododendrons in flower, they will gloat over Standard Roses, rave over Dahlias, and manifest symptoms of hallucination in regard to Cattleyas or Chrysanthemums, but they will ignore the existence of fine trees and flowering shrubs. No one of sense will disparage any one of these beautiful things; it is the indiscriminate and disproportionate attachment to some of them that is objectionable, as leading to the neglect of others equally entitled to admiration. The recommendation to visit a well-stocked arboretum like that at Kew, or a nursery where trees and shrubs are made special objects of attention, is one, therefore, that should commend itself to town gardeners desirous of making the best of their opportunities and resources. While the arboretum and the nursery should be visited for the purpose of selecting subjects suitable by their dimensions, habit, and form for the purpose intended, other visits should be paid to the parks, squares, and streets of our large towns, especially those which have been planted for some years, with a view of ascertaining what trees and shrubs do best in such situations.

In visiting old-established gardens, like that at Fulham Palace for instance, which is famed for its interesting trees planted by Bishop Compton about 1685, it must be remembered that at the time when those trees were planted the conditions were much more propitious to healthy growth than they are at present. Trees of the same kind planted in that locality now are

not likely to attain such dimensions or live to such an age as the venerable relics still to be seen at Fulham. It is useless lamenting over spilt milk, but the loss of the arboretum and shrubbery-walk at Chiswick, once so rich in the very class of plants we are now considering, will revert to mind, and, as the French say, *donne à penser*.

There are happily many towns still left where any tree or shrub that is capable of living in the immediately surrounding neighbourhood is capable of living in the town also. From this point of view the "Sylva," if such term may be permitted, of Canterbury or Oxford is not necessarily different from that of the country adjoining. But it is widely different in the case of cities like Glasgow, Newcastle, Sheffield, or Manchester, and more especially in the case of towns where the air is not only mechanically defiled by the presence of smoke and dirt, but rendered actively poisonous by the existence of sulphurous and other acid vapours from chemical works. Of the latter class of towns, and of the trees and shrubs that will exist in their vicinity, the lecturer had little personal experience; but that circumstance does not depreciate the value of the recommendation that intending planters in such towns should, before commencing operations, make a careful inspection of such trees and shrubs as exist there already. The consideration of this part of the subject led the lecturer to advocate the formation of town experimental gardens, and of the propriety of setting apart portions of the existing parks and gardens for the express purpose of ascertaining by experiment what trees, &c., are likely to do best (or least badly) in the locality. For this purpose it would, of course, be necessary not only to get together the ordinary Elms, Planes, Limes, &c., that form the staple of our existing town-Sylva, but also to procure other less known examples.

Experiments and observations of this kind demand time. The town planter seeks immediate effect. He is not on that account left stranded, or compelled to wait an indefinite period. He can, as has been seen, make visits of inspection to arboreta and to town gardens, but over and above this the structure and ways of life of the trees themselves may afford him many a valuable suggestion. Deciduous trees, for instance, which come into leaf in late spring are less liable to injury from late frosts than are those which expand their foliage early. Moreover, they

have to contend with a smaller dose of smoke than those which unfold their leaves earlier in the spring. Trees, again, which retain their foliage late are preferable to those in which the leaves fall early. The comparison in this respect between the Plane and the Lime is wholly in favour of the Plane. Trees with thin, flaccid leaves, like those of the Lime, are obviously at a disadvantage as compared with others in which the leaves are firmer and more resistent. The former shrivel with heat and drought much sooner than the latter. Trees like the Lime, again, from the leaves of which exudes a gummy or saccharine fluid, are unsuitable, inasmuch as the dust adheres to them and is not readily dislodged by rain, while the sweet juices are as nectar to undesirable insects. On the other hand, leaves of firm texture with glossy skins, which are soon cleansed, such as those of the Tulip-tree, the Cucumber-tree (*Magnolia acuminata*), the Naples Alder (*Alnus cordata*), some of the Poplars, many Maples, and the Copper Beech, are well suited for towns. The Maidenhair-tree (*Ginkgo biloba*) is excellently adapted for planting in towns, though rarely seen. In Brentford, in close vicinity to the gasworks of that noisome town, in the Botanic Garden at Chelsea, and in the Bow Road, fine trees of this species—isolated examples of course—may still be seen. A superficial examination of the leaves of this species, and of their mode of attachment, direction, and disposition, will show how well adapted they are to resist the injurious effects of a polluted atmosphere. Microscopical examination of these leaves (as also those of the Iris, Carnation, and Auricula among herbaceous plants, and which are all good town plants) will confirm the results of superficial examination by revealing a tough and relatively thick epidermis, abundance of breathing pores, and a relatively large amount of leaf-green or "chlorophyll." An adequate supply of this latter substance is to the plant what a corresponding supply of healthy blood is to the animal. Plants richly endowed with it have naturally greater powers of resistance than those less well provided. The thing is obvious to truism.

Evergreens are called on to exert an even greater power of resistance than are deciduous shrubs, but their glossy leaf-surface, the thick texture of their leaves, and their accumulations of deep green chlorophyll enable them to maintain themselves

in the struggle to a degree that our predecessors hardly appreciated. Those, for instance, who remember the squares of London a quarter of a century or more ago will call to mind the deplorable appearance they presented in winter from the absence of evergreens and from the general prevalence of mud-besmirched, leafless Privets and Lilacs. At that time there reigned an impression that evergreens would not live in London. In point of fact, Hollies, Aucubas, *Skimmia japonica* (the *S. oblata* of gardens), and Osmanthus are among the very best and hardiest trees and shrubs for town gardens. Rhododendrons, in the speaker's experience, form an exception to the rule ; but as they are reported to do well in and about Manchester, it is probably the soil rather than the air which is unfavourable in London. Conifers, as a rule, are useless in town-gardens, probably from their resinous exudations serving to retain and fix the deposits of soot on the leaves, and thus impeding transpiration and respiration by blocking up the breathing pores.

A remarkable exception was mentioned by the speaker in the case of *Pinus excelsa*, which grows fairly well in a London garden where other Conifers (and many have been tried) have failed. The slender drooping leaves, which allow the water that falls on them to wash them ere it falls to the ground, may partly account for this, though it will not do so in the case of the black Austrian Pine (*Pinus Laricio* var. *austriaca*), which has also been mentioned as doing well in towns, but of this the speaker has no personal knowledge.

The Maidenhair-tree (*Ginkgo biloba*), though a Conifer, is deciduous, and so exceptional in all ways as not to invalidate the above statement. It is, as before said, by reason probably of the conformation of its leaves, an excellent town tree.

In presenting the following lists the lecturer has confined himself for the most part to the enumeration of such trees, &c., as he knows from personal experience and observation to do relatively well in a smoky locality in a densely crowded part in the east of London, and which, of course, may be seen under more favourable conditions in the parks and nearer suburbs of the metropolis. So far as the outlying suburbs and country towns are concerned, the speaker's observations have been made only in places where the conditions of life, as regards atmospheric impurity, are not very materially worse than in the

open country, and where, in consequence, almost anything that can be grown in the surrounding district can also be grown—though, of course, not so well—within the limits of the town. To have enumerated the trees, &c., which might be planted in such situations would have swollen the lists to an inordinate length. Nor have plants been included of which the speaker has no personal knowledge. Some of these were mentioned by those who took part in the discussion which followed, notes of which are also appended.

I.—Deciduous Trees of Large Size.

Magnolia glauca.
Magnolia acuminata (Cucumber-tree).
Magnolia obovata.
Magnolia conspicua.
Liriodendron Tulipifera (Tulip-tree).
Tilias (Limes). Only in country towns.
Acer macrophyllum.
Acer pseudo-Platanus (Sycamore), and many varieties, including the purple-leaved variety.
Acer Volxemii. Should be tried.
Acer platanoides (Norway Maple), many varieties.
Æsculus Hippocastanum (Horse Chestnut). Has the objection that its spiny capsules and shining seeds offer temptations to stone-throwing boys that cannot be resisted. The double-flowered variety would not be open to this drawback.
Ailanthus glandulosa (Tree of Heaven). An excellent and majestic town tree, thriving even in the worst situations. It would make a fine avenue tree but for its habit of producing suckers; and its large compound leaves, disarticulating at every joint when they fall, might be objected to by some on the ground of the trouble of sweeping them up!
Sophora japonica.
Fraxinus Ornus (Manna Ash).
Fraxinus excelsa (Common Ash), and its varieties. This is said to do well in Manchester.
Quercus Cerris (the Turkey Oak), and the Lucombe and Fulham varieties with sub-evergreen foliage.
Quercus conferta (the Hungarian Oak). (See *Gardeners' Chronicle*, N. S. vol. v. p. 85, fig. 18.)

Quercus pedunculata (Common Oak), and its varieties.

Quercus glandulifera. Kew. Worth a trial. (See *Gardeners' Chronicle*, December 4, 1880, p. 714.)

Quercus coccinea (Scarlet Oak).

Castanea vulgaris (Sweet Chestnut).

Fagus sylvatica (Beech), especially the variety cuprea (or Copper Beech), of which a very fine specimen still exists in a garden near the Bow Road.

Juglans regia (Walnut).

Juglans nigra (Black Walnut). A noble town tree.

Juglans mandshurica. Should be tried, as it is said to be hardier than the Common Walnut. (See *Gardeners' Chronicle*, October 6, 1884, p. 384.)

Pterocarya fraxinifolia. Good specimen in the Chelsea Botanic Garden.

Platanus orientalis var. acerifolia. The best form of Plane for London. The Occidental Plane and many forms of the Oriental are spring-tender, and therefore unsuitable. Seedlings from the same batch show great differences in this respect.

Betula alba (Birch).

Populus alba (White Poplar).

Populus nigra (Black Poplar).

Populus canadensis (Ontario Poplar) and the fast-growing variety known as var. nova.

Populus balsamifera (Balsam Poplar). Fine specimens of Poplars may be seen in St. James's Park.

Salix alba (White Willow) and other species.

Ulmus campestris (Common Elm). Not recommended except in country towns, as the leaves shrivel early and are readily attacked by red-spider and various insects.

Ulmus montana (Scotch or Wych Elm).

Planera Richardi. Fulham.

Celtis australis. Fulham.

II.—Deciduous Trees and Shrubs of Medium or Low Stature.

Deciduous Berberis.

Acer eriocarpum. Excellent.

Acer rubrum.

Acer creticum. Chelsea Botanic Gardens.

Acer tataricum.
Acer monspessulanum.
Negundo fraxinifolium. Green form, excellent.
,, ,, Variegated form, in open places.
Æsculus carnea (Scarlet Horse Chestnut).
Pavia flava (Yellow Horse Chestnut).
Kœlreuteria paniculata. Foliage curious; yellow flowers very conspicuous.
Ptelea trifoliata. A large bush of this grew for many years in the yard bounded by the printing-office of the *Times*, and has only recently been removed. The golden tint of its foliage and its curious winged fruits used to attract much attention.
Hypericum calycinum. In open situations.
Staphylea pinnata (Bladder Nut).
Rhamnus hybridus (Buckthorn).
Rhamnus Frangula (Buckthorn).
Rhamnus catharticus (Buckthorn).
Colletia spinosa.
Colletia cruciata. Will not bear severe winters.
Rhus typhina (Sumach). Does very well in towns.
Rhus Cotinus (Wig-plant).
Rhus glabra laciniata. Ornamental foliage.
Cladrastis tinctoria.
Cytisus (Laburnum) and varieties, of which Waterer's is one of the best, but the leaves of all are apt to be disfigured by insects.
Robinia pseudacacia and varieties.
Cercis siliquastrum (the Judas-tree). Always attracts attention when in flower.
Gleditschia triacanthos (the Honey Locust).
Amygdalus communis (the Almond). A favourite tree in London suburbs for its flower in early spring, but is otherwise not to be recommended.
Prunus spinosa (Sloe).
Prunus mahaleb.
Prunus cerasifera var. Pissardi (Purple-leaved Plum). Retains its colour in London.
Prunus virginiana. Chelsea Botanic Garden.
Cerasus pseudo-Cerasus Watereri. A very handsome double-flowered variety.

Cerasus avium (the Bird Cherry). Flowers conspicuous.
Mespilus germanica (Medlar).
Cratægus (Thorns). Not recommended in any but country towns, large parks, and open suburbs. The leaves are apt to shrivel, and are greatly affected by insects.
Cotoneaster frigida. Red berries.
Cotoneaster affinis.
Pyrus Aria (Whitebeam).
Pyrus lanata. Handsome tree (a thriving specimen may be seen in Southwick Crescent).
Sorbus aucuparia (Mountain Ash). For berries and foliage.
Pyrus domestica (Service-tree).
Pyrus torminalis (wild Service-tree).
Pyrus (Malus) spectabilis. For flowers.
Pyrus salicifolia.
Amelanchier vulgaris. White flowers in spring.
Ribes alpinum. Dwarf shrub (Thames Embankment).
Aralia chinensis.
Cornus sanguinea (Dogwood).
Cornus sibirica (Red-stemmed Dogwood).
Cornus Mas. Yellow flowers in early spring.
Sambucus nigra (Elder) and varieties. The Golden Elder does not retain its colour except in open localities.
Syringa Emodi (Himalayan Lilac).
Syringa vulgaris (Common Lilac).
Syringa persica (Persian Lilac).
Ligustrum vulgare (Privet).
Ligustrum ovalifolium (Privet). Nearly evergreen.
Diospyros Lotus.
Diospyros virginiana. Chelsea Botanic Garden.
Catalpa bignonioides. An excellent town tree.
Paulownia imperialis. Somewhat tender, but does well if cut back, and thus forms a fine plant for lawns.
Hippophae rhamnoides. Bush.
Corylus Avellana (Hazel) var. purpurea.
Corylus Colurna.
Carpinus Betulus (Hornbeam).
Liquidambar styraciflua.
Ulmus Dampieri.
Ulmus plumosa.

Ulmus cornubiensis.
Ulmus Berardi.
Celtis australis.
Celtis occidentalis.
Broussonetia papyrifera. Chelsea Botanic Garden.
Alnus cordifolia (Naples Alder).
Alnus imperialis (Imperial Alder).
Populus tremula (Aspen).
Salix vitellina (Osier Willow).
Salix caprea (Goat Willow).
Salix rosmarinifolia (Rosemary-leaved Willow).
Morus nigra (Mulberry). Good town tree.
Ginkgo biloba (Maidenhair-tree).
Ficus Carica. Excellent town plant (for foliage). For an account of the Fig-trees at Lambeth Palace, alleged to have been introduced by Cardinal Pole in the reign of Henry VIII., see *Gardeners' Chronicle*, October 26, 1886, p. 528.
Ostrya vulgaris (Hop-Hornbeam). Chelsea Botanic Garden.

III.—Evergreen Trees.

Quercus glabra and Q. cuspidata, Japanese species, should be tried. They are hardy at Kew and Wimbledon, but have not been tried within town limits.
Quercus Ilex (Evergreen Oak). A good town tree.
Cedrus Deodara. Fairly well in open places.
Cedrus Libani. Not recommended in close situations.
Pinus excelsa (the Bhotan Pine).
Pinus austriaca (the Black Austrian Pine). Is said to do well near Manchester.

IV.—Trees with Pendulous Branches.

Robinia inermis pendula.
Sophora japonica pendula.
Cratægus oxyacantha pendula.
Pendulous Holly. Evergreen.
Populus tremula var. pendula.
Fagus sylvatica pendula.
Salix babylonica.
Salix Caprea pendula.

Ulmus montana pendula.
Ulmus viminalis pendula.
Ulmus microphylla pendula.
Betula alba pendula, &c., &c.
Platanus acerifolia var. pendula (Rivers).

Many of these require to be worked as standards, so that their use would be necessarily restricted.

V.—Fastigiate or Pyramidal Trees and Shrubs.

Cratægus oxyacantha fastigiata.
Carpinus Betulus var. fastigiata.
Quercus pedunculata var. fastigiata.
Populus nigra var. pyramidalis (Lombardy Poplar).
Populus alba var. Bolleana.
Ulmus montana fastigiata.
Ulmus Dampieri (fastigiate form).
Ulmus plumosa.
Cephalotaxus pedunculata var. fastigiata, *alias* Koraiana. Pyramidal evergreen shrub for open spaces.

VI.—Mop-headed Trees and Shrubs.

Robinia pseudacacia var. Bessoniana. Deciduous.
Cerasus lusitanica. Standard evergreen.
Aucuba japonica. Standard evergreen.
Ilex Aquifolium. Standard Hollies.

Numerous suitable plants might be grown as standards, but their use would, of course, be restricted for special situations.

VII.—Evergreen Shrubs.

Berberis Darwinii.
Berberis × stenophylla.
Mahonia (evergreen Berberis). Not recommended in very close localities.
Euonymus japonicus and varieties.
Euonymus radicans. Creeping habit.
Ilex cornuta.
Ilex microphylla.
Ilex dipyrena.

Ilex crenata.
Ilex Aquifolium (Common Holly).

Green, broad-leaved varieties do best, though variegated ones often do well. There are some good specimens in the Victoria Park and in neighbouring gardens.

Rhamnus Alaternus.
Skimmia japonica (oblata and fragrans of gardens).
Skimmia Fortunei (japonica of gardens).
Cerasus lusitanica. The common Laurel-Cherry is mostly unsuitable.
Cotoneaster microphylla.
Cotoneaster Simoni.
Cotoneaster congesta, for rockeries.
Aucuba japonica. Many varieties ; excellent shrub for towns.
Griselinia littoralis.
Arbutus Unedo (Strawberry-tree).
Arbutus Andrachne.
Garrya elliptica.
Pernettya mucronata. Has been known to ripen fruit out of doors in a densely smoky locality, and to retain it for two seasons.
Rhododendrons. Said to do well about Manchester ; do not do well in East London unless constantly renewed.
Osmanthus Aquifolium.
Phillyrea latifolia.
Phillyrea angustifolia.
Phillyrea Vilmoriniana.
Ligustrum coriaceum.
Daphne pontica.
Daphne Laureola (Spurge Laurel).
Elæagnus hortensis.
Elæagnus pungens.
Buxus. Not to be recommended unless in open situations, as the lower branches speedily die and become unsightly. Box-edging is impracticable in confined localities.
Ruscus aculeatus (Butchers' Broom).
Ruscus hypophyllum. Low growing.
Ruscus hypoglossum. Low growing.
Yucca gloriosa, recurva, &c. Splendid plants even for the most confined spots. Other species should be tried.

Arundinaria japonica (the Bambusa Metake of gardens). It does well in smoky localities and is perfectly hardy.

Vinca major and V. minor (Periwinkle). Trailing undershrubs of small dimensions, with evergreen foliage; do well under trees even in London.

VIII.—Flowering Shrubs.

Hibiscus syriacus and varieties (Althea frutex of gardens).

Ceanothus azureus and varieties.

Pavia macrostachya.

Ulex europæus. Double-flowered variety.

Spartium junceum.

Sarothamnus scoparius (Broom).

Caragana, species.

Halimodendron argenteum (Salt-bush).

Colutea arborescens (Bladder Senna). The passenger by the North London Railway, near Dalston and Hackney, may observe the luxuriant bushes of this curious and beautiful shrub on the railway embankment under very exacting circumstances.

Coronilla Emerus.

Amygdalus nana (Dwarf Almond).

Spiræa Lindleyana. Very striking in shrubberies.

Spiræa salicifolia.

Spiræa Douglasi.

Spiræa callosa.

Spiræa Fortunei.

Spiræa Bumalda. Dwarf.

Spiræa opulifolia, &c.

Potentilla fruticosa.

Kerria japonica.

Rosa rugosa.

Calycanthus floridus.

Calycanthus occidentalis.

Chimonanthus fragrans. Winter-flowering.

Philadelphus coronarius, &c.

Deutzia scabra.

Deutzia crenata.

Ribes sanguineum. Double-flowering variety.

Ribes aureum.
Diervilla (Weigela) rosea.
Lonicera tartarica.
Lonicera fragrantissima.
Lonicera Standishii. The two last-mentioned are specially valuable for their fragrant white flowers, produced in winter.
Lonicera Ledebourii.
Leycesteria formosa.
Symphoricarpus racemosus (Snowberry).
Santolina Chamæcyparissus (Ground Cypress).
Olearia Haastii. Very free-flowering.
Syringa persica.
Syringa vulgaris (Lilac).
Ligustrum lucidum.
Buddleia globosa. Injured in very severe winters.
Veronica Traversii.
Phlomis fruticosa.
Daphne Mezereum.

IX.—Creepers or against Walls.

Magnolia grandiflora. Against a wall, evergreen.
Clematis Flammula.
Clematis Jackmanni.
Ampelopsis hederacea (Virginian Creeper).
Ampelopsis Veitchii.
Ampelopsis cordata.
Vitis vinifera. Good town creeper.
Ceanothus azureus and varieties.
Wistaria chinensis.
Pyrus japonica.
Pyrus Maulei.
Rubus cæsius.
Rubus fruticosus (Bramble). Cut-leaved and double-flowering kinds very valuable in towns.
Rubus australis. Curious rock plant.
Pyracantha coccinea var. Lalandeii. Against a wall, or isolated as a bush.
Passiflora cœrulea. Bears fruit on walls near London.
Euonymus radicans. Evergreen.

Garrya elliptica. Evergreen.
Hedera Helix (Ivy). Evergreen, very numerous varieties, almost all of which do well in London, but some are tender.
Lonicera Periclymenum (Honeysuckle).
Lonicera chinensis.
Forsythia viridissima.
Jasminum officinale.
Jasminum nudiflorum.
Periploca græca.
Lycium Barbarum. As a cover for sheds, &c.
Solanum Dulcamara.
Aristolochia Sipho. Good for covering walls, sheds, arches.
Ficus Carica (Fig). Excellent in towns.
Smilax aspera.

In the discussion which followed—

Mr. George Paul expressed his concurrence with most of what Dr. Masters had advanced, and urged the necessity of greater attention on the part of public bodies to the proper planting of trees, &c., and of permitting an outlay sufficient for the due preparation of the soil and the subsequent care of the trees. He recommended the study of Dr. Masters' lists in order that more variety might be secured than had hitherto been thought possible. Dr. Masters' unfavourable experience with regard to Rhododendrons was, Mr. Paul continued, rather due to unsuitable soil than to polluted atmosphere, as at Pendleton and other suburbs of Manchester they succeeded admirably. *Retinospora plumosa* was recommended as a desirable plant for the suburbs where the old Arbor Vitæ failed. The curious fact that so many of the plants manifesting resistance to unhealthy town-conditions were of Japanese extraction was noted, Skimmias, Aucubas, Osmanthus, &c., being cited in illustration. All these have glazed skins and thick leaves.

Mr. George Nicholson did not quite accept Dr. Masters' estimate of the Lime. It is true there are Limes and Limes: the common one is objectionable enough in many ways, as it becomes infested with insects, and red-spider causes it to drop its leaves very early in hot seasons. Mr. Nicholson had seen whole streets planted with common Lime where scarcely a tree had any foliage left on it, and that before the end of August. The small-leaved Lime (*Tilia cordata*), under the same conditions,

in the same town (Metz), had green leaves in abundance, and was evidently better suited for town conditions than the common Limes—*T. platyphylla* and *T. vulgaris*. The Silver Lime (*T. argentea*) makes an excellent street tree, and retains its leaves long after those of the two last-mentioned species have fallen. The remarks on *T. argentea* equally apply to *T. petiolaris* (figured in a recent volume of the *Botanical Magazine*), perhaps much better known under the name of *T. americana pendula*. The two white-leaved species of Lime and the common ones are growing under the same conditions at Limoges. *T. euchlora*—with its smooth glossy leaves, of a bright dark green—also makes an excellent street tree.

Mr. George Wythes said that having lived for some few years in Manchester, he had had the means of studying which trees and shrubs did best. As is well known, the fogs in Manchester are most destructive to plant life, and the fumes from the many chemical and other works are more injurious than London fogs. Rhododendrons, which Dr. Masters did not advise to be planted, are the best plants in that district, making a good growth yearly. The ground in many cases is a disused brickfield, and they like the clayey damp soil to a certain extent. Before being planted, much of the ground had some of the clay burnt and remixed with the soil, and the ground drained. It must also be remembered in planting trees in towns that kinds with a soft or woolly foliage cannot resist and throw off accumulations of soot and dirt in the same way as the smoother-leaved kinds, and many of the trees recommended by Dr. Masters had smooth thick leaves. Many failures take place through neglect at planting time, such as by placing the roots in badly prepared soil, want of attention after planting, absence of moisture during dry weather, &c.

Mr. James Hudson wished particularly to emphasise the advice given by Dr. Masters not to plant the Lime as an avenue tree, and to avoid that frequent and foolish mistake of overcrowding the trees. The greatest harm done to trees—and especially to Conifers—in large towns was by fog; but the question of soil had also to be considered. Poor soil should be renovated with fresh loam and manure, labour spent in the rough preparation amply repaying itself. Trees and shrubs for towns should be selected from well-exposed nursery grounds of high altitudes in preference to those from sheltered and low-lying

districts, in order to secure plants of hardy constitution. In suburban gardens the builders, in the first place, commit a serious error in selling off the land the turf and best of the soil, thus not giving the future garden a fair chance. In addition to *Pinus excelsa*, mentioned by Dr. Masters, Mr. Hudson had proved that both *P. austriaca* and *P. Cembra*, with its dwarf form, were quite reliable near London, so also, except in the worst of positions, is the Deodar; but the Cedar of Lebanon does not thrive so well. Rhododendrons do not thrive well, the best being *R. ponticum* and *R. Everestianum*. Of the former, Mr. Hudson preferred seedlings to any others, so as to gain extra vigour. *Hedera dentata* is worthy of more notice than it receives. Rhododendrons should always be carefully planted in and about towns in such a way that they can be well supplied with water. When on mounds, this cannot be done.

Mr. W. Roupell, having had some experience in planting trees in London, said he would venture to make a few remarks on the subject. In selecting trees it is necessary to consider how far prevailing winds carry the smoke in certain directions, as it is found that in the smoky districts trees do not flourish so well as in non-smoky localities. If he were forming a list of trees, &c., to be planted in towns he would strike out the names of those that did not succeed, which would be a less task than giving a list of those plants that would grow, and he ventured to say the greater number would grow in towns. In the disused burial-ground in Lambeth, and also in Kennington Park, there are many trees which exist and are in fine condition. In the east end of London there is a garden attached to St. Philip's Vicarage, which was interesting enough to deserve a visit from anyone studying this subject. It would be seen that although much depended on situation and soil, still a great deal was due to the care bestowed on the plants. Trees do much better if washed occasionally, and the foliage should therefore always be kept clean, if possible, by this means. He agreed with Mr. Wythes that woolly-leaved trees should be avoided because they were hard to clean. The Tulip-tree (*Liriodendron Tulipifera*) and Catalpas did perfectly well within five miles of Charing Cross. Most Rhododendrons will thrive in a suitable soil, the lack of which much more than smoke was the cause of their failure. If the soil is good there

is no reason why *Rhododendron ponticum* and others should not be cultivated.

Sir CHARLES STRICKLAND, referring to the mention made by Dr. Masters of the Council of the R.H.S. taking up the subject of planting hardy trees and shrubs, said that in Scotland there is a Society which has been doing good work in this particular, and he thought it was quite open to the Royal Horticultural Society to take up the work in a systematic way. As to the trees and shrubs in London, he said the Plane-tree was the one tree which thrives there better than any other, and he wished it would also thrive in Yorkshire.

Mr. H. CANNELL said he was not at all surprised that plants would not grow in London, simply because there was no good soil for them to grow in. They had to be content with something like ash-heaps, from which little good could be expected. As to the Local Boards planting trees, all they cared about was that the trees should look pretty when planted, or as long as the contractor had the work on hand; after that it mattered little what became of them. Trees should not be planted anywhere near gas-pipes, as no matter how tightly fixed the latter were, there was sure to be an escape of gas for some distance round, and this would soon kill the roots of any plant.

Dr. MASTERS, rising to reply, thanked the audience for their attention to his lecture, and also the gentlemen who had taken part in the discussion. He was especially grateful to Messrs. W. Paul & Son, of Waltham Cross, for their cut specimens of trees and shrubs which they had kindly sent to illustrate his remarks, and he also thanked Messrs. Cutbush & Son for their exhibition of Pernettyas. Supplementing his remarks on trees for large towns, Dr. Masters said that *Magnolia acuminata* was a very fine town tree, and came next to the Tulip-tree, and, with the Plane, should be planted in London. He could not agree with Mr. Geo. Paul in eulogising *Retinospora plumosa*, which gathered dirt too quickly in smoky districts, although in such places as cemeteries it might do very well. He considered the Arbor Vitæ (*Thuja orientalis*) an excellent test-shrub as showing in what parts of a large town trees would flourish, and where they would not. He had observed it for many years, and noticed that the nearer it was to the centre of the town, the more

deplorable was its condition. So nicely graduated is this that when riding about London or the suburbs one could guess the distance from the central district by the condition of the Thuja, which in some places, *e.g.* in the Waterloo Road, hardly came up to the respectability of an ordinary birch-broom.

In illustration of the subject Messrs. William Paul & Son, of Waltham Cross, exhibited the following plants. The list is of interest as showing what in the opinion of those highly competent gentlemen is suitable for the purpose.

Evergreen.

Cotoneaster Hookeri.
,, affinis.
,, Simonsi.
,, buxifolia.
Phillyrea media.
,, Vilmoriniana.
Fontanesia phillyreoides.
Aucubas in variety.
Azara microphylla.
Hollies in variety.
Berberis in variety.
Osmanthus ilicifolius.
,, rotundifolius.
Buxus in variety.
Skimmia, two sorts.
Euonymus in variety.
Arbutus in variety.
Tree Ivy.
Garrya elliptica.
Ligustrum japonicum.
,, ovalifolium.
,, Ibota.
Rhamnus Alaternus.
Pernettya of sorts.
Rhododendrons.

Deciduous.

Acer Negundo.
Almond.
Cherry, double-blossomed.
Laburnum.
Planes in variety.
Euonymus europæus (Spindle-tree).
Judas-tree (Cercis).
Hippophae rhamnoides (Sea Buck-thorn).
Pyrus japonica.
Quince.
Alder, cut-leaved.
Pear of sorts.
Viburnum Lentago.
Hypericum patulum.
,, oblongifolium.
,, calycinum.
Prunus Pissardi.
Euonymus atropurpurea.
Poplars of sorts.
Maples of sorts.
Berberis of sorts.
Cratægus Carrierei.
Spiræa of sorts.
Rhus Cotinus.
,, typhina.
Gleditschia.
Acacia in variety.
Gueldres Rose.
Syringa of sorts.
Deutzia scabra.
Prunus of sorts.
Leycesteria formosa.
Privet, common.
Forsythia viridissima.
Elder of sorts.
Rhamnus Alaternus.
Rhodotypus kerioides.
Pterostyrax hispidum.
Cornus sanguinea.
Salix rosmarinifolia.
Cut-leaved Hazel.
Lonicera Ledebourii.
Snowberry.
Lilacs of sorts.
*Ailantus.
*Mespilus.
*Birch.
*Beech.
*Virginian Creeper
*Jasmine.
*Ivy of sorts.
*Passion-flower.
} Creepers.

The eight sorts marked thus * were not shown, but have been added to the list because considered suitable by Messrs. Wm. Paul & Son.

CHINESE PRIMULAS.

By Mr. A. W. Sutton, F.L.S., F.R.H.S.

[Read Nov. 11, 1890.]

The subject which I have been asked to introduce this afternoon cannot be said to be unpopular, and my task is therefore the more agreeable, although, on account of its very popularity, so much has been written and said about the Chinese Primula that little which is new or of sufficient importance to bring to the notice of the Royal Horticultural Society remains for me to say.

It is, however, a very wide subject, for had I been limited to any one aspect alone, such as the history of the species, its introduction into Europe, the most popular varieties, the best methods of cultivation, cross-fertilisation, &c., &c., enough might have been said to form a lengthy paper, if dealt with at all fully.

As it is, I propose to say a few words under each of these heads, and if in any degree it serves to create increased interest in the Chinese Primrose I shall be more than satisfied.

The History of the Chinese Primula.

This may naturally be considered first, and at the outset it strikes one as a remarkable fact that a plant which, next to the Geranium, is perhaps the most popular for conservatory and window decoration, has only been known in England for the brief space of seventy years; or, in other words, that there are many Fellows of the Royal Horticultural Society now living during whose early childhood the Chinese Primula had neither been seen nor heard of in this country, or indeed in Europe.

The genus *Primula*, representative of the widely distributed family *Primulaceæ*, contains at least 150 species, which number is being constantly added to by newly discovered species and interesting forms, and crosses resulting from the work of our hybridists.

Name and Synonymy.

The name "sinensis," by which the species is familiarly known, was given to the plant by Sabine in 1821, who was a few

years afterwards Secretary of the Royal Horticultural Society (*cf.* Lindley's "Collectanea Botanica," t. 7). Several other names have been proposed and published :—

"P. prænitens" by Ker, in the *Botanical Register* for May 1821, t. 539.

"P. sertulosa" by Kickx, in De Candolle's "Prodromus," vol. viii. p. 36.

"P. mandorina" by Hoffsmannseg, in Otto Dietrich's *Allgemeine Gartnerei Zeitung*, 1835, p. 195.

"P. semperflorens" by Loiseleur.

The names "sinensis" (Sabine) and "prænitens" (Ker) were published in the same year, and the latter probably earlier in the year than the former; for Ker gives as a reason for not adopting Sabine's unpublished name, the fact that a Spanish botanist, Loureioro (in "Flora Cochin-chinæ," p. 105) had already published a "P. sinensis," which might or might not belong to the genus. This plant still remains obscure, and Sabine's name, "sinensis," has been universally adopted.

Habitat of Species.

In Dr. Masters' able article on the "Chinese Primrose," which appeared in the *Gardeners' Chronicle* for January 26, 1889, we read: "Within the last few years we have for the first time gained a knowledge of the wild plant, which was found on dry calcareous rocks, exposed to full sun, in the gorges of Y-Chang, in the province of Ho Pé, Central China, by the Abbé Delavay, and also by our countryman, Dr. Henry. Good specimens from the latter gentleman are preserved in the Kew Herbarium, and they show that the plant has a creeping and branched rootstock about the thickness of a swan-quill, with small, stalked leaves, most of which are rounded and lobed, while others are elongated as in the Fern-leaved section. The flowers are small, have a distended five-lobed calyx, varying a little in form, destitute of cresting, a light pink corolla, with a yellow eye, each petal notched, but not fimbriate. The outlines (fig. 17) show sufficiently for our purpose the leaf (A, B), petal (C), and calyx (D, E, F) of the wild Chinese plant, while fig. 18 shows a flower of a cultivated plant which has so nearly reverted to the original condition that we may take it as an illustration."

I have copied the figures referred to, as I think they will enable my hearers to better appreciate the interesting details given by Dr. Masters in his article.

The Distribution of Species.

The distribution of the species is evidently very restricted, for Y-Chang alone is mentioned as a "habitat" by Delavay, Henry, Watters, and Hance in Forbes and Hemsley's "Enumeration of all the Plants from China Proper," now in the course of publication in the *Journal of the Linnean Society*.

With reference to its being a native of China, I find in the report of the Primula Conference, in the *Royal Horticultural*

Fig. 17.

(From the *Gardeners' Chronicle*.)

Fig. 18.

Society's Journal, vol. vii. p. 190, it is stated as follows: "We have also received an interesting note from the director of the Hong Kong Botanical Garden, a record of the culture of this same *P. sinensis* in China. He says, 'We manage to grow the cultivated varieties of *P. sinensis* in Hong Kong during the cold season, but they invariably damp off when hot weather sets in; they have not even time to mature their seeds. We have therefore to get a fresh supply from England every autumn.'"

Introduction of the Chinese Primula into Europe.

The earliest date named in connection with the culture of the Chinese Primula (according to an article which appeared in the *Gardening World*, December 17, 1887) is the year 1819. The

writer states that "the first evidence of its existence was in 1819. John Reeves, Esq., then a resident in China, sent home drawings of it, which excited much attention. At the request of the Royal Horticultural Society he sent home seeds and a plant, both of which failed. Soon after this Captain Rawes succeeded in bringing home a live plant, which he presented to a relative of his, Mr. Thomas Palmer, of Bromley, Kent, who managed to flower it. According to Lindley this was in 1821."

Turning again to Dr. Masters' article of January 26, 1889, we read: "The Chinese Primrose was introduced to this country about 1820 from *Chinese gardens*. The original introduction was from two sources, and different in character, one set having relatively small flowers and smooth-edged petals, while the other set had indications of the crenated edge and wavy margin that characterises so many of the best varieties of the present day."

These quotations which I have given are, as you will have noticed, from recently published articles, but an extract from Curtis's *Botanical Magazine*, vol. lii. t. 2564, bearing the date 1825, will be of still further interest, more particularly as it was accompanied by a very beautiful water-colour drawing made in 1825, and representing the plant as it was then known, some five years after its introduction.

In the description accompanying the plate, which depicts a red-flowered plant (no mention being made of variation in colour of the flowers), the corolla is said to be "saucer-shaped, tube half an inch long, limb plain, five-cleft; laciniæ-obcordate, generally with quite entire margins, but sometimes on the same plant, from luxuriance, variously incised, *oblique with regard to the tube*.

"The first plant that flowered in this country had so generally more than five teeth to the calyx, and a corolla so variously jagged, as to lead to a doubt whether it really belonged to the genus *Primula*, and Dr. Hooker has considered the species as consisting of two distinct varieties, but to us it appears most probably that whenever the number of teeth of the calyx exceed five, *and the margin of the corolla is not entire*, this deviation is the effect of cultivation, and arises from luxuriance only.

"This beautiful acquisition to our greenhouses was received from China, and first cultivated with success in this country by Thomas C. Palmer, Esq., of Bromley, Kent, who kindly communicated recent specimens in its different stages of growth.

This gentleman observes 'that it is generally considered as very shy of producing seed, but that he always has sufficient, and remarks that impregnation is assisted by blowing into the flower. He treats it as a very hardy greenhouse plant, says it thrives best in rich loam with a large proportion of sand, and requires to be well watered, but not over the plant, as it is apt to rot at the crown. It is rarely out of bloom, but is in its greatest beauty in the winter and spring months.'

"In the present month (March 1825), at the Royal Horticultural Society's establishment at Chiswick, we were delighted with seeing a large collection of these plants under glass, in the front of one of the houses. When viewed in this manner, assembled many together, they are seen to much greater advantage than in detached individuals."

It cannot fail to be a great satisfaction to many to see how at this early date the Royal Horticultural Society was doing an excellent work in testing and acclimatising new plants from foreign sources.

Another very interesting reference to the Chinese Primula is found in the first volume of the *Gardener's Magazine*, part 1, 1826, where, amongst "Foreign Notes," is the following, taken from the "Annals of the Linnean Society of Paris," March 1825 :—

"*P. sinensis*.—This plant is greatly prized in France and the Netherlands, where, under glass, without fire heat, it flowers abundantly the whole year."

Again in the same volume, under the still familiar title of "Calls at Nurseries," we find the following: "Lee's Nursery, Feb. 16, 1825.—In the heath-house a great number of species are under cultivation and in flower; but in this nursery, as everywhere else, the most conspicuous plant in flower is *P. sinensis*." This notice is also accompanied by an engraving of the plant as then growing in Mr. Lee's nursery.

Then, again, in the *Horticultural Register* for 1833, I find the following note by Mr. Thomas Upton, from Alton Gardens, February 22: "This plant, the Chinese Primula, was introduced into this country in 1820, and from its free-blooming habits and splendid appearance in the winter months, when under good cultivation, is deserving of the interest of every lover of plants;" and then follow some cultural notes.

Thinking that the leading growers of Primulas in France and Germany might be in a position to give me some useful notes about the introduction of the Chinese Primula on the Continent, I communicated with my friend M. Henri L. de Vilmorin, of Paris, so well known to Fellows of the Royal Horticultural Society; with Messrs. Stuart & Co., of Nice; and with Mr. Fritz Benary, of Erfurt, all of whom were most ready to give me any information in their power.

M. de Vilmorin endorses what I have already mentioned as the introduction of the plant in 1820 from Chinese gardens, and the recent discovery of the wild plant by the Abbé Delavay. He also describes the first plant introduced as having "a pale pink corolla, almost flesh colour," and states that "the white variety was the first sport obtained. The petals of the pink variety were rounded, cleft in the middle, and heart-shaped if taken singly. The trusses bore three, and even four, whorls of pale small flowers, the leaves were palmate, and not fern-leaved." He also gives the dates when the varieties of the plant now so well known were grown by his house.

Messrs. Stuart agree generally with M. de Vilmorin, but name the spring of 1821 as the date when introduced into England. They say "the original plant came from Canton, where it had been cultivated for some time previously. The colour was red," but they state that "the edges of the petals were jagged or dentate, the foliage palmate, green on the surface, and of a reddish tinge beneath."

Mr. Fritz Benary, of Erfurt, whom I have known intimately for many years, sends me a most interesting communication, which, as it contains a report from a Primula grower, who himself sketched the plant in the Botanical Gardens at Hamburg so long ago as 1837, I will quote somewhat fully.

Mr. Benary says: "A small florist of Eisenach, named Schwabe, was regarded as the raiser of *P. fimbriata alba*, and I thought I could not do better than apply to him for some information on the point. He is a man of much experience, and a good botanist. He has very kindly given me, as far as his knowledge goes, the history of the *Primula sinensis*, and I transcribe hereafter the salient points of his communication. Mr. Schwabe writes: '*Primula prænitens*, Kar-Gawler, was introduced from China into Europe, probably into England, in 1820.

Lindley named and described it in his "Nomenclator Botanicus," which appeared in 1821, but it does not even figure in the second edition of Loudon's "Encyclopædia of Gardening," issued in 1824; it may therefore be concluded that even in England the dissemination of the Primula proceeded but very slowly. The *Deutsche Garten-Magazin* contained a plate and description in 1824. Sprengel's "Systema Vegitabilium" mentions *P. prænitens*, with synonym, as early as 1825; and in Bosse's "*Handbuch der Blumengartnerei*" were comprehended already nine varieties, viz. *alba*, *densiflora alba*, *densiflora rubra*, *fimbriata rubra*, *fimbriata alba*, *alba flore-pleno*, *monstrosa*, *striata*, and *viridiflora*.

"'When the plant came to Germany I cannot say, but probably before 1830. I myself got to know it in the spring of 1837 in Hamburg, where I sketched one of the few specimens then growing in the Botanic Garden of that city. The advance in the culture of this Primula, and the raising of the nine varieties (including the *fimbriata alba*) named by Bosse, took place between the years 1837 and 1842. From this it follows that, as my becoming a florist dates from 1847 only, I cannot have been the raiser of the *fimbriata alba*. On the other hand, as far as my knowledge goes, I was the first to considerably improve this originally poor and inconstant variety, and this I did between the years 1847 and 1852, saving a certain quantity of seed, which was disposed of to the principal seed firms of Germany. *Primula fimbriata rubra* and *P. filicifolia* I saw first of all in Mr. Ernst Benary's establishment, and have always considered him to be the raiser of the last-named.' (This supposition of Mr. Schwabe's is, Mr. Benary says, quite correct.)

"'About 1854 a few plants having long crispate leaves made their appearance with me too, but, not finding the form particularly remarkable, I discontinued growing it. I also raised a white un-fimbriated Primula, with dark foliage, and called it *rubicaulis flore albo*, but a few years later the somewhat similar but much more beautiful *fimbriata striata* was raised by Mr. Ernst Benary. My *rubicaulis* was rapidly superseded thereby, and soon sank into oblivion.'"

Having thus traced the early history of the plant until the moment of its "improvement" by hybridists, I think we may best connect its early history with modern practice by a table,

showing as nearly as possible the dates when various modifications of the original type were fixed and offered in trade catalogues. For this purpose it may be sufficient if I quote from the three sources above named as representing France and Germany, and from our own catalogues for this country. At the same time I would not have it supposed for a moment that I lost sight of the great advance made by other English florists, but the number of growers in England who have devoted time and attention to Chinese Primulas is so large that it would be impossible within the limits of this paper to mention even briefly the results of their labours.

TABLE.

1837–1842. First advance made in raising distinct varieties, nine of which are named by Bosse. Seeds of these were distributed to German houses.

1840. Messrs. Vilmorin, of Paris, were cultivating fringed varieties.

1847–1852. Benary was cultivating *P. sinensis*, "red" and "white."

1850. Messrs. Stuart were cultivating some varieties of *P. sinensis*.

1852. I find that my own house was distributing seed of *P. fimbriata* at 1*s.* per packet.

1853. The same at 6*d.* per packet, also *P. sinensis* in mixed colours at 3*d.* per packet. I mention these prices, as they are somewhat significant, for, however popular *Primula sinensis* was at that time amongst nurserymen, the fall in price from 1*s.* to 6*d.* and 3*d.* in one year would seem to indicate that no general demand had set in.

1853. Messrs. Vilmorin offered seed of Double Pink and Double White.

1854–1856. Benary was offering a variety called *alba rubro-striata*, and he also offered the following varieties :—

1856. *Cupreata.*

1857. *Fimbriata striata.*

1859. *Kermesina splendens.*

1861. *Erecta superba.*

Up to this date all the varieties known had foliage of the palmate form; but in

1864. Benary first offered *filicifolia rubra*, or Red Fern-leaved; and the following year *slicifolia alba*.

1864. Messrs. Stuart mention that they were cultivating fern-leaved varieties this year.

1864. My house was offering a strain known as Dobson's Choice Auricula-flowered, and in

1867. We were offering "Finest Double *P. sinensis*."

1868. Benary offered Double White Primula, Double Red, and Double Carmine.

1868. My house were distributing a strain raised by Mr. Williams, and we offered in

1869. *Erecta alba violacea*; also in

1870. A fine variety named Magnum Bonum, which has since been too much lost sight of.

1870. My house were distributing seed of fern-leaved varieties, and M. Vilmorin was cultivating the fern-leaved sorts, and in

1871. He offered these, but mentions that fern-leaved plants had been shown at exhibitions as far back as 1868.

My house next offered the following :—

1873. Varieties named Florence, Marginata (this latter was a lilac variety with very pale edges), also *carminea alba punctata*.

1874. Village Maid.

1875. M. Vilmorin mentions that the "Lapipe" Primula was offered this year, which he describes as the first deep-coloured variety *with rounded petals*.

1875. The fringed varieties of the same Primula were grown by M. de Vilmorin, and described as "purple-red" and "blood-red," from which he states, or parallel with which, the whole of the Chiswick Red and similar varieties were developed. This, I think, is very likely to have been the case, as florists who grew Continental strains at this time found many sports greatly resembling the Chiswick Red. In

1876. Double Prince Arthur, a pale carmine variety, was offered by my house, and in

1879. Ruby King (*First-class Certificate Royal Horticultural Society*).

The following year we introduced :—

1880. Pearl.

1881. Reading Pink, Rosy Queen, fern-leaved, Double Lilac.

The next year we offered

1882. Williams's *alba magnifica*, remarkable for the perfect frimbriation of the petals, but not grown so much as it would otherwise be, because the calyx is of an abnormal size, and of such vigorous growth that the corolla falls from the plant somewhat prematurely. After this we sent out

1884. Princess Beatrice, Reading Scarlet, Reading Blue, Snowdrift, fern-leaved.

1885. Gipsy Queen, a white fern-leaved variety, with leaf-stalks almost black.

1886. Giant Lilac, Double Scarlet (*First-class Certificate, R.H.S.*), Double Rose (*First-class Certificate, R.H.S.*).

1887. Moss-curled, "white" and "lilac." These varieties showed a very distinct break in the form of the foliage.

1888. Blue, fern-leaved; Double Blue (*First-class Certificate, R.H.S.*); Double Carmine; Double White, fern-leaved; Double Blue, fern-leaved (*First-class Certificate, R.H.S.*); Single Blue, fern-leaved.

1889. Giant White, Giant Crimson, Double Crimson.

As I mentioned before, while we have been raising and introducing the varieties above named, other florists have likewise introduced many valuable varieties, some remarkable for their brilliant colours, and others for extraordinary vigour and robust growth, combined with massive flowers.

Cultivation.

Although a true perennial, it is generally admitted that the best results can be obtained by treating the Chinese Primula as an annual or biennial. The best season of the year for sowing is from March to May, and, under favourable conditions of atmosphere and temperature, the earlier varieties will begin to show masses of bloom about the end of September or beginning of October; and by a judicious selection of sorts the blooming period may be extended till late in the spring.

It will be found, as a rule, that the more robust types, bearing

very large and massive flowers, are the latest to bloom, and they seldom produce so many flowers to a plant as the earlier varieties.

So much has been said from time to time as to the details connected with the cultivation of the Chinese Primula that I think it would be superfluous for me to add anything here, although it may be interesting to quote the cultivation adopted by Mr. Thos. Upton, of Alton Gardens, in 1833, from which we shall see what changes have taken place in culture alone.

Mr. Upton says: "The following is the method of culture we pursue: In the month of October we make cuttings of all our old plants, taking them off a little above the surface of the soil. We then fill with a rich prepared compost various-sized pots, according to the size of the cuttings; in each pot we plant one cutting, and put a little white sand around it; then, with a fine perforated rose, we give them a little water in order to settle the mould. Afterwards we remove them to a close frame, and plunge them in a little bottom heat, admitting no air until they begin to grow. As soon as they show flower we remove them to the greenhouse, where they are greatly admired. The old root may also be plunged in a little heat, which will sometimes make it shoot vigorously and produce abundance of cuttings. Under this treatment we have a plant of the white-flowering species (which is by no means very common) that produced 97 fine flowers from seven flower-stems. They also produce abundance of seed, by which they are easily raised."

From this quotation we see that the custom of growers has entirely changed, and whereas Mr. Upton grew almost exclusively from cuttings, now it is found so very much easier and less expensive to grow from seed that cuttings are seldom made.

Cross-Fertilisation.

A great deal might be said under this head, but I have already exceeded the time usually allotted to readers of papers, and I must confine myself to a few general remarks.

In the first place, hybridists do not all work with the same object in view, and consequently their methods are different.

If the aim be to produce a race with moss-curled foliage, parents would be naturally chosen with leaves showing some tendency in this direction.

If, as it sometimes happens, a race of Primulas has been obtained in which all the strength of the plant seems to have been concentrated in the foliage, and the flowers show unmistakable signs of reverting to the original forms, the hybridist would seek to correct this tendency by introducing blood from another race, conspicuous for the perfect form of the flowers.

Then again, in the fern-leaved section, for many years after its introduction, the leaf-stalks were of such a length that the plant could not generally be used for table decoration, and it has been the aim in our own case, and doubtless with others, to alter this by cross-fertilisation and selection, so as to secure a race of fern-leaved Primulas as compact in form as any of the varieties with palmate leaves.

Perhaps the most constant aim of the hybridist is to produce some novelty or improvement in colour (which may apply either to the flower or the foliage), and in order to secure this very many years of patient labour are needed.

It may be interesting to note, as showing the increased attention given of late years to cross-fertilisation as compared with selection only, that whereas in the year 1875 we ourselves made two crosses, the number has recently risen to as many as sixty-four separate crosses in one season, all made with a definite object in view; the object being to produce some distinct advance in colour, form, habit of growth, or size of flower, &c.

The more divergent the types chosen for crossing, the more numerous, of course, will be the variations in the seedlings. This is shown by the following figures. Whereas in 1875 (the year in which only two crosses were made) we grew 18 varieties, that number had by the year 1888 been increased to 255; although out of this number only 29 were considered of sufficient merit to find a place in our catalogue, with the exception, of course, of a certain number of seedlings giving promise for the future.

As an illustration of the amount of detailed work often required in raising a distinct race of Primulas, I may give the history of our Reading moss-curled types. In 1882 we had a batch of double white Primulas, in which there was one plant in such an unhealthy condition that it never received a shift from a 72-pot; we called it a cripple, because of the deformed

leaves, which were notched and twisted, and in growth it resembled the variety called *alba magnifica*. When it flowered the petals were green; on examination of the organs they proved to be fertile, and were fertilised with their own pollen. In 1883 the seedlings were all white and very weak, and in this year we made the first cross, 1×83, with bright coloured flowers of a Chiswick type known as *P. rubra violacea*. This opposite blending was to impart strength and colour to the seed-bearing parent. From this opposite crossing we obtained plants with dark stems having lilac flowers. In 1884 we crossed Reading Scarlet on the produce of No. 1×83. During the same year another cross was made, No. $36\frac{\times}{84}$, using the pollen of $1\frac{\times}{83}$ on the original, and we continued to do so for three consecutive years. In 1885 we crossed Double Lilac on $1\frac{\times}{83}$. This cross produced the fern-leaved section of our moss-curled race. In 1886 we obtained a double lilac mottled flower, deeply fringed, curled foliage with bronze edges. This feature only lasted two years and then disappeared. We also selected from the seedlings this year one with a peculiar crisped form of fern-leaf foliage.

The next year (1887) we made five selections, one of which was white, but showing a distinct moss-curled foliage.

The same again in 1888, and in 1889 the number was reduced to four types.

So curious and various have the forms of the leaves been that they have sometimes been designated moss-curled, sometimes parsley-leaved, sometimes crispifolia, and even kale-leaved, and eventually illustrated and offered in our "Amateur's Guide" for 1887 as "Moss-curled White" and "Moss-curled Lilac."

In the *Gardeners' Chronicle*, January 26, 1889, Dr. Masters gives an engraving of this Primula as seen growing by him in our houses, and which he describes as "a new type of foliage, oblong, but crested." (See fig. 19 on next page.)

The Chief Uses of the Chinese Primula.

Under this heading I need say little, for everyone knows the chief uses to which the plants are put; amongst which may be noted, first of all, greenhouse and conservatory decoration, window decoration, table decoration, and as cut flowers. For this latter purpose the double varieties are preferable, because they remain in good condition the longest.

For table decoration and as cut flowers discretion will be, of course, necessary, according as the flowers are required for use by day or under artificial light, In the latter case certain

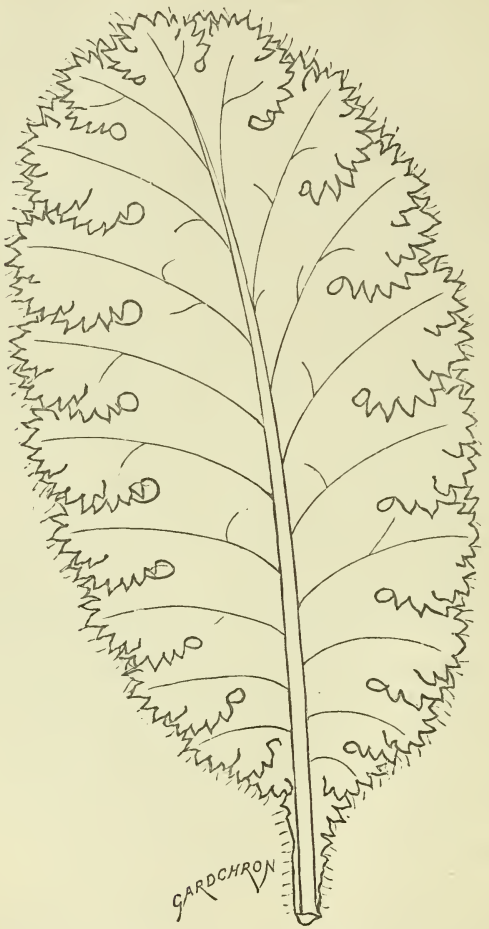


Fig. 19.—Leaf of Chinese Primula. (From the *Gardeners' Chronicle.*)

varieties, especially those of the carmine and scarlet types, are infinitely more showy.

The uses, moreover, to which the Chinese Primula may be put depend greatly upon the climate. In our own country it

is seldom, if ever, found safe to expose them out of doors, whereas in the South of France at Christmas time I have seen in the Public Gardens at Nice Chinese Primulas used as bedding plants without the slightest protection, just as we might use Lobelias or shrubby Calceolarias in summer.

In conclusion, I would only say that while endeavouring to make my remarks interesting, I am more than conscious of the fact that very much has been omitted which ought to have been included in any paper on the Chinese Primula read before the Fellows of the Royal Horticultural Society.

Discussion.

Dr. Masters said that a great contrast was observable between the Chinese Primula and the Chrysanthemum in the kind and degree of variation presented by them respectively. There was much less variation in the Primula than in the Chrysanthemum, and he thought this might be attributed to the fact that the Chinese Primula was pure-bred, the offspring of one species only, and that it had been *relatively* but a short time in cultivation, at least in this country. The Chrysanthemum, on the other hand, was probably the descendant of two or more species, the varieties of which had been selected and intercrossed for ages, either purposely or by insect agency, by the Chinese and Japanese.

The Chinese Primrose was first introduced to the notice of the Society by Mr. Reeves in 1819, and, in the following year, a living plant was brought over by Captain Rawes. Other importations followed, and the plant soon became popular. But all these were cultivated forms, or derived from the gardens of Chinese ports and towns. It was not till a few years ago that anything definite was known as to the wild plant. At the Primula Conference held in 1886, however, a communication was read from M. Franchet (Report of Primula Conference, *Journal of the Royal Horticultural Society*, vol. vii. (1886), p. 189), in which the discovery by the Abbé Delavay of the wild plant on calcareous rocks in the gorges of Y-Chang was announced. Since that time it has been ascertained that the plant was originally discovered in the same locality at an even earlier period, viz., in 1879, by M. Watters. About the same time that the Abbé

Delavay sent home specimens, or shortly after, Dr. Henry also met with the plant on hot, dry limestone rocks with little moisture. (See *Gardeners' Chronicle*, January 26, 1888, p. 114.)

On visiting the gardens at Appley Towers, near Ryde, in the autumn, Mr. Myles, the gardener, had shown Dr. Masters some young plants raised from seed from Y-Chang by Mr. Pratt, and which Dr. Masters immediately recognised as being the wild form collected by Dr. Henry. The plants were, however, not in flower. These plants, the leaves of which have a slight fragrance, he was very glad to see that day exhibited by Messrs. Sutton, as in their hands the doubtful points would be cleared up and new varieties obtained. He trusted also that Messrs. Sutton would endeavour to cross the Chinese Primrose with the common Primrose, or with some of the other hardy species, and thus confer a great boon on the cultivators of hardy plants. Hitherto, he understood that Mr. Martin, the expert who hybridised and cultivated Messrs. Sutton's Primroses, had been unsuccessful in this direction, a fact which, in the case of Messrs. Sutton, only showed the necessity for further effort.

ON THE INFLUENCE OF THE MYCELIUM OF USTILAGO VIOLACEA (PERS.) ON ITS HOST PLANTS.

By Mr. C. B. Plowright, F.L.S., F.R.H.S.

On Lychnis.—It has been asserted that the presence of the mycelium of *U. violacea* (*U. antherarum*, Fr.) in a plant of *Lychnis vespertina* will change the sexuality of the host-plant, simply by its action upon the stamens of the plant. But it has very naturally been objected that there is no evidence to show what the sex of the Lychnis plant originally was. Having during the past three or four years cultivated in my garden various individuals of *L. diurna* and *vespertina* affected with the parasite in question, the results of my observations may not prove uninteresting. In studying the life-history of these parasitic fungi nothing is so valuable as cultivating the host-plants in a garden and continually watching their growth and development. In the first place, it has always been taken for

granted that when a parasite attacks all the reproductive organs produced by a given plant, as when all the ears of a Wheat plant are affected with bunt or smut, that the parasite has gained admission into the host-plant at some early period of its existence; with the above-named parasites this is perfectly true, and it is most likely to be the case with the majority of other plants all of whose shoots produce infected flowers.

In the summer of 1888 I transplanted into my garden a healthy female plant of *Lychnis vespertina*. The object I had in view was to see if I could discover how and when *Ustilago violacea* effected its entrance into the Lychnis, and also to learn whether the *U. violacea* on *L. diurna* and on *L. vespertina* were the same species. My idea was that the spores from the diseased anthers were carried with the pollen, either by insects or otherwise, to the stigmata of healthy plants, and that the resultant seeds would produce plants infected with the Ustilago. For the purpose, then, of obtaining artificially infected seeds, the healthy female plant of *L. vespertina* was placed near a number of diseased plants of *L. diurna*. After due time the *L. vespertina* became established and produced healthy flowers, the long-pointed stigmata of which projected well beyond the tube of the corolla. Being sizeable objects and white in colour, it was very easy to apply the Ustilago spores to them. In due time the seeds ripened, and with much care and ceremony were duly planted. The seedlings which came were, however, very few in number and perfectly healthy! The parent plant was not removed, but, to my great astonishment, when it flowered this spring (1889) it had changed its sex; not a single female flower has it produced this year, but every blossom has contained anthers only, every one of which has been affected with *U. violacea*. It would be unwise to attach too much importance to a single case, but the probability of error in this case is very small. It was the only plant of *L. vespertina* in my garden, and its sex had been made the subject of special and frequent observation. We have here, therefore, an illustration that the presence of the mycelium of *U. violacea* can change a female into a male plant, and further, that the fungus can sometimes at least effect an entrance into an adult plant. The mode by which this has been accomplished is unknown to me, and I have no intention of theorising upon it.

In the same garden have been grown six plants of *L. diurna*,

all of which were infected with the *Ustilago violacea*. Of these five were male plants and did not produce a single seed-vessel. The other has produced female flowers only, but their sexuality has not been equally marked. When it first began to produce flowers it was evident from their external shape that they each contained an ovary. Upon closer examination, however, anthers were found in each flower filled with the Ustilago spores. The stigmata of these flowers were, if not absent, at least reduced to mere points a millimetre or two at most in length on the top of the ovaries. After a time flowers were found with smutted anthers, but longer and better developed stigmata. Towards autumn some few of the flowers were found without stamens, but with well-developed stigmata, and eventually ripe capsules were developed with perfect seeds. From previous experiment I have found that seeds thus produced by an affected plant, although they are few in number, yet when sown gave rise to infected plants. It would thus appear that the fungus has a very potent influence upon the reproductive organs of the host-plant, and although it is spore-producing, hyphæ are confined to the anthers, yet it does influence the development of the stigmata and the production of seed.

Barley Smut.—Herewith are sent two specimens of Barley Smut (*Ustilago segetum*). From the observations of Mr. J. L. Jensen, which he communicated to me last year, he informed me that he had reason to believe on biological grounds that there were at least two distinct species of Ustilago affecting Barley—specimens of which he was kind enough to send me. The commoner he calls *U. nuda*, because the spores are almost naked, and they are soon dispersed by the wind and weather, leaving only the bare rachis of the Barley. The other, much less common, *U. tecta*, has its spores enclosed in a membranous capsule. They form, moreover, much more compact masses and resist the disintegrating influences of the weather for a much longer period (see Plowright, *Brit. Ured. and Ustilag.* p. 274). The two species also differ in size and colour and their spores.

The same observer has arrived at the conclusion, on biological grounds, that the smuts of Wheat, of Barley, and of Oats are distinct species and incapable of infecting other than their proper host-plants—that is to say, the smut of Oats will not affect Barley or Wheat, and *vice versâ*. The biology of the smuts

affecting our cereals, excepting bunt (*Tilletia tritici*), is not by any means absolutely known even yet. From the remarkable discoveries of Brefeld, that they can exist for long periods outside living plants, it seemed as if the problem had been definitely solved. There are, however, still remaining certain points to be cleared up. For instance, Brefeld found that when the spores of *Ustilago segetum* were placed in a sterilised decoction of herbivorous excreta, they formed yeast-colonies, and continued to reproduce themselves by budding like yeast cells until the nutrient fluid was exhausted. He therefore concluded that it was from the farmyard manure that the cereal crops became infected. At the time his observations were first published, being much interested in the subject, I made careful inquiries amongst the farmers of West Norfolk as to whether their crops were not much more injured by smut when they were fertilised with farmyard manure than when artificial manure was employed. I also examined a number of fields myself with this point in view. But as far as I could see, and as far as I could learn, there was as much smut after artificial as after farmyard manure.

Then, again, the exact contour of a large manure-heap in a field can be readily enough made out by the luxuriance of the growing crop as compared with the rest of the field; but, contrary to what one would have anticipated from Brefeld's observations, smutted ears are not more common on the site of the manure-heap than elsewhere in the field. Perhaps some member of the Scientific Committee better conversant with Brefeld's more recent writings than I am may be able to clear up these points. I have elsewhere stated in detail my non-success of infecting cereals with smut (*Ured. and Ust.* p. 101).

NOTES ON HOAR FROST.

By Mr. C. B. Plowright, F.R.H.S., F.L.S.

Injuries to Trees by Hoar Frost.—The remarkable hoar-frosts, which excited so much admiration on the part of all those who were fortunate enough to see them, in the early part of January 1889, have produced results in this district such as the present generation has not before witnessed.

The grandest sight was on Monday, January 7, 1889. During the morning the fog, which had enshrouded everything more or less for the two previous days, lifted, and the sun illumined a perfect fairyland of hoar-frost. In the town of King's Lynn the overhead telephone-wires were broken down in all directions by the sheer weight of the rime. In the country the trees and hedges almost baffled description. One striking feature was that the icy crystals were deposited in almost every instance unilaterally—on one side of the twigs only. To such an extent did this occur that instead of being round they appeared flat. I measured the depth of this hoar-frost fringe on several trees at Wolferton, and found it varied from one and a half to two inches. The fringes all pointed in the same direction—southward. A galvanised wire netting, not usually an attractive object from an æsthetic point of view, was transformed into a gigantic honeycomb of hoar-frost crystals, the cells of which were an inch or more deep. The Fir-trees were pyramids of ice, and the telegraph-wires became flat ribbons of icy crystals. On the 8th came the thaw, and on the 9th one was able to observe accurately what mischief had been done to the trees.

The first tree to attract my attention was the Birch. One small individual near Wolferton Station had a branch amounting to nearly one-third of the tree broken quite off and lying on the ground. More generally, however, it was the smaller branches at the top of trees which suffered. These were in most cases split off, but still remaining attached to the tree. On South Wootton Heath almost all the isolated trees suffered more or less. The branches on the south side of the trees suffered most. A clump of Birches at Wolferton looked as if a mischievous boy had climbed up and twisted off a number of the upper branches.

But the tree which suffered most of all with us was the Elm. It is the most abundant hedgerow tree. Branches of all sizes were broken off; the smaller ones, as a rule, remained attached to the trees, but in many instances large arms were broken off. On the morning of the 8th some of the early travellers—notably the carriers' carts—coming to Lynn market were so impeded by the fallen branches that they had to dismount and clear the road before the carts could pass.

Amongst the finest—if not the finest—Elms in West Norfolk are a row of seven opposite Middleton Hall. These lost many limbs and branches. The Hon. Miss Milles measured one

of these broken-off limbs and found it to be 5 feet 6 inches in circumference and 1 foot 10 inches in diameter.

Fig. 20.—Oak-tree, Branch broken off by Hoar Frost.

The Oaks were also very much injured in many districts round King's Lynn. As a rule the broken branches remained attached to the trees. (See fig. 20, from the *Gardeners' Chronicle*.)

Many Willows and Black Poplars lost large limbs; but the Ash —although many of them were loaded with *samari*, which one would have thought would have afforded a much larger attachment surface for the hoar-frost than the bare twigs of the Elms and Oaks—almost universally escaped injury. The same is true of the Scotch Fir. I have only observed two or three injured Firs anywhere near Lynn.

The Hoar Frost of January 1889.—A short time since I sent to the Scientific Committee some specimens of Elm twigs and branches broken by the rime of January 8, 1889, and with them a series of photographs of Elm, Birch, Willow, and Oak trees taken by Mr. Herbert Tilson from various trees near King's Lynn, showing the rime-injuries to them *in situ*. So unusual a phenomenon naturally excited the interest of the Committee, who through their secretary requested further evidence to show that the injuries in question were really caused by rime and not by the action of wind upon branches loaded with snow. The most difficult fact to believe is that such large arms as shown by the photographs were really broken off by this cause. Of course the amount of rime was phenomenal. No one that I have met, and I have inquired of most of my friends as well as of others, ever saw such a one in this district. The influence of snow is quite out of the question, because there was no snow at all. It can readily be understood that snow, melted and then frozen upon the branches, might, if a strong breeze had arisen, have caused somewhat similar injuries. But from Friday, the 6th, to Monday, the 9th, we had no wind—the weather was as calm as it could be. Of more value, however, than these dogmatic assertions is the subjoined evidence obtained from actual observers.

The large branch which broke off the Elm at Middleton Hall fell down at about 5.20 on the evening of Saturday, January 7. Mr. Lewis Milles passed under the tree about 5 P.M., and he informs me that it was perfectly still at the time; there was no wind whatever when the arm fell, and there had been no snow.

On Sunday morning, January 8, Mr. Charles Bristow was walking along the Castle Rising Road about 11 A.M.; he both heard and saw a bough break off a Birch-tree. The morning was perfectly still, and there had been no snow during the night. Photographs of Birch-trees from this place were sent to the

Scientific Committee last month. Mr. S. N. Marshall, of The Elms, West Lynn, informed me that branches were breaking off the trees in and around his garden all Sunday. The trees which suffered most with him were Black Poplars; to such an extent did this occur that nearly a waggon-load of branches had to be cleared up on Monday. The branches were bent down so that they almost touched the ground, and gave way from time to time during Sunday up to 3 P.M. So remarkable was the sight that he and the members of his family watched the trees break during the morning, and remarked "There goes another branch" as each successive bough gave way under the weight of the hoar-frost.

Mr. Herbert G. Ward observed on Sunday morning the remarkable manner in which the Poplar arms were bowed down by the weight of the rime and the numerous arms which were broken off by it.

I would only add—the manner in which the branches broke off, but remained attached to the trees, seems to be a distinctive feature of rime-injuries. This does not apply to the Willows and Poplars, the vast majority of whose branches fell to the ground, but to the smaller branches of the Elms, Birches, and especially of the Oaks. It was a remarkable sight to observe the broken but still pendent branches of the Oak-trees upon the Hillington Road.* For about a mile the trees on both sides of the road had one or more broken branches hanging on them for some weeks after the rime. These branches were not large ones, but they were all on the south side of the trees, the direction in which, it will be remembered, the hoar-frost crystals pointed.

To see an Oak-tree with two or three small boughs broken but still attached is presumptive evidence that the injury has resulted from rime, for it is a rare thing for wind to break off the smaller branches at all, and if it is done the branch is generally blown quite off.

* Many of the broken branches still remain attached to these Oak-trees on the Hillington Road, January 1891.—C. B. P.

ON FIGS AND THEIR CULTURE AT CHISWICK.

By Mr. A. F. Barron, Superintendent of the Gardens.

The collection of Figs in the Society's Gardens at Chiswick is probably the largest and finest that is to be found in the country. They were for the most part collected by Dr. Hogg in the South of France, and for many years a considerable amount of attention has been given to their cultivation—especially in pots—and careful observations made as to their distinctive merits, &c., the Fig-house at Chiswick forming, during several months of the year, a special feature of attraction to the Gardens.

The home of the cultivated Fig would seem to be Syria and along the shores of the Mediterranean through Northern Italy and Southern France and Spain. In this country, excepting along the South Coast and in sheltered situations near the sea, Figs do not ripen their fruit without protection. At Tarring, Arundel, &c., on the coast of Sussex many trees are grown in the orchards as standards and annually bear immense quantities of fruit, and on the walls in similar localities an abundance of large and fine fruit is obtained. In the Channel Islands Figs do well and the trees attain a large size, and, being trained in many cases as arbours, afford delightful shade and have quite a picturesque appearance. In the neighbourhood of London, Figs seldom ripen out of doors. The plant is, however, quite at home and makes a capital shrub in many parts of the City itself. The original trees introduced into this country may still be seen growing in the Bishop of London's garden at Fulham. Naturally the Fig grows as a low bush or tree similar to a sturdy Apple, but where supported or grown against a wall the branches are more slender and dependent.

Mode of Fig-growing in France.—In the neighbourhood of Paris Figs are grown in the open ground in a very unique manner. The winters being too severe for the plants, shallow pits, four or five feet in diameter and eighteen or twenty inches deep, are formed in some warm situation, in which the trees are planted. The first year they are cut down pretty closely, so that they may produce a number of strong shoots, which are allowed to grow freely during the summer. When the leaves

have fallen in autumn, four trenches, radiating from the root or stool in the form of a Maltese cross, are dug out, into which the shoots or branches, divided into four equal bundles, are bent down and covered with ten or twelve inches of soil, a similar covering being placed over the crown. Here they remain until the danger of frost is past, when they are released from their winter's burial. In this way they are treated year after year, the shoots or branches being thinned where necessary, and they bear enormous quantities of fruit.

Fruiting of the Fig.—Differing from the majority of fruit-trees, the Fig will bear two, and sometimes, under very favourable circumstances, even three crops in one season. There is the "first crop," which is borne on the shoots of the previous year; the little round buds may easily be observed before the leaf-growth commences. The "second crop" is borne on the growing shoots of the current season. Some people are under the impression that the half-grown fruits which remain on the trees after the fall of the leaf are intended to form the next year's "first crop." But it is not so; they are simply late "second crop" fruit that failed to come to maturity through want of heat, &c. In the Fig-growing countries there are the recognised "first crop" and the "second crop" Figs, some varieties being suited for the one purpose, some for the other. In this country it is only the "first crop" varieties which come to maturity in the open air, the season of summer warmth being too short to do more; but under glass excellent crops both of the "first" and "second crop" Figs may be obtained where suitable varieties are grown. A singular point to be noticed is the markedly different shape of the fruits of the "first" and "second crops" off the same trees—the fruits of the "first crop" being long, nearly twice as long as those of the "second," which are frequently almost oblate.

The Setting of the Fruit.—The fruit, or edible portion, of the Fig is very curious, being the common receptacle of a congeries of flowers, which consist of numerous small florets lining the internal walls or surface of the embryo fruit, so that they are not visible without cutting the fruit open. Some of these florets are male, some female. With regard to the manner in which the hidden flowers or florets are set, we know little or nothing.

Casting of the Fruit.—The casting of the fruit without ripening, which is of very common occurrence, is attributed to the non-setting of the flowers. That it is so may easily be seen by cutting open the fallen fruits and examining them, when it will be observed that the flowers are undeveloped. Many reasons have been assigned as to the cause of this defect. Some ascribe it to a sudden check, to coldness, to dryness at the root, or to the reverse—of too much moisture, &c., &c.—all or any of which conditions may be injurious to the plant, and may tend towards the evil, but are certainly not the true or *primâ facie* cause. It may be noted that some varieties are more liable to cast their fruit than others, and that under all sorts of treatment, whilst others, receiving exactly the same treatment, do not do so. It is generally with plants that seem to be in the best possible health, and it is almost always with the "first crop," and not the "second," that failure occurs in this manner.

Caprification.—In many parts of Italy, Spain, &c., in order to prevent this "non-setting" feature, recourse is had to what is termed "caprification," which is firmly believed in by those who practise it, but condemned by most modern scientific writers who have studied the subject as an absolutely useless waste of time. The process is simply this: young Figs of the Caprifig (a wild species which is planted in almost every collection) are taken and placed on the shoots of the Fig-trees it is desired to set, and in these Caprifigs a certain insect is said to be generated which, it is alleged, enters the eye of the unripe, and as yet unset, fruit of the cultivated species, thus facilitating the entrance of light and fertilising vapour, thereby enabling the fruit to set and ripen. In some parts of the South of France it is said to be a common practice for men who are termed *caprifiguers* to prick the eye of the fruit with a straw or quill dipped in olive oil. Brandy also is applied by dropping a little in at the eye or through a puncture in the skin, which is, moreover, believed to hasten the maturity of the fruit and to improve its flavour.

Training and Formation of the Plant.—The training and formation of the plant is a very simple matter. The prettiest and most natural form for Figs in pots is that of dwarf standards. These should have a clear stem of from eight to twelve inches, and should on no account be allowed to produce suckers or to become many-stemmed, as such plants do not fruit so well. During the

first season the plant may be allowed to grow with a clear stem to the required height, when it should have the point pinched out—an operation, if the season is not too far gone, which will have the effect of causing three or more of the top buds to break, and when these have grown three or four inches they should be again stopped in the same manner, and in the second and following years (if they have grown sufficiently) the same process of pinching out the points of the young shoots when three or four inches long should be pursued. The plant thus formed should at the end of the third year have all the shoots pruned back to about half their length, and ought the following season to become a fruiting plant. A great deal, of course, depends upon the cultivation and condition of the plants, &c. General principles only can be stated.

Pinching the Shoots.—Plants which have attained a sufficiently large size should have their shoots regularly pinched when about three or four inches long, which will induce the production of fruit in abundance at the axils of the leaves. Shoots not so pinched, but allowed to ramble, do not fruit so freely, the incessant pinching to which they are subjected seeming to encourage the production of fruit.

Pruning.—Of pruning little is required with plants grown in pots and well pinched. There is an old saying that "a pruned Fig-tree never bears," which is scarcely true, as the Fig will bear any amount of pruning. It is true that if we cut off all the shoots in winter we can expect none of the "first crop" fruit, but hope for the "second." In pruning the Fig it is well to bear this in mind. Young plants, as already stated, require to be pruned or cut back to bring them into form, and with fruiting plants it is only necessary to prune back the straggling shoots, so as to bring the plants back into form again. In some cases it may be desirable to cut the plant quite hard back and commence to form a new head entirely.

Pot Culture.—The Fig is exceedingly well adapted to pot-culture—no plant more so perhaps—and it can be cultivated to more advantage in pots than in any other way. One recommendation of this method is the great variety of sorts that may be grown in a given space. By a proper selection of varieties—early, mid-season, and late—a continual supply for several months may be maintained. At Chiswick the crop begins

to ripen in July, and continues until the end of November. Properly managed Fig-trees in pots produce fruit in greater abundance and of better quality than do those which are planted out. When planted out they always, whilst young, grow so vigorously that little fruit is produced; and although the remedy for this is restriction of the root-space, it is found in practice difficult to regulate. When grown in pots the plants are perfectly under the control of the cultivator, and may receive whatever treatment may be required.

The Fig is easy of propagation by cuttings, taken off when the plants are at rest, any time during the winter, and placed in a little heat in early spring. Suckers are also freely produced; these taken off and potted soon form plants, and may be potted on as required, and grown freely. Whilst growing and forming plants the Fig delights in a warm and moist atmosphere, with full exposure to the direct rays of the sun. No greater mistake could be made than that of placing Figs in the shade; no plant is benefited more by full sun-exposure. In potting the young plants, the first shift may be into 5-inch pots, and, as they grow, into larger as may be required, always giving an abundance of drainage, which, being kept sweet and pure, tends much to the success of the pot cultivation of all kinds of plants. Whilst young, some may require shifting twice a year, but larger plants will only require to be potted once, the object being to produce short, stocky, fruitful shoots, and not gross ones, which would be the case if an excess of pot room were supplied. Early in the autumn, or as soon as the fruit may be gathered, the whole of the plants should be thoroughly examined, and repotted where required. For some it will be sufficient to turn them out of the pots, shaking away a portion of the old soil and reducing the ball by trimming off the stronger roots, and then replacing them in the same-sized pots; whilst others, which have attained the maximum size, may simply have a great portion of the top soil, roots and all, taken away, and be filled up afresh with new soil. Figs may be fruited in any-sized pot, from a 48, or 5-inch pot, to 18 or 20 inches. The most convenient size is 12 inches in diameter, and they never need exceed 15 inches.

Soil.—In regard to soil the Fig is not very particular; it will grow in any kind almost. That in which the best results

have been obtained is a sort of calcareous loam on a chalky subsoil. For pot cultivation a somewhat richer soil is required, so as to produce large and fine fruit. We have found the following to answer well: two-thirds fresh yellow loam and one-third lime-rubbish, so as to give it porosity, with an admixture of burnt ashes, a few half-inch ground bones, and some well-rotted stable manure. During the growing season the plants should be frequently and liberally top-dressed, and this should be of a considerably richer character. Thomson's vine manure answers remarkably well, or indeed any mixture containing ground bones, horn shavings, &c., mixed with the soil.

Watering.—Watering is an important matter with Figs. Whilst young and growing, if properly potted, and the drainage in proper action, in a high temperature too much water can scarcely be supplied. They may be, and should be, syringed overhead two or three times a day, and the atmosphere kept continually moist. When the fruit is ripening water must be applied more sparingly to the roots, and a much drier atmosphere maintained. An excess of moisture at this time is apt to cause many of the fruits to split open, especially the larger varieties, and also spoils the flavour. A bracing, warm atmosphere and comparative dryness are essential to secure well-flavoured fruit. The fruit of the Fig ripening successionally makes this somewhat difficult, as the treatment required by those in one stage is exactly the reverse of what is required by the other.

Atmosphere, Temperature, &c.—The Fig whilst growing delights in a close, humid atmosphere and a high temperature —the hotter the better, so long as it is copiously charged with moisture. For young plants this high temperature is not of so much importance, but for fruiting plants it is so in the highest degree. During the summer months not so much fire-heat is required, as by judicious attention to ventilation, &c., a sufficiently high temperature may be maintained from sun-heat alone. A temperature of from 80° to 90° F. may safely be allowed in the morning before giving air, and by shutting up early in the afternoon, and "bottling up the sun's rays," the temperature may rise to 120° or more, which will ensure plenty of warmth until the following day—a low temperature at night being preferable to a high one. On cold days a little fire-heat may be

applied, but the temperature from this source need never exceed 65°, and a similar temperature may be maintained when the fruit is ripening.

Enemies and Ailments.—These are not so numerous or so formidable as in the case of most other fruits. Of enemies red-spider and thrips are the chief; and as these are encouraged by dryness and a dry atmosphere, they may be subdued by plenty of moisture and a free use of the syringe, which is at the same time very agreeable to the plants. Mealy-bug is sometimes very troublesome, but may be destroyed by the timely application with a brush of a little diluted paraffin. A more insidious scourge we have suffered from at Chiswick is a species of scale received on some Figs from France, which spread so rapidly over the plants a few years ago as nearly to destroy the whole collection. Many varieties were lost in consequence of the repeated scrubbings and dressings required to cleanse them from the pest, which completely covered the young shoots and leaves. On submitting specimens to the Scientific Committee, it was found to be a species of scale new to Great Britain, rejoicing under the name of *Mytilaspis ficus*. One inscrutable malady of the Fig is the dying of the shoots and branches—a sort of cankering—sometimes to such an extent as to almost destroy the entire plant, sometimes only a few small twigs, or it may be only a partial injury which is subsequently healed over. This has been attributed to the action of frost, but cannot be so, as the injury is most pronounced on the trees in pots which are not exposed, and is seldom noticed on out-door trees.

When and how to enjoy Figs.—Figs thoroughly ripened are amongst the richest and most luscious of fruits, but there is great variety. There are good Figs, and Figs which are not so good. Very few people relish them quite on the first acquaintance; they are what are termed sickly. The taste is no doubt an acquired one, like that for Olives or raw Tomatos, but the taste grows upon one till one acquires a decided relish for them. Figs to be eatable must be ripe; unripe Figs are simply nauseous and intolerable. If the white, milky juice is seen at the end of the stalk after being gathered, that fruit should not have been gathered. A Fig that is ripe and fit to eat may be noted to droop a little, and to have a large "teardrop" at the eye; the skin cracked a little, with the juice exuding and standing on the surface like drops of dew;

and, beyond this, in fine dry sunny weather they sometimes dry up and increase in richness.

Selection of Varieties.—There is abundance of variety amongst Figs to please all tastes and fancies, so that the following selections may prove useful to intending growers.

1. *Size.*—For large sorts the following may be named: Brunswick, an old, well-known sort; Nebian, or Grosse Verte, as it is sometimes called; and a new variety, named the Large Black Douro, lately received from Spain.

For small-fruited sorts White Ischia is one of the best, with De Lipari, Black Provence, and Reculver.

2. *Fruitfulness.*—As a rule, the smaller-fruited sorts bear the most profusely, such as the White Ischia, Œil de Perdrix, and Black Provence. Some of those, however, which bear both first and second crops make a large return. Of these White Marseilles, Brown Turkey, and Negro Largo are good examples.

3. *Season of Ripening.*—The earliest of all is Trifer, closely followed by De la Madeleine and White Marseilles. For the main crop we would select varieties possessed of good quality, such as Brown Turkey, Bourjassote grise, Violette de Bordeaux, Grise Savantine bifère, Gouraud noir, Poulette, and, for the latest, Col de Signora Bianco, Nebian, and d'Agen, which is the latest of all.

4. *Flavour or Quality.*—For high quality and constancy there is none to surpass Bourjassote grise; even the half-ripened fruits of this variety are excellent. Col de Signora Bianco, Nebian, Grise Savantine bifère, and Poulette are all varieties of great excellence.

5. *Colour.*—This is not a material point, except in a matter of classification. They are readily divisible into three classes—(1) green, white, or yellow; (2) tawny; and (3) black, or dark. As examples of the first class we may take De la Madeleine, White Marseilles, D'Orée, and Nebian; and of the second, Brown Turkey, Bourjassote grise, and De l'Archipel; and of the third, Violette de Bordeaux, Black Ischia, Negro Largo, and Gouraud noir.

6. *Varieties which bear both First and Second Crops.*—This is a very important quality. White Marseilles, De la Madeleine, Trifer, Brown Turkey, and Brunswick.

Varieties of Figs.

1. *Adam.*—Fruit medium size, pyriform; skin dull brown, tawny; flesh dull red, second quality. Good cropper.

2. *Angélique noire.*—Fruit below medium size, roundish or oblate; skin dark; flesh bright red, rich. Strong grower and moderate cropper.

3. *Arbal.*

4. *Agen.*—Fruit medium size, roundish; skin bright green, cracking longitudinally when becoming ripe, thereby showing very prominent white bands; flesh deep red, very rich. The latest of all Figs, requiring heat. Great cropper.

5. *Barnisotte grise.*—Fruit below medium, roundish or oblate; skin dull brown or tawny; flesh red, juicy, and rich.

6. *Biberaeo.*—Fruit medium size, oblong; skin dark purple; flesh dull red, moderate quality. A free cropper.

7. *Bifère de la Malmaison.*—Fruit below medium size, roundish; skin light brown and purple streaked, with a light bloom; flesh red, very rich.

8. *Black Douro.*—A new variety from Spain.

9. *Black Ischia.*—Fruit medium size, pyriform; skin dark purple; flesh red, second quality.

10. *Black Provence.*—Fruit small, pyriform; skin dark purple; flesh red, second quality. Very prolific.

11. *A Bois jaspé.*—Fruit medium size, ovate; skin bright mahogany, netted; flesh bright red, medium quality.

Boughton.—Same as Brunswick.

12. *Bourjassote blanche.*—Fruit small, round or turbinate; skin dull green, inclining to tawny; flesh pale rose, sweet and rich.

13. *Bourjassote grise.*—Fruit medium size, roundish and flattened, almost oblate; skin dull brown or tawny, with patches of purple; flesh deep red, very rich and luscious. The most constantly good Fig we have grown, and a good cropper.

14. *Boutana.*—Fruit medium size, pyriform; skin pale greenish yellow, with russet; flesh dull rose, sweet, but not rich.

15. *Bourjassote noire.*—Fruit medium size, roundish, ribbed; skin purple; flesh deep red, rather solid, and not rich.

16. *Brown Turkey.*—Fruit medium size, pyriform; skin

dull brown and tawny; flesh dull red, medium quality. A free cropper and reliable sort. The Fig most generally cultivated.

17. *Brunswick.*—Fruit very large, long, pyriform; skin dull tawny brown; flesh dull red, second quality. A great cropper, and a variety largely grown.

18. *Castle Kennedy.*—Fruit very large, long, pyriform; skin pale green and dingy brown, resembling the Brunswick. Second quality. A shy cropper.

Clare (Hogg).—Same as Brunswick.

19. *Col de Signora Bianco.*—Fruit medium size, pyriform, with a rather long distinctly ribbed neck; skin green, changing to yellow; flesh deep red, very rich and luscious. A strong grower; late.

20. *Col de Signora Bianco panachée.*—A variety of Col de Signora Bianco; very prettily striped with broad bands of pale yellow.

21. *Courcourelle brune.*—Fruit below medium size, roundish oblate; skin dark purple, much cracked, and covered with a thick bloom; flesh very dark red, very rich and excellent.

22. *Courcourelle gavotte.*—Fruit small, round; skin dark brown, with prominent lines, much cracked; flesh dark red, rich and excellent.

Crave (Rivers).—Resembles Violette de Bordeaux.

23. *Datte.*—Fruit medium size, pyriform, with a long, tapering neck; skin greenish yellow and dingy brown, which cracks as it ripens; flesh dull red, juicy, but not rich.

24. *De Lipari.*—Fruit small, roundish, with a very short stalk and neck; skin pale yellow; flesh pale rose, not very juicy or rich. A great cropper.

25. *De l'Archipel.*—Fruit above medium size, obovate; skin light tawny; flesh very pale, juicy, rich, and excellent. A great cropper.

26. *Dorée nobis.*—Fruit small, pyriform; skin deep yellow; flesh pale, very sweet and good. Distinct.

27. *Dorée.*—Fruit above medium size, pyriform; flesh dull red, very rich and good.

28. *D'or bifère.*—Fruit below medium size, long, ovate; skin dull brown and greenish yellow; flesh blood red, very rich and juicy.

Douro Vebra.—Same as Biberaeo.

29. *Drap d'Or.*—Fruit below medium size, almost round, no neck; skin pale greenish yellow, shaded with brown; flesh delicate amber, thick, juicy, and well-flavoured.

30. *Du Roi.*—Fruit small, roundish, pale yellow.

Figue d'Or.—Same as Brunswick.

31. *Figue de Dalmatia* (Paul).—Fruit very large, long, pyriform; skin pale green, covered with a soft pubescence; flesh dull red, moderate quality.

32. *Gouraud noir.*—Fruit medium size, oblong; skin dark purple; flesh red, sweet and rich.

33. *Gouraud rouge.*—Fruit medium size, pyriform; skin reddish brown; flesh dull red, moderate quality.

34. *Grassale.*—Fruit small, pyriform; skin pale green; flesh dull red, moderate quality.

35. *Grise Savantine bifère.*—Fruit below medium, short, pyriform; skin dull brown, ribbed, with a thick grey bloom; flesh dull red, thick, syrupy, and luscious.

36. *Grosse Marseilles.*—Fruit medium size, long, pyriform; skin greenish yellow, shaded brown; flesh dull red, second quality.

37. *Grosse Monstrueuse de Lipari.*—Fruit large, turbinate, much flattened at the apex; skin dull brown or tawny, shaded with purple; flesh dull red, thick, second quality. A certain first-crop Fig.

Grosse Verte.—Same as Nebian.

Grosse Violette de Bordeaux.—See Violette de Bourdeaux

Hardy Prolific.—Same as Brunswick.

Lee's Perpetual.—Same as Brown Turkey.

Maris No. 2.—Same as Gouraud noir.

Martinique.—Same as Angélique.

38. *Lampa* (Tait).—New variety from Spain.

39. *Large Wild Fig* (Tait).—Variety used in Spain for caprification.

40. *Large Black Douro.*—Fruit large, long pyriform; skin dark purple, somewhat cracked; flesh dark red, very juicy, not rich.

41. *Hirta du Japon* (Rivers).—Fruit medium size, roundish, with long stalks; skin very dark; flesh pale opaline; foliage almost entire. Very distinct.

42. *Nigra.*—Fruit small, pyriform; skin dull yellow, shaded with purple; flesh bright red, juicy, not rich.

43. *Monaco Bianco.*—Fruit above medium size, roundish, oblate; skin green; flesh dark red, juicy, and exceedingly rich. Free cropper.

44. *Negro d'Espagne.*—Fruit large, oblong, broad at the apex; skin dark purple, and covered with a thick bloom; flesh deep red, thick, not rich. Very commonly grown in the South of France.

45. *Negro Largo.*—Fruit large, pyriform; skin dark purple; flesh dull red, juicy, but not particularly rich. A very free bearer and strong grower.

Negronne.—Same as Violette de Bourdeaux.

46. *Nebian.*—Fruit very large, obovate; skin deep green; flesh bright red, very rich and luscious, somewhat apt to split open. Free bearing; late.

47. *Œil de Perdrix.*—Fruit small, round, the stalk a little on one side; skin dark chestnut, almost black; eye very large and prominent; flesh thick, dark rose, second quality.

Osborn's Prolific.—Same as Brown Turkey.

48. *Pastilière.*

49. *Peau Dure.*—Fruit above medium size, pyriform, a little one-sided; stalk long and slender; skin greenish yellow, very thick and hard; flesh bright rose, thick and fleshy, not rich.

50. *Pied de Bœuf.*—Fruit large, long, obovate, much ribbed; skin dark brown, or reddish purple; flesh very pale, second quality.

51. *Poulette.*—Fruit above medium size, roundish; skin deep green, streaked and mixed with purple; eye bright red; flesh deep red, very juicy and rich.

52. *Quarteria* (Tait).—Fruit medium size; skin pale green, netted; flesh deep red, firm and juicy.

53. *Recousse noir.*

54. *Reculver.*—Fruit small, roundish, like the Black Provence; skin black; flesh red, thick, not rich.

55. *Ronde rouge.*—Fruit medium size; skin dull tawny red; flesh shell-red, second quality.

56. *Royal Vineyard.*—Fruit above medium, pyriform; skin reddish brown; flesh dull red, thick, not rich. A pretty Fig.

57. *Small Black.*

58. *Small Wild* (Tait).—From Spain. Fruit very small, pale yellow. Variety used in Spain for caprification.

Toulousienne.—Same as Grise Savantine bifère.

59. *Trifer.*—Fruit medium size, pyriform; skin pale green; flesh pale, thin, and watery, not rich. Very early, and a sure cropper.

60. *Trois-récoltes.*—Fruit small, ovate; skin dark tawny or copper-coloured; flesh dull red, with but little flavour. Early and a free bearer.

61. *Verdal de Valence.*—Fruit below medium, roundish, turbinate, slightly ribbed; skin dull tawny red, with a fine bloom; flesh thick, dull red, second quality. Very prolific.

62. *Versailles.*—Fruit small, pyriform, with a long stalk; skin dull green, slightly russeted; flesh pale red, juicy, not rich.

63. *Vigasotte Bianco* (Tait).

64. *Violette de Bordeaux.*—Fruit small, long, pyriform; skin rugose, dark purple; flesh dull red, thick, but not rich. A very prolific Fig, and not liable to rot.

65. *White Ischia.*—Fruit small, round; skin greenish yellow with russet; flesh pale, occasionally tinged with red, juicy and rich. A very prolific variety.

66. *White Marseilles.*—Fruit medium size, pyriform; skin pale green; flesh pale, very juicy, but rather watery. A very hardy and prolific sort, and early.

REPORT ON RED AND WHITE CURRANTS AT CHISWICK.

By Mr. A. F. Barron, Superintendent of the Gardens.

Although denoted one of the small fruits, Currants are yet of great importance and value in the garden, and form one of the most useful of fruits. Much confusion has been found to exist with regard to their distinctive characters and superabundant nomenclature. With a view to remedy this state of things, and to discover some system of classification, the Royal Horticultural Society has collected from the various nurseries in this country and in France plants of nearly every variety bearing a distinct name that could be found. These, grown under similar conditions,

have been carefully noted for several years, and were examined during the past year (1890) by the Fruit Committee.

It was found impossible from the fruits alone to adopt any classification; for although varying considerably in the size of the bunches and the berries, and in their colour, &c., these are so much influenced by cultivation, situation, &c., that nothing definite could be arrived at. The following classification is therefore based chiefly on the general appearance of the plants, their foliage, habit of growth, &c. This is generally very decided, and easily to be recognised. The typical names adopted, under which the others are grouped as synonyms, may not in all cases be the oldest or the most appropriate, but in many cases we had no means of determining which were the original names. Of Red Currants sixteen distinct classes or varieties have been recognised out of the forty-five named sorts which appear in various catalogues, and of White Currants six distinct varieties out of nineteen named sorts.

Red Currants.

Belle de Fontenay.—See La Versaillaise.

Cerise.—See Champagne.

1. Champagne (syns. *Cerise, Couleur de Chair, Red Champagne, Ombrée*).—Plant moderately robust, compact; leaves small bright green, resembling the Red Dutch; bunch of medium size; berries small, of a pale cerise or pink colour, and as sweet and pleasant as the white varieties. A profuse cropper. Distinct. Useful for dessert.

Chenonceaux.—See Red Cherry.

2. Chiswick Red (syn. *à Feuilles bordées*).—Large, sweet Red. Plant of dwarf, compact growth. Leaves small, flat, of a pale glaucous green; a portion, especially those in the shade, having a narrow margin of yellow; very distinct in appearance. Bunch short, borne in dense clusters. Berries small, of a pale-red colour, somewhat acid. A most profuse cropper.

Couleur de Chair.—See Champagne.

3. Cut-leaved (syn. *à Feuilles laciniées*).—Plant of somewhat slender growth, spreading. Leaves small, much cut and lobed, and of various sizes; very distinct in appearance. Bunches of medium size. Berries medium size, bright red, brisk acid. A very free-cropping variety.

Defiance.—See Red Cherry; also Gondouin Rouge.

De Caucase.—See Red Cherry.

Fay's Prolific (new American variety).—See Red Cherry.

Fertile d'Angers.—See Red Cherry.

Fertile de Palluau.—See Red Cherry.

À Feuilles bordées.—See Chiswick Red.

À Feuilles laciniées.—See Cut-leaved.

À Feuilles dorées.—See Yellow-leaved.

À Feuilles panachées.—See Variegated.

Frauendorff.—See La Versaillaise.

4. Gloire de Sablons (syn. *Striped*).—Plant of strong, robust growth, resembling the Red Dutch; leaves bright green; bunches long; berries small, red or striped white. A poor cropper, but distinct and pretty.

5. Gondouin Rouge.—Plant of strong, robust, compact growth; shoots reddish; leaves pale green; bunches and berries of medium size, bright red, very acid. Late. A shy cropper.

Hâtive de Bertin.—See Red Cherry.

6. Houghton Castle (syn. *Houghton Seedling*).—Plant of very compact, sturdy growth; leaves rather small, of a dark green colour; bunches of medium size, borne in dense clusters; berries of medium size, dark red, briskly acid. The vigorous, free growth of this variety, with its free-cropping qualities, render it one of the best Currants for exposed situations, &c.

Knight's Large Red.—See Red Dutch.

Large Sweet Red.—See Chiswick Red.

7. La Versaillaise (syns. *Belle de Fontenay, Frauendorff*).—Plant of a somewhat strong growth, the young shoots being very gross, and very liable to break off at the axis, so that many plants are entirely spoiled; in other cases the buds do not break, and so the plants are reduced to a few shoots from the base, and little or no fruit is borne. This is a very serious defect, rendering the variety scarcely worthy of cultivation. Leaves large, broad, flat, deep green, with frequently a deep bronzy metallic shade, in this respect resembling the Red Cherry; bunches of medium size, irregular; berries very large and extremely handsome, of a deep red colour and fine acid flavour. A very poor cropper.

8. Mallow-leaved (syns. *May's Victoria, Raby Castle*).—Plant of very strong, vigorous growth, attaining a large size, the

strongest growing of all Currants. Shoots pale; leaves pale glaucous green, soft, something resembling the leaf of a Mallow; bunches very long; berries of medium size, pale red, very acid. Late in ripening. A moderate cropper. Excellent for standards or walls.

May's Victoria.—See Mallow-leaved.

Old Dutch.—See Old Red.

9. Old Red (syn. *Old Dutch*).—A small-fruited and inferior variety of the Red Dutch.

Pitmaston Red.—See Red Dutch.

Raby Castle.—See Mallow-leaved.

Red Champagne.—See Champagne.

10. Red Cherry (syns. *Chenonceaux, Fay's Prolific, De Caucase, Defiance, Fertile d'Angers, Fertile de Palluau, Hâtive de Bertin, La Hâtive, Rouge de Boulogne*).—Plant of dwarf, bushy habit; shoots rather gross, breaking off somewhat in the same manner as La Versaillaise, but not to so great an extent; leaves large, flat, deep green, with a bronzy metallic hue, like La Versaillaise; bunches of medium size; berries very large, full, juicy, deep shining red, extremely pretty, of a brisk acid flavour. A very free cropper, and one of the best for garden culture.

11. Red Dutch (syns. *Knight's Large Red, Pitmaston Red, Red Foxley, Wilmot's Large Red, Rouge de Hollande*).—Plant of strong, vigorous, erect growth, forming compact bushes; leaves rather small, bright green; bunches of medium size, borne in dense clusters; berries of medium size, bright red, briskly acid. A free and abundant cropper, and having a fine constitution. This is the variety most commonly in cultivation.

Red Foxley.—See Red Dutch.

12. Red Grape (syn. *Reine Victoria*).—Plant of free, spreading growth; shoots somewhat slender and reddish; leaves large, deeply lobed, pale green with reddish venations; bunches very long and loose; berries of medium size, pale red and rather acid. Late. A fine free-cropping variety.

Reine Victoria.—See Red Grape.

Rouge de Boulogne.—See Red Cherry.

Striped.—See Gloire de Sablons.

Ombrée.—See Red Champagne.

13. Variegated.—A variety of the Old Red, having the leaves variegated with white.

14. Verriers Rouge.—Plant of sturdy, vigorous, compact growth; shoots reddish; leaves irregular, with red venations. Resembles Gondouin Rouge.

15. Wallace's Seedling.—A very fine selection of the Red Dutch. Berries as large as Red Cherry.

Wilmot's Large Red.—See Red Dutch.

16. Yellow-leaved, or Golden.—Plant of vigorous, compact growth; shoots rather gross; leaves large, splashed with pale yellow, and often with a narrow yellow margin, very distinct; bunches and berries small. A poor cropper.

White Currants.

Blanche d'Angleterre.—See White Dutch.

Blanche de Boulogne.—See White Imperial.

Blanche d'Hollande.—See White Dutch.

Blanche Commune.—See Common White.

Blanche Transparente.—See Common White.

1. Common White (syns. *Blanche Commune, Blanche Transparente*).—Plants of spreading habit, slender but free; leaves small, much lobed, pale green; bunches short; berries rather small, with a fine clear skin, sweet. Good cropper.

2. Cut-leaved White (syns. *à Feuilles laciniées, Wilmot's Large White, Shilling's Queen*).—Plants of free but rather slender growth; shoots small; leaves small, much cut and lobed, bright green; bunches and berries of medium size, very bright and clear-skinned, sweet and pleasant. A profuse bearer.

À Feuilles bordées.—See Macrocarpa.

À Feuilles laciniées.—See Cut-leaved White.

3. Grosse Blanche (syn. *Knight's Large White*).—Plant of moderate growth, somewhat spreading; leaves large; bunches medium size; berries large; skin clear. Free cropping.

Knight's Large White.—See Grosse Blanche.

Blanche Impériale.—See White Imperial.

4. Macrocarpa (syn. *à Feuilles bordées*).—Plant of strong, robust, erect growth; leaves large, flat, splashed and veined with pale yellow, and having a distinct yellow margin, which is very pronounced in the early summer; bunches medium; berries

large and full, of a dull cloudy-white, rather acid. A profuse cropper. A very distinct variety.

Shilling's Queen.—See Cut-leaved White.

Transparent White.—See Common White.

5. White Dutch (syns. *Blanche d'Hollande, Blanche d'Angleterre*).—Plant of moderate vigour, compact; leaves large, flat, deep green, with a narrow yellow margin; bunch medium size; berries large, clear white, sweetly flavoured. Free cropper and an excellent sort.

6. White Imperial (syn. *Blanche de Boulogne, Blanche Impériale*).—Plant moderately robust; bunches long; berries medium.

White Transparent.—See Common White.

Wilmot's Large White.—See Cut-leaved White.

ON THE EFFECTS OF URBAN FOG UPON CULTIVATED PLANTS.

Preliminary Report by Professor F. W. Oliver, D.Sc., F.L.S., *presented to the Scientific Committee of the Royal Horticultural Society, March 24th*, 1891.

The investigation, as to which I am now drawing up an interim report, has been undertaken by the Royal Horticultural Society's Scientific Committee, supported by a grant from the Royal Society to meet the cost of apparatus, &c. The question of the effects of urban fog on plant life has come prominently before our town and suburban cultivators, and the damage from this cause, which may formerly have been regarded as exceptional, is now admitted to be chronic and constitutes an ever-increasing source of dismay to all interested in horticulture. The action of the Scientific Committee in taking up this question is but the reflection of a general feeling amongst cultivators that something ought to be done. A winter never passes now without one or more prolonged spells of fog, contaminated with the products of coal combustion. For weeks at a time, during the winter, the London suburbs are enshrouded in semi-darkness, whilst the air is tainted with foreign and offensive matter. Coincidently, there occurs a dropping of buds, a destruction of flowers, and, what is

more serious, a wholesale annihilation of the foliage of most tender, soft-wooded stove-plants. The leaves of certain genera of Orchids and of hard-wooded plants turn yellow when these visitations are prolonged.

It seemed to the Scientific Committee desirable that steps should be taken to ascertain to what constituents of fogs the various classes of injury enumerated above are due; what part is played by the various acids present; whether the tarry products exert any specific action; and how far the conditions of semi-darkness participate in the destruction.

It was also considered desirable to make special investigation into the exact nature and amount of the impurities present in urban fog, and to observe the varying effects on vegetation of fogs differing in quality. The Committee, though hardly sanguine that any knowledge that might be obtained by such an investigation would lead to any effective abolition of the evil, was of the opinion that such an inquiry was desirable in view of the great interest of the question. In any case, such knowledge was necessary before special cultural precautions could be recommended as likely to mitigate the evil to an appreciable extent. A full understanding of the disease must precede any steps for its amelioration. Whilst the Scientific Committee was arranging for the carrying out of a systematic inquiry in the London area, the Manchester Field Naturalists' Society was taking steps in a similar direction. The Manchester Committee proposed to make systematic analyses of fogs at many stations and at various elevations, with a view to finding out everything appertaining to the genesis and composition of their city fogs, with special reference to their injurious effects on animal and vegetable organisms. Further reference will be found in the body of this report to the Manchester investigation.

Since October last the London inquiry has been in active operation. Circumstances have led the Committee to look to me for the execution of this research hitherto, and I now summarize shortly the general lines along which the inquiry has proceeded. Throughout, I have had the constant advice and help of my colleagues on the Committee, and my task, without their many suggestions, would have been a more difficult one than it actually has been. It is not proposed to enter here into the accumulations of facts bearing on the question that I have been

able to collect by observation, correspondence, and experiment, but to indicate only the lines of inquiry, in the hope of obtaining criticisms likely to be of value in the further prosecution of the work. It will not be possible or desirable to prepare any detailed report till another year has elapsed.

My observations so far deal almost entirely with plants cultivated under glass.

It will be convenient, for the purposes of this report, to take the several lines of inquiry, and to deal with them in successive paragraphs.

I. *Urban Fog and Country Mist.*—In an inquiry into the action of so complex a product as urban fog, it was of the greatest importance to obtain reliable data as to the effect on vegetation, if any, of pure country mists, uncontaminated by smoke. It was impossible for me personally to make the observations needful to establish the injurious or other action of mist upon plants; but, by the courtesy of correspondents in country districts, quite away from areas of smoke genesis, it would appear, so far as observations are as yet to hand, that little or no injury to stove or conservatory plants arises from this cause. Indeed, pure mists would seem to be beneficial to certain classes of cultivated plants. In those instances in which any injury obtained, it was, in most cases, referable to some other cause. The establishing of this point is of great importance, since foggy weather is so frequently attendant upon spells of frost, and it has been frequently suggested that the increased stove heat needful to maintain the requisite temperature would have a harmful action. Indeed, I was quite prepared to find this to be the case at the outset of the inquiry. My own observations during cold weather in London without fog, and the evidence to hand from a distance, as to frost with and without mists, point to the fact that, with proper precautions, no appreciable damage is done to plants.

In general, the same remarks apply to small towns away from manufacturing areas. With the increase in size of the towns, the conditions more nearly approximate to those of London. The fog leaves the well-known deposit of filth on glass-houses and evergreen foliage; and if such districts escape the more serious effects observable in or near the larger smoke-producing areas, it is due to the relatively small concentration of the impurities in those fogs. It seems to me desirable to obtain

accurate analyses of fogs from some country town of say 50,000 inhabitants, in which manufacturies are not carried on, for comparison with similar analyses from the metropolis.

II. *Extent of the London Fog Area.*—I have been at great pains to ascertain how far the London fog-cloud extends around the metropolis. In this I have had the most cordial co-operation of our nurserymen and cultivators, who have supplied me with detailed information as to the times of occurrence of fogs, and as to the nature and extent of the injuries sustained. In many cases I have availed myself of the opportunity to visit their collections, and form an estimate of the damage done, valuable for purposes of comparison. The extent of the fogs is greatest in a westerly and south-westerly direction, and has been traced as far as 35 miles away westward, and 25 miles south-west, under special atmospheric conditions. Exceptionally the London fogs are met with at even 50 miles distance on this side. With the wind in an easterly or north-easterly direction, these outlying districts receive visitations of fog with the accompaniments of sooty deposits and sulphurous smell. No doubt the concentration is not so considerable, nor the duration so long, as nearer London, but it is sufficient to at once affect the buds and flowers of such sensitive Orchids as *Lælia anceps*, *Cattleya Trianæ*, *Calanthe*, &c. The effect of the fog on foliage at these distances is, fortunately, small, though in certain instances it is sufficient to destroy the seedlings of *Cucurbitas*, Tomatoes, &c., which are extremely sensitive. As one follows the effects of fog down the Thames Valley, from the most outlying stations affected, to London, the observed effects increase in severity, till they are indistinguishable from those noted at stations actually within the metropolis. At Kew, for instance, the destruction has been most disheartening, it having come to flowers, flower-buds, and foliage alike. Effects of similar nature, but less in total magnitude, are reported from spots five miles further west. Southwards, the North Downs afford a valuable barrier, which in many cases would seem to filter off the more deleterious constituents of the fog. Indeed, the configuration of the country and the nature of the sub-soil have an important influence in determining the immunity of a given locality from damage. Eastwards I have information as to damage from so great a distance as Maidstone, over 30 miles. Since,

however, intermediate stations in this quarter, at a distance of 12 to 16 miles, are relatively free from the worst forms of fog, the local industries of the Medway Valley are not improbably answerable for the severe results reported from this town. All my correspondents emphasize the non-hurtful nature of the sea-fogs prevalent in this quarter. To the north and north-east the fog-effects do not extend to such extreme distances, and the conditions for winter cultivation are consequently more favourable on that side of the metropolis. Mr. E. Mawley, of Berkhampstead, has furnished me with some interesting meteorological details regarding fogs extending to this locality (26 miles N.W.)

The tabulation of the information bearing on the subject of this paragraph will form a valuable appendix to my detailed report.

III. *The Fogs of the Winter* 1890–91.—It is needless to say that the past winter has been one singularly favourable for the purposes of an investigation of this character. The season opened with a severe fog of short duration during the second week of October, which left its traces on vegetation in the London area. This was the only serious instance of a fog on which observations of hardy plants could be made, as the conditions were not complicated by the presence of frost. I am indebted to Mr. C. T. Druery for an interesting account of its effects, unprecedented in his experience, upon his collection of hardy Ferns at Forest Gate. Though there were minor fogs during November, it was during the long periods before and after Christmas, and again in February, that all the worst effects were exhibited by vegetation under glass. These two spells differed considerably in their nature. The Christmas fogs were accompanied by exceptionally severe frosts, were on the whole much darker overhead, and contained a larger amount of noxious matter. In addition to this, the duration of daylight was considerably shorter than in February. On the other hand, though in February the fogs were exceedingly opaque, the general average of light reduction was not so great as at Christmas. The vertical extent of the fogs in February was such that on many occasions the sun was able to partially disperse them for a short period at noon.

Both fogs had a marked effect on flowers, but on the whole

at Christmas, to instance only one genus of plants, *Cypripedium*, the effects were much more marked. *Cypripedium* is perhaps as little affected by fogs as any genus of Orchids I have met with. Yet, in a large collection, continuously under my observation, it was patent that the damage done was markedly less in February than at Christmas. In the collections of plants under observation, the damage to foliage was also greater during the Christmas fogs; this both as regards the dropping of leaves, which I have reason to believe to be greatly brought about by the reduction of light for a lengthened period, and also in the formation of actual corrosions of portions of the leaf-surface.

It must be remembered, in estimating the relative damage caused by these two fogs, that the earlier one destroyed a greater part of the foliage of very many soft-wooded plants, so that there was less surface exposed for attack on the second occasion. Nevertheless, so favourable were the circumstances during the latter part of January and the first week in February that rapid growth had in many cases taken place. If we narrow the comparison to the damage (corrosions) sustained by young and relatively unprotected leaves during the two periods, without doubt that at Christmas was immeasurably greater than in February. These remarks are based on observations on collections continuously under my eye, and situate in the worst districts. Full details are not yet to hand from correspondents at outlying stations, so that it is possible I may have to modify these observations when I come to take a general survey. (Thus at Kew, the ill effects noted after the February fogs were quite as bad as at Christmas, whilst further east the reverse was the case. Other considerations confirm the view that in February the fog-nucleus was several miles further west than at Christmas.) I have in my notes full details of the damage obtaining from these fogs from many sources, but with these horticulturalists are, in general, only too familiar, and they may well be reserved for the report on the whole question.

IV. *Constitution of Fog.*—On a purely chemical question, such as that of the constitution of fog, I am scarcely entitled to speak. However, since at the outset of this inquiry it was deemed advisable to obtain as much information on the matter as possible, with especial reference to those components deleterious to vegetation, I will state briefly what has been done.

The Meteorological Council very readily put at our disposal the pump and apparatus originally constructed for Dr. W. J. Russell's investigation. The whole apparatus was thoroughly revised and set up under the direction of Dr. Russell. Since the middle of December frequent washings of fog have been obtained with it. Those are now undergoing analysis. In addition, samples of many fogs have been aspirated through a solution of permanganate of potash—the volume of fog necessary to decolourise the pink solution being registered by a meter constructed on the wet system.

The permanganate is extremely susceptible to sulphurous acid, probably the chief agent of damage present in the London atmosphere. A comparison of the volumes of air necessary to completely bleach a known amount of permanganate in foggy and in fine weather is striking. Whilst during a severe fog as little as 1 or 2 cubic feet is sufficient, in fine clear weather 30 or 40 cubic feet may be aspirated without causing an appreciable decolouration. Even a rough method such as this would become an instrument of some precision in the hands of a chemist, and would furnish results of the greatest value in comparing the damage to vegetation inflicted by separate fogs.

During the winter, collections of snow from equal areas were made at frequent intervals, and the amount of matter precipitated upon it from day to day estimated.

At the close of the February fogs the opportunity was taken to make scrapings from 20 square yards of the glass roofs of plant houses at Kew and at Chelsea. The glass at both localities had been washed just before the commencement of the spell of fog. Each yielded an almost identical amount of deposit—*i.e.*, 31 grains per square yard or 6 tons per square mile.

Dr. G. H. Bailey, of the Owens College, Manchester, was good enough to analyse the samples and furnishes the following as the result of a preliminary examination of that from Chelsea: "It consisted of about 40 per cent. of mineral matter, 36 per cent. of carbon, and 15 per cent. of hydro-carbons. It was interesting to note that there was present also 2 to 3 per cent. of metallic iron in minute particles. The sulphuric acid present amounted to nearly 5 per cent., and the hydrochloric acid to

1½ per cent. The presence of such large quantities of volatile oils explained the oleaginous character of the deposits which formed from London smoke, and it had been noticed that, especially in the districts of Manchester where dwelling-houses were much crowded together (*e.g.*, Hulme), the deposit has a similar character."

The deposits on both out-door and greenhouse foliage have been from time to time collected, as well as the daily accumulation on a single pane of glass during foggy weather. The examination of these deposits is not yet concluded. It is interesting to note the presence of a considerable amount of iron oxide in these deposits. This fact may help to elucidate the results of analyses of injured organs.

The work this winter on this portion of the inquiry can only be regarded as preliminary in its nature. I will state here briefly what lines might be followed in future. Continuous observations from day to day, and sometimes from hour to hour, during dull weather, recording the fluctuating amounts of the hurtful components present in the atmosphere, are much required. These should be obtained simultaneously at a number of selected stations—for the purposes of this investigation situate, preferably, near establishments where plants are under cultivation. A knowledge of the varying amounts of these components would be of the greatest value in making a comparison between the nature of the damage incurred by vegetation in different localities and at different times.

It is obvious that had we possessed, this winter, stations for fog analysis at, for example, Kew, Chiswick, and South Kensington we should be in a better position to explain the differing effects of the Christmas and February fogs, respectively, at the last named and their very similar action at the first named.

Dr. G. H. Bailey, of the Owens College, has been devoting himself to a chemical investigation of this character in Manchester. He has now perfected apparatus by means of which systematic records of the kind indicated can be obtained. The apparatus in question is being fitted up at numerous stations in Manchester, and fully justifies his anticipations as a simple method which does not require manual labour, as is the case with the Meteorological Council's pump. My proposal is that the balance of our grant be used in establishing a number of stations,

in London and its suburbs, on precisely the same lines as those being employed in Manchester—the two inquiries, so far as the chemical investigation of fog is concerned, running *pari passu*. Dr. Bailey, with whom I have been in constant intercourse, is willing to co-operate in this undertaking, the experiments and analyses in question being made under his direction and control. This joint scheme has, I think, the additional recommendation of being likely to produce total results of greater value, and at a less expenditure of energy, than if the investigations at Manchester and London be conducted independently. Dr. Bailey and his colleagues have just issued a preliminary report on the atmosphere of Manchester. I would call special attention to this, as indicating the method and scope of the undertaking. The report in question is now appearing, *in extenso*, in the *Northern Gardener*.

V. *Physiological and Microscopic Work*.—The opportunity has been taken to have careful drawings prepared, exhibiting typical cases of damage attributable to fog. I have now a considerable collection of examples from the Royal Gardens, Kew, and elsewhere.

Large supplies of injured plant organs have been forthcoming and have been submitted to chemical analysis. These include the leaves of soft- and hard-wooded plants and of Orchids; also the leaves of *Cattleyas* and *Dendrobiums*, and the flowers of *Cattleya Trianæ*. The results of these analyses will be valuable for publication when similar analyses of the uninjured parts have been obtained. Incidentally, the presence of quantities of iron salts in the ash may be noted. I cannot at present say what may be the physiological bearing of this result. It is possible that a finely divided film of iron oxide on the surfaces of the leaves might promote injurious action in the subjacent tissues. The chief damage I attribute to the sulphurous acid, quantities of which are actually absorbed by the foliage.

The histological characters of injured tissues, as exhibited by the microscope, have been carefully studied, and drawings and notes made. Many of the facts thus obtained are still obscure, and require experimental elucidation. In the case especially of Orchid flowers the distribution of the stomates would seem to have a definite bearing on the distribution of the fog-injuries. In both *Phalænopsis Schilleriana* and *Cattleya Trianæ*, for

example, the sepals are much sooner and more easily injured than the upper petals and labellum. Microscopic examination shows that whilst stomates are frequent on the sepals of both plants, the petals have relatively few, comparing equal areas of surface. The labellum of *Cattleya* in many cases was found to be destitute of stomates. This part is usually the last to show actual injury. The action of the stomates here is probably to afford increased access of sulphurous acid to the part, which then directly attacks the soft, unprotected cells within.

The effects of a slow current of fog, and of sulphurous acid of various dilutions, upon living protoplasm have been very carefully followed under the microscope. The procedure in both cases was identical. A slow current was drawn by aspiration through a specially devised chamber on the stage of the microscope. The transparent root-hairs of *Limnobium* with their actively rotating protoplasm, and portions of the leaf of *Vallisneria*, were chiefly used. The effect of dense fog resembles that of dilute sulphurous acid. The rotating protoplasm is found gradually to swell up and invade the vacuole, its defined margin becoming less and less distinct. Finally, the protoplasm becoming granular, breaks down entirely; the rotation during the process gradually slowing, ultimately ceasing. The whole process with fog occupies several hours. This line of research, to which I attach importance, will be continued during the summer with sulphurous acid and other substances.

A considerable series of experiments has been made in the closed chamber, which was constructed for this, as also to serve as a fog-proof chamber for cultural purposes. As a fog-proof chamber it has not been used so far. At an early period I found that certain defects which could not be remedied forthwith disqualified it for this purpose. Since then it has served as a closed experimental case, in which plants were exposed to sulphurous acid gas of varying strength. It was possible also to draw off a current of the special atmosphere, to which the plants in it were exposed, and study its action upon living protoplasm under the microscope. A comparison could thus be effected between the macroscopic and microscopic phenomena simultaneously. The amount of sulphurous acid present was under control, and frequent estimates of its amount were made by aspirating air from the chamber through permanganate, the

volume required to decolourise being recorded. These experiments are not yet concluded, but it can be definitely said that increase of temperature, other things being equal, aggravates the poisonous action of the sulphurous acid, a difference of a few degrees of temperature being apparent.

During the summer these experiments will be continued. An attempt will also be made to estimate the influence of varying amounts of sulphurous acid gas, and other poisons, upon the plant functions: transpiration, assimilation, and respiration.

VI. *Possible Remedial Measures.*—It is too soon to speak of these with confidence, until a more complete knowledge of all the conditions of damage to vegetation from this source have been obtained. Many of the results obtained in the physiological inquiry are still obscure, and it will be necessary to carry out a series of experiments before some of these are elucidated. Since October I have had opportunity of inspecting many collections of stove and greenhouse plants, and growers have most freely communicated to me any methods which they employ to combat the fog. The placing of canvas, &c., over the plant-houses in foggy weather has in some instances mitigated the damage, the fog being in this way to some extent filtered. The regulation of the temperature has an important bearing. Some cultivators keep the temperature during a fog as low as can be done, having regard to the safety of the collections in the houses. Others raise the temperature in the hope of, to some extent, excluding the fog. There can be no doubt that a high temperature augments the damage, whilst a lower one, to some extent, hinders it.

Sulphurous acid acts more violently and immediately in a hot than in a cool atmosphere. Again, in a long, dark fog heat unnecessarily stimulates the plants when (from the prevailing darkness) their transpiring capacity is limited. Everything should be done to tax the vegetative organs of a plant to the least possible extent when any of the vital functions are interfered with, as in dull, foggy weather. In this connection it is important to supply water to the roots with a sparing hand. Heat and moisture at the roots stimulate absorption whilst the leaves are unable to throw off an excess of moisture, as they can in sunny weather. I know that in many establishments these precautions are taken, and, I believe, with relatively beneficial results.

The evidence on which this opinion is founded is derived (1) from observation of the behaviour of plants under different conditions of cultivation during foggy weather, (2) from actual experiments in which the special conditions were under control.

The action of a continuous drip of moisture on foliage in a closed experimental chamber, in which the confined atmosphere contains small quantities of sulphurous acid gas, is to mitigate the immediate damage so far as the leaves, thus continuously moistened, are concerned.

The degree of humidity in a house, where sulphurous acid is present, is a matter well worthy of attention, and one which I have under observation. The problem is a complex one, and I hope to be able to communicate my results later.

In a dry atmosphere the sulphurous acid, for the most part, acts as such directly on the living protoplasm. In a humid one it is more rapidly oxidised into sulphuric acid, which has an entirely different action, I apprehend, on vegetation, histologically distinct from the first mentioned. It would, however, be improper for me to draw any general conclusions from observations as yet incomplete.

Another measure, which may be ultimately shown to be practicable, is that of absorbing the most poisonous substances in the fog by using some substance as an absorbent, itself innocuous to vegetation.

A more practical method is to keep the fog out of the plant-house, rather than to try and neutralise its action after it has entered. So long as cultivators grow plants, susceptible to the impurities of fog, in houses with open glazings in winter time, of course this is impossible. It is to be hoped some metropolitan grower will pluckily face the situation and construct a range for winter use, which can be made at will absolutely fog-proof, with close glazing, triple doors, and padded ventilators. The horticultural engineer could easily manage this. Filtered air could be supplied, as it is to the House of Commons, by pumping through several inches of cotton wool or by some other method; whilst the illumination could be supplemented by a judicious use of the electric light. Hervé-Mangin showed, so long ago as 1861, that a plant could manufacture organic matter by the aid of artificial light, and the results of Siemens' more recent experiments are familiar.

An ingenious person has suggested to me an alternative method for excluding fog without interfering with ventilation, by an arrangement of tricklers, such as one sees on ice factories in summer for cooling. In this way a greenhouse might be completely enveloped in a thin mantle of dilute hydrogen peroxide, permanganate of potash, or other absorbent, which could be collected in gutters and pumped up again and again. A considerable objection to this plan would be the liability of the absorbent to freeze in cold weather, fog and frost being very frequently concomitant.

In conclusion, I have to thank my colleagues on the Committee for their constant help and sympathy. To my assistant, Mr. F. E. Weiss, B.Sc., I am indebted for his continuous devotion to the research ; without his aid the investigation could not have progressed as it has. For the making of the chemical analyses of injured tissues, &c., as well as for advice on many questions of a chemical nature, I must thank my former pupil, Mr. J. T. Leon, B.Sc., now Lecturer in Chemistry at St. Mary's Hospital.

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PERSIAN CYCLAMEN.

By Mr. W. WARREN, F.R.H.S.

[Read January 13, 1891.]

I HAVE been honoured by receiving an invitation to read a paper on the cultivation of the Persian Cyclamen, and, with the simple preface that the name "Cyclamen" is derived from the Greek κυκλος, meaning "circular," in allusion either to the form of the leaves, the corm, or the flowers, I will at once proceed to describe the method of cultivation as pursued at Worton Gardens, Isleworth, without for a moment assuming that it is necessarily the best or the only desirable method.

First, let me say that the old bulbs left from the previous season are not considered worth the trouble of further cultivation, but are sold for the purpose of extracting the cyclamine they contain.

With regard to the plants reserved for seed, of course the best are selected, viz., those that combine the qualities of large, good-shaped, five-petalled flowers, bold foliage and dwarf growth.

The flowers of the selected plants are daily hybridised (when there is any pollen) with the finger, and the plants, potted in 48's, are not allowed to bear more than six seed-pods, or the seed and its offspring would be weak. We cannot always be sure of obtaining six pods, as occasionally some of them decay unexpectedly. The seed ripens about the middle of May, when it is collected and placed in the sun, so that it may be well matured, otherwise it germinates slowly.

The first week in June the seed is sown in pans a foot square (as these are found to afford more available space), with plenty

of crocks for drainage. The most suitable soil is a mixture of two-thirds Hampshire yellow fibrous loam, one-sixth decayed leaves (not leaf-mould) rubbed through a half-inch sieve, and one-sixth coarse Thames sand; the decayed leaves, or the coarse siftings of the loam, being placed over the crocks. The seeds are carefully sown, so that two are not close together, otherwise the seedlings weaken each other as they develop. The pans are then placed in a one-pipe pit, which is covered with mats to keep it dark, and kept at a temperature of about 75° Fahr. The pans are daily looked over to see that the soil does not become dry, as is often the case at the sides of the pans. In about six weeks the young plants appear; the pans are then taken to a greenhouse and placed as near the glass as possible, damped morning and evening, and shaded from the sun. One hundred pans are generally sown, so as to give an abundant supply, and enable us to reject the weakest plants, although it is found that the most precocious plants produce the worst blooms.

About the end of September the seedlings are pricked out in the same sized pans, three dozen in each, with the same soil and treatment as before. Towards the end of November they are transplanted into thumb-pots, no change being made either in soil or treatment.

The plants in these two stages are kept at a temperature of 60° Fahr., and the thermometer may without injury be allowed to register as much as 70°. When the external conditions are favourable, air may be freely admitted to them.

At the beginning of March they are repotted into 60's, or 4-inch pots, using the same soil as before, and still continuing the same treatment, with the exception of potting them a little firmer. By the end of April last year as many as 750 dozen plants had been potted off in this manner.

About the end of May they are transferred to 48's, in which pots they are to bloom, but some few dozen are placed in 32's, or they bloom before they are required for market purposes.

It is necessary to keep the plants well up in the pots, but the corm should nevertheless be covered with the soil. At the last potting the soil is changed, being composed of five-sixths loam, one-twelfth Thames sand, and one-twelfth decayed leaves. The plants are then potted as firmly as possible without pressing the corms, whilst in all the former stages (except when they are

placed in 4-inch pots) they are transplanted and potted as lightly as possible.

It is surprising what a quantity of water Cyclamen will take with advantage during the summer months; hence it is necessary that the drainage for both pots and pans should be as perfect as possible.

The plants are not left too long in the pans and various sized pots before they are repotted, otherwise they are found to be slow at starting again after transplanting.

As the sun's power decreases, it is essential that great care be taken with the watering. Overhead damping is discontinued for fear of fog, and only those plants are watered which are seen to be dry.

Some of the plants at this time (the beginning of October) have a good show of bloom; they are then staked with Currant prunings, on account of their neutral colours, and are tied round with dark carpet-thread, after which they are despatched to Covent Garden Market.

It is of the utmost importance that the plants be kept in every stage of their growth free from aphis or green-fly, caterpillars, (which latter vary in size, colour, and number according to the heat of the weather), and thrip.

Incessant care is required to keep these pests in subjection, as without it the plants may soon be spoiled, in which case all previous effort and expense are lost. Mice, too, as the autumn approaches, are very mischievous; but they may be trapped before they have time to make any noticeable depredations.

Most of the greenhouses at Worton Gardens contain about 3,000 cubic feet. Upon an average the Cyclamen plants are placed about 18 inches from the glass upon beds of damp ashes, as it is found that they thrive so much better in such a position during the summer than when placed on dry shelves. In September, however, as the plants become larger and the weather cooler, they are placed on shelves; the floor of the greenhouses is kept wet, and effort is made, by shading, to prevent the plants becoming limp.

The plants are kept in a temperature of about 50° Fahr., and plenty of air given to them, even at night, if the external temperature will then admit of ventilation.

To keep the plants perfectly free from insect pests in the

first three stages of growth, Clibran & Sons' fumigating rolls are used, for the plants are so lightly potted that if dipped in any solution the soil would fall away. In the last two stages George's tobacco juice is used, and the solution is made in the proportion of four parts of soft water to one of tobacco juice.

HARDY CYCLAMEN.

By the Rev. W. Wilks, M.A.

[Read January 13, 1891.]

Let me preface the few remarks which I am going to make by disclaiming any intention, or indeed ability, to add anything to the knowledge and experience of those who already grow Hardy Cyclamen. I speak rather to those of our Fellows who, though lovers of hardy gardening, have for one reason or another not yet turned their attention to these most captivating and easily cultivated little plants.

Hardy Cyclamen.—And first let me assure you that there are several varieties of perfectly hardy Cyclamen. I do not, of course, mean that you can grow the ordinary greenhouse Cyclamen, *C. persicum*, out of doors, though, perhaps, even that may be accomplished in favoured spots in Devonshire and Wales. But *C. persicum* has several unassuming little country cousins which will well stand the rigours of even such a truly arctic winter as that through which we are now passing—less showy these little country cousins may be than their magnificent relative, but not one whit less beautiful, and, from their more natural outdoor cultivation, obviously far more interesting.

Name.—With the great and happy revival which is now taking place amongst us of hardy gardening, there is expressed on all sides a desire for English names to plants, and many sweet old-fashioned ones have been reclaimed from the diaries and jottings of our grandparents of those much bepraised days of good Queen Anne. I yield to none in my love of a sweet-sounding and descriptive English name, but I venture to think we may go too far in this resuscitation, this digging up of old names, for some of them were by no means sweet or savoury, and some few of the modern ones, albeit Latinised or Hellenised, are better.

Our subject to-day is, I think, a case in point. There is something graceful, to my ear at least, and suited to my little favourites, in the name of Cyclamen (a short *y* if you please), which is altogether wanting in dear old Queen Anne's "Sow-bread." No doubt whatever "Sow-bread" is descriptive—of the corms or tubers, for pigs are said to delight in rooting them up and devouring them, but they really are too good for pigs, and so I refuse to re*us*citate "Sow-bread." (I really did not mean it for a pun.) As Cyclamen I first knew them, and as such will I hand them on.

Culture.—As to cultivation, they appear to present no real difficulties whatsoever. They luxuriate in a light, open, porous, sandy, peaty soil with limestone, or (which serves the same purpose) a few handsful of fine mortar rubbish shaken in amongst them every spring. They seem to prefer a slightly shaded and raised place, for both in my own garden and at Messrs. Paul's nursery at Cheshunt, where they grow so magnificently, they are planted on a sloping bank at the foot of thin deciduous trees. This, indeed, is the nearest approach we can give them to the natural habitat of the majority of the varieties. I have found them growing abundantly on the northern slopes of the hills in North Italy in nothing but limestone rubble and leaf-mould. I have also met with them in thin woods overhanging some of the Swiss lakes, and almost carpetting the ground on the lower slopes of the Uri Rothstock, so one would naturally conclude that they are impatient of stagnant moisture, delight in semi-shade and the roots of trees to carry off all surplus wet, but yet rejoice in one or two good spring soakings, which would roughly correspond to the melting of the Alpine snows.

They are very easily raised from seed if the seeds be sown as soon as ripe, but, as in the case of Hellebores, I have found dry seeds very difficult, almost impossible, to germinate. The tubers also are very easy to transplant, even when not at rest; but when received in a dry state, without foliage or rootlets, the beginner should be careful to plant them the right way upwards—the only indication, generally speaking, consisting in a shallow depression in the upper side of the tuber, with an inconspicuous eye, or sometimes a very small slightly protruding neck in the centre of the corm, from which the leaves and flowers will spring. Once planted they require little attention beyond the annual

sprinkle of mortar rubbish and spring soaking, and they will attain a good old age, some of the tubers at Cheshunt having been collected over thirty years ago.

Flowers and Leaves.—The flowers are very similar in appearance and in colour to those of their so widely known Eastern relative *C. persicum*, but smaller in every part, though, as I said, none the less beautiful for that. The leaves of most are charmingly marbled, zoned, and veined with white, the undersurfaces being generally of a purplish crimson. Indeed, the late Mr. Atkins used to say that he grew them as much for ornamental foliage plants as for their flowers.

Hybridisation.—The mention of Mr. Atkins' name leads me to say how much I wish some amateur gardener in want of employment would take up and continue the work of hybridisation which the late Mr. Atkins so well began. There is a wonderful opening, I am confident, for anyone to immortalise his name in gardening annals in this direction. For whether *C. Atkinsi* be simply a seed variation of *C. ibericum*, or a hybrid, as some suppose, between *C. ibericum* and *C. persicum*, it is in either case such a manifest improvement on its hardy parent that it appears to me to hold out to the patient cultivator as distinct a promise of success and of improvement in size and colour in these hardy varieties as has already been attained by florists with the greenhouse *persicum*. And let me here say that, in almost all branches of hardy gardening at least, it is the amateurs—the men of leisure—who should undertake these things, because the nurserymen have first of all so little time for it; and, secondly, one great point in hardy gardening being the comparative cheapness of our favourite plants, the nurseryman, however much he would rejoice in such experiments, cannot afford to give up the time for them. Great as his success might be, it would not sufficiently remunerate him for the time abstracted from the other duties of his profession. It may possibly pay a nurseryman to hybridise and grow seedling Orchids, in which success may enable him to realise fifty or a hundred guineas for some grand new break; but when, as with the hybridiser of hardy Cyclamen, he could at the outside only look for fifty or a hundred pence, it is certainly not worth the speculation, so that it is to amateurs (or to nurserymen working as amateurs in this particular) that I think we ought to look for a new race of larger flowering and more diversely coloured hardy

Cyclamen. And I venture to suggest that not only should varieties be raised from seed, but that distinct and repeated attempts should be made to effect hybridisation between all varieties of *persicum* as the pollen-bearer, and *ibericum*, *Coum*, and *europæum* as the seed-bearing parents, and I am confident, if this were done patiently and systematically, that we should soon have a hardy race rivalling, and perhaps equalling, *persicum*.

History.—There is not very much of interest to be said under the head of History. The original habitat of the genus Cyclamen was probably some place in the Eastern Mediterranean region. It is found only, as far as we know at present, in the North of Africa, but stretches away to Syria in the east and as far as Belgium* and Mid-Germany in the north, producing different species or varieties in Italy, Greece, Asia Minor, and the Mediterranean islands. I have not been able to learn whether it occurs wild in Spain and Portugal, though the name *pyrenaicum*, used as a synonym for *C. neapolitanum*, seems to imply that it does. The "wild" British specimens are almost certainly escapes by seed from gardens, which have naturalised themselves in woods. Gerarde, in his "Herball," 1597, says, "It is reported that Cyclamen or Sowbreade groweth on the mountains of Wales, the hills of Lincolnshire, and in Somersetshire . . . . near a town called Hardington"; but, however it may have been in his time, the only authentic "wild" habitat in England now is, I believe, a certain wood in the Weald of Kent, whence I have myself procured seeds, but which, for fear of the ardour of collecting botanists, I will leave unnamed.

Properties.—Gerarde is certainly very interesting when he turns to the medicinal properties and virtues of the Cyclamen. "The roote of Sowbreade, dried into powder and taken inwardly, in the quantity of a dram and a half, with meade and honied water, purgeth downwarde tough and grosse flegme and other sharpe humours. The same, taken in wine as aforesaid, is very profitable against all poison and the bitings of venomous beasts, and to be outwardly applied to the hurt places; taken as aforesaid, cureth the jaundies and stoppings of the liver, taketh away the yellow colour of the body, &c., &c."; and then he adds, and I would ask your particular attention to this property of

* "Sowbred groweth plentifully about Artois and Vermandois in France, and in the Forest of Arden in Brabant."—Gerarde, *Herball*, 1597, p. 694.

hardy Cyclamen, "Being beaten and made up into trochisches or little flat cakes, it is reported to be a good medicine to make one in love."

Species.—Coming now to the different species and varieties, one is astounded at the fearful confusion of the names. Gerarde in 1597 says, "There be divers sorts or kinds of Sowbreade, differing very notably as well in forme or figure as in their time of flowering, flourishing, fading, and appropriate vertues," and he describes three sorts, to which in 1636 he adds two more. Philip Miller in 1737 enumerates seven kinds; and in a paper read before our Society in 1878, Mr. Samuel Jennings, F.L.S., after ably discussing the difficulty of finding any wholly satisfactory basis on which the differentiation of the species can be safely founded, concludes with these words, "For all practical purposes the number of species may be reduced to six, viz.: (1) *Coum*; (2) *ibericum* (including *Atkinsi*); (3) *vernum* (syn. *repandum*); (4) *europæum*; (5) *hederæfolium* (with its geographical forms *africanum* or *macrophyllum*, and *græcum* or *latifolium*); (6) *persicum*. Mr. Nicholson, in his "Dictionary of Gardening," gives nine; and that prince of modern botanists, Mr. J. G. Baker, F.R.S., now admits ten species. But what strikes an inquirer most of all is how strangely, from first to last, the different names have been engaged in what I suppose we all of us as children rejoiced in—I mean the game of "General Post"—for no sooner do you find a name attributed to one species or variety than it eludes your grasp by deftly slipping off to another; follow it, and perhaps you think you have it, but no, off he flies and settles on a third; follow again, and at last you feel sure you must have tracked him down to earth, but not a bit of it, off he is again, back to one of the two he had previously deserted; then off again to a fourth, backwards and forwards, "and so *ad infinitum*." In fact, every species seems to have passed under as many different aliases as the most notorious thief in London. I do, however, trust that Mr. Baker's latest classification, which I humbly follow as my guide, has stopped for good and all these playful antics of the names.

Description.—I will now proceed to give a short description of each of the species acknowledged by Mr. Baker, following the order of his classification, and endeavouring at the same time to note the most prominent points of difference between them, in

order to simplify as far as possible the identification of any given plant.

The points most deserving of notice, in attempting to identify any of the species, are, I think, the following :—

1. The tuber, its shape and colour ; and especially its mode of emitting rootlets, whether only from the centre, or from all parts of the base, or from all over the whole tuber.

Coum, *ibericum*, *repandum*, *cilicicum*, and *græcum* emit roots from the centre of the base only.

Europæum and *persicum* from all parts of the base.

Neapolitanum, *africanum*, and *cyprinum* from all parts of the tuber.

2. Season of flowering.

Spring : January to May—*Coum*, *ibericum*, *repandum*, *persicum*.

Summer : June to October—*Europæum*.

Autumn : September to December—*Neapolitanum*, *græcum*, *africanum*, *cilicicum*, *cyprinum*.

3. The shape and marbling of the leaves.

4. Whether the leaves appear before or after the flowers.

5. The existence or not of scent.

No one of the above points is sufficient by itself to fix identity, but each must be considered with reference to all the others. But

6. A stoloniferous rhizome, or a short gouty neck proceeding from the centre of the upper surface of the tuber, at once marks out *europæum* or (?) *cilicicum*.

7. Little earlike appendages at the base of each petal or calyx segment, forming a little diadem round the mouth of the flower, at once strictly limit us to *græcum*, *neapolitanum*, *africanum*, or *cyprinum*.

8. Flowers appearing before the leaves limit us to *africanum*, *græcum*, and *neapolitanum*. (The flowers of *neapolitanum* will often continue on with the leaves, but always begin before.)

9. The absence of any whitish marking on the upper surface of the leaf almost certainly indicates *Coum*, or, very rarely, varieties of *neapolitanum*.

I.—C. Coum.

(The "common round-leafed sowe-bread" of Parkinson. Confused by Reichenbach with *C. europæum*.)

Blooms, in January, February, and March; small; deep rosy red.

Scent, none.

Leaves, contemp. with flowers; always nearly round; smooth; dark green above; neither variegated, toothed, nor lobed; decided purple below.

Tubers, round, compressed, smooth; roots proceeding from the centre of the base.

Habitat. It is very widely distributed, being found in Germany, Italy, Greece, Syria, Turkey, Armenia, and the Caucasus.

This species is very hardy, thrusting its bright little head up through the snow. It is easily recognised from its small plain round dark leaf and short-stalked flower, which is the smallest of all the species.

There is a white variety called *C. C. album*; and a garden variety called *Coum zonale*, in which the leaf has a distinct white zone. This may possibly be a hybrid between *Coum* and *repandum*.

C. orbiculatum of Miller, *Bot. Mag.* t. 4, is considered only a variety of *Coum*.

II.—C. ibericum.

(Has borne the specific names of *caucasicum*, *Coum*, *Coum-ibericum*, *Coum vernum*, *vernum* (Sweet), *vernale*, *elegans*, and *europæum*.)

Blooms, in February and March; bright red in the type, with a purple spot at the base; very variable.

Scent, none.

Leaves, contemp. with flowers; slightly heart-shaped; often slightly undulated at the edge; always zoned with white above.

Tuber and roots, similar to *Coum*, to which indeed it is a very near relation; but the whole plant, in all its parts, is slightly bolder in habit, and the leaf difference can hardly be mistaken.

Habitat, the Caucasus.

As hardy as *Coum*, and of close, compact growth.

There is a beautiful white variety called *Atkinsi* after its raiser, the late Mr. Atkins, of Painswick, Gloucestershire.

III.—C. PERSICUM.

(Has borne the specific names of *indicum*, *pyrolæfolium*, and *latifolium*.)

Blooms (naturally) in March and April; white in the type, with a bright red-purple blotch at the base, but very variable under cultivation.

Scent, none in the type, but a form is found in Palestine which is very fragrant.

Leaves, contemp. with flowers; rather oval in shape; the edge slightly toothed; distinctly marked with white above.

Tuber, emits roots from all parts of its under-surface.

Habitat, Greece, the Greek islands, and the whole of Syria.

The flower is the largest (in cultivation by far the largest) of all the species of Cyclamen; it has also one distinguishing peculiarity that, whereas in all the others the seed-pod as soon as formed begins to wind itself up corkscrew-wise in the length of its flower-stalk until it assumes a spiral tightly curled up close to the parent tuber, in *persicum* the flower-stalk generally throws itself down flat upon the surface of the ground.

This well-known greenhouse plant cannot rightly be accounted hardy, although the late Hon. and Rev. J. T. Boscawen, writing to Mr. Jennings in 1878, says: "I have had *C. persicum* in the open air for five years or longer—some under slight shade, others exposed on a north bank. When in a north aspect they are evergreen, but do not blossom so well. The frost does not seem to injure them, though there has been skating within a few yards of where they are growing. They stood ten degrees of frost last week." This testimony may well encourage those who live in the warmer and more sheltered corners of our county to try *persicum* outdoors, but I fear it is hopeless for the mass of us. Specimens which have been sent to me, collected on the hills of Nablûs, the old Samaria, and which I take to be *persicum*, have invariably succumbed, even to a mild winter.

IV.—C. REPANDUM.

(Has borne the specific names of *hederæfolium*, *vernum* (Lobel), *ficariifolium*, *romanum*, and is still very generally known in nurseries and gardens as *vernum*.)

Blooms, in March and April; in the type rosy red, with a deeper spot at the base, but individuals occasionally vary through all shades of rose to white; larger than *Coum*.

Scent, variable.

Leaves, comtemp. with flowers; rather long oval heart-shaped; toothed round the edge; distinctly zoned with white above, purplish beneath.

Tuber, smooth; dark yellow; roots proceeding from the centre of the under-sides.

Habitat, Majorca, South of France, Italy, and Greece. On the mountains of the Peloponnese it grows at a height of four to six thousand feet.

It is one of the most beautiful, but requires a somewhat warmer spot than *Coum*.

C. balearicum is a variety of *repandum* with smaller flowers.

V.—C. EUROPÆUM.

(Has borne the specific names of *purpurascens* (Miller), *odoratum*, *æstivum* (Parkinson), *Coum* (Reichenbach), *officinale*, *Clusii*, *littorale*, and *retroflexum*.)

Blooms, January to October; deep carmine to pale pink; much larger than *Coum*.

Scent, very fragrant.

Leaves, contemp. with flowers, and almost evergreen; deeply heart-shaped at the base; very slightly notched round the margin; marbled with white above, purple below.

Tubers, very irregular in shape, sometimes quite elongated; dark yellowish colour; compressed in the centre; frequently grow to a great size; roots emitted all over the surface. It possesses the peculiarity of forming short neck-like stems, sometimes several from one tuber, with gouty knobs, from which the leaves and flowers proceed; it also "often throws out rhizomes of considerable length . . . . which if broken into pieces will grow, thus forming the *C. anemonoides* of the Dutch" (Atkins).

It "varies much in northern and southern habitats, the southern forms receding from the northern type so as to more resemble *persicum*. Lagger's *C. Lodonæum* is our typical *europæum*, and his *europæum* covers the southern forms" (Atkins).

Habitat, Southern and Central Europe—France, Italy, Austria, and Greece.

C. Peakianum (*Floral Mag.* t. 262) is a fine Italian variety of *europæum*. There is also a white variety.

VI.—C. CILICICUM.

Blooms, October and November; pure white or pale rose, with a bright purple spot at base; calyx-segments sharply pointed.

Scent, unrecorded.

Leaves, contemp. with flowers, nearly round; edge not toothed; close basal lobes.

Tuber, large, depressed; roots proceeding from the centre of the base.

Habitat, Cilicia.

This is a very near relative of *europæum*, but Mr. Atkins considered it distinct on the ground of its sharply pointed petals (calyx-segments), and the roots proceeding from the centre only, and not, as in *europæum*, from all parts of the base.

VII.—C. GRÆCUM.

(Has borne the specific names of *persicum* (Smith, "Prodrom. Fl. Græc.") and *latifolium*.)

Blooms, September and October; pale red to pure white with purple spot at base; with little ear-like protruberances at the base of each petal (calyx-segment).

Scent, often fragrant.

Leaves, after the flowers; small, thick, heart-shaped, slightly toothed; zoned with white above; purple beneath.

Tuber, large, red, emitting roots from the centre of base.

Habitat, the mountains of Greece at an attitude of 2,500 ft. and up to snow-level.

A near relative of *neapolitanum*, but differing in leaves and tuber.

VIII.—C. NEAPOLITANUM.

(Has borne the specific names of *subhastatum*, *autumnale*, *pyrenaicum*, *europæum*, *ficariifolium*, and *hederæfolium*, under which last name it is still most generally known in nurseries and gardens.)

Blooms, September and November; all shades between deep crimson and pure white, the two extremes being the least common; very distinct ear-like protruberances at the base of each petal.

Scent, none.

Leaves, after flowers; oval heart-shaped, or shield-shaped, but very irregular and variable; distinct angular projections from the margin, with often a very small toothing all round the edge as well; seldom dark green, or free from marbling, but generally with most beautiful bright silvery bands and markings; the leaves die down in early summer.

Tuber, very large, rough, dark brown, scaly when old; sometimes reported as much as a foot in diameter; roots proceeding from all parts of the tuber, but chiefly from the rim on the upper surface.

Habitat, Central and Southern Europe; very abundant about Corfu and in the Ionian Islands.

Perfectly hardy, and the most beautiful of all.

C. linearifolium (De Candolle), *Bot. Reg.* xxiv. 49; *Garden*, August 19, 1875, is a monstrous variety of this species.

IX.—C. AFRICANUM.

(Has borne the specific names of *macrophyllum*, *neapolitanum*, *robustum*, and *algeriense*.)

Blooms, September and October.

Leaves, very broad, with foot-stalks sometimes eight to twelve inches high, and not fully developed till December.

In all other respects similar to a very large coarse-growing *neapolitanum*, to which it is a very close relation.

Habitat, the mountains of Algiers.

There is said to be a variety of this which has the under-surface of the leaves green, and another with the leaves lilac beneath, and the flowers fragrant.

X.—C. CYPRINUM.

Blooms, October; white with bright purple spot at base; long narrow petals with ear-like protruberances at base.

Scent, unrecorded.

Leaves, contemp. with flowers; broad; marbled with white above; red-purple beneath; edge irregularly toothed, but not lobed.

Tuber, roots all round the sides.

Habitat, the Island of Cyprus.

A very near relative of *neapolitanum*, differing chiefly in the unlobed leaves and long narrow petals or calyx-segments.

In conclusion, I will only add that in preparing this paper I have been greatly indebted to Mr. J. G. Baker, Mr. Samuel Jennings, Mr. George Paul, and my assistant secretary, Mr. Weathers; what merits it may possess are theirs, but for the mistakes, and they are doubtless many, I can at least claim the entire copyright myself. I only hope I may have succeeded in interesting some of our "Hardy" enthusiasts in the genus Cyclamen, and that they will in future bestow upon it the attention and the love which it so well deserves, and which it will, I am sure, so amply and generously repay.

Discussion.

Mr. James Walker, of Ham Common, said he did not at first intend to make any remarks on the papers which had been read, as he was what might be called a broken-down Cyclamen-grower. At one time he thought he could grow a few of these plants, but now he knew he could not. He had had no experience whatever in the cultivation of the hardy species, and therefore could not say anything about them. As to Mr. Warren's advice that the seed, after being gathered, should be exposed to the air for a considerable length of time, he had, on the contrary, always found that the sooner the seed was sown after being ripe, the better and stronger were the seedlings. It would, of course, he said, be quite possible to keep the seed in an atmosphere the conditions of which would be such that the seed would germinate freely after some length of time, but it should not be exposed to the sun. That was his experience. As to keeping the seeds in a temperature of 70° Fahr. after being sown, that he had

not found to be beneficial to the seedlings. The best Cyclamen he had grown had been raised in a somewhat cooler atmosphere. If the seed were sown, say, in August, and kept cool and shaded, it no doubt took longer to germinate, but the stronger the seedlings would grow. When young, *Cyclamen persicum* cannot have too much moisture ; a dry heat is fatal to them when they are babies, but they like a somewhat drier condition when the corms are fully matured.

Mr. George Paul said he was a great lover of hardy Cyclamen, and had been fortunate enough to obtain the famous collection of the late Mr. Atkins. That gentleman was known to many lovers of plants as one who devoted many years of his life to the study of hardy plants, but particularly to Cyclamen. With his collection came a note-book in which were recorded the dates and places where many of his specimens were collected, some of the plants having been in his garden for five-and-twenty years, a fact which testified most fully to the great longevity of the corms. Mr. Wilks having alluded to the fact that hardy Cyclamen thrive at the base of thin trees, Mr. Paul said his plants were at the foot of a large Elm, the roots of which absorbed the moisture from the soil, leaving it comparatively dry for the Cyclamen. Limestone situations are favourite spots for Cyclamen, and if they are grown in rubble they will thrive. *C. neapolitanum* does very well in it, and all those kinds which grow along the Mediterranean shores. Cyclamen, he said, had a peculiar habit of burying their seed-pods underground, and the result often was, when they had not been gathered, that numerous seedlings were found coming up the next season. The sooner the seeds were sown after the pods had burst the better, in regard to hardy Cyclamen, as the seedlings would then certainly be stronger. This fact explained why people who bought Cyclamen seed from shops did not obtain good results—because the seed had lost much of its vitality by keeping. Hardy Cyclamen were a very beautiful race of plants, and should be more generally cultivated. Some of them (*e.g. neapolitanum*) did not object to a fall of snow even, but will push their flowers up through it.

Mr. Martin, who had been much interested in the papers read and the remarks which followed, said that the Cyclamen was everyone's plant when grown, but it was not everyone's plant

to grow, by which he meant that there were plenty of people to be found who would go into raptures over a well-grown specimen, but very few who would take the trouble to grow such a specimen. He agreed in the main with the remarks of Mr. Walker, and believed a great deal in the spiral form of the seed-vessels, and the way in which nature had provided for the plants taking care of themselves so as not to become too dry. As to hybridising *C. persicum* with *C. Coum*, he believed this was as far off as ever, owing perhaps to just a slight difference in the size of pollen grains, for which we cannot account. As to humidity, the plants liked it at one period of their existence, namely, when they are young, but not at another—when they are old. A temperature of 70° Fahr. had been recommended as suitable; but Mr. Martin preferred a cooler one of 50°, so as to allow the seeds to germinate more slowly, and thus have sufficient time to absorb the nourishment required for a later stage in their growth. As to the length of time seed could be kept without any deterioration, Mr. Martin said he had kept some Cyclamen seed for ten or twelve years, and he found that it germinated as freely as seed that was fresh. He had seen many people trying to grow Cyclamen, but the number who were successful might be counted on the fingers of one hand. Cyclamen are the first plants a man will attempt to grow, and they are also the first he will leave off growing. When Mr. Paul said they were lime-loving plants, he "hit the right nail on the head." To be successful with Cyclamen, lime must in some form or other be introduced into the soil.

THE GERMINATION OF CYCLAMEN.

Dr. Maxwell T. Masters, F.R.S., has kindly drawn our attention to the following interesting remarks from his pen which appeared in the *Gardeners' Chronicle* in November 1887, p. 596:

The ordinary mode of germination in Cyclamens differs from that of Dicotyledons in general, and has, moreover, been differently interpreted by different observers. Gaertner and his son,* as well as Treviranus,† describe the germination as taking place thus:—The radicle is first of all protruded, its upper portion (or more properly speaking the caulicle) becoming dilated

* *Gaertn. Fruct.*, 3, 25, t. 183 k. † *Symbol. Phytol.*, 86.

to form the tuber. The whole of the solitary cotyledon, except a short stalk attaching it to the tuber, remains within the seed and decays with it. The short stalk or petiole of the cotyledon remains attached to the tuber for some time in the form of a minute hooked stalk-like process, which ultimately withers and disappears. The first leaf is produced at the top of the tuber, by the side of the hook-like remnant of the cotyledon, and resembles the perfect leaves of the plant in everything except its smaller size. The subsequent leaves are produced in succession one after the other. Mirbel* gives a different account of the process of germination in this genus, and considers what has just been mentioned as the first leaf to be really the cotyledon.

My own observations of a great number of seeds and seedlings lead me to consider the view taken by Gaertner and Treviranus as correct, and to say with the last-named observer that the greater part of the cotyledon remains constantly within the seed, and that the first leaf is a subsequent production, of which not a trace exists in the seed itself. The hook-like remnant of the cotyledon Mirbel seems to have mistaken for the rudiment of the second leaf.

The primary radicle speedily disappears; to supply its place a number of adventitious root fibrils spring from the base of the tuber.

On the first glance the vestige of the cotyledon is very likely to be entirely overlooked, or, indeed, it may have disappeared during the growth of the little plant; in either case, the first leaf is very likely to be mistaken for the cotyledon—an error which can only be detected by close observation of the seed before and during germination.

Again, when the first leaf is injured during its growth—as was the case in several specimens that came under my notice—another error may readily be made, viz., that of considering the second leaf as a cotyledon opposite to the first, the difference in size and degree of development being accounted for by the injury or disease that has befallen the supposed fellow-cotyledon. This error, like the former one, is readily corrected by examining a large number of seeds and seedlings in all stages of their development.

One of the specimens here illustrated (No. 6) has precisely

* *Ann. du Mus.*, xvi. 454, t. vi. (xxi.), f. 1.

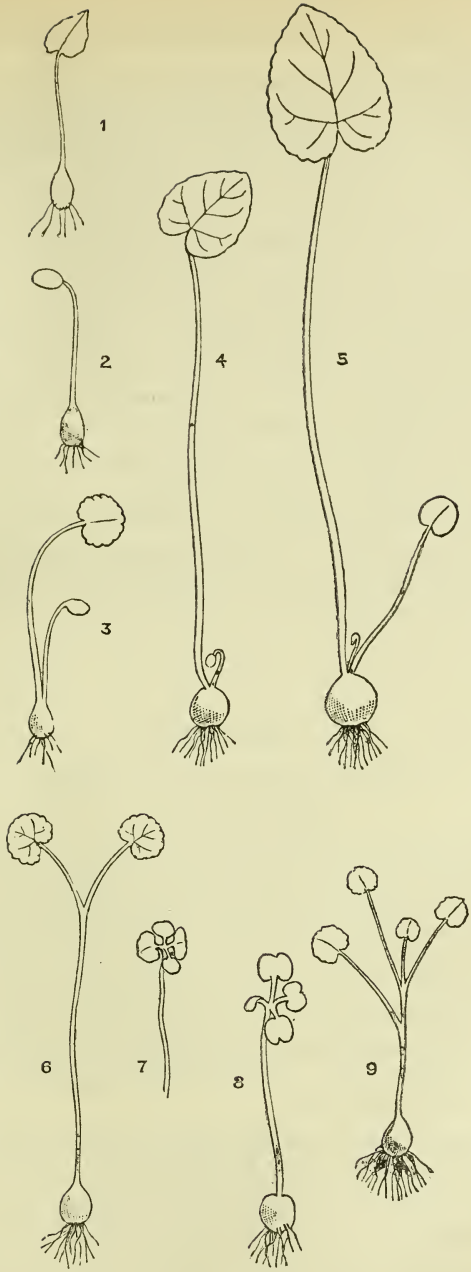


Fig. 21.—Germination of Cyclamen: 1–5, Normal; 6–9, showing adhesion of Leaf-stalks.

the appearance as if two cotyledons of equal size were present, each stalked, the stalks originating from the top of a slender tigellum or caulicle, whose base is dilated into the tuber; this appearance is rendered the more deceptive as the hook-like rudiment of the cotyledon has entirely disappeared.

The specimen in question may be explained in consonance with what has been before described as the mode of development of the seedling, by supposing a fusion of the leaf-stalks of the two first leaves for some distance. It must, however, be remembered that two cotyledons have been found in this genus. Gaertner fil. figures one such instance out of hundreds examined by his father and himself. Other specimens (Fig. 21, Nos. 6, 7, 8, 9) presented a similar fusion of the first four leaf-stalks in varying degrees. That there has been a fusion or lack of separation of the stalks, and not a division or branching of one into others, is shown by the existence of minute furrows proceeding upwards from the tuber to the point of separation of the little leaves, such furrows being more obvious on a cross-section.

SNOWDROPS.

By Mr. James Allen, F.R.H.S.

[Read March 10, 1891.]

As I know nothing of botany, I must ask you to bear with me in the use of unscientific terms when speaking of the various Snowdrops. I cannot give you any information as to how many species of Snowdrops have been described and allowed by the best authorities, neither can I tell you the points that constitute a species, or that separate one species from another. What I propose to do is to attempt to describe, in homely language, the various Snowdrops that, with but few exceptions, have come under my own observation.

Less than twenty years ago there was, practically, but one kind of Snowdrop grown in England, *G. nivalis*, in its single and double forms. *G. plicatus* was introduced soon after the Crimean war, but it was not often seen unless in botanical gardens. Early in the '70's *G. Elwesii* was introduced, and in 1875 Mr. Barr offered, under the name of *G. Imperati*, a very

fine form which the late Mr. James Atkins, of Painswick, procured "from somewhere in the Kingdom of Naples." This is much finer than the *G. Imperati* offered by Messrs. Backhouse and others some two or three years later, and now generally grown under that name. I propose that the earlier form be called *G. n. Atkinsi*. Then the wonderful *G. latifolius* (first offered as *G. Redoutei*), a Snowdrop with the leaves of a Scilla, followed later on by *G. caucasicus*, and finally by *G. Fosteri*.

At the present time we have all these heads of the family in cultivation, and in addition there is just opening up to us the results of intermarriages between the various branches.

We have also discovered that a few forms of *G. nivalis*, whose lot it is to grow on some of the classic mountains of Greece, hurry into flower in September or October instead of January, and some of their little cousins in Corfu try to do the same, but cannot get their wardrobes ready until a few weeks later.

In speaking of Snowdrops we must not forget that, besides the scientific division into species and sub-species, we have the amateurs' arrangements into classes, according to colours and other peculiarities. Consequently we hear of *white* Snowdrops and *yellow* Snowdrops, and also *green* Snowdrops. From more than one quarter a rumour reaches me that there actually exists a really *pink* Snowdrop. I shall have something more to say on each of these classes.

G. nivalis and *Imperati*.—I do not think it is necessary for me to say much about *G. nivalis*, as it is so well known and is such a favourite everywhere. For massing or growing on grass there is no variety equal to it, or that yields such a quantity of flowers.

G. Imperati (of Backhouse) seems to be nothing more than *nivalis* enlarged and improved, by growing for untold generations under more favourable climatic conditions. I think no botanist would be able to say where *nivalis* ended and *Imperati* commenced.

In this section there are some most lovely Snowdrops, amongst which I would mention first Mr. Melville's Dunrobin form, now known as *G. Melvillei major*. For several years after Mr. Melville sent me this it did not seem at all happy, but since it became thoroughly established it has done well, and I consider it a very fine variety, and I think the purest in colour of all Snowdrops, scarcely excepting *G. poculiformis*.

G. n. Atkinsi is second to none in size, form, quality, and freedom of growth. All my correspondents speak most highly of this; it is the plant known to some as *Imperati* of Atkins, or true *Imperati*.

One of my first seedlings, which I named Charmer, is quite in the front rank, being very large, of great breadth and substance of petal, and of perfect form and quality. It is of dwarf habit, and the foliage is of great substance and very broad. The whole plant is most distinct.

Another of my seedlings I call Galatea. This, too, is one of the giants of the family as to size of flower, but not in stature. I have never been able to decide whether this or Charmer is the more perfect flower.

A recent seedling named Cupid is a great favourite of mine. This is not a giant, but is large, if classed under *nivalis*, and I think it the most perfect of that section, having such breadth and substance of petal and beauty of form.

G. n. "Valentine" is also one of my newer seedlings, and quite distinct. It is of the ordinary size, but of fine expanded form, showing off the unusually large dark green markings on the inner petals.

A small seedling of perfect form I have named Tomtit. This is quite different from the usual small forms of *nivalis*.

Another of my seedlings flowers after most of the other Snowdrops are over, being even later than a selected form which I called *G. Gusmusi*. My seedling I call Lazybones.

A year or two since I selected from some imported roots of *G. Imperati* a lovely dwarf, very late flowering form, which I named Afterglow. This is the most beautiful of the late class.

G. nivalis fl. pl. (Allen).—One of my earliest seedlings was a double form, quite distinct from the old one so common in gardens. The seedling is of dwarfer growth and gives smaller flowers, but the doubling is almost as regular as that of a Ranunculus, and there are no extra outer petals to destroy the symmetry of the flower, which is as perfect as the single ones.

G. n. plenissimus is another double seedling which has just given its first flower. The centre is very full and the formation very regular; the green-marked petals are not so perfect as in the other seedling, and I do not think it will be so handsome a

flower. As the parent was a large form it is probable this will have a large flower.

Besides these I have a large number of fine seedlings belonging to this section, which are full of beauty and interest to me, but to mention them would be weariness to you.

G. plicatus is very distinct in its character, and its best forms possess great beauty, both of flower and of leaf. The foremost place in this section belongs to *G. p. maximus*, found a few years since in a garden at Chapel, in Berwickshire, by Mr. W. B. Boyd, of Melrose. This wonderful variety, under favourable conditions, gives flowers the petals of which are fully two inches long; the width is, perhaps, not quite equal to this great length, but it is without exception the grandest of all Snowdrops. It has the additional recommendations of being a very late bloomer and a good grower.

In the same garden Mr. Boyd found another good variety, which he named *G. p. Chapeli*. This is not nearly so large, but it has very broad petals, and is of fine form, and ranks with the best.

Some years ago I selected a fine form, which I named *G. p. elegans*. I have sent this to a great many correspondents, and they place it in the front rank. I regret to say that for several years it has done badly with me, and I have almost lost it. About the same time I selected a variety which had the broadest and handsomest leaves I have ever seen. For several years it grew well; then got sickly and died out after struggling for two or three seasons.

G. plicatus usually flowers late, but I have a selected form, *G. p. præcox*, which flowers with the early varieties of *G. nivalis*. This is very distinct. Another selected form, *G. p.* "Omega," flowers with the very latest.

G. Elwesii is one of the most distinct species of Snowdrop we have, and the best varieties of it are very large and handsome, but still it is not a universal favourite. It wants the most sheltered spots in the garden, otherwise the wind is too much for the top-heavy flowers, and their purity and beauty are soon gone. I am trying to get a race of finely shaped flowers, with short, sturdy stems, to enable them to carry their heads erect in the battle of life. Many find *G. Elwesii* difficult to manage, but with me it grows very freely, especially in one bed of very light soil, where the seedlings are almost a nuisance.

Last autumn I planted in the grass and odd places some collected bulbs of *G. Elwesii*. These are now giving some very weakly flowers, and amongst them I have noticed great variety and novelty of form; and I have found half-a-dozen with the inner petals almost entirely green, which is very unusual in *G. Elwesii*. I imagine these must have been from a new habitat. I have selected one bulb and named it *G. Elwesii* "Balloon," from the extraordinary shape of the petals, which are hollowed out like an old-fashioned caddy-spoon. I have never seen any at all like it before.

G. latifolius.—I well remember when my first roots of this species pushed through the soil, I thought Dr. Wallace had made a mistake and sent me Scillas instead of Snowdrops, and the uncertainty was prolonged as I had no flowers for several years, a peculiarity of this species being that it will not bloom until thoroughly established. This is the most distinct of all the Snowdrops, with its broad grass-green foliage and small pure white flowers, and it has a delicate beauty all its own, more especially just before the bud expands, when the two leaves curve so lovingly round the flower-stem. I have obtained roots of this species from many quarters, but there seems to be little or no variation in the size, shape, or markings of the flowers. Had they been raised from one original plant they could not well be more uniform. I am anxious to get some varieties of this species, and shall be very thankful for any assistance that way.

G. caucasicus was first offered by Mr. Ware in 1888. The dozen bulbs I had that autumn, and also the six which I bought the following spring, have not done well, and at the present time I have but four roots left alive, half of these being too weak to flower. The two strongest roots are growing in gritty loam, and the others in very sandy soil. The heavier soil seems to suit this species best, although Mr. Ware tells me that he grows it in nearly pure sea-sand. This species has broad, pointed, very glaucous leaves, and rather small flowers, very much of the *nivalis* type. It has not been in cultivation sufficiently long to develop its true character.

G. Fosteri was introduced from Amasia in Asia Minor by Professor Foster, of Cambridge, and was named out of compliment to him by Mr. Baker, of Kew, to whom specimens were sent in 1889. Mr. Max Leichtlin has since procured a large

number of bulbs, so that it will soon become well known. I am indebted to both gentlemen for a supply of roots. It bloomed with me first last season, and I must confess that it did not come up to my expectations; but I think it is scarcely fair to pass judgment on it before it has been grown in our gardens for some four or five years so as to develop its true character. The collected bulbs, which were planted in January 1890, had almost lost their vitality, and will require several years to recover their strength. I understand that in the favoured spots of their native habitat the bulbs of *G. Fosteri* are as large as those of a good-sized Narcissus. This seems to be the most sportive of all the Galanthi as to size, form, and marking of the flowers. From the comparatively few bulbs I have already bloomed, I have had flowers with petals of every imaginable shape, some showing points of great beauty, and others quite the reverse. We must be patient and weed out unsparingly, and then in a few years we shall be proud of *G. Fosteri*. The markings on the inner petals are very similar to those of *G. Elwesii*, but the foliage is quite different, being broad and somewhat blunt, and in shape and colour much like the leaves of *Scilla sibirica*. Mr. Max Leichtlin thinks very highly of *G. Fosteri*, and considers it to be the "King of Snowdrops." The hard frosts of February or March 1890 scorched the leaves of my plants and puckered the petals of the flowers, thus indicating that a sheltered spot should be selected for it. The sportive character of the flowers of *G. Fosteri*, and the shapelessness of its leaves, lead me to think that it must be a hybrid between *G. Elwesii* and *G. latifolius*, although I am told that *G. Elwesii* is not found in the same district.

In 1883 I ordered some roots of *G. latifolius* from Gusmus, an Austrian nurseryman. Amongst these was a bulb which showed altogether a different character from the type. In 1889 and 1890 I sent a flower and leaf to Mr. Baker, of Kew, but he was unable to trace its history. Recently I sent him the complete plant in flower, and he reported it to be distinct from any Snowdrop hitherto described, and quite worthy to be named, and he proposes to call it *G. Alleni*, out of compliment to myself. Mr. Baker thinks it is probably a hybrid between *G. latifolius* and *G. caucasicus*, as it has some of the features of each species. The flower is of much the same character as that of *G. latifolius*, but nearly twice as large, and the foliage

corresponds in size with the blossom; but it is somewhat glaucous, and of a much darker green than that of *G. latifolius*, but of exactly the same elegant form. *G. Alleni* is very hardy,

Fig. 22.—G. Alleni.

of robust growth, and also free-flowering. It is a handsome plant, and is much admired by the two or three friends to whom I have been able to send a bulb (fig. 22).

Autumnal-flowering Snowdrops.

In Greece and the adjacent countries several Snowdrops have been found which flower in the autumn or early winter. They seem to belong to the *nivalis* section. One peculiarity I have noticed in them is that they have a glaucous line running down the centre of each leaf, and by this they can be at once distinguished from the spring-flowering forms of *nivalis*. So far as I can learn, all these Snowdrops grow on high ground, mostly on mountains, and it seems to me that their early flowering may be Nature's instinct hurrying them into bloom before the snow comes. I understand that the Snowdrops on the lower grounds do not flower until early in the year.

G. Olgæ.—This autumnal-flowering Snowdrop was found on Mount Taygetus by Orphanides, the Greek botanist. Mr. Max Leichtlin tried to purchase the stock from the lucky discoverer, but the exorbitant price demanded prevented his doing so. A year or two since Mr. Max Leichtlin informed me that Orphanides was confined in a madhouse, and that the Snowdrop cannot be found in his garden, or traced in any way. From the descriptions given of it, *G. Olgæ* must have been a fine variety, and it is very unfortunate that it is lost to cultivation. M. Tanka, the Hungarian botanist, asserts that this and *G. octobrensis* are identical, but I do not think so, and the difference between *G. octobrensis* and *G. Rachelæ* confirms my opinion.

G. octobrensis.—Lord Walsingham, when travelling in Albania about the year 1875, collected some bulbs on one of the mountains and sent them to the late Rev. H. Harpur-Crewe. Amongst these was a bulb which proved to be a Snowdrop flowering in the autumn, usually in October. The first bulb Mr. Harpur-Crewe had to spare he very kindly sent to me, and it has always been true to its autumnal habit. I am sorry to say that it is somewhat delicate and apt to disappear ; it also increases very slowly with me. In Mr. Boyd's garden at Melrose it seems quite at home, a single bulb having given five blooming roots the first year after planting. Mr. Boyd recommends that the Snowdrops belonging to this section should be lifted directly the foliage dies down, and not replanted for two or three months.

G. Rachelæ.—When travelling in Greece in 1886, Professor Mahaffy collected a quantity of bulbs and tubers on Mount Hymettus, which he sent home to Mr. F. W. Burbidge, so well known to everyone who takes an interest in choice flowers. One of these roots proved to be a Snowdrop flowering in October and November. Hearing of this from a mutual friend, I wrote to Mr. Burbidge for information about it, and his reply was accompanied by the original bulb, leaving him an offset only which it had formed. This great kindness to a perfect stranger was quite unexpected, and I take this opportunity of expressing my gratitude to Mr. Burbidge for it, and also for the many genial letters so full of valuable hints and sketches with which he has favoured me from time to time.

G. Rachelæ is of the same type as *G. octobrensis*, but the flower is a little larger, and the leaves are quite a third broader, and it seems to have a stronger constitution than that variety. It also differs in being a week or ten days later in flowering. Is this the *G. Olgæ* of Orphanides?

G. corcyrensis or *præcox.*—This usually flowers from the middle to the end of December, according to the mildness of the season. It is evidently a form of *G. nivalis*, small in size and delicate in constitution. Being the connecting link between the autumn and spring flowering kinds it is valuable, and well worth the extra care required in its cultivation. The late Mr. Harpur-Crewe received it from the English Chaplain at Corfu.

Mr. Max Leichtlin informs me that he has raised some seedlings from *G. corcyrensis* which bloom a month earlier than their parent, and in some of these the form of the flower is quite changed, the petals being very narrow, and one and a-quarter inches long. This they have maintained for two seasons.

In October 1889, a gentleman residing in Corfu kindly sent me, by sample post, some bulbs, then in flower, of a rare early Snowdrop which grew in one spot only on the island. The rootlets of the bulbs got dried up in transit and the flowers were much withered, but I could distinguish considerable variation in the size and markings of them, and in the character of the foliage. A large proportion of these bulbs died, but more than a dozen have given flowers this spring, but they have not bloomed early, which I attribute to their trials, as they virtually made a second growth last season. I think these will be quite a dif-

ferent strain from *G. corcyrensis*, in which I have found no variation. My kind correspondent informed me that the ordinary Snowdrop of the island of Corfu blooms in January.

G. Elsæ.—Amongst some roots collected by Dr. Mahaffy on Mount Athos in Greece in April 1889 (?) were a few bulbs of a Snowdrop which pushed through the soil in October of that year. Mr. Burbidge noticed these, and kindly sent one of them to me. This opened its flower on the 17th December. It is a dwarf variety with small flowers of good form, but I fear it is not very robust or hardy, as the frosts of last season injured the leaves, and it has not flowered this spring.

The Yellow Snowdrops

form but a small class, two varieties only being known at present. It must not be supposed that the petals of the flower are yellow; the name is given because of the rich yellow colour of the ovary, and the markings on the inner petals are also of that colour, instead of the usual green, and even the flower-stalks are more yellow than green.

G. lutescens was found some fifteen years ago by Mr. Sanders, of Cambridge, in an old-fashioned garden in Northumberland. When Mr. Harpur-Crewe first saw it he thought it was the "long-looked-for *G. reflexus*," but further observation convinced him that it was not. This is a very beautiful and unique variety of small size and of delicate constitution, but the reward of success amply repays a little loving care and trouble.

G. flavescens was discovered quite recently by Mr. W. B. Boyd, of Melrose, in a cottage garden, also in Northumberland, but in quite a different part of the county. This variety is rather larger than *G. lutescens*, and all the yellow points are brighter in colour with the exception of the flower-stem, which in my two plants seems rather paler. *G. flavescens* is a very beautiful variety, and will be a great favourite when it becomes known. It also has the recommendation of growing and increasing freely.

The White Snowdrops

also consist, at present, of two varieties only.

G. poculiformis was first brought into notice by Mr. D. Melville, who found it in the grounds at Dunrobin Castle. It has

since been found in Wales by Mr. A. D. Webster, and I have also received bulbs of a very similar form from a lady near Ayr, in whose garden it grew with several other peculiar forms. When in character the inner petals are almost the same length as the outer ones, and the green markings are entirely absent, thus giving the flower an elegance and purity not found in any other Snowdrop. Unfortunately, a good many of the flowers come with some of the inner petals reverting more or less to the normal form, and in this state they are not beautiful.

G. n. albus is smaller than most of this section, and is very distinct from Snowdrops in general; its peculiar feature being that the usual green markings on the inner petals are replaced by small dots, which are scarcely observable at a short distance. The flower is generally of perfect shape, and is then very delicate and pretty. An occasional flower sports in the way of *poculiformis*. It grows freely, but increases slowly. I found this in my garden several years ago, but whether a seedling or not I cannot say.

This season (1891) *G. n. albus* seems to be inclined to run into *G. poculiformis*.

The Green-flowered Snowdrops

form quite a large class, but of course none of the blossoms are entirely, or even mostly, green in colour. They come into this class in consequence of having more or less green on the outer petals, somewhat in the style of the Leucojum.

G. Scharlokii was so named in 1868 by Professor Caspary in honour of its discoverer, Herr Julius Scharlok, who found it in the valley of the Nahe, a tributary of the Rhine. This variety, in addition to large pale green spots towards the tips of the outer petals, has the peculiarity of a twin or divided spathe, which curves down on the two sides much like a pair of wings. This variety grows and increases very freely.

G. virescens is a very singular-looking Snowdrop, reminding one somewhat of an Ornithogalum. The outer petals are pale green, shading off to pure white at the edges, and especially at the tips; the inner petals are entirely green. At first I did not care much for this variety, but it has a quiet beauty which grows

on one, and I should not now like to lose it. It is very late in flowering, coming in quite at the end of the season. I do not know its history, but I believe Mr. Max Leichtlin had his bulbs from the Vienna Botanic Gardens.

G. Warei has green spots on the outer petals like *G. Scharlokii*, but has not the divided spathe, and the markings on the interior petals are larger. Mr. Boyd, of Melrose, kindly sent me my root of this variety, and he obtained it from Mr. Ware under the name of *G. Scharlokii*, and I imagine it must be a seedling from that kind. Mr. Ware is unable to account for the variation from the type. It is a strong-growing, handsome plant.

G. Fosteri "Leopard" is a great curiosity, having flowers of quite unusual shape, and at the tip of each outer petal a *large dark* green spot, in the style of *Leucojum vernum*. Mr. Max Leichtlin kindly sent me ten collected bulbs of *G. Fosteri* in January 1890, and one of these flowered as described, and has kept true this season.

G. Fosteri "Spot" is quite distinct from "Leopard." It has long outer petals, somewhat pear-shaped, and at the tip of each is a small pale green spot. The spots are not sufficiently prominent to give a decided character to the flower, but it is valuable as a variety.

To the green-flowered Snowdrops already mentioned may be added three of my seedlings. Two of these were raised from *G. Scharlokii*, the first having the green spots but not the divided spathe. I think this will be very similar to *G. Warei*. The second is from *G. virescens*, and is very much like that variety, but the green markings are paler in colour. The third is another seedling from *G. Scharlokii*, and seems to be almost a reproduction of that curious plant, having not only the green spots, but the divided spathe also. Another seedling from *G. Scharlokii* had the divided spathe, but the outer petals were entirely white.

Pink (?) Snowdrops.—Writing to me in July 1888, my valued friend Mr. Max Leichtlin says: "There exists a pink Snowdrop! So I was assured by my late friend Mr. Threlfall, who unfortunately died in Armenia. He told me so last November, and said he was promised a bulb this summer. Alas! he does not want it." Some gentleman present may, perhaps, have known Mr. Threlfall or his family, and be able to follow up the clue given.

Mr. A. D. Webster tells me that the spring before he left Llandegai he found in the Penrhyn woods a pink-flowered Snowdrop, which he transferred to his garden. When he left his residence, shortly after, the bulbs passed into the hands of a Church dignitary, from whom he can get no information about them. Mr. Webster says "the colour was like deep pink seen through muslin," and he has every confidence that it would be permanent.

In the spring of 1887 a note appeared in the *Garden* describing a pink Snowdrop which had appeared in a garden near Norwich. A friend took very much trouble in making inquiries about this for me. It was found that the young ladies of the house had played a joke on the gardener by watering a clump of Snowdrops with a strong solution of cochineal, which was partly absorbed by the plant and resulted in the blossoms having a pink tint. I have never tried this experiment.*

In 1856 Lord Clarina brought home with him from the Crimea some Snowdrop bulbs which he had collected whilst there. These roots were planted in the garden at Straffan House, Co. Kildare, where they have been growing since that time. Such is the history that comes to me with the Straffan Snowdrop. One would naturally expect this to be a variety of *G. plicatus*, but it appears to be an unusually fine form of *G. Imperati*. Can our botanical friends clear up the mystery? Is *G. Imperati* a native of the Crimea as well as *G. plicatus*?

About ten years since I had a Snowdrop from M. Van Houtte under the name of *G. Redoutei*. It was not Dr. Regel's plant, but a very fine form of *G. nivalis*, and very distinct, from its tall habit and large flower. I believe there is a *G. nivalis major* (*Redoutei*), and probably this is it.

G. umbricus appears to be nothing more than *G. Imperati* collected from a new district. It varies very much in quality of flower, and some good things may probably be selected from it, but I do not think that it is going to give us a December-flowering Snowdrop as promised by Messrs. Dammann.

G. n. Cathcartiæ is a small form of not very robust constitution.

* From information received since this paper was written I feel convinced that the Pink Snowdrop referred to by the late Mr. Threlfall was the one that had been "doctored" with cochineal in the neighbourhood of Norwich in the spring of 1887.—J. A.

The flowers are of perfect shape, with very pale green markings on the inner petals, which give them a very delicate appearance. Many of the spathes are partially split, and a good number entirely divided, as in *G. Scharlokii*. Miss Cathcart, of Auchendrane, found this in her grounds, and kindly sent me roots of it in 1886. Miss Cathcart also sent me a form very similar to *G. poculiformis*, but not equal to the Dunrobin variety.

Several years ago Mr. Murray, the gardener at West Ashby, Horncastle, sent me roots of a *white-spathed* Snowdrop which grew in the grounds there. It is not at all beautiful, neither is it always constant to this character, but when seen at its best it is very remarkable, there being two or three short white spathes in addition to the usual green one.

In 1880 I had sent me from two sources some very dried up bulbs under the name of *G. reflexus*. Most of these roots perished, and neither lot has increased much. They were not quite alike, but both were forms of *G. nivalis*, with small narrow-petalled flowers, and very weakly in growth.

Once or twice I have received so-called *G. montanus*, but only to find that I had my old friend *G. nivalis* with a fresh name. Probably the bulbs had been collected in a new district.

I have a race of seedling Snowdrops which I believe to be hybrids of *G. Elwesii* and *G. plicatus*, as they seem to be intermediate between the two species. Most of these have large, handsome flowers of great substance and fine form, and the inner petals are generally entirely green. They are of strong growth, and have broad glaucous leaves which, with very few exceptions, have the edges slightly turned or folded. The flowers are carried erect on very stout, tall stems. Amongst the best of these I may mention *G. hyb.* "Majestic," a very fine variety, quite equalled by *G. h.* "Titania," which has a grand flower and most distinct and striking foliage. Merlin, Robin Hood, Raphael, and Creole may also be mentioned as good varieties of this section.

In raising seedlings of Snowdrops one meets with many disappointments. This season I have bloomed about thirty seedlings from *G. Scharlokii*, and only three of these have been different from ordinary *G. nivalis*. Also about a dozen new seedlings from *G. virescens*, every one of which has reverted to the common Snowdrop. The same has happened with three seedlings from *G. lutescens*.

Raising Seedlings.

The raising of seedling Snowdrops is not at all difficult. After gathering the seed it should be kept in an airy place for a week or two, to thoroughly ripen, and then it should be sown as soon as possible. I have not met with much success from sowings in the open ground, so I now always use boxes, and I find that brandy-cases are very suitable for the purpose, as they are strongly made of good wood, and are not so deep as most boxes of the size. I bore twenty-five $\frac{3}{4}$-inch holes in the bottom, and then nail a 2-inch square strip of red deal about 3 inches from each end. This keeps the boxes off the ground, makes them handy to move, and prevents stagnation. I use ample drainage and a free soil with plenty of grit in it to keep it sweet. The seed is sown in drills about $\frac{1}{4}$ inch deep, the drills filled up with silver sand, and then $\frac{1}{4}$ inch of sifted soil put over the whole. Each box is numbered at the end or right side, and in my reference book I enter the particulars of the seed sown in each row. These boxes are placed about two feet from a low north wall, and are never protected in any way. They require but little attention; of course, the weeds must be kept down, and a little fresh soil added after the second year. The Marchantia and Spergula are the greatest pests in this work. I usually let the seedlings remain in the boxes until some of them begin to flower, which generally occurs the fourth season. Galanthus seed comes up very irregularly, and when seedlings are removed from the boxes they will be found to vary from the size of a wheat-corn to that of blooming bulbs. Seed of *G. lutescens* does not germinate for several years as a rule. Last spring, in the same box, and from seed sown at the same time, I had *G. Imperati* in flower and *G. lutescens* making its first appearance. If Snowdrop seed is kept till the spring, it will not germinate until the following spring. The true quality and size of seedlings cannot be ascertained until the third or fourth year of flowering.

With me *G. nivalis* grows freely in all soils and situations. *G. plicatus* is not very particular, but still some of its varieties require extra care, as they have an unpleasant way of disappearing. *G. Elwesii* does not do well in close, retentive soil. *G. latifolius* and *G. caucasicus* I believe prefer gritty loam, and I should say that *G. Fosteri* would also like it. Mr. A. D.

Webster tells me that peat has quite a magical effect on Snowdrops, but I have not tried it. My ideal soil for Snowdrops in general would be half good sweet yellow loam and almost half unsifted river-grit, and a little leaf-mould. The situation I should choose would be a gently sloping bank, more or less shaded by trees whose roots were allowed to wander freely among the Snowdrops. I believe that all bulbs are healthier when planted amongst active roots than in ordinary beds. When the bulbs are at rest it is very essential that the soil should be kept sweet by the activity of other roots. We too often lose sight of this fact. I think the autumnal-flowering Snowdrops should be treated as alpines. All my best Snowdrops are grown under trees, the soil being quite full of their roots. I do not use manure for them. In this same situation the white Daffodils do well, and even *Nar. pallidus præcox* seems happy, and the delicate little *N. cyclamineus* is sending up its buds for the third or fourth time. Here, too, the Irises of the *reticulata* group—*sophenensis*, *histrioides*, *Kolpakowskiana*, and *Krelagei*—grow freely. The wonderful *Iris Rosenbachiana*, planted in 1888, has again just opened its beautiful flowers. *I. Histrio* I cannot manage. The only drawback to my situation for these spring gems is the soiling of the flowers from the droppings of the trees. I should mention that the climate is so trying that I cannot grow such hardy plants as Primroses, Pinks, Daisies, &c. All these disappear after a season or two.

I move most of my Snowdrops when in full flower, and do not find they are injured by it in any way. This is also the best time for moving *Leucojum vernum*.

I have noticed that the more green colour there is in any Snowdrop the more freely it grows and the more rapidly it increases, whilst the absence of green, or the substitution of yellow for the green, makes the plant delicate and slow of increase. *G. Scharlokii*, *G. poculiformis*, and *G. lutescens* illustrate this point.

In very frosty weather, when the young growth of Snowdrops appears to be shrivelled and dried up, I have an idea that the vital juices of the plant are instinctively drawn into the bulb, which acts as a reservoir. If the juices were left in the young leaves, would they not become frozen, and so destroy the tissues of the plant ?

When lifting Snowdrops which are in full flower, I have often

noticed that the bulbs are very soft and spongy, as though they had exhausted all their substance in perfecting the flowers.

In 1889 the Snowdrop fungus appeared in my garden; last season it visited me again, and this year it is working destruction amongst some of my choicest varieties. The feeling of utter helplessness is very depressing. I can hear of no remedy or preventive. Still I do not intend to give up in despair, but intend to work on and hope for "a good time coming" when the terrible fungus shall be a thing of the past. A faint heart never made a good gardener, and with that sentiment I will conclude my rambling remarks on Snowdrops.

SNOWDROPS.

By Mr. D. Melville.

[Read March 10, 1891.]

A discussion on Snowdrops, under the auspices of the Royal Horticultural Society, will afford a valuable opportunity of comparing the various forms of *Galanthus*, and of putting on record what progress has been made in the improvement of the flower in recent years.

Other spring flowers, notably the Daffodil, have been materially helped forward in improvement, and in classification, by discussion or conference, and no doubt the present discussion will encourage those who take an interest in our earliest of spring flowers to further effort.

Although the Snowdrop has always been a popular favourite, and the hardy pioneer of the floral beauty of the year, yet the improvement of the flower has not, until recent years, attracted the attention its merits deserve.

Collections of the known varieties have been gathered together by lovers of hardy plants, but improvement by selection, or hybridisation, has been slow.

Galanthus nivalis is the best known Snowdrop, and is found wild throughout Europe and the greater part of Asia Minor. Where *G. nivalis* grows freely, and has been increased naturally by seeding, there are usually many variations which, to the close observer, are very interesting.

Some vary in size, shape, and substance of flower; some in size and form of cup; others in habit, or time of flowering. Some flowers when fully open have a tendency to reflex, some vary in the intensity of the green markings, while all are beautiful.

There are two very distinct types of *nivalis*, one with a deep narrow cup well marked with green lines, long and rather narrow outer petals, with *G. n. Imperati* as the largest form. Many of the continental flowers are of this type.

The other form, which appears to be mostly grown in the British Isles, has a wider and shallower cup, with fainter markings, broader petals, of oblong ovate form, with *G. n. Melvillei* as the largest form of the type.

It may not be out of place to note a few of the forms of *nivalis* which have originated here; viz.: *Galanthus nivalis Melvillei*, a variety which has proved remarkably constant after nearly a dozen years' cultivation, here and elsewhere. This variety received a first class certificate in March 1879. It is larger in all its parts than *nivalis*, the bulbs being sometimes nearly double the size, leaves stouter and longer, flower-stalk from two to three inches longer, flowers larger and of better substance, of a creamy white, retaining in a marked degree a more globular form.

Galanthus nivalis serotinus, so named by the late Rev. H. Harpur-Crewe, as being "quite a little gem in its way," is the opposite of the giant form, being dwarfer than the ordinary type, bulbs and flowers being smaller, and its time of blooming later. The flowers, when fully expanded, sometimes reflex in sunshine.

G. nivalis poculiformis, another variety which originated here, is very pretty but rather scarce. There is no cup in this variety, the cup petals and outer segments being all of the same length; usually pure white, without the green marking, or at least with very faint indications of green.

A variety named *G. n. præcox* showed a marked tendency to blossom earlier than *nivalis*, usually coming into bloom from a fortnight to three weeks before the others. This form was noted in bloom at Chiswick on New Year's Day, 1881. There is no special peculiarity about this form except its early blooming tendency.

There is a very pretty late variety doing well here, and just coming into bloom—*G. nivalis æstivum*, kindly sent me some time ago by Mr. Smith, of Newry. It is a free, robust grower, distinctly later than *nivalis*, and the green markings are of a deeper colour than usual.

I need not enumerate here all the known varieties, but may take this opportunity of asking if the rare *G. Reginæ Olgæ* has been found, or does it still only exist in name?

Culture.—The Snowdrop is very accommodating in its requirements, and will grow in most friable, well-drained soils. A light black loamy soil with a fair mixture of sand perhaps suits it best of all, while a wet clay soil is about the worst for its culture. Where it is cultivated in beds or borders, the addition of leaf-mould, or sand, will sometimes help ground not naturally suited to its requirements. It is, however, when planted in grass or lawns, in quantity, that the value of the Snowdrop for spring gardening is most apparent. When once planted and established in grass in suitable soil, the Snowdrop yields its floral tribute each returning spring, without further labour or trouble; all it requires is that its foliage be allowed to ripen naturally before the scythe or mower is put over the grass. The foliage is usually ripe by May, so that little inconvenience is experienced in the mowing of the turf. When a large space is to be planted, the best way is to lift the turf thinly about September, or early in October, sow the bulbs over the ground, lightly fork in two or three inches, level and roll the ground, relay the turf, finishing off with the roller.

If the bulbs do well in four to six years they should yield a crop if required for planting elsewhere, or extending the area, leaving enough in the ground to keep up the stock.

Another method of stocking a piece of grass, where clumps of Snowdrops can be had on the ground, is to divide the clumps after flowering, making notches with a spade a foot or two apart all over the ground, dropping a few bulbs into each. After a few years the turf may be lifted, the ground lightly forked over, relaying the turf as before after breaking up the clumps, and distributing the bulbs all over the ground.

Diseases.—The only disease I have found Snowdrops subject to is a species of rot or mould which attacks the young growths as they show above ground. The disease does not appear to

be infectious, as infected bulbs may die off close to healthy bulbs without injury to the latter, if the mould or decay is not actually in contact with the healthy growth.

Fertilisation.—Bees are seldom abroad at the period of Snowdrops flowering, and even if weather permit do not seem to visit the flower. Fertilisation appears, by a provision of nature, to be assisted by a small fly which frequents the flower for shelter and to feed on the pollen. During the mild weather of the month of February, 1891, the maximum temperature here ranged between 50 deg. and 60 deg. on eleven days. Bees were busy carrying in pollen from early patches of Gorse, *Leucojum vernum*, or *Jasminum nudiflorum*, but it was a rare occurrence to observe a bee among the Snowdrops, although there was about an acre of them within a hundred yards of the hives.

Time of Flowering.—Although some of the early forms make their appearance early in January, it is usually in February that the bulk are in blossom. This year the bloom was at its best the second and third weeks of February. Some discussion has taken place in the gardening papers from time to time as to whether Snowdrops flower earlier in Scotland than they do south of the border. I think they are usually earlier most seasons in Scotland. There is from what I hear no doubt of it this season, as Snowdrops here are practically over, except in shaded places, or behind a north wall, while I believe in England Snowdrops will be about their best by March 10th, making a difference of from a fortnight to three weeks between the north and south of the British Islands.

SNOWDROPS.

By Mr. F. W. Burbidge, M.A., F.L.S.

[Read March 10, 1891.]

The Snowdrop is one of the earliest and most exquisite of all our hardy bulbous flowers, and it has been mentioned by nearly all the modern English poets for its modest purity and simplicity. It is almost more interesting, however, to know that amongst those who have not alluded to the flower we may name Shakespeare and the so-called garden-poet Cowper, although both must often have seen and admired the flower itself.

The generic name of the Snowdrop is Galanthus, or literally the "milk-flower." Old John Evelyn called it "snow-flower" in his "Kalendarium Hortense," just as the French people call it "Snow Piercer" (Perce Neige) to-day.

One of the earliest portraits of the common Snowdrop (*G. nivalis*) is that of L'Obel, who gave a characteristic wood engraving in his "Stirpium Historia," published at Antwerp in 1576. Our own Gerarde, in 1597, uses this figure of L'Obel's, and also an engraving of a larger species, which may have been *G. Imperati*, or possibly *G. plicatus*. Then Clusius, in his noble "Historia" of 1601, also uses these two figures, and tells us that the larger Snowdrop came to Europe by way of Constantinople, or Byzantium as it was then called.

It is extremely doubtful whether we can claim the common Snowdrop as a true native of England; my own impression is that it is mainly found growing where, as Goldsmith tells us, "once a garden smiled." Hooker, in the "Students' Flora," tells us that the Snowdrop is "frequently naturalised in England and Scotland, hardly in Ireland," and adds that "it is possibly wild in Hertford and Denbigh."

The plant seems more truly at home on the Continent, where it grows all through "Southern and Central Europe from the Pyrenees to the Caucasus."

The best account of the species generally is by Mr. J. G. Baker in his "Amaryllidaceæ," where six species are described, and the seventh, viz., *G. Fosteri*, has since been described in the *Gardeners' Chronicle*.

Mr. J. G. BAKER'S SPECIES OF GALANTHUS.

(In "Amaryllidaceæ," pp. 16–18, and in *Gard. Chron.* April 1889, p. 458.)

1	2	3	4	5	6	7
G. nivalis, L.	*G. græcus*, Orph.	*G. Elwesii*, Hook. fils	*G. latifolius*, Ruprecht	*G. Olgæ*, Orph.	*G. plicatus*, M. B.	*G. Fosteri*, Baker
Pyrenees to the Caucasus. Sub-species: *G. Imperati*, *G. caucasicus*.	Isle of Chios, on Mount Pellinos, alt. 3,000 to 4,000 feet.	Asia-Minor, near Smyrna, alt. 3,700 feet on the Manissa range.	Caucasus, alt. 6,000 to 8,000 feet.	Greece, on Mount Taygetus.	Crimea, and Mountains of Dobruscha.	Amasia, in the Province of Sirwas, N. Central Asia-Minor.
Feb. and Mar.	April	May	May	October	Mar. and Apr.	April

The above is a tabulated view of the species described by Mr. Baker.

In studying Snowdrops we find (as is usually the case) that the leaves and the flowers afford the best means of distinguishing the species one from another; but before passing to these we may glance at the bulb characters also.

The Bulb Characters.

The bulbs of Snowdrops may be referred to three typical shapes, viz. the ovoidal or egg-shaped, as in *G. nivalis*; the rhomboidal or short spindle-shaped, as in *G. plicatus*; and the rounded or even oblate spheroidal, as in *G. Elwesii*. In size Snowdrop bulbs will vary within narrow limits, according to their luxuriance; but those of *G. nivalis* vary from half to three-quarters of an inch in diameter, being indeed about the size of hazel-nuts. The double variety has stouter-looking bulbs, while those of *G. plicatus* and *G. Imperati* are often an inch or more in diameter, being similar in size and shape to pigeons' eggs.

As seen in bulk, the bulbs of all the true species are recognisable by their different shapes and sizes, and by the lighter or darker hue of their hazel-nutlike brown bulb-coatings, as grown on any one kind of soil.

If you make a cross-section of a bulb of any Snowdrop, you find it composed of the swollen bases or petioles of two, three, or more of its former leaves, arranged eccentrically around the new growth. The inner faces of two of these bulb-scales, as they are called, are fluted or channelled in a very pretty way, and covered with a delicate satin-like membrane. The eccentric arrangement as shown in the woodcut (fig. 23 *b*) of two of the bulb-scales is very peculiar, and I know of no other instance except in bulbs of *Galanthus*. Fig. 23 *a* shows the vertical section of a Snowdrop bulb.

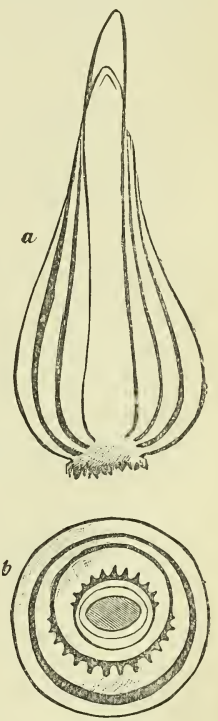


Fig. 23.

The Leaf Characters.

When we examine the leaves of all the so-called species of Snowdrops we find them clearly referable to three types, viz.: 1, the strap-shaped glaucous leaf of the common Snowdrop and its allies; 2, the much broader plicate or enfolded leaf of

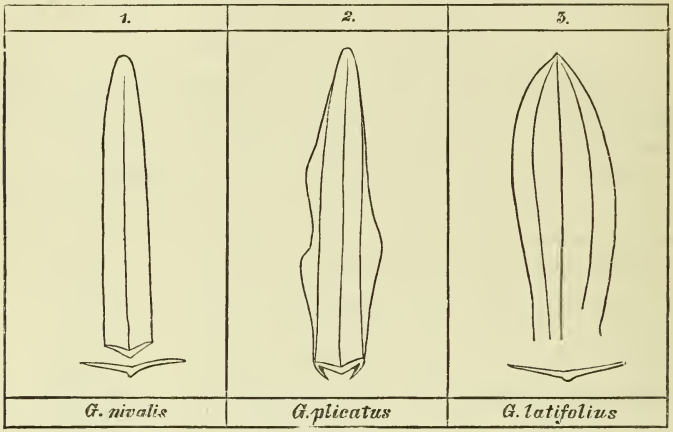


Fig. 24.

G. plicatus, readily known by its re-duplicate marginal area. Then 3, we have the broadly lorate shining green leaves, such as those of *G. latifolius* and *G. Fosteri* (fig. 24).

When once these types of leafage are recognised and understood the specific identification of any known Snowdrop becomes an easy matter. As thus tabulated one may see at a glance how important the leaf characters are in the study of Snowdrops.

1	2	3
Narrow glaucous leaf	Broad plaited glaucescent leaf	Broad lorate green leaf
G. nivalis „ „ Imperati „ „ caucasicus G. Elwesii *G. græcus(?) *G. Olgæ(?)	G. plicatus	G. latifolius G. Fosteri

* These are doubtful species not in cultivation (?).

Guided in some measure by the leaf characters, which are far

less variable than those of the flowers, I am led to believe that the three species heading the columns of the above table really form the backbone of the genus Galanthus, and I should not feel at all surprised to find that all the other kinds of Snowdrops known to us could be obtained as hybrids or seedlings of these three main types. *G. Fosteri* is, as I believe, merely a natural hybrid between *G. latifolius* and *G. Elwesii*, and I am at present cross-fertilising *G. latifolius* and *G. plicatus* "Emerald," in the hope of producing *G. Fosteri* as a synthetic proof of what I believe to be true; and I trust Mr. Allen and other Snowdrop growers will also try this union.

That *G. nivalis* and *G. plicatus* will hybridise with each other we know, since Mr. Allen has a plant which sprang up in his garden, where these two species were growing alongside each other. It has been alluded to in my list as *G. nivalo-plicatus* "Valentine."

Before considering the floral characters of the Snowdrops, we may, in passing, allude to the scape or flower-stem, which varies in thickness, being nearly twice as thick in the case of *G. plicatus*, *G. Imperati*, and *G. caucasicus* than it is in *G. nivalis*. The scape is solid, elliptical in section, and fluted in Snowdrops, as in Snowflakes (Leucojum and Erinosma), and not hollow as in Narcissi and in Daffodils.

The scape is topped by two spathe-valves, which are green, and more or less connected by a translucent satin-like membrane. In the case of the species this membrane is burst open on one side only by the erect and swollen flower-bud, so that the green valves are connected, and at first sight appear to be one only; but in such varieties as *G. Scharloki*, *G. Cathcartiæ*, and *G. Warei* the spathe-valves are larger and more leaf-like in texture, and in the two first named the valves often tear themselves apart, and so these phases have obtained the name of twin-spathed Snowdrops. I have had from Lincolnshire a variety with two sets of spathe-valves, the lower set being green and the extra upper set being *white* like the sepals.

In *G. Warei* the spathe-valves are leafy, but remain united along one edge by a membrane, as in Snowdrops generally.

All the Snowdrops in the early up-shooting bud stage form a beautiful study.

In the earlier stages of its existence the flower-bud of a

Snowdrop is as erect on its stalk as a spear-head on its shaft, and it is tipped and sheathed, or buckram'd at the sides by the green spathe-valves, and enfolded elsewhere by a tough but thin and translucent and elastic membrane. As thus erect and sheathed, the tender and pure white bud boldly pierces the cold and wet enclodded earth without injury. When nearly fully grown the bud bursts out of the sheath, generally on the sunny side, the slender stalk or pedicel elongates, and the bud becomes pendant and expands when elevated beyond all risk of harm. In the whole world of flowers I know of no prettier or more suggestive sight than this of a little Snowflower being born, fresh and beautiful, into a cold and wintry world. No wonder some wise old Frenchman bestowed on the flower-buds of Galanthus the name of "Perce Neige"; no wonder that some English poet crystallised the purity of the flower by calling them "Fair Maids of February"; for Snowdrops, simple and abundant though they be, have, like the fairest of human flowers, a divine instinct for keeping themselves pure and unspotted from the world.

The Flower Characters.

If we examine a Snowdrop flower we find that it consists of scape, spathe, pedicel, ovary or seed-vessel, and then the white segments popularly known as the flower. The outer series of three white segments we speak of as *sepals*. The inner series, which are generally marked more or less with green, we call *petals*. Then comes a cluster of six orange-yellow pollen-bags or anthers, opening by seams or slits near their apices, so as to let out the life-giving dust on to the *stigma*, which is like a pin in the very centre of the flower.

The accompanying engraving (fig. 25) represents the various portions of a Snowdrop flower.

The flowers of Snowdrops generally vary in size and in the colour or shape of the spots and markings on the sepals and petals. Taking *G. nivalis* as an example of size, we find it varies from its smallest stage, having sepals not more than half an inch long, to the great Caucasian and Italian forms, such as *grandis* or *Imperati*, which often have sepals one inch to one and a third of an inch in length. *G. plicatus*, *G. latifolius*, *G. Elwesii*, and *G. Fosteri* again are very variable in size.

Apart from size, however, the arrangements of the petals varies somewhat in different species. In *G. nivalis* the inner segments are broadly obcordate and spreading, the three divisions forming a cup-like or bell-shaped protection to the anthers and style in the centre of the blossom. In *G. plicatus* the inner segments are more cylindrically arranged, the edges of the segments being imbricated in a convolute manner, one within or without the other.

Again, in *G. Elwesii* the inner segments are valvate, forming what appears to be a tube, so cylindrical is the arrangement of

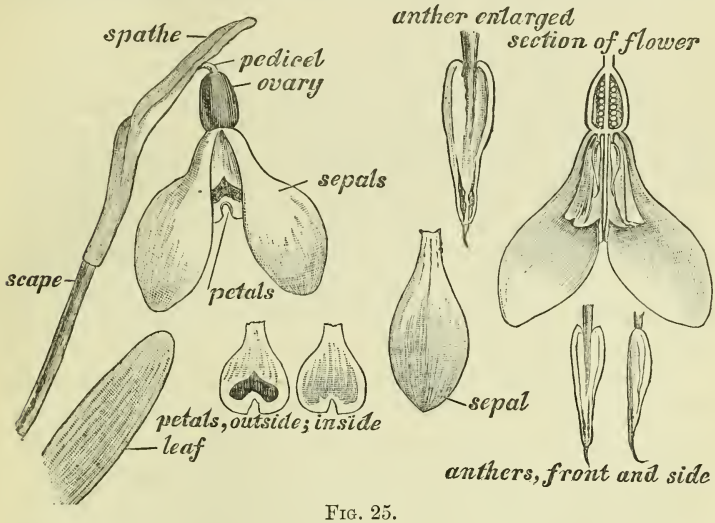


Fig. 25.

the petals, and in a less marked degree the same is true of *G. Fosteri.*

When we come to the green markings on the sepals and petals, we find that two forms of *G. nivalis* have their sepals striped or marked with clouded lines of green. These are *G. virescens* (basal) and *G. Scharloki* (apical). The sepals of some forms of *G. Fosteri* are also blotched or spotted with green near their apices.

The petal markings are more definite, and in some species and varieties form good distinguishing characters. *G. Elwesii* is readily known by the bold oblong basal blotch on each of its inner petals, and by the two deltæ one on either side the sinus, or

cleft at its apex. *G. Fosteri* also has a basal blotch on its petals, but the spots on either side the apical sinus are confluent, thus forming a kidney or saddle-shaped blotch.

In *G. plicatus* we generally find a bold saddle-shaped apical blotch, but in one variety at least, *G. plicatus* "Emerald," the green blotch extends nearly the whole length of the petal, as it does also in the case of *G. virescens*, leaving only a narrow white margin. The way in which the green colour, concentrated outside the petals of Snowdrops into kidney or saddle-shaped blotches, is diffused in lines inside, is peculiar and interesting.

The Cultivation of Snowdrops.

Speaking of the culture of these flowers, one may almost venture to say the less they are cultivated the better! By this I really mean to imply that on suitable soils the Snowdrop will grow anywhere, in hedges and orchards, and in woods and the fields, as well as in gardens. The fact of their not requiring special culture, if other things are in their favour, is proven by the luxuriant way in which the Snowdrop has become naturalised throughout England and Wales, as also in Scotland, and in a lesser degree perhaps in Ireland.

When I wrote to Mr. Peter Barr to ask the names and addresses of the trade "growers" of Snowdrops for trade purposes, he said there were none in the same sense that there are cultivators of Tulip, Hyacinth, Crocus, and Daffodil bulbs, but that the Snowdrop dealers drive about and purchase any batches of Snowdrops they can find growing in orchards, hedge banks, cottage gardens, &c., or here and there in the fields as naturalised on old farms and manse lands. In Lincolnshire, where the Snowdrop may be considered a speciality, patches, varying from one or two square yards to a perch or two, are grown by cottagers; but the upshot of this is, that after a few years the roots rot, so that it is a precarious industry, sometimes succeeding and sometimes failing. The cottagers lift the roots every other year, selling the larger and re-planting the smaller ones. Within the last few years, however, at least one farmer has devoted an acre or two of black moorland soil to the culture of these bulbs by the million.

The fact appears to be that the Snowdrop is as shy of long-

continued or permanent culture as it is of a hothouse or forcing-pit temperature, and once planted in suitable soil it enjoys being left alone to grow at its own pace. It is also clearly established that double and single (*G. nivalis*) varieties do not always succeed alike on all soils. Wherever the singles luxuriate, there the doubles generally thrive also, but the reverse of this is not always true, since double Snowdrops often thrive where the singles die off, either by reason of the fungoid disease peculiar to them, or from some other unknown cause, and possibly lack of moisture. The reason why and wherefore, however, is really a puzzle not as yet found out! Some will even go the length of telling you that in such gardens "the single Snowdrops all turn to 'double' ones"! The fact, however, is that the "doubles" often grow and increase, while the singles die out. Now and then, however, the reverse is true. At Dunrobin Castle, N.B., for example, where there are two or three acres of Snowdrops in the grass under trees, the singles thrive and increase far better than the double ones do.

Wherever Snowdrops really luxuriate in grass, or in beds and in borders, they also seed freely, and I have known Snowdrops to become well established from fresh-gathered seeds sown on soils where bulbs were formerly tried but had died away. Seed should be sown as soon as ripe; it germinates the succeeding winter and spring, and seedlings flower in from three to five years.

Snowdrops look better, their flowers last longer clean and pure in colour, and they frequently thrive far better in the solid grass-covered ground than on bare cultivated ground. Only the other day I read in one of the gardening journals of twenty pounds per annum having been made of the Snowdrop flowers growing in the grass around the boles of apple-trees in a country orchard. In county Wicklow I have seen Snowdrops twelve to sixteen inches high in the lush grass of an unmown lawn, and at Straffan, county Kildare, the masses of *G. nivalis*, *G. plicatus*, and *G. nivalis grandis*, under the spreading lime-trees, are remarkable features in February.

Snowdrop bulbs are so cheap, and on most soils give so little trouble after they are once well planted on grass near trees, that the wonder is they are not more generally grown. The best Snowdrop of all for naturalisation is *G. nivalis*, and its double and

single variations; *G. plicatus*, the "Crimean Snowdrop," also does well. *G. Elwesii* is a noble kind as seen at its best, but is very capricious, and dies off on some soils. *G. græcus* and *G. Olgæ* appear to be extremely rare, even in herbaria, and we have not as yet had time to test *G. Fosteri* fairly, but when established it promises to become one of the best of the garden kinds. *G. latifolius* forms good, bold clumps, and is very distinct in leafage, but it also takes time to establish, after which it flowers very freely. One of the most fatal of all diseases to which the Snowdrop is liable is the Snowdrop fungus (*Polyactis galanthina*, Berkeley and Broome, *Gard. Chron.*, March 2, 1889, p. 275, with figure). This fungus appears quite suddenly, often after a fall of snow, and affects leaves, scapes, and bulbs also, the latter becoming soft and pulpy. It is an ally of the Lily and Tulip fungus, and so far no preventive or remedy has been discovered. Iron sulphate applied as a top dressing, mixed with sifted earth, might possibly prove beneficial, as it certainly has been in the case of the Potato disease. Practically, however, we know nothing of an efficient remedy for this Polyactis, which has proved a great bane to successful Snowdrop culture in England and Scotland. Possibly Mr. Allen, or the Rev. C. Wolley-Dod, may enlighten us on this matter.

Alphabetical List of the Species and Varieties of Snowdrops.

1. *G. æstivalis.*—A late-flowering form of the common Snowdrop—often a month later than *G. nivalis*.

2. *G. Boydii.*—This is a very fine form of *G. Imperati*, and generally known in gardens where it is grown as *G. Imperati Boydii*.

3. *G. caspicus*, Ruprecht.—A form of *G. caucasicus*.

4. *G. Cathcartiæ*, Hort. Allen.—A twin-spathed Snowdrop, somewhat similar to *G. Scharloki*, but having no green markings on the sepals. It is, in fact, a small *G. nivalis*, but having a leafy twin spathe.

This was found in Scotland, I believe, by Miss Cathcart, and it was sent to me by Mr. Allen.

5. *G. caucasicus*, Baker in *Gard. Chron.* 1887, p. 312.—A large, late-blooming form of *G. nivalis* from the Caucasus. Mr.

Baker says it includes *G. nivalis*, vars. *Redoutei*, *major*, and *caspicus* of Ruprecht. Edge of the leaf not recurved as in *G. plicatus*, with which *G. caucasicus* has been often confounded.

6. *G. Clusii*, Fisch.—This is *G. Imperati*, Bertol. Clusius is said to have received bulbs of this from Byzantium in 1582, and it is supposed to be the larger form figured by Clusius in his "Plant. Hist." 1601, p. 169.

7. *G. corcyrensis*.—A form of *G. nivalis* from Corfu, blooming in December and January. It is *G. præcox* of some gardens.

8. *G. Elsæ*.—An early-flowering form of *G. nivalis*, brought

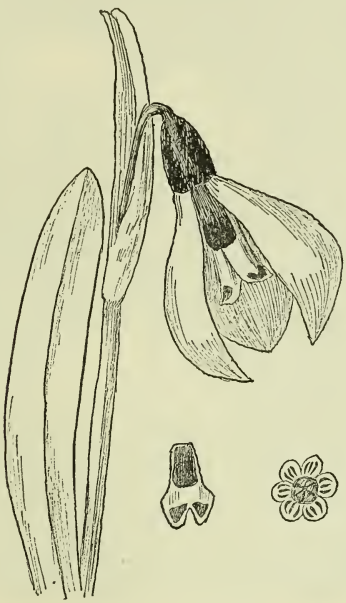


Fig. 26.—G. Elwesii.

from Mount Athos by Dr. Mahaffy to the College Gardens, Dublin. December and January. Habit of *G. Imperati*, but with smaller flowers.

9. *G. Elwesii*, Hook. f., *Bot. Mag.*, t. 6166.—First discovered by M. Balansa in 1854, but introduced to gardens by Mr. H. J. Elwes in 1874 from mountains near Smyrna. Inner petals arranged in a narrow tube-like or cylindrical manner, bilobed at their apices (fig. 26). *G. E.* "Novelty," "Winner," "Gem," "Distinction," and others are seedlings of Mr. Allen's. *G.*

Elwesii globosus, Wilks (fig. 27), and *G. Elwesii major*, Burbidge, are large and similar forms. I once bloomed a bulb of the latter with four flowers on a scape.

G. Elwesii "Gem."—A rather small and dumpty or globose flower, the sepals three-quarters of an inch long and very broad. The petals are closely connivent, forming what appears to be a

Fig. 27.—G. Elwesii globosus. (From the *Garden*.)

tubular cup. There is a dark green basal blotch extending half their length, and two deltæ, one on either side, the notched apex outside. Inside, each of the six lobes is marked with two or three lines, the sinus being unmarked with green.

10. *G. flavescens*.—A yellowish form of common Snowdrop, ovary and petals yellowish instead of green. This seems to be a stronger grower than *G. lutescens*, which it resembles in colour, &c.

11. *G. Fosteri*, Baker.—A very variable plant, possibly* a hybrid between *G. latifolius* and *G. Elwesii*. Leaves broad and green. Some varieties of this have green blotched or spotted sepals (fig. 28). The green petal markings are similar to those of *G. Elwesii*, but paler in hue, and the apical green spots are confluent in *G. Fosteri* and separate in *G. Elwesii*.

12. *G. globosus*, Wilks in *Garden*, 1887, i. 393.—A very robust and two-flowered globose form of *G. Elwesii* (fig. 27).

Fig. 28.—G. Fosteri.

13. *G. græcus*, Orph.—Said by Mr. Baker to be near *G. Elwesii*.

14. *G. grandis*.—A very fine form of *G. nivalis* of the *caucasicus* type, having flowers nearly as fine as Atkins' variety of *G. Imperati*. This form came to the gardens at Straffan, co. Kildare, along with *G. plicatus*, being brought by Lord Clarina on his return from the Crimea. It is one of the finest of all the Snowdrops.

15. *G. Imperati*, Bert.—Is a native of Italy (Naples, &c.), and

* Both Mr. Jas. Allen and Mr. Smith, of Newry, have surmised this hybrid origin of *G. Fosteri*.

it may be considered as the southern or giant form of the more northern *G. nivalis*. *G. Imperati*, Bert., is the *G. plicatus* of Tenore, but not of M. Bieberstein.

G. Imperati, Atkins' var.—This is quite a different plant to the *G. Imperati* sent out by Backhouse of York in 1877. Mr. Allen calls it *G. nivalis Atkinsi*. Barr sent it out at 2*s*. 6*d*. per bulb in 1875, and the late Mr. Wheeler, of Warminster, was the only trade customer who ordered bulbs. It died out with Mr. Barr at Tooting, but grew very finely at Warminster. It bears

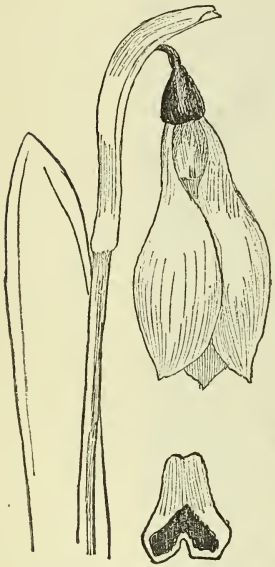


Fig. 29.—G. Imperati.

Fig. 30.—G. latifolius.

very bold and shapely flowers, whereas Backhouse's variety, although very large, often bore misshapen blooms.

G. Imperati, Boyd's var.—This is one of the finest of all the Snowdrops, a flower from Mr. Smith, of Newry, sent to me in February of this year, having sepals one inch and a half long and very broad, with a fluted outer surface (fig. 29).

16. *G. latifolius*, Ruprecht (*non* Salisbury).—A distinct plant, with broad shining green leaves and small pure white sepalled flowers, often miscalled *G. Redoutei* in gardens (fig. 30). It is easily recognised even when not in flower. Mr. Allen's variety,

G. latifolius major, is a fine form with sub-glaucous squill-like leaves and larger flowers.

17. *G. latifolius*, Salisbury.—This is the *G. plicatus*, M. B., "Fl. Taur. Cauc." iii. 255, not to be confounded with *G. latifolius* of Ruprecht, "Gartenflora," 1868, 130, t. 578, fig. 1.

G. latifolius major.—This fine variety was sent to Mr. Jas. Allen from Herr Gusmus, an Austrian nurseryman, in 1883, along with typical *G. latifolius*. Mr. Baker saw it, and supposed it to be a fine form of *G. caucasicus*.

18. *G. lutescens*, Hort.—A very delicate form of *G. nivalis*, having a yellow ovary and yellowish markings on inner petals.

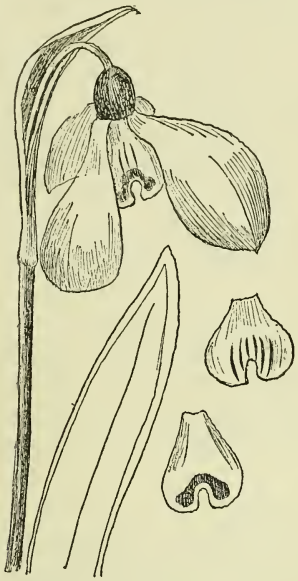


Fig. 31.—G. Melvillei.

Found by Mr. Sanders, of Cambridge, in an old farmhouse garden in Northumberland, by whom it was sent to Mr. J. Allen. Mr. Boyd has distributed this yellowish form. It is a stronger grower than *G. flavescens*, having a yellow ovary and yellow markings on the petals.

19. *G. major*, Ruprecht.—This is a large-flowered form of *G. nivalis*.

20. *G. Melvillei*, Hort.—A seedling form of *G. nivalis*, raised at Dunrobin Castle by Mr. Melville. It is dwarf, with a large and spreading flower (fig. 31).

21. *G.* "*Merlin.*"—A very fine seedling of the *caucasicus* or *plicatus* group, of hybrid origin, raised by Mr. Allen. The inner segments are nearly wholly dark green, with a narrow white wire edge or border. A bold and distinct thing.

22. *G. montanus* (?)= *G. latifolius.*

23. *G. nivalis*, L.—The common Snowdrop, very variable. There are many single and two or three double forms. There is a monstrous variety having duplicated spathes, the lower one green and the upper one white like the sepals. It originated in Lincolnshire, and first obtained notice in 1884.

A " pink " or " rosy-lined " Snowdrop was sent to the *Garden* in February 1887 by Mr. E. Pitcher, of Cringleford, near Norwich. The flowers were striped with pink inside, the lines being fainter on the outside, with a tendency to flush the whole flower with pink or rose colour.

Mr. Barr made inquiries about this through Mr. Octavius Corder, of Norwich. It is supposed the bulbs had been watered with Judson's magenta dye, in solution, or with cochineal.

24. *G. nivalis* " Charmer."—A very bold and beautiful seedling raised by Mr. Jas. Allen. It is of the *G. caucasicus* group, and a robust variety.

25. *G. nivalo-plicatus* " Valentine."—A hybrid raised by Mr. Allen, who sent me a specimen in February 1890. It has narrow plicate foliage, but well-marked flowers, not unlike those of the common Snowdrop.

26. *G. octobrensis*, Hort.—An autumnal-flowering variety of *G. nivalis.*

27. *G. Olgæ*, Orphan.—This is said to be a pure white flowered species from Mount Taygetus, flowering in October. Sometimes known as *G. Reginæ Olgæ* in gardens. If Mr. Baker's description is correct, it has its petals wholly white, a fact that distinguishes it from *G. octobrensis*, which last has been thought by some to be identical with *G. Olgæ.*

28. *G. pallidus*, Smith.—A very pale yellowish green-marked form of *G. nivalis*, flowering earlier than the type.

A peculiar white-spathed variety was announced in March 1884 by Mr. G. Murray, West Ashby House, Horncastle. The flowers themselves were quite normal, but the spathe-valves, instead of being green, are as white as the sepals. Several clumps were mentioned as possessing this peculiarity, so that it

would seem to be an established form. This year I have just noted that one bulb is bearing a flower from a white sheath or spathe, and several other flowers have extra sepals, and are more or less monstrous. Flowers of this variety sent by the same gentleman in February 1891 had a normal greenish spathe and a prolonged pedicel bearing two or more bracts of a white colour. Some of the flowers are semi-double, having long and slender sepals, and others have four to five sepals. The petals also vary in number and shape, some being pure white, as in *G. poculiformis* and other intermediate varieties.

29. *G. plicatus*, M. B., *Bot. Mag.*, t. 2162, is a native of the Crimea and the Caucasus, and is readily known, even when not in bloom, by its plaited leaves.

G. plicatus of Tenore is *G. Imperati.*

G. plicatus majus is a larger-flowered form.

30. *G. plicatus* "Romeo" is a fine seedling variety raised by Mr. Allen; so also are "elegans," "Emerald," and several others.

G. plicatus "Chapel var." is a distinct form found by Mr. Boyd

G. plicatus maximus is a discovery made by Mr. Boyd, and is a very robust, large-flowered variety.

31. *G. poculiformis*, Hort.—This is a pure white or albino Snowdrop raised by Mr. D. Melville, of Dunrobin Castle, N.B. It is a form of *G. nivalis.* Mr. A. D. Webster also found this form among the Snowdrops at Penrhyn. The petals, like the sepals, are unmarked with green. The inner perianth segments are nearly as long as the outer, and are closed inwards in a peculiar manner.

32. *G. præcox.*—A garden name for *G. corcyrensis.*

33. *G. Rachelæ.*—An autumnal-blooming variety of *G. nivalis* from Mount Hymettus, flowering in October. Introduced by Dr. J. P. Mahaffy in 1884. Habit of *G. nivalis*, but with smaller leaves, which succeed the flowers.

34. *G. Redoutei.*—A large Caucasian form of *G. nivalis*, so named by Ruprecht. Not to be confounded with *G. latifolius*, which is often grown in error as *G. Redoutei* in gardens. The true *G. Redoutei* is supposed to agree with the Snowdrop figured in "Les Liliacées" of that artist.

35. *G. Reginæ Olgæ.*—This is a garden name often used for *G. Olgæ* of Orphanides.

36. *G. reflexus*, Herbert.—A form of *G. nivalis* from Mount Gargarus, with very small flowers, the inner segments reflexed at their apices.

37. *G. Scharloki*, Caspary.—A very distinct variety of *G. nivalis*, having large twin spathes of leafy texture, and small flowers marked with greenish lines near the apices of the sepals.

Fig. 32.—G. Scharloki.

It is easily recognised by the large and leafy twin-spathe, and by its outer sepals being marked with three to five green suffused lines near their apices, the inner petals having a bold green delta with a pyramidal point over the sinus (fig. 32). No two spathes are quite alike ; sometimes they split to the base and recurve, others are wholly, or in part, united along one of their edges.

This was named by Professor Caspary, of Kœnigsberg, in compliment to M. Scharlok, of Grandenz (an acute explorer of the botany of Prussia), who discovered this twin-spathed or leafy-spathed form growing wild in some copses of Western Prussia, where it may still be found.

38. *G. serotinus*, Hort., Dunrobin.—A seedling reared by Mr. D. Melville, and flowering later than the type-like *G. n. æstivalis*.

39. *G. umbrensis*, Hort., Dammann.—An Italian Snowdrop near *G. Imperati*, earlier than *G. nivalis*, but a delicate grower.

Fig. 33.—G. virescens.

40. *G. Van. Houttei*.—This is a very fine and bold form of *G. nivalis* of the *G. caucasicus* type. A good grower, and one of the best of Snowdrops flowering with the type.

41. *G. virescens*.—A very late blooming and very green tinted form of *G. nivalis*. The sepals are striped with green at the base, and the inner petals are nearly all green except their white margins (fig. 33).

Professor Fenzl, the late director of the Vienna Botanical Garden, grew this greenish form of *G. nivalis*, and from him Herr Max Leitchlin obtained two bulbs, and thereafter sent a bulb to the Rev. Harpur Crewe, and another to Mr. Allen, whence dates its culture in English gardens.

42. *G. Warei.*—This is a form or phase of *G. Scharloki*, but the spathe lobes are coherent.

THE CULTIVATION OF HARDY BULBS AND PLANTS.

By Herr Max Leichtlin of Baden-Baden.

[Read March 24, 1891.]

Under due consideration of circumstances, to imitate, as far as practicable, the natural growth-conditions of hardy plants is the first principle leading to success.

We have now-a-days collected in our gardens a vast number of plants, from the most varied climates, and we are wanting them to adapt their peculiarities at once to our climate; if seemingly they do so, we call them "quite easy and quite hardy."

We cannot *acclimatise* plants, but the primeval power has endowed certain species with the power of resisting a far greater amount of cold or heat than they ever have to endure in their own native land; the law of evolution seems to be to-day as much in force as in bygone millenaries. *Calandrinia umbellata*, a tiny succulent Portulacca-like herb, from the Chilian Andes, and *Papaver aculeatum*, a botanical curiosity, both plants never in their home seeing more than slight frosts at night, have undergone here bare frost of 7° F.; but a succeeding changeable winter, with higher temperatures, killed the Calandrinia, whilst I am unable to get rid of the Papaver, with its delicate, beautiful foliage; even in this dreadful winter, it shows its frog-green rosette of foliage as if it would laugh at the uncomfortable existence of its introducer.

Permit me to state this in order to draw your attention to the fact that the grower, to have success, must study the wants, not

only of a whole genus, but often the wants of a particular species.

If practicable it would be best to sow all seeds of hardy plants at once when ripe; we only delay sowing for the sake of convenience, because we should in the case of autumnal sowings be obliged to house a very large number of pans and boxes of young plants too small to pass the winter outside. Hard-shelled seeds must be sown at once, also all seeds of bulbs suitable for out-of-door cultivation. If seed of Colchicum, *e.g.*, is kept only a few days exposed to the air there will be not more than from 1 to 5 per cent. come up after a year, the rest taking up to five years before germinating. However, if they are sown at once, when the seed-pod splits, the number of seedlings may be 25 to 30 per cent. the first year, the rest taking only one or two years more to show life.

Delay sowing seeds of *Lilium*, *Fritillaria*, *Tulipa*, &c., until spring, and you may be sure that 20 to 80 per cent. will refuse to move.

Campanulas readily germinate, and so does *Ostrowskya magnifica*, but if sowing is deferred until spring the seeds may lie dormant for an entire year or may be dead for ever.

It is the practice to cover seeds with soil to the depth of their diameter or a little more, but with very few exceptions all seeds of bulbs want to be covered with from half to one inch of soil. To this rule the large family of Gladiolus is an exception, wanting to be but slightly covered with some light soil or other material.

The influence of rain and frost on germination is very remarkable. Himalayan and other Primulas, sown in a pan and kept as usual under glass, may take three weeks to germinate slowly and unevenly; but if a second pan be kept under the same treatment, with the difference that any time after a week it be exposed to a gentle rain, the majority of the seeds in this pan may be up within twenty-four hours. I have even known very hard seeds, which had been sown a long time, to come up suddenly after a heavy thunderstorm. Of other seeds a percentage, or all, lose germinative power if they once become dry during the time in which they lie dormant. Clematis, Anemone, Hepatica are of this class; these should be plunged in coal ashes, fine-grained cinders, or

charcoal refuse. The surface of the soil should be covered by a thin stratum of silver sand, and after this slightly more than up to the rim should be covered by the same material in which they are plunged. The beds must be slightly shaded, kept clean, and be left alone. When the time of possible germination draws near, the beds must be carefully looked over every day, and when movement is perceptible the pans must be taken out, and the covering material shaken off, which is very easy to do, as the stratum of silver sand separates it well from the soil.

Frost in many cases acts even more powerfully than rain. I am used to having many seeds frozen, so much so that the pan and its contents become one solid block, and even seeds of plants from warmer countries do well with such treatment. Seeds of Kniphofia, of *Tropæolum tricolor* and *azureum*, of *Tecophylæa cyanocrocus*, &c., germinate more freely if frosted than if not; pulpy or soft-shelled seeds must not be thus treated.

It does not matter what kind of soil is used for sowing seeds of hardy herbaceous plants or bulbs in, provided it be porous, light, and free from fermenting matter. However, the whole family of Ericaceæ is an exception to this rule, preferring a peaty soil.

Bulbous plants may remain in the seed-pans to complete their first season of growth. Some of the stronger growers like Iris, Lilium, Colchicum, &c., can, with advantage, be pricked out in full vegetation.

Some herbaceous annuals or perennials will do well and grow in any situation or soil, but many are particular in this respect, and when pricking them out care must be taken to afford soil and situation according to their wants.

All herbaceous plants having hairy or spiny leaves want a sunny dry situation, especially those with glaucous or grey foliage. If we can get some information as to the soil and situation in their native habitats we have a safe guide for their cultivation; if we cannot get it we must empirically find out what to do.

We cannot cultivate well the Cypripedium or Trillium of the North American forest if we give them a sunny open situation. *Pæonia Wittmaniana*, a native of Caucasian woods, refuses to produce seeds if grown in an open dry place. A number of

Primulas want cool and shady places, whilst many Himalayan species want fullest sun and abundance of water. Hellebores want full light in winter and shade in summer.

As to soil, a sandy loam best suits perennials as well as bulbs; however, some perennials and certain bulbs cannot be grown in sand for any length of time, and others, especially so-called rock-plants, want their soil entirely free from manurial matter.

Most gardeners are working under the false impression that manure is always beneficial; we observe that vegetables, fruit trees, some weedy herbaceous plants, and some plants in pots are apparently improving by application of liquid or solid manure, and such observation is the cause of the belief that *all* plants ought to like manure. I do not know whether plants can be grown well in sand without the addition of leaf mould or decomposed manure, but loamy or heavier soils do not want it for many years; if they are often and deeply worked, and now and then some sand or mineral matter added, just to keep the soil porous and open, herbaceous plants and bulbs can be grown on the very same spot for a very long time. The majority of bulbs will grow in light or heavy soils equally well; Crocus and Tulips, Erythronium and Muscari may even do better in sand, but Colchicum and Lilium refuse to do so. The great-grandmother of *Hyacinthus orientalis* grows in Asia Minor in hard ferrugineous clay, and its descendants have adapted themselves to grow in the highly manured sands of Haarlem. I grow all my imported bulbs in soil entirely devoid of manure, and most of my herbaceous borders have not seen any for at least ten years. I have no experience whether the use of compost leaf-mould or manure can be dispensed with in pure sandy soil, but the constant addition of such stimulants causes the bulbs to become liable to disease, and especially so if they come into immediate contact with the manure. The vigour of the splendid specimens of Coniferæ in the public garden at Meran (Tyrol) is due to repeated heavy dressings with night soil, whilst I have seen a plantation of *Lilium candidum* ruined within a few days by the application of liquid manure. Lilies and Fritillarias, when found wild, always grow in places where the ground is covered by other herbs or grass, keeping the ground cool, and where they enjoy besides the protection of trees, keeping off sun and

wind. Beautiful specimens of *Lilium Martagon dalmaticum* I have seen in Montenegro, growing under cushions of moss on the sides of crater-like depressions in the chalky rocks, and in positions where the sun could scarcely, and no wind at all, reach them. The capital success of Mr. George F. Wilson in the cultivation of Lilies in his Wisley garden is mostly due to his ingenious methods to supply the best possible natural conditions under which to cultivate them. Individually Lilies and Fritillarias, after having attained to flowering size, are comparatively short-lived plants; nature has, on the other hand, provided for their further existence by abundant production of seed or brood-bulbs. By hindrance or suppression of seed production, we can prolong the existence of the individual for several years, and analogously, we can force such plants as *Fritillaria macrophylla* and *F. Hookeri* to flower prematurely by cutting off the numerous brood-bulbs, when in an early state of formation.

Fritillarias belong to the large group of lime-loving plants, and in Asia Minor they are mostly found upon or next to rocks of rapidly decaying gypsum; whether lime, chalk, or gypsum acts chemically or mechanically I have no means of knowing, but I must say that here at Baden-Baden I grow Fritillarias tolerably well in soil entirely free from lime. The American species, as well as the Himalayan, seem to do best in a somewhat shady position.

It is a most important point in the cultivation of bulbs to protect the leaves, because these are the manufacturers of the newly-forming bulb.

Early Irises, producing their foliage during a warm winter, must have protection, when a sharp frost suddenly set in, by mats or shading material, and should be kept covered day and night until warmth comes on again; if the sun is allowed to brightly shine upon the leaves of a hard frozen bulb there is always damage done, more or less; in some cases the leaves may suffer to destruction; this weakens new-formation and often causes disease.

If bulbs get diseased by manure, fungus, or by insects, it is easy to restore perfect health by taking them up when ripe, cleaning and washing them, and when dried off for a short time replanting them in fresh virgin soil.

What little I have been able to state in this article is neither

theory nor invention, it is simply my experience ; and I shall feel well rewarded if anyhow I have thus been able to contribute to the general knowledge of plant cultivation.

Discussion.

Mr. James Douglas said it was very important that seeds should be sown when ripe. Sometimes, however, it was very difficult to save them. He had found it a good plan to put some fine soil round the base of the plants, and when the seeds dropped, to cover them, after which the seedlings would come up naturally all round the parent plant in due course. The seeds of the Primula family should be sown directly they were ripe, otherwise the vitality in them diminished, and the result was weakly seedlings. The Himalayan species of Primula must be raised every year, because the old plants after flowering were in the habit of dying. It was the same with Alpine Primulas. If seeds of these latter are sown at once it will be found that they will remain in the soil for three, four, or even six months, and occasionally twelve months, before they germinate.

Mr. E. H. Jenkins, in regard to the sowing of seeds, said he could not quite agree either with Mr. Max Leichtlin or with Mr. Douglas as to sowing seeds as soon as they were ripe, except in the case of bulbous plants. The seeds of other plants he had kept for two or three years before sowing them, and he found after such a length of time that they germinated freely. In regard to Primulas, he remembered keeping seeds for seven years, after which he sowed them, and within three weeks obtained as many as 400 seedlings, but many of these were destroyed by damp. The seeds of Himalayan Primulas, however, should be sown as soon as they are ripe. There was one important point omitted from Mr. Max Leichtlin's paper, namely, covering the seeds with soil. When sown they should be put in a dark spot and stood in a pan of water until they germinate. He preferred this method of procedure, as it was then unnecessary to disturb the seeds by watering them with a rose pot. He also fully endorsed the lecturer's remarks as to planting the seeds of bulbous plants deeply. Instead, however, of sowing them in open beds, so that birds, cats, or other animals might be able to destroy them, he was in favour of sowing them in pans, and covering them

with pieces of slate or board. This not only prevents birds or animals from doing any harm, but also serves to retain the moisture for a longer time. The seeds of Primulas and bulbous plants will also germinate much more freely when treated in this way, as will also those of Hepaticas and Hellebores.

Mr. George Bunyard endorsed the views expressed by Mr. Jenkins as to standing seeds of Primulas when sown in water. He had found *Primula rosea* to germinate freely in this way. *Eucharis sanguinea* also, which until recently was a very rare plant, he succeeded in raising by accident in this way. A cold frame, in which the seeds had been sown, became saturated with water, and the seeds came up like mustard and cress.

LACHENALIAS.

By Mr. F. W. Moore, F.R.H.S.

[Read April 14, 1891.]

To possess a fondness for certain classes of plants, and to have means, facilities, and sufficient independence to gratify this love, constitutes one of the pleasing episodes in life that gardeners can always reflect on with pleasure. I speak advisedly when I say "to have sufficient independence," for assuredly it is very difficult to remain constant to your "hobby" for a lengthened period in the cultivation of flowers. Fashion, always a powerful factor, no matter how it may be sneered at, may be against your "hobby." Your candid friend is almost certain to favour you with advice contrary to your inclinations. Should you be a grower of succulents, he will say, Why don't you burn your succulents and grow Ferns? The lover of Ferns is told. It is a pity to occupy so much valuable space with such rubbish, when it could so well be utilised for Orchids. However, the most potent factor is the seductive power of rival flowers. Their attractions are so varied, the advantages which accrue from the cultivation of a mixed collection of plants are so numerous, that it is indeed hard to remain faithful to one hobby. Nothing can more fittingly illustrate the changes in fashion as regards plants, and the effect of these changes, than a careful study of botanical and horticultural

publications, serials, and illustrated works, such as the invaluable *Botanical Magazine*.

From these sources of information it becomes apparent that bulbous plants were formerly much more cultivated than they are at present. No doubt a very good reason for this is that given by Mr. Hemsley, namely, that bulbous plants and succulents were more tenacious of life than most other plants, and therefore easier to introduce. As means of transit became better and more expeditious, and experience demonstrated the best mode of treating fragile plants during long voyages, and the best seasons at which to import them, the variety of plants increased enormously, and bulbous plants were largely superseded in gardens. The genus Lachenalia was one of those that suffered. Over forty species have been described, and of these about thirty have, at one time or another, been in cultivation; but in 1880 Mr. Baker estimated that not more than eight species were in cultivation in England. A reference to-day to the lists of tradesmen and private growers proves that Lachenalias have regained much of the favour they lost, as at least thirty well-marked species and varieties are now in cultivation, and this number is rapidly being added to. That the genus has much to recommend it cannot be denied. Easily grown, with flowers of great beauty and variety, and with no variation in treatment, lasting in flower from early December to May, such are some of the good qualities of Lachenalias. I do not mean to convey that any individual species remains in flower for four or five months, but that some of the various species are in flower during this time, all the species receiving the same treatment. The first species to come into flower is either *Lachenalia pendula* or *L. quadricolor maculata*, better known in gardens as *L. superba*. These are succeeded by some of the crosses between *L. quadricolor* and *L. tricolor*, or *L. Nelsoni*; then comes *L. reflexa*, and *L. aurea-reflexa*; then the tricolours, and *L. Nelsoni*; then *L. orchioides*, *L. glaucina*, *L. Cami*, and others; and lastly *L. aurea*, these being about the best of those now in cultivation. Interspersed amongst them are some of the less showy species. Not only is the genus represented by species in flower during a lengthened period, but some of them remain fully six to eight weeks quite fresh, and the flowers last for a long time when cut.

Before treating of the cultivation of Lachenalias, it may be well

to say something about the botanical position of the genus. Baker in his monograph of Liliaceæ, in the Journal of the Linnean Society, places it in the tribe Hyacinthus, of the order Liliaceæ, between the genera Dipcadi and Veltheimia—other allied genera, which may be more familiar to many, being Hyacinthus and Muscari.

The chief distinguishing characters of the genus lie in the perianth, in which there are two distinct rows more or less united into a cup at the base. The outer row consists of a series of three segments, smaller than the inner, of a firmer texture, and, as a rule, each having a well-marked protuberance or beak near the point. The inner row also consists of three segments, which are generally brighter in colour than the outer (except in the bud state, when the outer are often brightest), longer, and different in shape, so that in most of the species there is a well-marked difference between these two rows.

Lachenalia is further divided into four sections:

1. *Eulachenalia.*—This includes the species best worth growing. They are characterised by having a very symmetrical perianth, tubular in shape, about four times as long as broad, the mouth rather open, the stamens included, and the flowers arranged in racemes.

2. *Cœlanthus.*—Having a ventricose perianth, and a spike of erect, or partially erect, flowers, represented by *L. reflexa*, a species which is also remarkable for its very large ovary.

3. *Orchiops.*—Distinguished by having the tubular perianth shorter than in the preceding section, but the stamens remain included or almost so. There is much more irregularity in the formation of the perianth. The flowers are borne in dense spikes and racemes, and are patent or erect.

4. *Chloriza.*—In this the perianth is almost as broad as long, in shape campanulate, and the stamens are generally exserted.

In Bentham and Hooker's "Genera Plantarum" the genus is somewhat differently disposed of. It is placed in the tribe Scilleæ; in it is included the genus Brachyscypha of Baker, and it is divided as follows:

1. Eulachenalia, similar to Baker's.

2. Orchiops, which includes Orchiops and Chloriza of Baker with the exception of *L. orthopetala.*

3. Brachyscypha.

4. Cœlanthus, similar to Baker's.

All Lachenalias are natives of the Cape of Good Hope. It is not easy to say when the first species was introduced into Great Britain, but it is certain that *L. orchioides* was cultivated and had flowered in this country previous to 1752. This is the first species recorded. From 1752 onwards, new species appeared at irregular intervals, a large addition to the number being made by Masson in 1774. *L. tricolor* appeared in 1790, and as recently as 1884 three new species were introduced by Ware, and named by Baker *L. fistulosa*, *L. lilacina*, and *L. odoratissima*, all belonging to his fourth group, Chloriza. The first authenticated garden seedling was *L. Nelsoni*, which was raised by the late Rev. John Nelson, and flowered in 1880. Nothing has since appeared to surpass it, or even to equal it. Lachenalias have all moderately sized tunicated bulbs, the strongest being about as large as that of a good *Scilla siberica*, the weaker-growing species having bulbs not larger than that of a Snowdrop. The leaves appear first; they are generally well developed before the flowers appear, but to this there is one exception. I am informed by Mrs. Tait, of Oporto (to whom I am indebted for much information), that in the case of *Lachenalia rubida* the leaves and scapes appear simultaneously, or almost so, and that the leaves continue to grow, and only attain their full development after the flowers have withered. This has occurred each year, and is constant. In wild specimens the number of leaves is, in the case of *Lachenalia unifolia*, one, and in other species two or rarely three; but in strong cultivated specimens three, four, and even five leaves are found. The flowers are borne on stout scapes which are either green or beautifully mottled with reddish purple, and sometimes covered with a glaucous bloom. Frequently these scapes at the apex pass into bright red. This is more marked in some of the seedling forms, and is in them a most attractive feature. The flowers are arranged in racemes, or in more or less dense spikes. At the top of the inflorescence they pass into imperfectly developed and sterile buds, these sterile buds sometimes, as in the case of the upper portion of the scapes, being bright red, and not the least handsome part of the inflorescence.

It is amusing to note the varied cultural directions given by different writers, and certainly some of the directions if followed

will not lead to very satisfactory results. Andrews says, "They are of so hardy a nature as to require no further protection than shelter from severe frosts." Another writer states, "They should not be put in a dry place or in a situation exposed to fire heat." I think both are somewhat astray, although with this treatment they are said to have produced leaves 18 inches long. However, the time given for flowering, September, seems suspicious, as I have never known any species to flower at that time of year. To have satisfactory results it is necessary to secure sound well-matured bulbs, and it will be found that home-grown ones are far superior to imported bulbs, not only for one year, but for an indefinite period. In proof of this I can assert that for at least twenty years *L. tricolor* has been grown at Glasnevin, that no fresh bulbs of this species have been purchased during that period; and that never have the flowers been better than in February 1891, some of the scapes carrying as many as twenty-four flowers. In fact newly imported bulbs require careful cultivation for some years before the best results are attained.

Time of Potting.—Here again the advice and directions given vary much: Pot as soon as the leaves die down; pot before the new roots appear; pot when the new roots have somewhat grown. I cannot imagine any thinking practical grower seriously giving such advice as to pot when the roots had begun to grow. The young roots are very delicate, white in colour, unbranched, and easily broken. When once injured they die back to the base, and do not branch above the injured part. This I proved by potting some bulbs which had already made roots, and turning them out after some time. The old roots were all dead, and new roots were growing from the necks of the bulbs. I find the middle of August to be the best time to pot, and my plants are invariably potted between August 10 and 20, the latter date being rather too late. However, I find that the time of flowering is not altered by potting in June, July, or August, the after-treatment in each case being the same.

Potting Material.—The material in which Lachenalias are grown must be rich. The compost I have used with most success is two parts of loam, one part of leaf-mould, one half-part of decayed manure, to which I add some fertiliser such as fish-potash guano, the effect of which I think is to intensify

the colour of the flowers. The material is prepared in the spring, and well turned over three or four times before it is used. I use 7-inch pots for the strong-growing sorts, and put from eight to fifteen bulbs in each pot—eight of *L. pendula* and fifteen of *L. tricolor*. It is necessary to sort the bulbs well, keeping the stronger bulbs to themselves, and weaker bulbs to themselves, as when mixed they sometimes flower irregularly. The strong bulbs flower earlier than the weaker. Basket culture may also be resorted to with advantage. In fact they grow rather better in baskets than in pots; the foliage is stronger, and so are the flower-spikes. The effect produced by a basket of Lachenalias with forty to fifty flower-spikes all open together is very fine, and such an effect can be secured without much trouble. The finest *Lachenalia Nelsoni* I ever saw was sent to me by the Rev. Theodore Marsh from a basket. He informed me that when carefully tended these baskets need not be disturbed for three or four years; but I have always remade them each year. The same soil does for baskets as for pots. The baskets should, however, be lined with Sphagnum before putting the soil into them.

General Treatment.—When the bulbs have been potted they are well watered, and the pots are put in a light airy house on a shelf near the light. The glass is not muffed, or in any way shaded. The ventilators are kept open day and night until the middle of September, when they are closed on cold nights. As the soil gets dry the pots are again watered, and so treated until the leaves appear in the course of a few weeks, after which the soil should never be allowed to get quite dry. Watering must be carefully attended to, as the roots decay if the soil be too wet, such species as *L. glaucina* and *L. orchioides* being much more sensitive than *L. tricolor* or *L. Nelsoni*. The temperature in the house should not be allowed to fall below 45 deg. Fahrenheit, and plenty of air should at all times be given. Should the day be dull or cold a little heat is turned on when the ventilators are opened, as a cold draft is less injurious than a damp stagnant atmosphere. So treated they will commence to flower early in December, and at present several species are still in flower. As the plants come into flower they are fed with liquid manure once weekly, and this is continued until the leaves die down. Much of next year's success depends on this being carefully

attended to. When the plants have finished flowering they are replaced on the shelf, and about May they are placed in a frame with southern exposure, and carefully attended to until they go to rest. The decayed leaves are then removed, the ashes in the bottom of the frame and around the pots well damped; the sashes are shut down, and remain so until potting time in August. I have tried various other methods, such as growing Lachenalias in unheated houses, in frames, or in brick pits, but I find the system I have now detailed to be by far the best. I was led to it by observing how much better plants in baskets grow, which had perforce to be so treated, than plants in pots which were differently treated, and since adopting this plan they have never failed. I do not wish to imply that all flower equally well. Such is not the case. *L. pendula*, *L. tricolor*, *L. quadricolor*, *L. Nelsoni*, *L. orchioides*, *L. Cami*, and *L. glaucina* can always be relied on. On the other hand *L. rubida*, *L. pustulata*, *L. unifolia*, and *L. aurea* are very uncertain, and sometimes refuse to flower. However, *L. rubida*, *L. unifolia*, and *L. stolonifera*, whatever this may be, have incurred much ill favour, which they do not altogether deserve. Peculiar irregular tortuous tubers, similar to those of *Milla biflora*, or to the swellings on the roots of some Bomareas, have been widely distributed for the bulbs of the three species named. The late Rev. John Nelson, having failed to flower these tubers, handed some of them over to the Rev. T. Marsh, who, also failing to flower them with ordinary treatment, planted them out in deep soil in front of a greenhouse, and covered them with a light. Here they eventually flowered. The flowers were sent to Mr. Baker, who identified them as belonging to an early form of *Scilla campanulata*. These impostors are still extensively cultivated for Lachenalias.

Raising from Seed.—Almost all the species and varieties of the group Eulachenalia intercross freely with each other, the exception being *L. pendula*, and only twice have I succeeded in crossing it, once with *L. quadricolor*, and once with a seedling form. Lachenalia flowers are strongly proterandrous, the anthers dehiscing before the flowers are fully open. It is therefore necessary to open the buds to remove the anthers before they dehisce. The stigma is not protruded beyond the mouth of the perianth for about a week after the flowers have opened,

and in some cases it is not protruded at all. It can easily be reached by taking off a stamen with the filament, a method which I always adopt in preference to a brush. The seeds take from ten to twelve weeks to ripen, and should be sown as soon as ripe. They are small, black, and shining, and generally round, but those of *L. pendula* are gourd-shaped. They may be sown as soon as ripe, and will be found to germinate much more freely if placed in a temperature of 55 to 60 deg. Fahrenheit, in which temperature they may remain until about the end of February, which will be eight months from the time of sowing. They should then be brought to the house in which the old plants are grown, to finish off their growth and go to rest. Next season they behave exactly as do the old bulbs, and they should be treated like them. The third season they will flower, that is in two and a half years from the time of sowing. It would serve no useful purpose to give a list of all the species of Lachenalia which have been described, more especially as I have never seen many of them. My object has been to treat the genus from a practical point, giving my own experience of it, and stating what I was certain about, in furtherance of which plan I now give a list with descriptions of all the species best worth growing, of which I have seen fresh flowers.

Before doing so I wish, however, to thank Mr. Baker very sincerely for the great trouble he has taken in replying to my letters, and in correcting the nomenclature of some species which I sent to him. Mr. Baker has done much to earn the gratitude of all those who take an interest in plants, and the kind and unostentatious manner in which he places his vast accumulation of knowledge at the disposal of inquirers, evokes towards him generally feelings of respect and esteem.

Lachenalia pendula, Aiton.—One of the best and most distinct of all the species, and generally the first to flower; the flowers opening in December or January. It is one of those introduced by Masson in 1774. It grows easily, and increases freely. Its bulbs are larger than those of any other Lachenalia, and in all its parts it is strong and fleshy. The two leaves are broad, deep green, and brittle; the upper leaf being smaller than the lower leaf. Their edges are closely adpressed, forming an erect cup, from the centre of which comes the scape. The scape is quite $\frac{1}{3}$ inch in diameter, green, passing into bright red at

the top. The pedicels are short and rigid, the flowers, when young, being borne in a horizontal position. Flowers six to ten, the outer segments nearly as long as the inner, colour bright red, the tips of the perianth segments are purple and green. There is a well-marked gibbous swelling at the base of the flower. It is well figured in the *Botanical Magazine*, table 590.

Lachenalia pendula, var. *gigantea*.—A fine form of *Lachenalia pendula*, but not larger than the type. The flowers are somewhat larger, pendulous instead of horizontal, the top of the inflorescence gracefully arched, instead of being straight. It is frequently stated that the difference between *Lachenalia pendula* and *L. pendula gigantea* is due to cultivation, but this is certainly not the case. The former increases freely, the latter very slowly, besides which the type flowers earlier, and there is a marked difference in habit.

Lachenalia rubida, Jacq.—This is rather an unsatisfactory species for British gardens, as it cannot be relied on to flower regularly, and at no time does it flower freely. However, it is well worth growing, as the colour of the flowers is so bright and distinct, almost a uniform bright red, paler near the ends of the flowers, with purple and green edgings to the perianth segments. As already stated, this species differs from most other species of Lachenalia, by producing its leaves and flowers almost simultaneously. It is a dwarf species. The scapes are slender, about 6 inches long, green at the base, passing into red 1 inch from the bulb, with large blotches of deeper colour. Flowers six to ten, long and slender, about $1\frac{1}{2}$ inches long, the inner segments about a quarter longer than the outer. The flowers are oblique at the base, patent, on stout pedicels. It was introduced in 1803, and is figured in the *Botanical Magazine*, table 993.

Lachenalia rubida, var. *tigrina*, Gawl.—Similar to *Lachenalia rubida*, but the outer segments paler in colour, and liberally spotted with deep red. A very nice variety.

I may here state that this is the only *Lachenalia tigrina*. It is necessary to clear up this, as in numerous collections a form of *Lachenalia tricolor* is cultivated under the name of *L. tigrina*, which, however, has nothing to do with *L. tigrina*; all its characters being those of *tricolor*, such as the relative length of

the perianth segments, the colour, shape, and direction of the flowers, and the habit of the plant. I procured specimens, and submitted them to Mr. Baker, who says: "*Tricolor*, not far off type." A plant called *L. tigrina Warei* should be *L. tricolor Warei*. Flowers of this, from bulbs obtained from Mr. Ware, have been submitted to Mr. Baker, who agrees in this opinion. The following notes in the *Garden* (March 21, 1885) about some Lachenalias prove this: "A series of varieties of these pretty plants, from Mr. Ware, shows what a diversity of colour there is now among them. Another interesting plant is *L. tricolor Warei*, a variety which Mr. Baker, of Kew, recently named. It reminds one of *L. quadricolor*, and seems to be intermediate between that kind and *tricolor*."

L. tricolor.—From a gardening point of view, *L. tricolor* and its varieties form the backbone of the genus, and they alone are sufficient to secure a firm footing for the genus in gardens.

L. tricolor is a very variable species, widely variable, if *L. aurea* is to be regarded as a variety, and about these varieties there exists endless confusion. The following is a list of the well-marked varieties:—

1. *L. tricolor*.
2. *L. tricolor*, var. *quadricolor*.
3. *L. tricolor*, var. *quadricolor maculata* (*superba* of gardens).
4. *L. tricolor*, var. *Warei*.
5. *L. tricolor*, var. *luteola*.
6. *L. tricolor*, var. *aurea*.

1. *L. tricolor*.—In most gardens, *L. quadricolor* is grown for *L. tricolor*. Baker takes for his type the plant figured in the *Botanical Magazine*, table 82, and this should generally be adopted. It will be noticed that in this plant the bases of the flowers are red, passing into yellow and then into green, and that there are no red or purple markings at the points of the perianth segments.

L. tricolor is a vigorous free-growing plant, the leaves being about 12 inches long and 2 inches broad, glaucous green above, obscurely blotched, paler beneath, and narrowing into a point. Scapes stout, at first quite erect, afterwards becoming sickle-shaped, blotched with long purple patches, and covered with bloom. Flowers twelve to twenty-four, somewhat more than an inch long, inner segments about twice as long as the outer.

Base of the flowers red, centre portion yellow, and apex green, these colours merging into a pale yellow-green as the flowers wither.

2. *L. tricolor*, var. *quadricolor*.—This is the plant figured in the *Botanical Magazine*, table 1097, and in Andrew's *Botanist's Repository*, table 148. In habit it resembles *L. tricolor*, the leaves being similar and quite as large, and spotted. The flowers are well shouldered out from the stem, and there is a considerable amount of green in the outer perianth segments. The points of the inner segments are also spread back considerably as in *tricolor*, and pale red in colour. In growth it is somewhat dwarfer than *L. tricolor*, and the habit is stiffer. It is rather a delicate plant.

3. *L. tricolor*, var. *quadricolor maculata*.—This is the *Lachenalia superba* of gardens, and *L. tricolor*, var. *superba* would be a much preferable name to that now affixed to it; it would distinguish the plant from the preceding variety, and save much confusion. It is a much more slender plant than *L. tricolor* or *L. tricolor*, var. *quadricolor*, and the flowers are more brilliantly coloured, and longer and narrower, the mouth being more closed. Leaves long and narrow, about 12 inches by $\frac{3}{4}$, of a glaucous grey colour both above and beneath. The inflorescence is as long as the leaves. Scape slender, unspotted. Flowers long, about $1\frac{3}{4}$ inches, slender, hanging close to the scape, not shouldered out as in the preceding variety. The ends of the inner segments are rich purple, this colour extending as far on the interior face of the segments as on the exterior. It is almost the first Lachenalia to flower, in fact, sometimes it flowers before *Lachenalia pendula*. It is figured in the *Botanical Magazine*, table 588.

4. *Lachenalia tricolor*, var. *Warei*.—This is said to be a seedling raised by Mr. Ware. It is a pretty variety almost intermediate between *L. tricolor* and *L. tricolor quadricolor*, the reddish purple colour on the ends of the inner segments being confined to a narrow band. Its habit is that of the variety *quadricolor*.

5. *L. tricolor*, var. *luteola*.—Here again there is endless confusion between *L. tricolor*, *L. tricolor luteola*, and *L. tricolor aurea*. Typical *L. tricolor* is called *L. tricolor luteola*, and *L. tricolor luteola* passes for *aurea*. It differs only from *L. tricolor* in having the fully opened flowers pure yellow, with slight red

shading in parts. The bases of the flowers are, however, not red, and the green colour is not found on the points of the outer segments. Baker takes for his type of this, the plant figured in the *Botanical Magazine*, table 1704, and I think it is impossible to separate from it the plant figured at table 5992.

6. *L. tricolor aurea.*—A cantankerous little plant, differing from *L. tricolor* in habit and in constitution. The leaves are short and firm, 6 inches long, 1 inch broad, spotted with dull red: in the older leaves the red becomes a continuous patch at the points. Scape short and stout, 6 to 7 inches long, a few patches of red near the base; the upper portion is of a uniform reddish colour, and the apex bright orange-red. Flowers few, eight to ten, close together at the top of the scape, far more spreading than in *L. tricolor;* the ends of the outer segments are marked with green. Plate 1020 of the *Botanical Magazine* exactly represents this plant, although it is there called *L. tricolor*, var. *luteola.*

L. Cami, Hort. Leichtlin.—This is said to be a species, and it emanated from the rich collection of bulbs of Herr Max Leichtlin, of Baden-Baden. Leaves stout, more erect than those of *L. Nelsoni* or *L. tricolor*, or *tricolor aurea*, 9 inches long, bright and shining; on the upper surface mottled with dull brown. Scapes very stout and erect, heavily blotched with brown to half way, and uniform dull brown in the upper portion. Flowers twelve to twenty, shorter than those of *L. tricolor*, $\frac{3}{4}$ inch long, orange-yellow, shaded with green on the outside. Bases of young flowers, sterile buds, and top of the scape, bright red. A very attractive, free flowering, and vigorous plant, not coming into flower until March.

L. reflexa.—Not a very attractive species. Dwarf; leaves three, the bottom leaf reduced to a large sheathing scale extending about 2 inches, upper two leaves forming a narrow tube, 3 inches long, which is red. Rest of leaf green, $\frac{3}{4}$ inch broad, 6 inches long. Scape 6 inches long, four to six flowers. Flowers long, yellow, swollen in the middle, closed almost completely at the mouth. Ovary large, three times as long as broad. Flowers erect on very short pedicels.

L. glaucina, Jacq.—One of the most striking of all Lachenalias, and as variable as *L. tricolor.* From a gardening point of view it is by far the most important species in all the groups except Eulachenalia. The base of the flower is very globose.

Flowers short, narrowing in the middle, expanding again at the mouth. Outer segments yellowish green, tipped with green, the ends reflexed. Inner segments nearly twice as long as outer, the anterior segment longer than the others. All become curled backwards when the flower is fully open. Apex of scape, and sterile buds, soft bluish green. I imagine this to be the plant figured in the *Botanical Magazine*, table 1269.

L. glaucina viridis.—This is the best of all the *glaucinas*, and is generally grown under the name *Lachenalia viridis*. It is a bold flower, with very handsome foliage. Leaves about 12 inches long, 1½ inches broad, very erect, and tapering to a point, heavily spotted with purple brown, passing into a uniform patch at the apex, and along the margins. Scape stout, erect, blotched with reddish purple. Flowers twenty to twenty-five, 1 inch long. Outer perianth segments bluish green, the posterior segment having a large hump, tips green. Inner segments pale green or almost white, the anterior segment longer and more slender than the others, slightly reflexed. Buds reddish purple. Baker now includes in *L. glaucina* the *L. pallida* described in his monograph, species No. 8, and figured in plate 170 of Saunders's *Refugium Botanicum* and in *Botanical Register*, plate 1350, and plate 1945.

L. orchioides, Ait. Kew.—A pretty species, with small flowers of varied colours, from almost white to deep blue. The flowers are much smaller and narrower than those of *L. glaucina*, and the inner segments are not so irregular. In strong specimens the flower-stalks are curved over like a shepherd's crook, with flowers arranged in rather dense spikes. The leaves are long and slender, faintly spotted. Scape 8 to 12 inches, erect, slender, spotted. Flowers numerous, spreading horizontally. Flowers not ½ inch long, outer segments one-third shorter than the inner, with green tips. It is well figured in Saunders's *Refugium Botanicum*, table 171. There is also a plate in *Botanical Magazine*, table 854.

Lachenalia orthopetala, Jacq.—A species of very slender growth, with pure white flowers, save that each of the perianth segments is tipped with reddish purple. The leaves are long and slender, four to five in number, ½ inch wide, spotted with red along the midribs on the upper side, and tapering to a long point. Scape slender, 6 to 8 inches long, dull red.

Flowers ten to fifteen, white, segments spreading, pointed, the outer nearly as long the inner, stamens not longer than the inner segments, anthers red.

Lachenalia pallida, Aiton.—The true *Lachenalia pallida* of Aiton is a fine species abundantly distinct from *L. glaucina* and *L. orchioides*, and not the plant figured as such in the plates mentioned under the head of *L. glaucina*. In Baker's monograph he says it is scarcely more than a variety of *L. glaucina*, and not the plant figured in *Botanical Register*, table 287. Mr. Baker now says that the true *L. pallida* of Aiton is the plant figured in the *Botanical Register*, table 287, and, therefore, it is far removed from *L. glaucina*. It is also figured in the *Botanical Magazine*, table 1372, as *L. lucida*, Gawl. Leaves fleshy, erect, 12 inches long, 1½ inches wide, pale green on upper surface, dull purple on under surface, unspotted. Scapes very stout green, unspotted, 10 to 12 inches long. Flowers twenty-five to thirty, urn-shaped, pale white, segments tipped with green. The segments are fleshy. Flowers ⅓ inch long, ¼ inch broad. Outer segments nearly as long as inner, the latter with points reflexed; anthers as long as or slightly longer than the segments. Anthers yellow. Ovary strongly three-lobed. The short white pedicel is attached to the lower side of the flower, and not to the centre of the base of the flower. This species is rare in gardens.

Lachenalia pustulata, Jacq.—A well-marked species which pervades most collections under a variety of names. *L. racemosa*, *L. fragrans*, and *L. purpureo-cærulea* generally prove to be this species. It is a free grower and free flowerer, well worthy of a place, although the flowers are not conspicuous. Leaves two, flaccid, long, and slender, thickly marked on upper surface with pustules and blisters, green. Scapes slender, long, 12 to 15 inches, green. Flowers numerous, erect, on short green pedicels, more bell-shaped than tubular, ¼ inch long, green and white. Outer segments shorter than the inner, green, or tipped with green. Inner segments more obtuse than the outer, white or lilac, fading pink. Stamens slightly longer than the inner segments. *Botanical Magazine*, table 817, well represents it. Also Andrew's *Botanist's Repository*, table 350.

Lachenalia versicolor, Baker.—A variable species, with several pretty varieties. It is a slender grower, with very long scapes. On the leaves a few scattered pustules occur. The

flowers are very campanulate, about ¼ inch long, outer segments as long as inner, stamens twice as long as segments. Flowers from pink to purple in colour.

Seedling Lachenalias.—The late Rev. John Nelson seems to have been the first person to take up the raising of hybrid Lachenalias. Two of his seedlings are well known, one of which is probably the very best Lachenalia in cultivation at the present time, and very aptly it bears his name, *L. Nelsoni*. The other is *L. aureo-reflexa*. The first reference I can find to the former is in the *Garden* for July 17, 1880, where there is a coloured plate of this species and others. In the text pertaining to that plate it is stated to be a variety of *L. tricolor*; but the Rev. Mr. Nelson, in a note headed "Seedling Lachenalias," on page 166 of the *Garden* for February 5, 1881, says: "I send for your inspection my seedling Lachenalia and its two parents. My impression last year was correct about its distinctness from *aurea*; the Floral Committee pooh-poohed it as only *aurea*, and I began to think my impression of the colour of *aurea* might possibly be a little indistinct, though I appreciate colours pretty well and can generally keep them in my mind's eye as a rule. I think you will agree with me that the two plants are quite distinct; I may be a little blinded in favour of my own bantling, but in my estimation my plant is the more showy of the two, and it is a far more vigorous grower, and will be as free as its female parent *luteola*, so that it will soon become common and everybody's plant." This it certainly should be. It is a free, vigorous grower, with bold, handsome foliage. The scapes are very stout, and stand firmly upright without any support; as many as eighteen blossoms have been open on one flower-stalk, all fresh and good, their colour being bright golden yellow, with an occasional splash of green, which serves to emphasise the body colour. The sterile buds and the top of the scape are red, very bright when well exposed to light. The Rev. T. Marsh says in a letter to me: "None, I think, are such free flowerers or so easily managed as *Nelsoni* and its crosses. They never seem to fail." An opinion which I thoroughly endorse. *L. aureo-reflexa* (so named by Baker, and described in the *Gardeners' Chronicle*, April 30, 1887) seems undoubtedly to be the plant exhibited by Barr & Son at the meeting of our Society on March 10, 1885, under the name of "Aldborough Beauty," and about which

there is the following note : " One of the late Mr. Nelson's seedlings, raised by him shortly before his death. It is most distinct from all the other kinds in gardens. The flowers are larger than those of any other, and, instead of being pendulous, as in other large-flowered kinds, they are sub-erect. The colour is a bright golden yellow, similar to that of *L. Nelsoni*. The foliage is broad and unspotted; in short, it is so different from any other Lachenalia that it may prove to be a true species."

Some seedlings of very great merit have been raised by the Rev. Theodore H. Marsh, of Cawston Rectory, Norwich, to whom I am indebted for specimens, and for information concerning them and other Lachenalias. These seedlings are characterised by brightness and variety of colour not to be found in any others which I have seen. Some have been raised between *L. quadricolor maculata* crossed with *L. Nelsoni*, of which " Garnet " may be taken as a good type. They flower in February, and have all the brilliant colouring of *L. quadricolor maculata*, with the large flowers and fine constitution of *L. Nelsoni*. Others, of which " Cawston Gem " may be taken as an example, are crosses between *L. quadricolor maculata* and *L. tricolor*, *L. luteola* and *L. aurea*. They flower later than " Garnet," and the specimens I have seen seem to be more robust and quite as attractive. When bulbs of these get distributed a great impetus will be given to the cultivation of Lachenalias.

Seedlings have also been raised at Glasnevin, some of which possess considerable merit, but they lack the brilliant colours of the Cawston seedlings. To one of these only will I draw your attention, *L. aureo-reflexa* crossed with *L. Nelsoni*. Although three times removed from *L. reflexa* it indicates the large ovary of that species, and the characters of the plant are almost exactly intermediate between those of the two parent plants. The most interesting point lies in the direction of the flowers, some of which are sub-erect, as in *L. aureo-reflexa*, some pendulous as in *L. Nelsoni*, and some spread out horizontally.

CAPE BULBS.

By Mr. James O'Brien, F.R.H.S.

[Read April 21, 1891.]

In dealing with the subject set down for me to-day, viz., Cape Bulbs, I shall follow the text and speak on bulbs proper, such as we find more especially among the showy but all too little known Cape Amaryllids, passing by the Gladioli, Freesias, and other Irids, as they have been lectured on here lately by others who are far better able to do justice to them than I am. I shall also confine myself to the cultural side of the question, and to remarks calculated to bring about a better knowledge of these bulbs as garden plants; and I hope to be able to make an original statement or two with a view to that end.

First, then, to plunge into the subject at once, I will say that with proper planting the whole of the South African Crinums, and many of the other strong-growing Cape bulbs, are perfectly hardy in the open garden in any part of the British Isles, and what noble garden plants they make is well exemplified by the scores of stately flower-spikes on the *Crinum Powelli* in the raiser's garden, as well as in the gardens of the President of the Royal Horticultural Society at Burford Lodge, where, too, a row of *Crinum Moorei* (also known as *C. Makoyanum*, *C. Colensoi*, and *C. Mackenii*) annually produce an abundance of delicate pink flowers. *Crinum longifolium* is an old plant in our open gardens, and I have proved *C. campanulatum*, *C. scabrum*, and others to be equally hardy. I therefore advise all who have spare bulbs of these plants in their greenhouses, or who can get fresh imported bulbs, to try some in the open ground; but in order to succeed deep planting, and, if possible, in places where the bulbs are not likely to be disturbed, is necessary. When I say deep planting, I mean that short-necked bulbs should be planted so that the top of the neck is from 6 inches to 9 inches below the surface of the soil, and *C. Powelli* and *C. Moorei*, of which the bulb and neck together are from 2 feet to 3 feet in length, should have trenches opened for them sufficiently deep to allow of the tops of the neck being well below the surface. The object of deep planting is evident, for by its means when hard frosts come it is longer

getting down to the bulbs, and what is of still greater importance, when the thaw comes the return of warmth to the bulbs is gradual. I would advise anyone who contemplates trying these showy bulbs outdoors to set apart for them a narrow border at the foot of a wall, or in front of a plant-house, and in such a situation the Crinums and other bulbs may be planted close to the wall, so that they need not interfere with other things planted on the border, nor be disturbed themselves. So planted and left alone these bulbs grow to a great size, and form huge masses producing a wealth of bloom every year. From such a situation the late Sigismund Rucker, of West Hill, Wandsworth, essayed to get for me a bulb of each of two varieties of what is now known as *C. Moorei*, but which at the time I speak of—some twenty years ago—was growing in his open garden. The bulbs were in a dense mass, and were so firmly rooted that the root crowns were broken in lifting them, although every care was taken.

Experiments in "Plant Protector."

Nearly four years ago I set up a range of "Plant Protector," as this kind of span-roof cold frame with glass-slab sides is called. No trouble was taken to make the different parts fit well, and the bulbs stored in it winter and summer were practically outdoors. Indeed, the effect in it of last winter, resulting in the death of *Amaryllis Belladonna* (one of our prettiest of hardy bulbs), *Crinum Moorei*, and several others, which passed the winter in perfect health in the open ground, proves to me that the test was actually more severe than it would have been had all the bulbs been planted out. But, grown in pots, I had the advantage of having them always under observation. It is well, perhaps, that I did not relate my experience before the present severe and protracted winter or I should undoubtedly have pronounced many things to be perfectly hardy which the experience of the year just past will not allow me to do, as the death-roll among those which had hitherto escaped has been very heavy.

First, then, as to the *Cyrtanthi*, the species experimented on being :

1. *Anoiganthus* (*Cyrtanthus*) *breviflorus*, yellow, Eastern Provinces of the Cape, alt. 5,000 feet.

2. *Cyrtanthus Huttoni*, red and yellow, Eastern Provinces, alt. 4,000–5,000 feet.
3. ,, *Macowanii*, dark scarlet, Eastern Provinces, alt. 4,000–5,000 feet.
4. ,, *Tuckii*, yellow and blood red, Eastern Provinces, alt. 4,000–5,000 feet.
5. ,, *Collinus*, red.
6. ,, *spiralis*, red.
7. ,, *pallidus*, pale red.
8. ,, *angustifolius*, red to orange.
9. ,, *Mackenii*, white.
10. ,, *lutescens*, yellow.

The above are of the Monella type.

Gastronema Section.

11. *Cyrtanthus sanguineus*, dark scarlet.
12. ,, *helictus*, white.
13. ,, *uniflorus*, white.

Of the first four, viz., *Anoiganthus breviflorus*, *Cyrtanthus Huttoni*, *C. Macowani*, and *C. Tuckii*, all from high elevations, I can safely say that they are as hardy for the open garden as any plant needs be, for, with me, they have the past winter been frozen—to use a common expression— "as hard as a brick" for weeks together; and not only were they uninjured, but by their subsequent growth proved that such treatment was good for them.

For example, *Cyrtanthus Tuckii* is in a vigorous condition, which is all the more worthy of remark as the only other bulb or two (beside the three which were wintered with it as described, and which are in good health) in cultivation have been grown in heat, and are in a very poor condition; also bulbs of *Anoiganthus breviflorus* and *Nerine angustifolia*, which were not even potted, have done well. Of the remainder of the Monella section of Cyrtanthus, I am not so certain of their hardiness; that is to say, I believe most of them would live planted as recommended outdoors, but whether they would thrive well enough to flower I have not yet settled to my own satisfaction, and therefore recommend cautious experiments with them outdoors. The hardiness of *Cyrtanthus obliquus*, too, is still an open question.

Of the Gastronema section the tale is short and sad. All of them lived in my frame other winters, but all have died this year.

Nerine.

My experiments with a view to test the hardiness of the genus Nerine have revealed some very interesting facts, although at a lamentable loss on the stock generally. Some two hundred and fifty plants in pots were experimented on, comprising most of the known species and a great many of my own hybrids, in quantities of from six to twenty of each. The result has been directly opposed to what I should have thought would have been the case—that is to say, all the soft pale or bright green shiny-leaved species, viz., *N. flexuosa*, *N. undulata*, *N. angustifolia*, *N. humilis*, and all the hybrids in which either of them had made one of the parents, passed the winter, frozen hard for weeks together, in perfect health, while the larger-bulbed *N. curvifolia*, and indeed all the others, although they survived the first and longest run of severe weather, succumbed to the second cold period.

In bringing about this result, I find again that the question of altitude in the native habitat gives us the key to the relative hardiness of these bulbs in the same manner as with the Cyrtanthi. *Nerine flexuosa* is from 4,000 to 5,000 feet, *N. angustifolia* from a still greater height, and all the others mentioned as passing the winter well, are upland plants. Of the hardiest is my beautiful winter-flowering *N. Manselli*, which has broad bright green leaves like an Agapanthus, and, when strong, a 3 foot scape of rose-pink or light crimson flowers. It was obtained by intercrossing *N. flexuosa* and a fine form of *N. curvifolia*, and on both occasions of my raising it I only succeeded in getting some four or five to grow. *N. erubescens* × *flexuosa* and *undulata*, *N. excellens* × *flexuosa* and *humilis major*, and crosses between *N. flexuosa* and *N. pudica* also came through the winter well; not one variety in which *N. flexuosa* was one of the parents died. But it must be understood that I merely set down the result of my experiments, and make the suggestions I have made as to the fitness of some Cape bulbs for outdoor culture rather as a basis on which others may work, and an inducement for them to continue carefully experiments in the open ground, than to advise the indiscriminate planting of these

beautiful bulbs; a proceeding which might result in loss and disappointment. I think, however, there may be many who have surplus stock who would like to make a trial of this method of Cape bulb culture, and again, there may be some—indeed I know there are some who are now doing it—who would like to grow them in the open ground, if possible, but who either cannot, or do not care to give them space under glass.

But for the general culture of Cape bulbs in a manner in which they may all be grown together with certainty, the cold greenhouse is the best; and as they prefer a dry rather than a moist air in the house they occupy, there is no class of plants better adapted for growing in conservatories, either in town or country; indeed, so grown, they thrive far better than they do in the warm plant-houses, in which too many of them meet their end.

Generally speaking, the Nerines and many other Cape bulbs grow through the winter, and careful observation of their foliage will give the grower a good guide as to his procedure in the matter of giving water. As soon as the leaves turn yellow (generally in May) water should be withheld from the deciduous kinds, and not a drop given until the flower-spikes appear in the end of the summer, or until, by the advancing growth of the leaves, it is seen that water must be given. During the resting season, if the atmosphere of the house in which the Nerines and other deciduous Cape bulbs are grown cannot be kept dry and airy, or if a shelf in a well-ventilated place cannot be found for them, they had better be placed in a cold frame, with the lights tilted back and front (but still left over them to keep rains off), for abundance of air they must have, or degeneration and inability to flower results. These remarks apply especially to *N. curvifolia* and others grouped with it. *N. flexuosa* and its hybrids; *N. angustifolia*, *N. pulchella*, and their hybrids, partake more of an evergreen character, and require a shorter dry period than the others. As requiring the same treatment as the Nerines, should be mentioned the Hæmanthus, Brunsvigia, Buphane, Hessea, and the Gastronema section of Cyrtanthus, which appears to me to differ mainly from the Monella section in the treatment they require by their being deciduous, and consequently wanting a distinct dry season of rest.

Vallota purpurea

Is a fine old greenhouse plant probably well known to you all. It affords a familiar example of another section of Amaryllis, which, being of a more nearly evergreen character, does not require the severe and protracted dry season of the Nerines. In these days, when most handsome plants are attempted to be grown in quantity for the purpose of cut flowers or for indoor decoration, this fine bulb has come in for attention in that direction. Lately I have been told that in some places where it has been largely grown the stock has completely died out, and when asked the reason, I have said it was probably due to the plants being kept too warm, and in a too moist atmosphere; to their being over-potted, or too frequently repotted, which is one of the most fruitful causes of decay in Cape bulbs. Wishing to get to the root of the matter, I addressed questions on the subject to an old friend in South Africa, and his reply fully bears out my conjectures. His remarks are brief and to the point, and I give them in his own words: "*Vallota purpureas* always die here if planted in the open ground. The only way that we can keep them alive is to keep their roots compressed into a small space, either in small pots or among rocks or stones. They will thrive by keeping them in pots until the roots burst the pots, and they will flower profusely." These remarks give the key of success to the culture of all Cape bulbs. Nothing is more fatal to them than the annual repotting which gardeners are so fond of giving to all plants alike. The same correspondent informs me that the "white form of *Vallota purpurea*" recorded in some botanical works must refer to *Cyrtanthus* (*Gastronema*) *uniflorus*, which he remembers being sent to Dutch gardens many years ago, where it was named *Vallota Brehmii*, and his suggestion is doubtless correct and consequently worth recording.

That there is a close affinity between the Gastronema section of Cyrtanthus and *Vallota purpurea* may be seen by careful examination, but the question has been definitely settled by the production of a cross between the two, viz., *Cyrtanthus intermedius*.

Cliveas, or Imantophyllums,

Are familiar Cape plants which are usually included among bulbs, their root-stocks being imperfectly developed bulbs.

The finest, and indeed the only one in general cultivation is *Clivea miniata*, and it, by the gardener's art, has been improved until now we have a fine series of distinct named varieties raised from seeds in Europe, which are one and all better than the imported type. The variety "Marie Reimers" is a good example, and there are numerous other kinds equally attractive, but different in some respect. Some have flowers approaching to the blood-red tint, others have a white eye, and one which I saw exhibited in this hall at the last meeting may be said to have a creamy-white flower, the segments broadly edged with orange.

All the bulbs hitherto mentioned do well in a cold greenhouse or conservatory all the year round, subject to the remarks before made as to summer treatment in a cold frame. But if more convenient, in a frame from which the frost is excluded in winter will do, or if needs be, and no better accommodation can be given, in an unheated frame if the pots are plunged in dry leaves, and three or four inches of dry leaves such as are swept up in parks and gardens be placed lightly over them at the beginning of winter, and kept over them while the frosts last. If the last mode of culture is attempted care should be taken that the winter finds the plants dry in the pots.

The proper method of culture where it can be compassed, and the one which will give the best results as regards flower, is to winter these things on a cool greenhouse shelf—for it is through that season that Nerines and many other Cape bulbs grow—and to keep them for the summer months in a cold frame, the deciduous ones being kept at one end, for at that season they require no water, and the Cyrtanthi of the evergreen section, which require water more or less all the year, at the other. If I may be allowed to travel from the subject too, and to touch on other than Cape bulbs, I should like to say that the Zephyranthes Coburgias, Stenomessons, and other South American bulbs should be grown with those touched on in this paper, and treated like them. The fine *Zephyranthes carinata* also comes into the list of those bulbs of whose hardiness I have no doubt.

Soil, &c.

My experience of all the bulbs we are here dealing with is that as a potting material nothing suits them better than a good

turfy yellow loam, broken up by hand, and not sifted, and without admixture of sand or any other material. The practice of sifting soil is far too common in gardens, and I am sure it is a bad practice, especially for bulbs. Potted in sifted soil, if a bulb does not root very quickly it perishes, but in the more porous, or open material carefully broken up and not sifted, such is not the case. In the matter of repotting, all these things do best, are safest, and flower most profusely when allowed to get pot-bound, many of them not requiring to be repotted for two, three, or even four years. When repotting takes place, succession should be looked after by potting up the offsets, or small bulbs, separately to grow on to take the place of the old ones which mishap or decay may carry off, and also with the same view seedlings of each of the more delicate should be raised, for this is a sure way of keeping the stock up, as home-raised seedlings generally grow with greater vigour than the old or imported plants. In potting the old bulbs it is best to leave half of the larger bulbs above the soil, and the small ones just beneath it.

Watering.

In conclusion, dealing with the question of watering generally, it will be sufficient to say that if the leaf growth is watched and the watering regulated according to the condition of the foliage, the grower can have no better guide. Thus when the leaves of the deciduous kinds turn yellow, and until growth commences again, no water is required, but when growth commences water is as it were asked for. And with the more or less evergreen kinds there comes a time when active growth is not going on and less water is required; and at other times when the leaves indicate active growth it is easy to understand that water to assist in its development is required. In fact in all our dealings with plants, if we are observant, we can get from them by careful observation a safe and certain guide in many particulars as to the treatment they require.

HYBRID RHODODENDRONS.

By the Rev. Prof. G. Henslow, M.A., F.L.S., &c.

[Read May 12, 1891.]

Introduction.

In giving some account of the hybrids and crosses raised by Messrs. Veitch & Sons between species of East Indian Rhododendrons, the following observations refer almost entirely to the effects produced in the forms and colours of the flowers, as well as in the shapes of the leaf-blades. Other observers and experimenters on hybrids have paid great attention to the question of the relative degrees of sterility and fertility amongst true hybrids and crosses of subsequent generations. As the Rhododendrons in question are raised for commercial purposes, the methods of multiplication and propagation adopted, besides having the advantage of keeping the different sorts true, are entirely by cutting and grafting, as affording a more rapid means of increasing the stock. Hence the sole object of crossing is to raise new varieties in which form and colour are the only points attended to, apart from a more compact habit of growth than that which some of them are liable to affect. Such being the case, no statistics of importance are retained upon which generalisations can be framed in reference to relative degrees of sterility or fertility. Such observations as Mr. Veitch has made I have supplied. Still, from the point of view above stated, the results will not, I think, be found devoid of interest.

General Effects of Crossings on Flowers and Foliage.—It has been often asserted that a hybrid resembles the male parent in the flowers, and the female parent in foliage. One chief result, however, observed in studying the comparative effects of the male and female parents in the present case is to modify considerably, if not to render nugatory, this supposed rule; for it is by no means absolute. It would be more correct to say that the offspring may resemble either parent in either way and in various degrees, according to some unexplainable prepotencies in them respectively. Moreover, characters observable in the grandparents or higher ancestry may reappear, having been more or less in abeyance in the parents; or, again, a trace of colour of an

ancestor, retained either in the corolla as a delicate tint, such as of pink, or in the anthers alone, may suddenly become very pronounced.

With regard to flowers, prepotency in the transmission colour is usually, and I may say generally, recognised by florists as being correlated with its intensity: so that, if they wish to "improve" a flower, they select the best coloured as the male parent; but as far as the East Indian Rhododendrons herein described are concerned, it sometimes happens that a paler tint, such as a primrose-yellow or a shade of pink, is retained in the offspring, notwithstanding the fact of one of the parents being of an intense golden yellow or crimson, respectively.

With regard to colours, it may be remarked here that they are all reducible to two, yellow and rose-red. The former is produced by the presence of yellow granules scattered within the cells of the epidermis or underlying tissue; while the reds are due to various degrees of concentration of a coloured fluid both in individual cells as well as by superposition of cells containing the rose-coloured fluid. The buffs or orange-colours are due to combinations of the pink fluid with yellow granules, either in the same cell, as occurs in some epidermides, or in adjacent cells, as occurs in orange-coloured anthers examined. If there be a pink throat with a yellow or orange border to the corolla, this is due to the epidermal cells containing a more concentrated solution of the pink fluid.

Another point worth noticing, especially from a practical point of view, is that better results as to the production of colours occurred by using true species as the male parent, rather than a cross. Hence it will be observed that in the following cases of crosses a true species was much more often employed than a cross as the staminate parent. The same rule, however, holds good when a true species is used as the seed-bearing plant and a cross as the male, rather than when both parents are crosses. Nevertheless, some excellent results were obtained when both parents were crosses.

With regard to the forms of the corolla of the hybrid or cross, this is by no means necessarily correlated to the size and shape of that of either one parent rather than the other; but it depends upon some inherent prepotency in the plant. Thus the small-flowered *R. multicolor*, and its variety *Curtisii*, invariably brings

down the size of the corolla of the larger-flowered species with which it may be crossed, whether it be used as the male or female parent, to some approximation to its own in the offspring. Mr. Veitch has thus obtained a series called the "Multicolor section," with corollas intermediate in size beween the larger and smaller species.

In several crosses described it will be seen how even the tube and the limb may each have its own particular influence respectively on the offspring. Again, if two forms, having about equal-sized corollas, be crossed, the result may be a flower in every way larger than that of either parent. In a few cases the number of lobes seems to be permanently increased (*see* p. 271).

Hence from the results obtained from the Rhododendrons in question, it would appear that no precise rules as to the transmission of floral characters can be laid down. Special influences may, however, be discovered by experiment, and certain peculiarities of any particular species of form ascertained; so that the florist can then readily see whether it is worth while proceeding along certain special lines.

With regard to foliage the same uncertainty prevails. The leaf of the offspring of a hybrid or a cross may resemble either parent entirely, mainly, or in part only, or not at all.* The four points to be noticed are length, breadth, apex, and base of the blade.† Each of these may affect the offspring together, or independently of one another. Again, an ancestral character may reappear, as *e.g.* the truncated base of the leaf of the species *R. jasminiflorum* reappears in certain offspring, both of whose parents may have had blades attenuated at the base. Lastly, of two plants raised from seeds out of the same pod, one may resemble one parent, the other the other parent.

The general dimensions of the leaf may be reduced or not. All one can say is that such or such features are prepotent or not, as the case may be; but it does not appear possible to say why they are so.

Fertilisation.

With regard to the question of degrees of sterility or fertility

* Of about twenty crosses taken at random, about half appeared to bear a stronger resemblance to either parent respectively.

† As the margin is "entire" in all the species, no incisions of any kind occurred.

amongst true hybrids and crosses, it is now well known that they range from zero to infinity in both cases; but that hybrids, as a rule, are more sterile than subsequent crosses. In the case of the East Indian Rhododendrons, Mr. Veitch detected no differences in the fertility of the seedlings he raised, whether of first hybrids or of subsequent combinations—the average number of seeds in any pod being roughly estimated at 500, no accurate measurements having been taken.

It has been asserted that seedlings of true hybrids, which resemble one parent very much, are usually very sterile; but Mr. Veitch did not find it to be so in the present instance. His results, however, conformed to the rule that there was greater uniformity in first hybrids than in subsequent crosses. Similarly his reciprocal hybrids were, as is usually the case, very like one another; there appears to be no difference in their fertility.

As Mr. Veitch found great difficulties in crossing species of Cypripedium from the two hemispheres, so likewise attempted crosses between the E. I. Rhododendrons and Sikkim or American species have met with little success, though the seven species utilised cross amongst themselves with great facility.

As an illustration, Princess Royal (fig. 35) (=*R. jasminiflorum* × *R. javanicum*) × *R. Aucklandii* from Silkim (fig. 34) gave rise to a small white-flowered cross called "Pearl." It closely resembles Princess Alexandra (fig. 37). In fact, the white male parent simply eliminated the pink from Princess Royal, scarcely affecting the size of the corolla at all.

M. Naudin found that colours were sometimes associated with sterility and affinity, but nothing of the sort obtains amongst these species of Rhododendron.

On examining the pollens I found that several of the grains from the true hybrids were shrivelled, or else refused to swell with water. On the other hand, the pollen grains of the first and subsequent crosses were all good, and swelled up vigorously in water. *E.g.* "Hippolyta," which contains five species in its constitution, is one with composite grains, and all good.

Summary of the Effects of Colours on Crossing.

1. *The Combination of Colours.*—Reds and yellows form orange, ranging from yellow-orange to scarlet-crimson.

Fig. 34.—R. Aucklandii (hyb.).*

* The Society is indebted to the courtesy of Messrs. Veitch & Sons, and the Editors of the *Journal of Horticulture* and of the *Garden* for the use of the engravings inserted in the text of this paper.

2. *The Reduction of Colours.*—White and crimson may produce pink. Pink and crimson may produce pink or rose. Light yellow and golden yellow may produce a primrose-yellow.

3. *The Separation and partial Elimination of one of the Colours.*—White and orange may produce pink or yellow. Pink and orange may produce yellow.

4. *The total Elimination of all Colour.*—White, orange, or yellow, crossed with pink, may produce white.

5. *The Dissociation of Colours.*—A crimson or yellow crossed with orange may produce reddish lobes and a yellow tube, or yellow lobes with roseate throat.

6. *The Prepotency of Colours.*—Crimson or yellow may completely overpower yellows and orange, one or other being alone transmitted.

7. *The Restoration of Colours.*—Reds and yellows can be restored without a fresh infusion, if the tint be "in the blood" from some previous generation, whether in the corolla or in the anthers and filaments only.

Illustrations of the Effect of Crossing on Colours.

1. *The Combination of Colours.*—The whole colours of the present species of Rhododendron are crimson (*R. Lobbii* and *R. multicolor*, var. *Curtisii*), cerise (*R. malayanum*), golden-yellow (*R. Teysmannii*), straw-colour (*R. Brookeanum*, var. *gracile*), lemon-colour (*R. multicolor*), buff-orange (*R. javanicum*), and white (*R. jasminiflorum*).

When red and yellow are united, one, and the more usual, effect is their combination, giving rise to various shades of orange or scarlet, ranging from a golden-orange to scarlet-crimson. When two orange-coloured forms are crossed, the offspring, as might be expected, are mostly characterised by various shades of orange.

As examples of the above combinations are *R. Lobbii* (crimson) × *R. Brookeanum*, var. *gracile* (straw-coloured) = Queen Victoria (yellow-orange) and Prince Leopold (red-orange).

Crown Princess of Germany (pinky-orange) × *R. javanicum* (orange) = Souvenir de J. H. Mangles (chrome-orange).

R. javanicum (orange) × *R. multicolor*, var. *Curtisii* (crimson) = Nos. 37, 406 (scarlet-crimson).

Fig. 35.—Princess Royal.

R. multicolor, var. *Curtisii* (crimson) × Princess Christian (yellow) = No. 394 (scarlet).

R. Lobbii (crimson) × *R. Brookeanum*, var. *gracile* (straw) = Duchess of Edinburgh (scarlet-crimson).

2. *Reduction of Colours.*—As instances of the colour of the offspring being paler than that of the parents, Princess Alexandra (white) × Duchess of Edinburgh (scarlet-crimson) = Pink Perfection and Princess Beatrice (cream and pink).

Princess Royal (pink) × *R. Lobbii* (crimson) = Princess Helena (pink).

Princess Alexandra (white) × *R. Teysmannii* (golden yellow) = No. 464 (primrose).

R. Teysmannii (golden yellow) × *Taylori* (pink) = offspring of different shades of primrose-yellow, as Portia, Juliet, and Purity, in which the pink of the male parent is scarcely perceptible.

3. *Separation, with Elimination of one of the Colours.*—Instances occurred where yellow or red was more or less completely eliminated, especially when white characterised one or other of the parents.

The first hybrid raised was Princess Royal (fig 35), by crossing *R. jasminiflorum* (white) with *R. javanicum* (orange). In the offspring the yellow of the male parent disappears, while the pink or rose-colour of the same parent is left. A sister hybrid, Jasminiflorum carminatum, of the same parentage, resembles Princess Royal in form, but approaches a crimson in colour (fig. 36). A very similar result occurred in several of the offspring of Princess Alexandra (white), crossed by *R. javanicum* (orange). Most of them are more or less decidedly pink, such as Queen of Roses, Rose Perfection, &c. In others the yellow is present, but with a tendency to dissociation from the red, as is implied, *e.g.*, in the name "luteoroseum." In one case, however, Minerva, the corolla is a rich yellow, the red of the orange having in this case disappeared, the anthers alone being crimson. A similar result occurred in crossing Princess Alexandra (white) with the scarlet-crimson Duchess of Edinburgh, the offspring of which, Monarch, is a yellow-orange, while Virgil is a pure yellow; so that the white of Princess Alexandra has nearly eliminated all the crimson from the male parent. It is remarkable, however, that in a sister offspring, Pink Perfection, the opposite and more usual result

occurs, in that now the white has eliminated all trace of yellow (derived from the grandparent *R. Brookeanum*, and at the same time reduced the crimson (derived from *R. Lobbii*) to a pure pink.

Very similar results had been previously noticed to occur in crossing the orange-coloured *Begonia cinnabarina* with the white *B. Dregei*; a pink offspring, *B. Weltoniensis*, was obtained.

FIG. 36.—RHODODENDRON JASMINIFLORUM CARMINATUM.

Again, no varieties of colours were obtained from the old bronze-red *Abutilon Darwinii* until crossed by the white Boule de Neige.

4. *Total Elimination of Colour.*—On recrossing Princess Royal (pink) with *R. jasminiflorum* (white), Princess Alexandra (white) was obtained (fig. 37).

In some cases red and yellow eliminate each other, though in others, as stated, and perhaps more generally, they combine to produce orange and scarlet. Thus Purity (French white) is derived from *R. Teysmannii* (golden yellow) × *Taylori* (pink).

R. multicolor (lemon) × Princess Beatrice (cream and pink) produced white varieties. Princess Royal (pink) × *R. Teysmannii* (golden yellow) = No. 392, which has a pale pink limb and a nearly white tube; the anthers alone are orange, containing, therefore, the union of the two colours. Lastly, Princess Royal (pink) × *R. javanicum* (orange) = Thalia (white).

Fig. 37.—Princess Alexandra.

5. *Dissociation of Colours.*—In other genera of plants this may give rise to a striped, flamed, or blotched appearance, as for example in Calceolarias and in varieties of the Snapdragon; but such has not occurred in these Rhododendrons. Sometimes,

however, a flower would have the interior of the tube or throat of a more strongly tinged hue than the lobes, or *vice versâ*.

Thus, *R. multicolor* (lemon) × Lord Wolseley (red-orange) = No. 403, which has light crimson lobes and a yellow tube.

R. Teysmannii (golden yellow) × *R. multicolor*, var. *Curtisii* (crimson), as well as the reciprocal hybrid, has a rose-coloured throat with a yellow-orange limb.

R. multicolor (lemon) × Aurora (yellow-orange) = No. 460. This has a yellow tube with red-orange lobe. The reciprocal cross is the same. Princess Frederica (yellow) × *R. multicolor* (lemon) = No. 339, has a pink* throat and a yellow limb.

The stigma and anthers are very often quite different from the corolla, frequently retaining an ancestral colour, which is lost or inconspicuous in the corolla. Thus *e.g.* Princess Frederica has orange anthers, the corolla being yellow; while in Queen of the Yellows the anthers are crimson.

6. *Prepotency of Colours.*—It not infrequently happens that the colour of one parent will be almost or entirely prepotent over that of the other, and be transmitted to the offspring.

Lord Wolseley (red-orange) × *R. Teysmannii* (golden-yellow) = Yellow Perfection. On the other hand, *R. multicolor*, var. *Curtisii* (crimson) × *R. Teysmannii* (yellow-golden) = No. 474 (crimson). The former species very frequently transmits its crimson colour unaffected by the other parent.

R. Lobbii (crimson) × *R. Brookeanum*, var. *gracile* (straw) = Duchess of Edinburgh and Duchess of Connaught (bright scarlet-crimson).

Monarch (yellow-orange) × *R. malayanum* (cerise) = Little Beauty (cerise).

7. *Restoration of Colours.*—In some cases a particular colour is, so to say, in the blood, and, though eliminated more or less entirely in one generation, may reappear in the next without any fresh infusion; or, if there be a trace of it, as *e.g.* in the anthers alone, it appears capable of redevelopment till it becomes pronounced in the next generation. Thus, Monarch (orange) is the offspring of Princess Alexandra (white) × Duchess of Edinburgh (scarlet-crimson); but this latter is a hybrid resulting from crossing *R. Lobbii* (crimson) with *R. Brookeanum*, var. *gracile* (yellow).

* The pink is traceable to the grandparent Princess Royal.

Hence the source of the yellow colour in the orange in Monarch was this last-named grandparent.

Princess Alexandra (white) × *R. Brookeanum*, var. *gracile* (straw) = *Taylori* (pink); but Princess Alexandra is the offspring of Princess Royal (pink).

Princess Frederica (yellow with orange anthers) × *R. multicolor* (lemon) = No. 339 (yellow border, but pink throat). The pink here is derived from the grandparent Princess Royal.

R. multicolor (lemon) × Princess Beatrice (cream and pink tinge) = No. 335 (dark rose). In this case not only has the yellow disappeared, but the red derived from *R. Lobbii*, through Duchess of Edinburgh (the male parent of Princess Beatrice), has reappeared and become pronounced.

Effects of Form in Crossing.

Form of the Original Species (*large-flowered*).—Cor. border large and tube short, lobes reflexed—*R. Teysmannii* (fig. 43, *f*). Cor. border large and tube short, lobes straight—*R. Brookeanum* (fig. 43, *a*) and *R. javanicum* (fig. 43, *e*). Cor. border small and tube long—*R. jasminiflorum* (figs. 38 and 43, *c*), and *R. Lobbii* (fig. 43 *b*).

Small-flowered Species.—Cor. border broad, tube funnel-shaped—*R. multicolor* (fig. 43, *d*). Cor. border small, tube straight —*R. malayanum* (fig. 43, *g*).

The long straight tube of *R. jasminiflorum* is traceable through most of the progeny of Princess Royal and Princess Alexandra, when crossed with *R. Brookeanum*, but when crossed with the short-tubed *R. javanicum*, it approximates that of the latter species. A similar result follows when they are crossed with *R. multicolor*. The short-tubed *R. javanicum* similarly reduces the larger one of Princess Frederica, as in Princess Christian.

On the other hand, *R. javanicum* (short-tubed) (fig. 43, *e*) × Duchess of Edinburgh (long-tubed) (fig. 44, *l*) = Militare (long-tubed). The long tube is derived from *R. Lobbii* (fig. 43, *b*), which is strongly curved and ascending. A slight curvature is retained in the hybrids, but disappears in the second and subsequent generations.

With regard to the form of the small-flowered *R. multicolor*, whenever this species is crossed with any other or a descendant

of them, it universally reduces the size so that the offspring, while being intermediate, are nearer to that of *R. multicolor* than the other. The short funnel-shaped tube is more or less traceable in all its offspring in the *multicolor* section.

The Effects of the Leaf in Crossing.

Forms of the Leaves of the Original Species (fig. 42).—Elliptical, apex very obtuse, base truncate, length 2 to 3 inches—*R. jasminiflorum.* Elliptical, apex acute, base truncate, length 5 inches

Fig. 38.—R. jasminiflorum.

—*R. Teysmannii.* Lanceolate, apex acute to acuminate, base tapering, length 5 inches—*R. javanicum.* Lanceolate, apex acute to acuminate, base tapering, length 2 to 3 inches (the under surface is covered with russet-brown scales)—*R. malayanum.* Lanceolate, apex acute to acuminate, base tapering, length $2\frac{1}{2}$ inches—*R. Lobbii.* Oblanceolate, apex acute to acuminate, base very tapering, length 8 inches—*R. Brookeanum.* Oblan-

ceolate, apex acute to acuminate, base very tapering, length 2 to 3 inches—*R. multicolor*.

R. jasminiflorum.—The elliptical form with truncated base is traceable in immediate descendants, as in the hybrid Jasminiflorum carminatum=*R. jasminiflorum* × *R. javanicum*, but it is soon lost when again crossed with other species or descendants; as when it is crossed with *R. multicolor*, except in Nos. 452 and 453, which retain much of the form of the leaf of *R. jasminiflorum*, or again in Ruby=*R. jasminiflorum* × *R. multicolor*, var. *Curtisii*, this latter species having acute and tapering leaves.

R. Teysmannii.—The broadly elliptical form is lost when this species is crossed with *R. multicolor*, but somewhat retained when crossed with Maiden's Blush=No. 397. Similarly in No. 450= Lord Wolseley × *Teysmannii*, and in Nos. 53a, 458, &c.=Princess Frederica × *R. Teysmannii*, as also in No. 405=*R. multicolor*, var. *Curtisii* × *R. Teysmannii*. It will be observed that *R. Teysmannii* is prepotent in these cases while being the male parent.

R. javanicum.—The broad lanceolate leaf with tapering ends is retained in Diadem, Militare, and Ne plus ultra=*R. javanicum* × Duchess of Edinburgh. Similarly in Brunette=Princess Frederica × *R. javanicum* and No. 158, in which cases the species is the male parent.

R. Brookeanum, var. *gracile*.—The very remarkable leaf of this species, which is 8 inches long, obovate, and with very attenuated base, is never reproduced; the barest trace only being observable in Crown Princess of Germany=Princess Royal × *R. Brookeanum*.*

R. multicolor.—This small and tapering leaf is readily transmitted, as in No. 426, &c. = Queen of the Yellows × *R. multicolor*, var. *Curtisii*. The general effect of this species, whether used as the male or female parent, is to reduce the size of the leaf of the other parent, and impart its tapering ends, narrowing the blade at the same time.

R. malayanum.—This species was crossed, as the male parent, with Monarch (derived from Princess Alexandra), both parents having tapering leaves, but those of the latter being large. This form is retained in the offspring, Little Beauty and No. 29, which have the same russet-brown scales of the male.

* This well illustrates the fact that a large-sized leaf is by no means always correlated to prepotency. The same feature is true also for the corolla.

Effects of Multifold Crossing.

Mr. Veitch has raised several crosses of the fourth generation, combining four or five species in the results. The following are a selection to illustrate the fact that the species first used frequently retain no visible trace of their existence in the latest offspring, which is much more conformable to the form and colour of the species last introduced into the cross.

Hippolyta (fig. 44, *k*) = Queen of the Yellows × *R. multicolor*, var. *Curtisii*. This contains *jas.*, 2 *jav.*, *Brook.*, and *mult.*, var. *Curtisii*. The form is nearly identical with that of *R. mult.* (fig. 43, *d*), but larger; the increased size being probably due to the effect of *R. javanicum*. The leaf is an enlarged form of that of *R. multicolor*. This cross also illustrates the strong propotency of this species, for there is no appreciable difference of any importance in form or colour between Hippolyta and the second generations, Nos. 32 and 301=Pr. Royal × *R. mult.* var. *Curt.*, which contains *jas.*, *jav.*, and *mult.* only.

Yellow Perfection=Lord Wolseley (fig. 44, *m*) × *R. Teysmannii* (fig 43, *f*). This contains *jas.*, 2 *jav.*, *Brook.*, and *Teys.* It is intermediate between *R. Brookeanum* and *R. Teysmannii*, with the leaf more nearly that of the latter species.

Primrose and No. 456 = Maiden's Blush × *R. Teysmannii*. This contains *jas.*, 2 *jav.*, *Brook.*, and *Teys.* In Primrose, *R. Teysmannii* overpowers everything; but in No. 456 *R. Brookeanum* is more apparent in colour and form.

Little Beauty and No. 318 (fig. 44, *n*) =Monarch × *R. malayanum* (fig. 43, *g*). This contains five species, and one of them twice—viz., *jas.*, 2 *jav.*, *Lobb.*, *Brook.*, *malay.*; yet the result is almost purely *R. malayanum*, the leaf only being larger, yet even that has the russet scales of this species.

Artemis=Ophelia × *R. Teysmannii*. This contains *jas.*, 3 *jav.*, and *Teys.* The large lobes may be attributed to *R. javanicum*; but the size and colour are nearer to *R. Teysmannii*.

Aspasia = *R. Teysmannii* × Maiden's Blush. This contains 2 *jas.*, *jav.*, *Brook.*, and *Teys.* *R. Brookeanum* is seen in the slender tube, *R. Teysmannii* in the general form and colour, as well as in the leaf.

Juliet, *Portia*, *Imogene*, and *Purity* = *R. Teysmannii* ×

Taylori. These contain 2 *jas.*, *jav.*, *Brook.*, and *Teys*. In these *R. Brookeanum* predominates in the slender tube and paleness of the colour.

In not a single instance is the original form *R. jasminiflorum* traceable either in the corolla or the foliage.

Practical Results.

From the preceding observations a few practical results may be noticed.

1. It has often been observed that when a plant with coloured flowers succeeds in throwing up a seedling with *white* flowers, the second generation from the latter may be remarkable for a great variation of tints. This, however, does not apply in the present instance, as the only white form is a true species (*R. jasminiflorum*). (Fig. 38.)

2. When a flower with a composite colour, as orange, is crossed by white, then the next generation may have the colours separated, shades of red or of yellow being the result. This is true, either when crossed by a true species (*R. jasminiflorum*) or a cross (Princess Alexandra). (Fig. 39.)

3. If rose or pale red, and pale or dark yellow be united, delicate pinky-cream coloured, as well as primrose-yellow tints, are produced.

4. It is generally preferable to employ the pollen of a true species when a crossed offspring is fertilised.

5. If it be required to enrich a colour, the plant with the richer tint should be used as the male parent.

6. Reciprocal hybrids are practically identical.

7. Pollen from short stamens tends to dwarf the size of the offspring in *Rhododendrons*. This was discovered by Mr. McNab, but is scarcely applicable to the present species, as there is little or no difference in the lengths of the stamens.

8. From the history of the *Balsamæflorum* section (p. 256), one may gather the usefulness of self-fertilisation in *fixing*, but, of course, not in *creating*, double forms. Conversely, the offspring of a semi-double flower crossed by any single one was invariably single, the latter being prepotent over the semi-double form.

The Balsamæflorum Section of Rhododendron Crosses.

The group of semi-double and double forms of Rhododendrons called *Balsamæflorum* (figs. 39 and 40), from their resemblance to the double flowers of some Balsams, is a curious result of self-fertilisation. Mr. Heal, Mr. Veitch's assistant, who has raised all these hybrids and crosses, observed a *single* flower in a certain truss on a plant of the second generation to have *one* anther only, slightly petaloid. He impregnated the pistil of the flower with

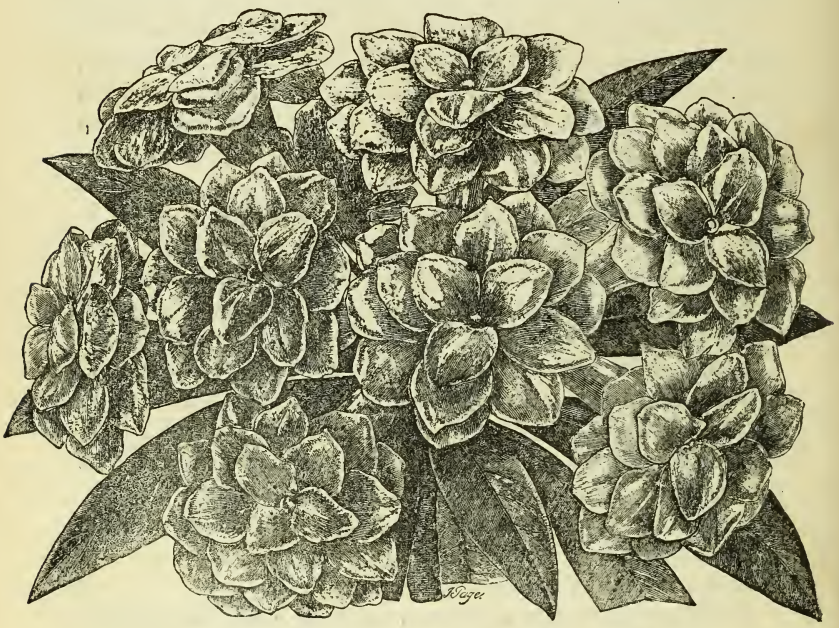


Fig. 39.—Rhododendron Balsamæflorum carneum.

pollen from the other anthers of the same flower; this process being thus strict self-fertilisation. About twenty seedlings were raised, which now constitute the *Balsamæflorum* section.

It would, I think, be incorrect to say that self-fertilisation in this case was a *cause* of doubling, but that it enabled and encouraged the tendency to petalody to be intensified. For, on the contrary, whenever a member of this group has been crossed with a true species, or one of the crosses raised from the seven species, the results were always normal (*e.g.* Nos. 207 and 423),

thereby showing that this tendency to petalody was destroyed or overcome by the natural vigour of the true species or cross with which it was united.

With reference to petalody, differences range from a very slight condition in the filaments to a completely double state. In one seedling raised the stem was forked, each branch terminating in a truss; and while the flowers on one truss had all their stamens more or less petaloid, those in the other had but some only.

FIG. 40.—RHODODENDRON BALSAMÆFLORUM ALBUM.

With regard to the form of the corollas, some have elongated tubes with a comparatively small limb, and consequently partaking much of the shape of Princess Royal. Others have a short tube, and broader limb, thereby approximating the form of *R. javanicum*.

With regard to colours the offspring show great variety. They range from white and pink to dark red or crimson, as well as pure yellow, to various shades of orange.

The name of the original plant is not known, but this dis-

sociation of form and colour reveals the parentages, in that Princess Royal and *R. javanicum* and *R. jasminiflorum* are clearly present. As pure yellow forms occur, such would probably point to *R. Brookeanum*, var. *gracile*. Consequently, as it was known to be a second generation, it was most probably one of the three following, Princess Frederica, Crown Princess of Germany, or Duchess of Teck.

The foliage is very variable, with a frequent want of symmetry in the two halves of the blade.

Bigener, Indico-javanicum (fig. 41).

This is a bigeneric cross between Rhododendron Lord Wolseley (fig. 44, *m*) and Azalea indica stella.

The female parent is of the third generation, the descent being as follows :—*R. jasminiflorum* (white) × *R. javanicum* (orange)= Princess Royal (pink); Princess Royal × *R. Brookeanum*, var. *gracile* (yellow)=Duchess of Teck (reddish orange); Duchess of Teck × *R. javanicum* (orange) = Lord Wolseley (red-orange).

The male parent has a dark rose-coloured corolla, with crimson spots over the upper petals.

The corolla of the cross is smaller than that of either parent, having a broadish, nearly straight tube, slightly bulging above; the lobes of the limb are much shorter than is the case with either parent.

The colour is a rather redder orange than that of the female parent; the anthers are crimson, as well as in both parents.

With regard to the foliage of the cross, though smaller in size the leaf agrees both in form and anatomical details with that of the Rhododendron or female parent in every detail of importance. The leaf of Azalea is markedly different, being obovate instead of lanceolate; toothed, and not entire; covered with fibrous hairs instead of being glabrous above, with minute peltate scales below; the cell-walls of the epidermis being sinuate instead of straight; and the proportion of stomata being less than in the Rhododendron as well as the cross. The hairs of the Azalea are very peculiar in structure. They grow on the branches, petioles, midrib, and veins below, and are generally scattered over the upper surface of the leaf. They are composed of numerous fibres resembling short liber-fibres, graduated in length, so that

the longest form the point of the hair, like a fine camel's-hair brush.

With regard to a dwarf sister-plant,* the anatomical details exhibited a very considerable amount of arrest of structure, the number of cells being nearly twice that of the Rhododendron in the same area, in consequence of their minute size, with fewer stomata. It also agreed in most other respects both with the

FIG. 41.—R. INDICO-JAVANICUM.

sister-cross as well as with the Rhododendron, except that the shape was more elliptical, and possessed glandular hairs instead of peltate scales.

It is observable that this case followed the supposed rule in so far as that the female parent imparted its likeness to the foliage. Of the numerous hybrids and crosses raised by Mr.

* This plant is now seven years old, but does not exceed five inches in height. It has never flowered.

Veitch amongst these seven East Indian species, the above rule was found to fail very generally, in that each parent would impart certain peculiarities either to the flowers or leaves, according to its own prepotency, but the cause of such power is unknown.

Discussion.

Sir John Llewelyn said it was not more than twenty years when nothing but *R. ponticum*, *catawbiense*, and *maximum* were cultivated in this country, and these possessed but a poor variety of colour, the prevailing tints being a dull or rosy purple. By crossing these with the scarlet *arboreum* from Nepal, a strain was obtained having scarlet flowers, but retaining the tender habit of their Indian parent. This progeny was again crossed with hardy kinds, and so up to the present day when our collections present us with every intermediate shade of colour between intense scarlet, rich purple, and down to a pure white produced in plants in every respect hardy. Amongst the many names of those who have been successful raisers of hybrid Rhododendrons are Mr. Burn, of Tottenham Park, Wilts, and Mr. Carton, late of Highclere, Hants. Mr. Carton was warmly supported by Mr. J. R. Gowen, Messrs. John and Hosea Waterer, of Bagshot and Knap Hill; Messrs. Lee, of Hammersmith; Messrs. Standish & Noble, Bagshot; Mr. Baker, and many others. Several hybrid Azaleas and Rhododendrons had been raised at Highclere, the seat of the Earl of Carnarvon, but it was not until 1831 that a very remarkable and lovely hybrid was obtained. It was duly figured in the *Botanical Register*, table 1414, under the name of Rhododendron Alta-clerense,* and is described in the words of Dr. Lindley as having flowers of a "clear transparent crimson colour, rendered still more bright by a few distinct spots of a darker hue." This hybrid was raised by Mr. J. R. Gowen, who gave the following particulars concerning it in the *Botanical Register*:—"They (the flowers) are intermediate between *R. arboreum* of Nepal and a seedling Rhododendron from *R. catawbiense*, which had been fertilised with pollen from *R. ponticum*. From the period of the introduction of *R. arboreum* into the Highclere garden by my friend Dr. Wallich, and more

* Alta-Clera is the name of Highclere in Domesday Book, and in ancient writings.

particularly since its inability to withstand the rigour of this climate had been ascertained, Lord Carnarvon became desirous of producing a cross breed between it and the hardy species. The pollen from *R. arboreum* was used early in the spring of 1826 in fertilising the flowers of this hardy species, which by previous concert had been brought into contemporaneous bloom. The result was the production of a number of capsules containing good seed, from which were raised above 1,800 plants, which have been extensively distributed to nurseries and private gardens both in England and Scotland. The plants retained by Lord Carnarvon showed flower-buds in small quantity late last autumn. Some of the most perfect were removed into pots early in the present season from the shrubberies, and, being placed under glass in a cool conservatory, have flowered. The plants are quite hardy, having never been damaged in the slightest degree by the winters of this climate ; but they are very excitable, shoot very early, and will therefore in early springs be liable to be injured by late frosts. They make extremely vigorous growth, and, judging from the analogy which I have observed to prevail in hybrid production, I am inclined to believe they will attain to the height of 20 feet and upwards. Their foliage is very ornamental." It was probably about 1854 to 1864 the species of Himalayan Rhododendron were attracting attention, for in those days Hooker, in the *Botanical Magazine*, figures some forty species.

EAST INDIAN SPECIES OF RHODODENDRON.

The following species, of which the majority have been introduced by Messrs. Veitch & Sons, are the origins of the hybrids and crosses described in this paper.

1. *R. Brookeanum** (Low) var. *gracile*.—A lax shrub, epiphytal, or growing on mossy limestone. Leaves, form oblanceolate, 8 inches long; apex acute; base very tapering. Corolla large ; tube somewhat funnel-shaped, about $1\frac{1}{4}$ inches long; limb $2\frac{1}{2}$ inches diameter ; lobes revolute ; colour straw. There are two principal varieties, yellow and a rich red, said to resemble *Azalea indica lateritia*, but richer. It is not used in

* *Journ. Hort. Soc.* iii. p. 83, 1848.

these crossings. The present variety of the yellow form has been unfortunately lost to cultivation. Being somewhat more slender than the typical specific form it received the cognomen *gracile*. Mr. Veitch's variety was introduced by Lobb from Borneo in 1855. (Figs. 42 and 43, *a*.)

2. *R. jasminiflorum** (Hook.).—A small shrub, about 1½ feet high, of compact habit. Leaves, form obovato-oblong or elliptical, 2 to 2½ inches long, 1 to 1½ inches broad; apex very obtuse; base truncate. Corolla large; tube 2 inches long, straight; limb small, 1 inch diam.; lobes small, obovate; colour white. Anthers pink. A native of Mount Ophir, Malacca, 5,000 feet. Introduced by Mr. Veitch, sen., 1849. (Fig 38; from *Journ. of Hort.*, Vol. II., New Ser., p. 131. Figs. 42 and 43, *c*.)

3. *R. javanicum*† (Blume ?).—A shrub of lax habit, with long internodes, sometimes epiphytal. Leaves, form lanceolate, 3 to 4½ inches long, 1½ inches broad; apex acute to acuminate; base tapering. Corolla large; tube about ¾ inch long; limb 2½ inches diameter. Colour yellow orange. Anthers crimson. Several varieties in colour occur wild, *e.g.*, a citron and a red-orange or Rolleson's variety. A native of Java, 4,000–8,000 feet, on a volcanic range. Introduced by Mr. Rolleson. (Figs. 42 and 43, *e*.)

4. *R. Lobbii*‡ (Veitch), *R. longiflorum* (Lindl.).—A shrub 8 feet high, with lax branches. Leaves, form lanceolate, with revolute margins, about 3 inches long and 1 inch broad; apex and base tapering. Corolla large; tube curved and ascending, 2½ to 3½ inches long; limb 1 inch diameter. Colour bright glossy crimson. A native of Sarawak jungles, Borneo. Introduced by Mr. Veitch. (Figs. 42 and 43, *b*.)

5. *R. malayanum* (Veitch).—A small shrub with a compact habit. Leaves small, 1½ to 2½ inches long, ½ inch to 1 inch broad; form oblanceolate; apex acute to acuminate, base very tapering; covered with russet-brown peltate scales on the underside. Corolla very small; tube straight, about ½ inch long; limb 1 inch diameter. Colour cerise-crimson. A native of Sumatra. Introduced by Mr. Veitch. (Figs. 42 and 43, *g*.)

* *Bot. Mag.* 76 t. 4,524; Lem. *Jard. Fl.* 41.

† *Bot. Mag.* 73 t. 4,336; *Fl. de Ser.* 3, 293; var. *aurantiaca*, *Fl. de Ser.* 6, 576; Rolleson's var., Beck's *Fl.* 1852, p. 65.

‡ *Florist and Pomologist*, 1870, p. 233.

6. *R. multicolor* (Oliver).—A small shrub with a compact habit. Leaves small, form suboblanceolate, $1\frac{1}{2}$ to 2 inches long, $\frac{1}{4}$ to $\frac{1}{2}$ inch broad; apex acute; base very tapering. Corolla small; tube funnel-shaped, $\frac{1}{2}$ inch long; limb $1\frac{1}{4}$ inches. Colour lemon. Var. *Curtisii*: this only differs in having a rich crimson corolla. Natives of Sumatra. Introduced by Mr. Veitch. (Figs. 42 and 43, *d*.)

7. *R. Teysmannii* (?).—A lax shrub. Leaves large; form elliptical, $4\frac{1}{2}$ inches long, 2 inches broad; apex acute; base abruptly tapering. Corolla large; tube $\frac{3}{4}$ inch long; limb $2\frac{1}{2}$ inches diameter; lobes reflexed. Colour golden yellow. Anthers yellow. A native of Sumatra. Introduced by Mr. Veitch. (Figs. 42 and 43, *f*.)

GENEALOGIES.

First Generations.—True Hybrids.

I. *Rhododendron Brookeanum*, var. *gracile*. (No hybrids raised.)

II. i. *R. jasminiflorum** × *R. javanicum* = Princess Royal and Jasminiflorum carminatum.

ii. *R. jasminiflorum* × *R. multicolor*, var. *Curtisii* = Nos. 35, 329 (Pl. III., fig. *i*), 452, 453.

III. *R. javanicum* × *R. multicolor*, var. *Curtisii* = Nos. 37, 406, 455, 506.

IV. *R. Lobbii* × *R. Brookeanum*, var. *gracile* = Duchess of Edinburgh (Pl. III., fig. *l*), Duchess of Connaught, Prince Leopold, Queen Victoria.

V. *R. malayanum*. (No hybrids raised.)

VI. *R. multicolor*. (No hybrids raised.)

VII. *R. multicolor*, var. *Curtisii* × *R. Teysmannii*† = Nos. 405, 444, 474.

VIII. i. *R. Teysmannii* × *R. multicolor*, var. *Curtisii*† = Nos. 31*a*, 31*B*, 300, 457.

ii. *R. Teysmannii* × *R. javanicum* = No. 518.

* The first named is always the female parent.
† Reciprocal hybrids.

SECOND GENERATIONS.—TRUE HYBRIDS CROSSED BY A TRUE SPECIES.

II. *Through Princess Royal* (*R. jas.* × *R. jav.*).

i. Pr. Royal × *R. Brookeanum*, var. '*gracile* = Princess Frederica, Crown Princess of Germany, Duchess of Teck.

ii. Pr. Royal × *R. jasminiflorum* = Princess Alexandra (fig. 37; from *Journ. of Hort.*, Vol. III., New Ser., p. 477).

iii. Pr. Royal × *R. javanicum* = Baroness Schroeder, Excelsior, Thalia, No. 170.

iv. Pr. Royal × *R. Lobbii* = Princess Helena.

v. Pr. Royal × *R. multicolor*, var. *Curtisii* = Nos. 32*a*, 32*b*, 32*B*, 301.

vi. Pr. Royal × *R. Teysmannii* = Czarina, Duchess of Fife, Nos. 55, 392, 508.

vii. Pr. Royal × *R. Aucklandii* (fig. 34)* = Pearl.

Through Jasminiflorum carminatum (*R. jas.* × *R. jav.*).

Jas. carm. × *R. multicolor*, var. *Curtisii* = Ruby, Nos. 33, 413, 425.

IV. *Through Duchess of Edinburgh* (*R. Lob.* × *R. Brook.*).

Duch. Edinburgh × *R. javanicum* = Brilliant, Scarlet Crown, Triumphans.†

Through Duchess of Connaught (*R. Lob.* × *R. Brook.*).

i. Duch. Con. × *R. javanicum* = Conqueror, No. 63.

ii. Duch. Con. × *R. multicolor*, var. *Curtisii* = Nos. 317, 442.

TRUE SPECIES CROSSED BY A TRUE HYBRID.

R. javanicum × Duchess of Edinburgh = Cardinale, Diadem, Militare, Ne plus ultra.†

R. multicolor × Duchess of Connaught = No. 473.

TRUE HYBRID CROSSED BY A TRUE HYBRD.

IV. *Through Duchess of Edinburgh* (*R. Lob.* × *R. Brook.*).

Duch. Edinburgh × Jasminiflorum carminatum (*R. jas.* × *R. jav.*) = No. 505.

* *R. Aucklandii* is the only species which is not E. Indian, and not used on any other occasion. It is a native of Sikkim-Himalaya. (*See* fig. 34; from *Journ. of Hort.*, Vol. VIII., New Ser., p. 229).

† Reciprocal crosses.

THIRD GENERATIONS.—SECOND GENERATIONS CROSSED WITH A TRUE SPECIES.

Through Princess Frederica (*Pr. Roy.* × *R. Brook.*).

i. Pr. Frederica × *R. javanicum* = Queen of the Yellows, Princess Christian, Thetis, Brunette, No. 158.

ii. Pr. Frederica × *R. multicolor*=Nos. 339, 419, 428.

iii. Pr. Frederica × *R. multicolor*, var. *Curtisii* = Nos. 418, 507 (?).

iv. Pr. Frederica × *R. Teysmannii* = Nos. 53*a*, 53*B*, 449, 458, 459.

Through Crown Princess of Germany (*Pr. Roy.* × *R. Brook.*).

Cr. Pr. Germany × *R. javanicum*=Star of India, Aurora, Apollo, Empress, President, Gloria Mundi, Indian Yellow, Souvenir de J. H. Mangles, Dante, Ajax.

Through Duchess of Teck (*Pr. Roy.* × *R. Brook.*).

Duch. Teck × *R. javanicum*=Lord Wolseley (fig. 44, *m*), No. 56.

Through Princess Alexandra (*Pr. Roy.* × *R. jas.*).

i. Pr. Alexandra × *R. Brookeanum*, var. *gracile*=Maiden's Blush, Taylori.

ii. Pr. Alexandra × *R. javanicum*=Rose Perfection, Queen of Roses, Ambient, Ophelia, Favourite, Luteo-roseum, Aphrodite, Amabile, Minerva.

iii. Pr. Alexandra × *R. multicolor*, var. *Curtisii*=Nos. 42*a*, 42*B*, 328, 353, 398.

iv. Pr. Alexandra × *R. Teysmannii*=No. 464.

SECOND GENERATIONS CROSSED WITH A TRUE HYBRID.

Pr. Alexandra × Duchess of Edinburgh (*R. Lobbii* × *R. Brook.*) =Acis, Monarch (fig. 44, *h*), Princess Beatrice, Pink Perfection, Virgil.

FOURTH GENERATIONS.—THIRD GENERATIONS CROSSED BY A TRUE SPECIES.

Through Queen of the Yellows (*Pr. Fred.* × *R. jav.*).

Qn. of Yellows × *R. multicolor*, var. *Curtisii* = Hippolyta (fig. 44, *k*), Nos. 381, 426, 487, 490.

Through Princess Christian (*Pr. Fred.* × *R. jav.*).

Pr. Christian × *R. multicolor*, var. *Curtisii**=No. 39, 443, 489.

Through Star of India (*Cr. Pr. Germ.* × *R. jav.*).

i. Star of India × *R. multicolor*, var. *Curtisii* =Nos. 34, 322, 417.

ii. Star of India × Jasminiflorum carminatum=No. 511.

Through Aurora (*Cr. Pr. Germ.* × *R. jav.*).

Aurora × *R. multicolor*=Nos. 387, 402, 451.

Through Lord Wolseley (*Duch. Teck* × *R. jav.*).

i. Lord Wolseley × *R. multicolor*, var. *Curtisii*=No. 395.

ii. Lord Wolseley × *R. Teysmannii*=Yellow Perfection, Boule d'Or, No. 450, 519.

iii. Lord Wolseley × *Azalea indica stella*=Indico-javanicum (fig. 41, and p. 258; from *Journ. of Hort.*, Vol. XIX., New Ser., p. 373).†

Through Acis (*Pr. Alex.* × *Duch. Edin.*).

Acis × *R. Brook.*=No. 503.

Through Amabile (*Pr. Alex.* × *R. jav.*).

Amabile × *R. Teysmannii*=Acidalia, The Queen, No. 79.

Through Ophelia (*Pr. Alex.* × *R. jav.*).

Ophelia × *R. Teysmannii*=Artemis, Nos. 484, 510.

Through Maiden's Blush (*Pr. Alex.* × *R. Brook.*).

i. Maiden's Blush × *R. multicolor*, var. *Curtisii*=Nos. 331, 346.

ii. Maiden's Blush × *R. Teysmannii**=Primrose, Nos. 320, 327, 456.

Through Monarch (*Pr. Alex.* × *Duch. Edin.*).

Monarch × *R. malayanum* = Little Beauty, Nos. 29, 318 (fig. 44, *n*).

Through Princess Beatrice (*Pr. Alex.* × *Duch. Edin.*).

Pr. Beatrice × *R. multicolor*=No. 50.

True Species Crossed by a Third Generation.

i. *R. multicolor* × Aurora* (Cr. Pr. Germ. × *R. jav.*)=Nos. 388, 441, 460.

* Reciprocal crosses raised with these.

† This "bigener" did not flower until it was six years old. A sister cross is now seven years old, and only about 5 inches in height. It has never flowered.

ii. *R. multicolor* × Pr. Beatrice (Pr. Alex. × Duch. Edin.)= Nos. 335, 386.

iii. *R. multicolor* × Lord Wolseley (Duch. Teck × *R. jav.*)= Nos. 403, 466.

i. *R. multicolor*, var. *Curtisii* × Pr. Christian* (Pr. Fred. × *R. jav.*)=Nos. 394, 424, 429, 488.

ii. *R. multicolor*, var. *Curtisii* × semi-double "Balsamæflorum"=No. 423.

i. *R. Teysmannii* × Maiden's Blush* (Pr. Alex. × *R. Brook.*)=Aspasia, No. 397.

ii. *R. Teysmannii* × Taylori (Pr. Alex. × *R. Brook.*)= Juliet, Portia, Imogene, Purity.

THIRD GENERATION CROSSED BY A TRUE HYBRID.

Through Star of India (*Cr. Pr. of Germ.* × *R. jav.*).

Star of India × Jasminiflorum carminatum=No. 511.

Through Ld. Wolseley (*Duch. Teck.* × *R. jav.*).

Lord Wolseley × Jasminiflorum carminatum (*R. jas.* × *R. jav.*)=Nos. 73, 509.

TRUE HYBRID CROSSED BY A THIRD GENERATION.

Through Pr. Leopold (*R. Lobb.* × *R. Brook.*).

Prince Leopold × Maiden's Blush (Pr. Alex. × *R. Brook.*)= Incarnatum floribundum.

EFFECTS OF PARENTAGE.—FIRST GENERATIONS.—TRUE HYBRIDS.

II. i. *R. jasminiflorum* (white) × *R. javanicum* (orange)= Princess Royal (pink), Jasminiflorum carminatum (crimson).

Male.—Cor., colour pink or crimson; form, broad limb. Leaf larger,† acute apex, tapering base.

Female.—Cor., colour (eliminates yellow from orange of the male); form, long tube.

* Reciprocal crosses raised with these.

† Comparative terms always refer to the same feature in the opposite sex.

II. ii. *R. jasminiflorum* (white) × *R. multicolor*, var. *Curtisii* (crimson)=Nos. 35, 329, 452, 453 (crimson).

Male.—Cor., colour crimson; form, broad limb. Leaf lanceolate, acute (No. 35).

Female.—Cor., form, slightly longer tube. Leaf nearly elliptical, obtuse (Nos. 452, 453).

III. *R. javanicum* (orange) × *R. multicolor*, var. *Curtisii* (crimson)=Nos. 37, 406, 455, 506 (crimson-scarlet).

Male.—Cor., colour crimson-scarlet. Leaf, reduced in size.

Female.—Cor., form same, reduced in size. Leaf, lanceolate, acute.

IV. *R. Lobbii* (crimson) × *R. Brookeanum*, var. *gracile* (straw) = Duchess of Edinburgh, Duchess of Connaught, Prince Leopold, Queen Victoria.

Male.—Cor., colour, yellow in combination, producing scarlet-crimson (Duch. Edinburgh, Duch. Connaught), red-orange (Prince Leopold), primrose-yellow to pale salmon (Queen Victoria).

Female.—Cor., colour red in combination; form, curved tube. Leaf, form and size.

VII. *R. multicolor*, var. *Curtisii* (dark crimson) × *R. Teysmannii* (golden yellow) = No. 405 (yellow orange), 444 (red orange), 474 (crimson).*

Male.—Cor., colour, yellow has entered most in No. 405 (yellow orange); less in No. 444 (red-orange), and is wanting in No. 474 (crimson). Form, lobes reflexed in No. 444.

Female.—Cor., colour three shades of red. Form, size, and shape, but enlarged.

Leaf, form, lanceolate as in female, but much larger, especially in No. 474 (4 inches), No. 405 (5½ inches) in length.

VIII. i. *R. Teysmannii* (golden yellow) × *R. multicolor*, var. *Curtisii* (crimson) = Nos. 31*a*, 31*B*, 300, 457.*

N.B. These hybrids being reciprocal with VII. are practically identical with No. 405, slight variations occurring in the depths of the tints and in the size of the leaves.

ii. *R. Teysmannii* × *R. javanicum* (orange)=No. 518 (golden yellow).

Male.—Cor., broader tube; anthers pink.

Female.—Cor., reflexed lobes. Leaf, form.

* Reciprocal hybrids.

SECOND GENERATIONS.—TRUE HYBRIDS CROSSED BY A TRUE SPECIES.

II.—*Through Princess Royal* (*R. jas.* × *R. jav.*).

i. Pr. Royal (pink) × *R. Brookeanum*, var. *gracile* (straw) = Princess Frederica, Crown Princess of Germany, Duchess of Teck (all yellow).

Male.—Cor., colour yellow.

Female.—Cor., colour, occasional pink tinge; anthers orange; form same, with slight differences in size; leaf much the same.

ii. Pr. Royal (pink) × *R. jasminiflorum* (white) = Princess Alexandra (white).

Male.—Cor., colour white; form, long tube.

Female.—Cor., colour, occasional pink tinge; form nearly same; anthers orange; leaf, form and size.

iii. Pr. Royal (pink) × *R. javanicum* (orange) = Baroness Schroeder, Excelsior, Thalia, No. 170.

Male.—Cor., colour yellowish white (Thalia); French white (Bar. Schr.); form, broader limb but shorter tube; leaf same (Thalia).

Female.—Cor., colour rose (No. 170); leaf elliptical, with truncate base of *R. jasminiflorum* (Bar. Schr.).

iv. Pr. Royal (pink) × *R. Lobbii* (crimson) = Princess Helena (pink).

Male.—Cor., form, long curved tube and small limb; anthers crimson.

Female.—Cor., colour pink; leaf, form nearly same.

v. Pr. Royal (pink) × *R. multicolor*, var. *Curtisii* (crimson) = Nos. 32*a*, 32*b*, 32*B*, 301 (shades of crimson).

Male.—Cor., colour crimson, form same enlarged; leaf same, but larger.

Female.—Cor., form, large limb.

vi. Pr. Royal (pink) × *R. Teysmannii* (golden yellow) = Czarina, Duchess of Fife, Nos. 55, 392, 508 (pale pinky-yellow to orange).

Male.—Cor., colour, imparted shades of yellow; form, broad limb, shorter tube (Nos. 55, 508); leaf, large size and breadth.

Female.—Cor., colour, pink tinge, *e.g.* No. 508 (in which the colours are dissociated), red in orange (No. 55); form, slightly longer tube (No. 392, Czarina); anthers orange.

vii. Pr. Royal (pink) (fig. 35) × *R. Aucklandii* (white) (fig. 34) =Pearl (white).

Male.—Cor., colour white.

Female.—Cor., form same; leaf, 2 inches long, obovate, obtuse apex, tapering at base, unlike parentage.

Through Jasminiflorum carminatum.

Jas. carm. (crimson) × *R. multicolor*, var. *Curtisii* (crimson) = Ruby, Nos. 33, 413, 425.

Male.—Cor., colour crimson; form, enlarged, with a more funnel-shaped, shorter tube.

Female.—Cor., form, larger limb; leaf same; sometimes elliptical as in *R. jas.*

IV. *Through Duchess of Edinburgh* (*R. Lobb.* × *R. Brook.*).

Duch. Edinburgh (scarlet-crimson) × *R. javanicum* (orange) = Brilliant, Scarlet Crown, Triumphans (all scarlet-crimson).

Male.—Cor., colour, yellow in crimson and scarlet or orange; leaf same, varying in size.

Female.—Cor., form same (with curved tube of *R. Lobbii*); leaf same, varying in size.

IV. *Through Duchess of Connaught* (*R. Lobb.* × *R. Brook.*).

i. Duch. Connaught (crimson) × *R. javanicum* (orange) = Conqueror (scarlet), No. 63 (scarlet-crimson).

Male.—Cor., colour scarlet; form, enlarged limb and shorter tube; leaf broader.

Female.—Cor., colour, introduction of yellow forming scarlet or scarlet-crimson.

ii. Duch. Connaught (crimson) × *R. multicolor*, var. *Curtisii* (crimson)=Nos. 317, 442 (crimson).

Male.—Cor., form same, but larger. Leaf same, but larger.

Female.—Cor., form, longer tube.

True Species Crossed by a True Hybrid.

R. javanicum (orange) × Duch. Edinburgh (scarlet-crimson)= Cardinale, Diadem, Militare, Ne plus ultra (scarlet-crimson).

N.B. These being reciprocal hybrids with Brilliant, Scarlet Crown, and Triumphans, there is no difference of importance between them, beyond slight shades of colour.

R. multicolor (lemon) × Duch. Connaught (scarlet-crimson)= No. 473 (scarlet-crimson).

Male.—Cor., colour cimson (yellow of male eliminated). Leaf broader and longer.

Female.—Cor., form nearly same, slightly larger. Leaf enlarged.

True Hybrid Crossed by True Hybrid.

Through Duchess of Edinburgh (*R. Lobb.* × *R. Brook.*).

Duch. Edinb. (scarlet-crimson) × Jasminiflorum carminatum (dark crimson)=No. 505 (dark crimson).

Male.—Cor., colour deep crimson, eliminated yellow from the scarlet tint. Leaf, same size.

Female.—Cor., form, slight curvature of tube and large limb. Leaf, acute apex.

Third Generations.—Second Generations Crossed with a True Species.

Through Princess Frederica (*Pr. Roy.* × *R. Brook.*).

i. Pr. Frederica (pinky-yellow) × *R. javanicum* (orange)= Queen of the Yellows, Princess Christian, Thetis, Brunette, No. 158 (yellow to yellow-orange).

Male.—Cor., colour slightly intensifies the orange tint in No. 158 and Brunette. Anthers crimson. N.B. Six lobes appear to be constant in these two. Form, sometimes broadens the tube.

Female.—Cor., colour same in first three. Form same. Leaf same.

ii. Pr. Frederica (pinky-yellow) × *R. multicolor* (lemon)= Nos. 339 (yellow limb, rose throat), 419 (pinky-lemon), 428 (lemon).

Male.—Cor., colour prevails in No. 419 (pinky-lemon) and 428 (fine lemon-yellow). Form same, but slightly larger. Anthers yellow-orange. Leaf intermediate.

Female.—Cor., colour, No. 339 (lobes salmon, throat rose). Anthers red-orange. N.B. This form is scarcely distinguishable from Nos. 457=*R. Teysmannii* × *R. multicolor*, var. *Curtisii*.

iii. Pr. Frederica (pinky-yellow) × *R. multicolor*, var. *Curtisii* (crimson)=No. 418, 507 (?)

Male.—Cor., colour crimson. Form, same size. Leaf intermediate.

Female.—Cor., form, straight and longer tube.

iv. Pr. Frederica (pinky-yellow) × *R. Teysmannii* (golden yellow)=Nos. 53*a*, 53*B*, 449, 458, 459 (primrose-yellow to golden yellow).

Male.—Cor., colour, when yellow is intensified. Form, slightly shorter tube. Leaf, broadening, with truncate base.

Female.—Cor., colour, when paler yellow. Form same, when slender tube.

Through Crown Princess of Germany (*Pr. Roy.* × *R. Brook.*).

Cr. Pr. Germany (yellow) × *R. javanicum* (orange)=Star of India, Aurora, Apollo, Empress, President, Gloria Mundi, Indian Yellow, Souvenir de J. H. Mangles, Dante, Ajax (yellow to red-orange).

Male.—Cor., colour, imparted orange tint, even intensified, in last two. Form, enlarged limb and shorter tube. Leaf, same when tapering at base, and more acuminate.

Female.—Cor., colour, when yellow prevails. Leaf, when not attenuated at base; it is a reversion to *R. jasminiflorum*, for the female parent is attenuated.

Through Duchess of Teck (*Pr. Roy.* × *R. Brook.*).

Duch. Teck (yellow) × *R. javanicum* (orange)=Lord Wolseley (red-orange), No. 56 (yellow-orange).

N.B. These, being of same parentage as the last, are not distinguishable except in shades of colour.

Through Princess Alexandra (*Pr. Roy.* × *R. jas.*).

i. Pr. Alexandra (white) × *R. Brookeanum*, var. *gracile* (straw)=Maiden's Blush (pinky-yellow), Taylori (pink).

Male.—Cor., colour, imparted yellow. Form, enlarged size.

Female.—Cor., colour, imparted pink, intensified in Taylori, from the grandparent Pr. Royal. Form, long tube. Anthers orange. Leaf, form and size.

ii. Pr. Alexandra (white) × *R. javanicum* (orange)=Amabile, Rose Perfection, Queen of Roses, Ambient, Ophelia, Favourite, Aphrodite, Luteo-roseum, Minerva, Light Pink, Rose, through pinky-yellow salmon to golden yellow (Minerva).

Male.—Cor., colour, shades of pink, derived from orange by

elimination of yellow. Form, larger size. Leaf, size, and when tapering and acuminate.

Female.—Cor., colour, dissociation or elimination of yellow from orange in some, and red from orange in Minerva; form, longer tube; leaf, when truncate, due to *R. jasminiflorum.*

iii. Pr. Alexandra (white) × *R. multicolor*, var. *Curtisii* (crimson)=Nos. 42*a*, 42*B*, 328, 353, 398 (crimson).

Male.—Cor., colour crimson; form, reduced size; leaf, form.

Female.—Form, longer tube; leaf longer and larger.

iv. Pr. Alexandra (white) × *R. Teysmannii* (golden yellow)= No. 464 (primrose).

Male.—Cor., colour yellow.

Female.—Cor., colour paler tint; form nearly same; leaf intermediate.

Second Generation Crossed with a True Hybrid.

Through Princess Alexandra (*Pr. Roy* × *R. jas.*).

Pr. Alexandra (white) × Duchess of Edinburgh (scarlet-crimson)=Virgil (primrose), Acis (salmon), Monarch (yellow-orange), Princess Beatrice (cream), Pink Perfection (pink).

Male.—Cor., colour various; form greatly enlarged; anthers deep crimson.

Female.—Cor., colour. The effect of the white female parent is to dissociate the yellow from the red in the scarlet-crimson of the male parent. This is completely effected in Virgil (primrose), which has pink anthers. The yellow is a restoration from the grandparent, *R. Brookeanum.* On the other hand the yellow is totally eliminated in Pink Perfection.

Fourth Generations.—Third Generations Crossed by a True Species.

Through Queen of the Yellows (*Pr. Fred.* × *R. jav.*).

Queen of the Yellows (slightly orange-yellow) × *R. multicolor*, var. *Curtisii* (crimson)=Hippolyta (fig. 44, *k*), Nos. 381, 426, 487, 490 (scarlets).

Male.—Cor., colour scarlet by combination of crimson; form same, but enlarged; leaf tapering and narrower.

Female.—Cor., colour scarlet by combination of yellow; form, larger limb; leaf, size.

Through Princess Christian (*Pr. Fred.* × *R. jav.*).

Pr. Christian (yellow) × *R. multicolor*, var. *Curtisii* (crimson) =Nos. 39, 443 (crimson), 489 (pinky-scarlet).*

Male.—Cor., colour crimson; form same, but larger; leaf tapering and narrower.

Female.—Cor., form, large border; leaf larger.

Through Star of India (*Cr. Pr. of Germ.* × *R. jav.*).

Star of India (pinky-orange) × *R. multicolor*, var. *Curtisii* (crimson)=Nos. 34, 417, 322 (crimson to scarlet).

Male.—Cor., colour, imparted crimson; form same, but reduced; leaf tapering at both ends.

Female.—Cor., colour, slight infusion of yellow; form same, but reduced; leaf same length, but narrower.

Through Aurora (*Cr. Pr. of Germ.* × *R. jav.*).

Aurora (pinky-orange) × *R. multicolor* (lemon)=Nos. 387* (orange), 402 (pinky-salmon), 451 (rose-crimson).*

Male.—Cor., colour, imparted crimson tint; leaf tapering at both ends in No. 387.

Female.—Cor., form same, but much reduced; leaf, same in No. 451 but reduced, broader in No. 387.

N.B. Nos. 387 and 451 are practically similar to Nos. 34, 417, and 352 described above, of similar parentage.

Through Lord Wolseley (*Duch. Teck* × *R. jav.*).

i. Lord Wolseley (red-orange) × *R. multicolor*, var. *Curtisii* (crimson)=No. 395 (light crimson).

Male.—Cor., colour, imparted crimson; form, slightly increased.

Female.—Cor., colour, reduced crimson; form, same tube, but smaller; leaf identical.

ii. Lord Wolseley (red-orange) × *R. Teysmannii* (golden yellow)=Yellow Perfection, Boule d'Or, No. 450, 519.

Male.—Cor., colour golden yellow, red eliminated from orange; leaf larger, broader, more truncate.

Female.—Cor., form same, but larger; lobes not reflexed as in male; anthers orange.

* For reciprocal crosses to these, see below, pp. 276, 277.

iii. Lord Wolseley (red-orange) × *Azalea indica stella* (red-orange)=Indico-javanicum. (For description and figure, see p. 259, fig. 41.)

Through Acis (*Pr. Alex.* × *Duch. Edin.*).

Acis (salmon) × *R. Brookeanum*, var. *gracile* (yellow)= No. 503 (pale pinky-salmon).

Male.—Cor., colour more yellow and less orange ; anthers salmon (instead of crimson); leaf enlarged.

Female.—Cor., colour, retained pink from salmon.

Through Amabile (*Pr. Alex.* × *R. jav.*).

Amabile (pale pink) × *R. Teysmannii* (golden yellow)=Acidalia (very pale primrose), Queen (ditto), No. 79 (ditto).

Male.—Cor., colour, imparted yellow, but reduced in tint ; eliminated pink ; form, reflexed lobes ; leaf, form and size of first two.

Female.—Anthers pink ; leaf of No. 79.

Through Ophelia (*Pr. Alex.* × *R. jav.*).

Ophelia (rose) × *R. Teysmannii* (golden yellow)=Artemis (primrose-yellow), Nos. 484 and 510 (ditto).

Male.—Cor., colour, imparted yellow, but reduced in tint ; form, reflexed lobes ; leaf, form and size.

Female.—Anthers pink.

Through Maiden's Blush (*Pr. Alex.* × *R. Brook.*).

i. Maiden's Blush (pinky-yellow) × *R. multicolor*, var. *Curtisii* (crimson)=Nos. 331, 346 (light scarlet-crimson).

Male.—Cor., colour, crimson hue ; form nearly same, but larger.

Female.—Col., colour, scarlet tinge due to yellow; form, straighter tube; leaf same, variable in size.

ii. Maiden's Blush (pinky-yellow) × *R. Teysmannii* (golden yellow)=Primrose, Nos. 320, 327, 369, and 456.

Male.—Cor., colour more golden in Primrose, eliminated pink in all ; form, short tube in Primrose ; anthers golden ; leaf, ends tapering, truncate in Nos. 369 and 456.

Female.—Cor., colour paler yellow, and orange anthers in 456 ; leaf elliptical.

Through Monarch (*Pr. Alex.* × *Duch. Edin.*).

Monarch (yellow-orange) × *R. malayanum* (cerise-crimson) =Little Beauty, Nos. 29 and 318 (scarlet-crimson) (fig. 44, *n*).

Male.—Cor., colour same; form same, but slightly larger in size; leaf, imparted russet scales.

Female.—Leaf, size. N.B. Both parents have a tapering base, but it is more truncate in the offspring, traceable to *R. jasminiflorum*. It has the russet scales of the male parent. In No. 318 the base is very tapering.

Through Princess Beatrice (*Pr. Alex.* × *Duch. Edin.*).

Pr. Beatrice (cream, pink throat) × *R. multicolor* (lemon)= No. 50, 486.

Male.—Cor., colour, pale primrose tube; form nearly same, but enlarged.

Female.—Cor., colour, pink tinge in border and crimson anthers.

True Species Crossed by a Third Generation.

Through R. multicolor.

i. *R. multicolor* (lemon) × Aurora (yellow-orange)=Nos. 388, 441, 460.

N.B. These being reciprocal crosses with Aurora × *R. multicolor* (p. 274), the offspring are identical, only varying in tints; No. 441 closely agrees with No. 451; No. 388 with No. 387. In No. 460, the red and yellow tend to be more dissociated, the former on the edge, the latter in the throat.

ii. *R. multicolor* (lemon) × Princess Beatrice (cream, pink throat)=Nos. 335 (dark rose), 386 (light orange to white).

Male.—Cor., colour, presence of pink; form, large border, truncate tube. Leaf, larger size.

Female.—Cor., colour pale yellow to white, by mutual elimination; form approximates, but is larger; anthers yellow.

N.B.—This cross contains five different species, *R. jasminiflorum* (no trace), *R. Lobbii* (no trace), *R. Brookeanum* (no trace), *R. javanicum* (orange tint and large border, and truncated tube), *R. multicolor* (relatively small size). Leaf, form of *R. javanicum*, but reduced size.

iii. *R. multicolor* (lemon) × Lord Wolseley (red-orange), (through Duch. Teck)=Nos. 403 (rose), 466 (orange).

Male.—Cor., colour, reddish tints. Leaf, breadth and size.

Female.—Cor., yellows mutually eliminated; form nearly same, but larger.

Through R. multicolor var. Curtisii.

i. *R. multicolor*, var. *Curtisii* (crimson) × Pr. Christian (yellow-orange) (through Pr. Fred.)=Nos. 394, 424, 429 (red-orange), 488 (light scarlet).

Male.—Cor., colour, introduced yellow; form, straight tube. Leaf, large in No. 394.

Female.—Cor., colour, red in the orange; form, nearly same size. Leaf, attenuated both ends.

ii. *R. multicolor*, var. *Curtisii* (crimson) × semi-double form of "Balsamæflorum" section (pinky-yellow)=Nos. 70, 423 (crimson).

Male.—Cor., form, broad limb, straight tube; size larger than either parent.

Through R. Teysmannii.

i. *R. Teysmannii* (golden yellow) × Maiden's Blush (pinky-yellow) (through Pr. Alex.)=Aspasia (golden yellow), No. 397 (lemon).

Male.—Cor., colour same or paler yellow; form, somewhat longer tube (397), lobes not reflexed. Aspasia resembles reciprocal form, "Primrose."

Female.—Cor., colour, absence of red tinge. Leaf, form and large size.

ii. *R. Teysmannii* (golden yellow) × Taylori (pink) (through Pr. Alex.)=Portia and Juliet (deeper yellow), Purity and Imogene (paler yellow).

Male.—Cor., form same. Leaf attenuated at base and apex.

Female.—Shades of yellow (pink of male eliminated). Leaf, large size and broad.

THIRD GENERATION CROSSED BY A TRUE HYBRID.

Through Star of India (Cr. Pr. of Germ. × R. jav.).

Star of India (pinky-orange) × Jasmin. carminatum (light crimson)=No. 511 (deep rose).

Male.—Cor., colour, eliminated yellow; form, same border, but reduced. Leaf, same form.

Female.—Cor., form and length of tube.

Through Lord Wolseley (*Duch. Teck* × *R. jav.*).

Ld. Wolseley (orange) × Jas. carm. (crimson)=Nos. 73, 509 (light scarlet).

Male.—Cor., form, same enlarged. Leaf, form of *R. jas.*, but much enlarged.

Female.—Cor., lobes larger; scarlet, by infusion of yellow.

TRUE HYBRID CROSSED BY A THIRD GENERATION.

Through Prince Leopold (*R. Lob.* × *R. Brook.*).

Pr. Leopold (red-orange) × Maiden's Blush (pinky-yellow)= Incarnatum floribundum (rosy salmon).

Male.—Cor., form nearly same.

Female.—Cor., colour deeper red; nearly same. Leaf same.

DESCRIPTION OF PLATES.

Fig. 42.

Leaves of the Seven Species.

The four uppermost represent the general form and size of the leaves (from left to right) of *R. Brookeanum*, *R. multicolor*, *R. malayanum*, and *R. javanicum*, respectively. The three lower forms are those of *R. Teysmannii*, *R. jasminiflorum*, and of *R. Lobbii*.

The figure of *R. Brookeanum* is one-half, and that of *R. Teysmannii* about two-thirds of the real length. The remainder represent the average size and form.

Fig. 43.

Flowers of the Seven Species.

a, *R. Brookeanum* (straw-coloured). *b*, *R. Lobbii* (crimson). *c*, *R. jasminiflorum* (white). *d*, *R. multicolor* (lemon) and *R. mult.*, var. *Curtisii* (crimson). *e*, *R. javanicum* (orange). *f*, *R. Teysmannii* (golden yellow). *g*, *R. malayanum* (cerise).

In no species is there any calyx, thus emphasizing the rule that when flowers grow in corymbs, heads, umbels, &c., there is a great tendency in many cases to arrest the calyx, as may be illustrated by Caprifoliaceæ, Umbelliferæ, Rubiaceæ, Compositæ, &c.

The corolla is quite, or much more regular than in Rhododendrons of other countries, and the stamens are symmetrically arranged, and not declinate.

Fig. 44.

Corollas of Hybrids and Crosses.

h, Monarch. *Genealogy.*—*R. jas.* × *R. jav.*=Princess Royal; Pr. Royal × *R. jas.*=Princess Alexandra; Pr. Alex. × Duchess of Edinburgh (=*R. Lobbii* × *R. Brook.*)=Monarch.

This cross, therefore, contains *R. Brook.*, *R. Lobbii*, *R. jas.* (twice), and *R. jav.* (fig. 43, *a*, *b*, *c*, and *e*).

The form of the corolla closely approximates that of the last species introduced (Duch. of Edin., fig. 43, *l*), but the tube is slightly shorter and quite straight, the curvature of the former (due to *R. Lobbii*) being lost by the effect of the female parent (Pr. Alex.).

The colour is a yellow-orange, the white of the female parent having reduced the red of the scarlet male parent. The anthers have now become a deep crimson.

i, No. 329.—This hybrid, which is the result of crossing *R. jasminiflorum* (fig. 43, *c*) with *R. multicolor*, var. *Curtisii* (fig., 43 *d*), shows how the flower (especially the tube) is intermediate in size, while the male parent has imparted its crimson colour to the flower. This is one of the *multicolor* section.

k, Hippolyta. *Genealogy.*—*R. jas.* × *R. jav.*=Princess Royal; Pr. Royal × *R. Brook.*=Princess Frederica; Pr. Fred. × *R. jav.* =Queen of the Yellows; Qn. of Yell. × *R. mult.*, var. *Curt.*= Hippolyta.

This cross therefore contains four species, and one of them twice.

The form is identically the same as that of the last male parent, or *R. mult.*, only larger. The colour is rather more scarlet than crimson in consequence of the infusion of yellow by the female parent.

Hence both Monarch and Hippolyta show the preponderating influence of the last species introduced in multifold crossings.

l, Duchess of Edinburgh. This hybrid is the offspring of *R. Lobbii* (crimson), (fig. 43, *b*) and *R. Brookeanum* (straw-coloured), (fig. 43, *a*). Comparing the figures, it will be seen how the latter form has greatly overpowered that of *R. Lobbii*, the slight curvature of the tube alone being indicative of the male parentage. The bright scarlet-crimson is due to the infusion of yellow by the the female parent into the bright crimson of that of the male (*R. Lobbii*).

m, Lord Wolseley. *Genealogy.*—*R. jas.* × *R. jav.* = Pr. Royal; Pr. Royal × *R. Brook.* = Duchess of Teck; Duch. Teck × *R. jav.* = Lord Wolseley.

This cross therefore contains three species, and one of them twice.

The female parent, Duchess of Teck, has much the same form as Princess Royal, but is a little smaller. The effect of the large-flowered *R. jav.* (fig. 43, *e*), last introduced, is to greatly enlarge the flower.

The colour of Duchess of Teck is almost a primrose with a faint pink tinge, the anthers being orange. In Lord Wolseley the corolla is a bright orange, and the anthers crimson.

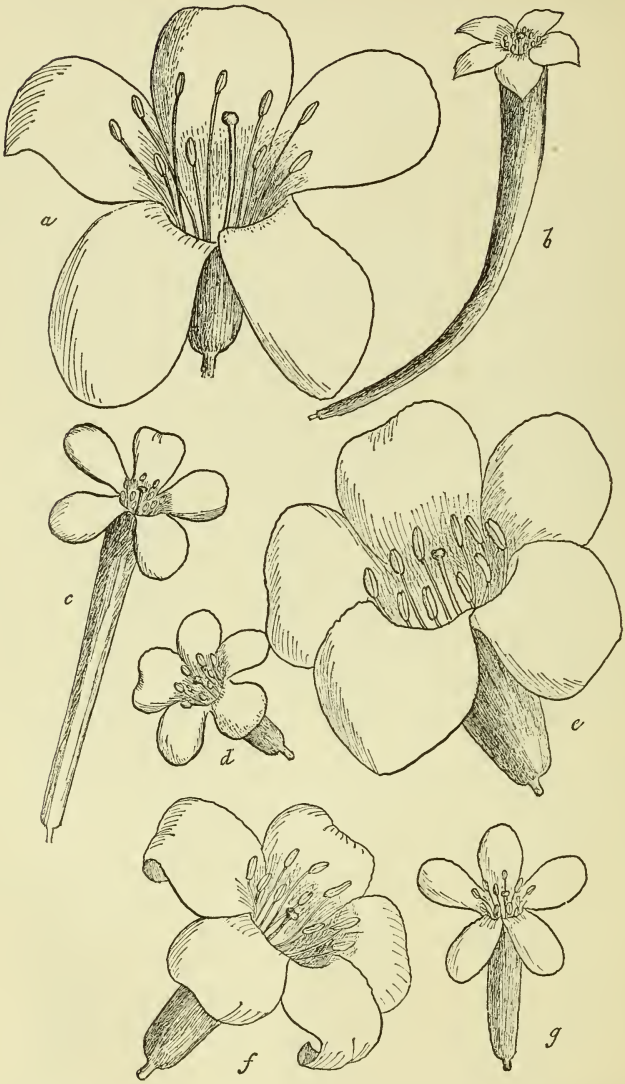
n, No. 318. *Genealogy.*—*R. jas.* × *R. jav.* = Pr. Royal; Pr. Royal × *R. jas.* = Princess Alexandra; Pr. Alexandra × Duchess of Edinburgh (= *R. Lobbii* × *R. Brook.*) = Monarch; Mon. × *R. malayanum* = No. 318.

This cross therefore contains five species, and one of them (*R. jas.*) twice, (fig. 43, *a*, *b*, *c*, *e*, and *g*). The last introduced (*R. mal.*), though the smallest-flowered species, has practically overpowered the other four, this and allied crosses being slightly "improved" forms of *R. malayanum*.

R. Brookeanum ($\frac{1}{2}$). R. multicolor. R. malayanum. R. javanicum.

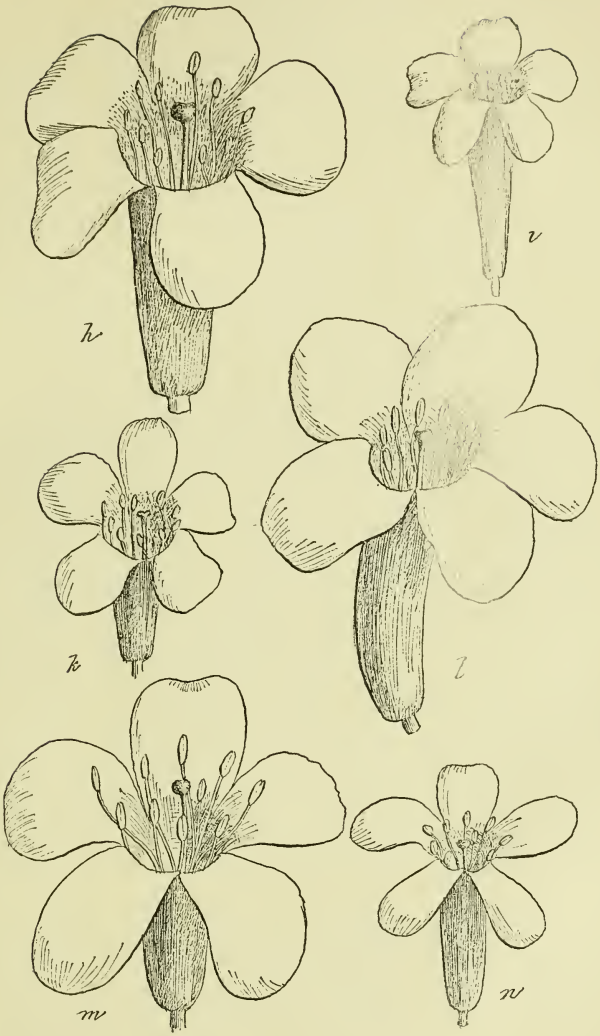
R. Teysmannii ($\frac{2}{3}$). R. jasminiflorum. R. Lobbii.

Fig. 42.



R. Brookeanum. *b*, R. Lobbii. *c*, R. jasminiflorum *d*, R. multicolor *e*, R. javanicum. *f*, R. Teysmannii. *g*, R. malayanum.

Fig. 43.



h, Monarch. *i*, No. 329. *k*, Hippolyta. *l*, Duchess of Edinburgh. *m*, Lord Wolseley. *n*, No. 318.

Fig. 44.

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THE CULTIVATION OF ALPINE PLANTS.

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THE flora of the European Alps is the richest mountain flora in the world; but the term "alpine plants" is used to include many which are not found on the Alps—some which are not mountain plants at all. In this sense the word "alpine" is hard to define; but I intend to speak generally to-day of the cultivation of ornamental hardy plants of low stature, such as may be successfully grown amongst large stones, either facing a bank or elevated above the level of the ground.

There are some favoured gardens where natural rockeries exist, or where the conditions of the soil with regard to quality or drainage are such that choice and delicate mountain plants may be grown on the ground-level in ordinary borders. Such gardens exist in several districts in England, and are common in Scotland and Wales; few rules are necessary there, where plants have only to be planted and kept clear of weeds in order to thrive.

But most of us who wish to grow choice alpines in our gardens have to make the best of conditions naturally unfavourable, and in doing this we can be helped by the experience of those who have made it their special study.

We need not say much of climate and atmospheric conditions, because they are beyond our control. It may be remarked, however, that high elevation above the sea-level is a great advantage in the neighbourhood of towns, because the im-

purities in the air are more readily dispersed, and do not collect or settle as in lowland valleys. Good natural drainage is also a great advantage, because although we can drain the spot in which our alpines grow, and even our whole garden, still, if the soil of the district is wet and retentive, the local damp seems to affect mountain plants unfavourably. Local differences of climate caused by soil and evaporation are no doubt important factors in the growth of plants, but it would be waste of time to dwell upon the endless particulars which make it impossible that the conditions which prevail on the Alps can be imitated in the valley of the Thames. I will therefore assume that the object of the amateur cultivator of alpines is to bring together as many ornamental and hardy dwarf plants as he can, and make them flower and thrive in his garden. The degree of his success will depend partly on circumstances which he cannot control, but in a great measure on his own skill and perseverance.

The first necessity for growing choice alpines is to secure perfect drainage for the soil in which they grow. This may seem strange to those who have seen them growing on the mountains, often apparently in perpetual wet; but there the soil is never waterlogged, or charged with stagnant moisture, but the wet is always in rapid motion and changing. Supposing that no part of a garden naturally gives the conditions in which alpines will thrive, we must make these conditions by artificial means. Those who wish to grow them on flat borders on retentive wet soils, may do so on the ground-level by digging out the soil to a depth of three feet, and draining the bottom of the bed to the nearest outfall, and filling up to the surface with soil mixed with two-thirds of broken stone, either in small or large pieces. But in heavy soils, where large stones are easily obtained, still better beds for alpines may be made by enclosing the space with large blocks to a height of two or three feet, and filling up as before directed. The sides of these stone blocks can be covered with many ornamental plants in addition to those which are grown on the raised surface.

But the commonest way of cultivating alpines is upon what are called rockeries, or loose rough stones laid together in different forms and methods. Of these I will speak more particularly, and then say something about the use of walls and frames for the growth of mountain plants.

The forms in which the rockery, usually so called, can be constructed may be divided into three: (1) The barrow-shaped rockery, (2) the facing rockery, and (3) the sunk rockery. The first may be raised anywhere, the other two depend partly upon the configuration of the ground. No wood or tree roots should be used to supplement any of them; they must be all stone. The kind of stone is seldom a matter of choice; everyone will use what is most handy. The rougher and more unshapely the blocks the better. The size should vary from forty or fifty pounds to three or four hundredweight. No mortar or cement for fixing them together must ever be employed; they must be firmly wedged and interlocked and depend upon one another, and not upon the soil between them, to keep them in their places. This rule is of the utmost importance; if it is neglected a long frost or an excessive rainfall may cause the whole structure to collapse.

Each successive part of the stone skeleton must be put together before the soil is added. This applies to all rockeries.

The most convenient size for the barrow-shaped rockery is about four feet high, and six or seven feet through at the base. The length is immaterial. If the long sides face north-east and south-west it will afford perhaps the best variety of aspect; but the amount of sunshine each plant gets will depend on the arrangement of each stone as much as upon the main structure. There cannot be too many projections, and care must be taken to leave no channels between the stones by which the soil can be washed down to the base. Overhanging brows, beneath which plants can be inserted, are very useful; large surfaces of stone may here and there be left exposed, and irregularity of form is far better than symmetry. A formal arrangement of flat pockets or nests offends the eye without helping the cultivator, as the tastes of alpines as regards slope of surface and moisture at their roots are very various. As for the degree of slope from the base to the summit of the barrow, it will not be uniform. In some places there will be an irregular square yard of level on the top, bounded by large cross keystones, for which the largest stones should be reserved. In other parts the sides will slope evenly to the ridge; or the upper half may be perpendicular, leaving only wide crevices to suit the taste of certain plants. If the blocks are very irregular in form, and their points of contact as

few as possible, providing only for secure interlocking, there will be plenty of room for soil to nourish the plants. Ever-changing variety of stone surface, both above and below the soil, is the object to be aimed at, and any sort of symmetry must be avoided. The second form, or facing rockery, is dependent upon the natural shape of ground-surface. Wherever there is a steep bank facing south or east it may be utilised for the growth of alpines. The stones, as before advised, should be large and unshapely, and be buried to two-thirds of their bulk, and form a very uneven surface, all being interlocked from top to bottom as described. Rockeries of this form are less liable to suffer from drought; if the surface covered is large, access to all parts should be provided by convenient stepping-stones, because, although every stone in the structure ought to be capable of bearing the weight of a heavy man without danger of displacement, it is better not to have to tread upon the plants.

The sunk rockery is perhaps the best of all, but entails rather more labour in construction. Where subsoil drainage is perfect, a sunk walk may be made, not less than ten or twelve feet wide, with sloping sides. The sides may be faced with stones, as described in the second form of rockery, and all or part of the excavated soil may be made into a raised mound, continuing the slopes of the excavated banks above the ground-level, and thus combining the facing rockery and the barrow rockery. If the outer line of this portion above the ground be varied by small bays, every possible aspect and slope may be provided to suit the taste of every plant. However, unless drainage is perfect, a sunk walk, rising to the ground-level at each end, would not be feasible. But a broad walk, excavated into the side of a hill and sloping all one way, could be adapted to a structure nearly similar to that described, or the ground may be dug out in the form of an amphitheatre to suit the taste or circumstances. But whatever the form of rockery adopted, let the situation be away from the influence of trees, beyond suspicion of the reach of their roots below, or their drip, or even their shade above. Trees which only shelter from high winds are so far serviceable, and so are walls and high banks. There are few alpines for which a storm-swept surface is good, but trees are objectionable where they lessen the light, which is an important element in the welfare of most mountain plants. The shade

and shelter afforded by the stones and form of the structure itself is the best kind of shade and shelter.

We now come to the subject of soil, which is very important, though I attach less importance to it than others do who have written on the subject. I hold that where atmospheric and mechanical conditions are favourable, the chemical combination of the soil is of secondary consideration. It is true that in nature we find that the flora of a limestone mountain differs in many particulars from that of a granite mountain, and on the same mountain some plants will thrive in heavy retentive soil, whilst others will be found exclusively in peat or sand. But for one who is beginning to cultivate alpines to have to divide them into lime-lovers and lime-haters, lovers of sand and lovers of stiff soil, is an unnecessary aggravation of difficulties. So large a proportion of ornamental plants are contented with the soil which most cultivators provide for all alike—even though in nature they seem to have predilections—that where an amateur has only one rockery it would be too perplexing to study the partiality of every plant, and to remember every spot where lime-lovers or their opposites had been growing. While saying this, I confess that I have some rockeries where both soil and rock are adapted exclusively for lime plants; others from which lime is kept away, and where both soil and rock are granitic; but the great majority of plants thrive equally well on both. I know few better collections of alpine plants than one which I recently saw at Guildford, growing on a bank of almost pure chalk. I cannot say that I noticed any inveterate lime-haters there; but conditions of drainage and atmosphere were the chief cause of success. With regard to soil, then, we must take care that it does not retain stagnant moisture, and yet it must not dry up too readily. Plants must be able to penetrate it easily with their roots, the lengths of some of which must be seen to be believed. Good loam, with a little humus in the form of leaf-mould or peat, and half or three-quarters of the bulk composed of stone riddlings from the nearest stone quarry, and varying in size from that of rape-seed to that of horse-beans, make up a soil with which most alpines are quite contented. The red alluvial clay of Cheshire, burnt hard in a kiln, and broken up or riddled to the above size, is an excellent material mixed with a little soil and a little hard stone. Where you are convinced that

lime is useful, it may be added as pure lime, not planting in it till thoroughly slaked by mixture with the soil. Rough surface-dressing is a thing in which all alpines delight, as it keeps the top of the soil sweet and moist, and prevents their leaves being fouled. Use for this purpose the same riddled stone as described above, which is better than gravel, as round pebbles are easily washed off the slope by rain or in watering.

Having now constructed our rockeries, we must next furnish them, and it must not be forgotten that they are to be furnished with alpines. It is better not to be in a hurry to see the stones covered. It would be easy to cover them with growth in a single season, but it would be demoralising to the cultivator. We must not degrade choice alpines by putting them to keep company with Periwinkles, Woodruff, large St. John's Wort, Dead Nettles, Creeping Jenny, fast-running Sedums, and Saxifrages, which do duty for alpines on raised structures of roots or stones in the shady, neglected corners of many a garden. Some of these things are very pretty, and desirable in their way; but growing these cannot be called the cultivation of alpine plants, and such subjects as I have mentioned must be carefully kept off the alpine rockery. Indeed, there are some plants, of which *Coronilla varia* is one, which, when once established amongst large stones, cannot be eradicated by any means short of pulling the whole structure to pieces. Any plant which runs under a large stone and reappears on the other side should be treated with caution. As a rule, nothing should be planted which cannot be easily and entirely eradicated in a few minutes. If a rockery is large, there is no reason for limiting the area to be assigned to each plant, especially to such as are ornamental when in flower, and not unsightly at other seasons. If different rockeries, or separate parts of the same, can be assigned to rapid growers and to dwarf compact plants, it will be an advantage. There are many subjects which belong to the class of alpines which require to be displayed in a broad and high mass to do them full justice. Such things should make a train from the top of the rockery quite to the ground; Aubrietias, for example, and *Veronica prostrata* should look like purple or blue cataracts; others should be unlimited in breadth, like the dwarf, mossy Phloxes and the brilliantly coloured Helianthemums. Such things do not like being cropped round to limit their growth, and if there is not enough room for them they had

better be omitted from the rockery, though in stiff and cold soils they will not thrive in the mixed border. Whatever is grown, the small and delicate gems of the collection must run no danger of being smothered by overwhelming neighbours, and this requires both careful arrangement and constant watching. When first I began to cultivate alpines, I planted somewhat indiscriminately together things which I thought would make an ornamental combination, but the weaker soon became overwhelmed in the fight with the stronger, and there was nothing to be done but to build a new rockery and plant it more carefully. In this way I have now constructed at least a dozen rockeries, trying each time to benefit by past experiences and to exclude weedy plants. The first and second made still continue, and are still flowery wildernesses in spring, but everything choice and delicate upon them has either long ago perished or been transferred to new quarters. But visitors to my garden in spring who are not connoisseurs in alpines think these wild rockeries far more ornamental than the half bare stone-heaps where my choicest plants are grown, and which they think will look very nice in a year or two when they are as well covered as the others. I have mentioned this to show that those who can appreciate the beauty of the smaller and more delicate alpines, and grow them for their own sake, must be contented to see their favourites surrounded in many instances by bare stones; but the stones, especially if they contain cracks, may often be clothed with plants without any danger of overcrowding. I have said little about choice of stone for rockeries, though I have tried many kinds, and of all I have tried I prefer the carboniferous limestone, common in North Wales, Derbyshire, and the North of Lancashire. The loose blocks of this which lie about the land are full of cracks, and are varied in shape. I carefully avoid the furrowed and smooth-channelled surface slabs of this stone often sold in London for rockwork, but most unsuitable for growing plants; I do not speak of these, but detached solid blocks, abounding in deep cracks and crevices. These crevices are the very place for some of the choicest alpines. Paronychia shows its true character in no other spot. *Potentilla nitida* flowers when fixed in them, and there only. They are excellent for *Phyteuma comosum*. The Spider-web Houseleeks delight in them, and so do some of the smaller Saxifrages. These are only a few of a long list I might make,

and things which grow in such tight quarters never encroach much. The little *Arenaria balearica*, which grows all over sandstone as close and in nearly as thin a coat as paint upon wood, does not grow well upon limestone; but this plant *does* encroach, spreading over the surface of small neighbours and smothering them. There are many things, however, some herbaceous, some shrubby and evergreen, which do well only on condition of resting upon stone with their leaves and branches. It is so with *Pentstemon Scouleri*, and with that most charming dwarf shrub, *Genista pilosa*, which rises hardly an inch off the stone, though it may cover several square feet. There are many other such plants, but a list of plant names is out of place here, and will be given in an appendix.

I have said before that in planting aspect must be carefully considered. The best aspect for alpines is east, and west is the worst; but there is not a spot on any rockery which may not be filled with a suitable tenant. Some of the most ornamental flowers abhor, in the atmosphere of my garden, even a glimpse of the sun. *Ramondia pyrenaica* is withered up by it in an hour; so is *Cyananthus lobatus*; and these must be shaded on every side but north. As a general rule, I find all Himalayan alpines impatient of sunshine; they may endure it in their own home, where they live in an atmosphere always saturated with wet. However, it is only the deep recesses of the rockery towards the north which get no sun at all, and plenty of things are quite contented on the north side of the slope.

It was said above that the rockery is intended for dwarf and choice plants which will not thrive in other parts of the garden. This, of course, includes some dwarf shrubs. For instance, I must grow *Lithospermum prostratum* on stones or not at all. The white *Erica carnea*, and several such dwarfs, are included in the same number. These details everyone must settle for himself. Such things are included in my definition of alpines. As for bulbs, they may be ornamental enough at times, but I find they do as well or better elsewhere. Their leaves are untidy just at the time when the rockery ought to be most gay and neat; and watering in summer, which other plants require, is bad for them, so I have not included them in my list. While speaking of watering, I may say that rockeries such as I have described could not dispense with it in dry weather; it requires

careful judgment, and I often prefer to water the soil holding the can close to the ground at the highest point of the stones, and letting the water run down the slope to get to the roots, rather than wet the plants themselves. Wet foliage and flowers often get burnt up by sunshine.

Weeding, carefully done, is a necessity on rockeries, for weeds will come; but plants which seed about freely are to be avoided, as they greatly multiply the labour of weeding, and some of them are hard to eradicate from among the stones. The Harebells and Alpine Poppies, pretty as they are, must be excluded on this account; so must that weedy little plant *Saxifraga Cymbalaria*, which can be grown on any wall. The fewer weeds there are, the more likely are seedlings of choice and rare plants to assert themselves. For instance, *Geranium argenteum* grows in crevices into which the seeds are shot when ripe, and where plants could not be inserted, and keeps up the supply of this elegant alpine.

A few words may be in place here about raising alpines from seed; for constant succession is necessary, the duration of their life in cultivation being, for many obvious reasons, which need not be discussed here, far shorter than in their native home. Reproduction from seed, where seed can be obtained, ensures the healthiest and finest growth; and there is no better way of getting seed than saving it yourself. In several cases the first hint I have had that a plant has ripened fertile seed has been the recognition of a seedling near the parent; and this experience has taught me always to look carefully for seed after the flowering of rare specimens. I need not say, therefore, that I disapprove of the practice of cutting off flower-heads as soon as they wither; in some cases the seed-head is nearly as ornamental as the flower; but I have before said that discretion must be used even in this, as seedlings of some things are troublesome from their number. When ripe seed is gathered I recommend its being sown at once. It is then more likely to come up quickly; and as all such plants as we grow on rockeries are better sown in pans, there is seldom difficulty in keeping small seedlings through the winter. The greatest enemy we have in the process is the growth of lichen, the worst being the Marchantia or Liverwort fungus, which completely chokes tender growth. A coating of finely sifted burnt earth on the surface,

and a piece of flat glass laid over the pan, especially if no water is used for them unless it has been boiled, reduces this trouble to a minimum. But sowings of choice and rare seed should be carefully watched, and the fungus picked off at the first appearance. Many alpines seem never to make seed in cultivation, and must be reproduced by division or cuttings. The skill required to do this varies greatly with different subjects; where a shoot can seldom be found more than half an inch long, as in the case of two or three hybrid Alpine Pinks, the striking needs delicate manipulation. Other things grow very slowly, though not long-lived, and a constant succession from cuttings must be ensured. Some of the terrestrial Orchids, such as Bee, and Fly, and Spider, excellent subjects for rockery, we must be contented to keep as long as they choose to live, as they seem never to increase in cultivation at all, though they may flower well year after year. But there are not a few plants which refuse to be tamed, and from the time they are planted in our gardens seem always to go from bad to worse, and are never presentable in appearance for two seasons together. Of these I may instance *Gentiana bavarica* and *Eritrichium nanum*, which I believe no skill has ever kept in cultivation without constant renewal, and which perhaps are never likely to repay the trouble of trying to keep them alive on an English rockery. In all alpine gardening there will be, even where equal skill is exerted, different degrees of success, according to the surrounding conditions; and it must not be expected that the same soil and treatment which keeps a hundred rare alpines in perfect health at Edinburgh will be equally fortunate at Kew.

This paper would not be complete without saying something about the use of frames in alpine gardening. Where the area of rockery is considerable, a cold frame should be assigned for keeping up the supply of plants for it—cuttings and seedlings—in pots. The best treatment of these plants in winter has been much discussed in gardening journals. I may say that I think all attempts to imitate natural conditions, such as snow and long rest, by unnatural means are mistakes. During warm winters mountain plants will grow, and must be allowed to grow, and to keep them unnaturally dark or dry when growing is fatal to their health. Even in severe frosts air must be given abundantly in the daytime, and the frames must not be muffled up.

Stagnant air, whether damp or dry, is their worst enemy; but if the weather is warm enough to set them growing, they may easily die for want of moisture. I will not say more than this, for experience is the best guide, and everyone thinks he can manage his frames better than his neighbour, but of the use of frames for flowering alpines in pots I must add a few words. There are certain very early flowering alpines upon which a mixture of admiration and lamentation is bestowed at the end of every winter. Their flowers are often beautiful in a treacherous fortnight at the beginning of February, and are suddenly destroyed by a return of winter in its severest form. I may mention, amongst others, *Saxifraga Burseriana* and *sancta*, and their near relatives and hybrids, *Primula marginata* and *intermedia*, *Androsace carnea*, *Chamæjasme*, and *Laggeri*, several dwarf species of Alyssum and Iberis, and there are a good many more. Pots or pans containing these may be grouped together in an open sunny spot, and plunged in sand or coal-ashes, in a rough frame made for them, so that the lights may be not more than three or four inches above the pots. These lights should be removed in the daytime when the weather is fine, and air should be admitted, according to the temperature, at night. Such a sheet of elegant beauty, lasting, if well arranged, through February, March, and April, may be obtained in this way that I often wonder why amateurs attempt to flower early alpines in any other fashion.

With me April is the earliest month in which I can expect to have anything gay on the open rockery without disappointment. I am obliged to disfigure the slopes with sheets of glass and handlights to preserve through winter at all *Omphalodes Luciliæ*, *Onosma tauricum*, *Androsace sarmentosa*, and others which cannot endure winter wet, and the real pleasure of the rockery begins when the frame alpines are waning. I recommend those masses of covered pots in early spring to all cultivators of alpines.

I promised to speak of alpines on walls, and that shall end my say. A few years ago I was driving through Dorking, and I noticed a smooth and by no means ancient brick wall covered, above the reach of boys' hands, with *Erinus alpinus*. Rough stone walls I had often seen well clothed with alpines, but from that time I became aware that there is hardly any garden wall, of

whatever material, of which the parts otherwise bare might not be made ornamental with flowers. I do not suggest that such things should supersede climbing Roses and wall-fruit, but how often we see bare walls on which nothing is grown at all! The capabilities of rough stone walls for growing mountain plants are very great. Falls of Aubrietia and Iberis, groups of Saxifrage, and similar subjects may make many a corner gay instead of bare. Some very pretty things I grow on walls which have defied all my attempts to cultivate them elsewhere. I may specify *Lychnis Lagascæ*, a fragile evergreen plant of shrubby growth, easily multiplied by seed, which alternate snows and thaws generally crush up, but in this way it continues to thrive, and is covered during early summer with crimson flowers.

I have now come to the end of my subject, and only add that I have made a careful selection of one hundred and fifty or so alpine plants suited for English rockeries in a list given as an appendix, from which all coarse growers are excluded.

Rock Plants suitable for English Gardens.

Acantholimon venustum.
Achillea tomentosa.
„ Clavennæ.
„ argentea.
„ umbellata.
„ rupestris.
Æthionema grandiflorum, and others.
Alyssum serpyllifolium.
„ pyrenaicum.
Androsace carnea.
„ Laggeri.
„ lactea.
„ sarmentosa.
„ villosa.
„ lanuginosa.
„ Vitaliana.
Anemone alpina.
„ sulphurea.
„ narcissiflora.
„ vernalis.
Anthemis Aizoon.
Aphyllanthes.
Aquilegia pyrenaica.
Arenaria purpurascens.
„ grandiflora.
„ balearica.
„ tetraquetra.
„ laricifolia.
Arabis Androsace.
„ Halleri.
Arnebia echioides.
Aster alpinus.
Aubrietia.
Anthyllis montana.
Bellis cærulescens.
Calandrinia umbellata.
Campanula garganica.
„ Portenschlagiana.
„ Waldsteiniana.
„ Raineri.
„ isophylla.
Cyananthus lobatus.
Cyclamen.
Dianthus deltoides.
„ alpinus.
„ neglectus.
„ cæsius.
„ sylvestris.
„ viscidus.
„ hybrids.
Draba.
Dryas octopetala.
„ Drummondii.
Edraianthus dalmaticus.
Epilobium obcordatum.
Erinus alpinus.
Erodium Reichardi.
„ petræum.
„ macrodenum.
Erythræa diffusa.

Fritillaria (dwarf kinds).
Geranium argenteum.
„ cinereum.
„ subcaulescens.
Geum minutum.
Globularia nana.
Gypsophila cerastioides.
„ repens.
Haberlea rhodopensis.
Helianthemum.
Hippocrepis comosa.
Houstonia.
Hutchinsia alpina.
Hypericum Coris.
„ reptans.
„ nummularium.
Iberis saxatilis.
„ petræa.
„ Pruiti.
„ Tenoreana.
„ rupestris, &c.
Leontopodium.
Linum alpinum.
Linaria alpina.
„ anticaria.
„ hepaticæfolia.
Lithospermum Gastoni.
„ petræum.
„ fruticosum.
Lychnis Lagascæ.
„ alpina.
Micromeria piperella.
Myosotis rupicola.
Omphalodes Luciliæ.
Onosma tauricum.
Oxytropis Halleri, &c.
Paronychia serpyllifolia.
Phlox stellaria.
„ amœna.
„ setacea, &c.
Polygala Chamæbuxus.
Potentilla nitida.
Pratia repens.
Primula Auricula.
„ marginata.
„ viscosa, &c., &c.
Ramondia.
Ranunculus montanus.
„ hybridus.
„ Thora.
„ parnassifolius.
„ pyrenæus.
Ranunculus amplexicaulis.
„ rutæfolius.
„ Seguieri.
„ anemonoides.
„ alpestris.
Rubus arcticus.
Samolus repens.
Saponaria ocymoides.
Saxifraga. These should be bought by sight; varieties and hybrids are endless and good.
Saxifraga Burseriana.
„ Cotyledon.
„ diapensoides.
„ arctioides.
„ cochlearis.
„ longifolia.
„ marginata.
„ sancta.
„ oppositifolia.
„ retusa, &c., &c.
Scabiosa Parnassi.
Sedum. (*See* note under Saxifraga.)
„ Ewersii.
„ pulchellum.
„ populifolium.
„ arboreum, &c., &c.
Sempervivum (many sorts).
Spiræa umbellata.
„ crispifolia.
Thymus Serpyllum (in many varieties). - &c.
Tunica saxifraga.
Veronica (several dwarf shrubs from New Zealand).
„ reptans.
„ saxatilis (in variety).
„ spicata (true).
„ hybrida.
„ aphylla, &c.

Additional Shrubs.

Cytisus Ardoini.
Erica carnea.
Genista pilosa.
Margyricarpus setosus.

Annuals.

Grammanthes gentianoides.
Ionopsidium acaule.
Leptosiphon hybridus.

Discussion.

Mr. Henry Selfe Leonard, of Guildford, said there was one important point to which he desired to call attention, viz.,

as to the reason why hardy plants should be grown in pots. He had been doing away with the use of pots in his garden, and was in favour of planting the specimens out in cold frames for the winter. His objection to pot culture seemed to be that there was not drainage enough for the plants and not enough freedom for the roots, especially when they had been in pots for a long time. He had attained much better results by not growing his plants in pots, but simply covering them with a cold frame in winter.

The Rev. C. Wolley Dod said the advantage of putting plants together in pots was that a much better general collection could be made. When gaps occurred, through death or otherwise, in the open ground, then a fresh plant from a pot could take its place. A certain number always failed when planted out, and it was necessary to keep some of the same species growing in pots, in order that the spaces as they occurred might be filled. He quite agreed that some plants grew much better when planted out in a frame, as there was more freedom given to the roots. He, however, preferred to grow his plants in pans about twelve inches square, as such pans packed so closely, which was a great convenience. Mr. Wolley Dod remarked that the most wonderful collection of alpine plants ever grown, years ago by Messrs. Loddiges, of Hackney, were all grown entirely in pots, and a record of them was to be found in the "Botanical Cabinet," published by the same firm.

Mr. R. Milne-Redhead, Holden Clough, Clitheroe, said he would like to ask the lecturer if he grew such choice plants as *Saxifraga Burseriana major*. It blooms, he said, in the month of January in Yorkshire, and is only protected by means of a piece of glass. In this condition, even when the snow falls, the plant is still able to obtain a supply of air, and the speaker said that after six weeks of snow he found this pretty plant in perfect health. *Haberlea rhodopensis*, which flowers in April, he also hoped to grow as well by treating it in the same way during the winter months.

Mr. Wolley Dod replied that he considered the practice of putting glasses over alpine plants an excellent one. But in windy localities it was necessary to have the pieces of glass pegged down in such a way that they were not blown about and broken, with the risk of spoiling many fine plants. There was

no doubt that the access of air to plants was most necessary, but his objection to covering the plants was that the appearance of the rockery was more or less disfigured by doing so. He had never found any difficulty in growing *Haberlea rhodopensis*, and in fact he had about thirty bunches of it at that very time in bloom in his garden.

In reference to some remarks from Mr. Milne-Redhead, the lecturer said he did not desire to speak disparagingly of the Saxifrages—at least not all of them. The best proof of this would be given by seeing the number of them he cultivated in his rockery. What he objected to growing, however, were such "moss" Saxifrages as *S. hypnoides*, and *S. cæspitosa*, and with these he classed *Sedum acre*, *S. rupestre*, and *S. spurium*, as being of little use or ornament.

TEA-SCENTED ROSES.

By Mr. T. W. Girdlestone, M.A., F.L.S., F.R.H.S.

[Read June 23, 1891.]

The Tea-scented Roses are in many ways the most wonderful of all Roses, and it might have been thought that they would have been grown by everyone, everywhere that Roses can be made to thrive. Yet, as a matter of fact, their cultivation is nothing like universal, and has only in quite recent years become even general. Hardly more than ten, and certainly less than fifteen, years ago very few "Teas" were grown out-of-doors, and this although Tea-scented Roses are no recent invention—several of the most beautiful varieties having been distributed at an early date; for instance, Niphetos (perhaps, with the exception of Maréchal Niel, the best known of all Teas) was sent out by Bougère in 1844, Souvenir d'un Ami by Belot-Defougère in 1846, Madame Bravy by Guillot in 1848, and Souvenir d'Elise Vardon (the Tea that so often wins the medal as the best in the show) by Marest in 1854—a quartet of Teas all still ranking among the twelve best varieties—not to mention Madame Willermoz (Lacharme, 1845), Devoniensis (Foster, 1838), and, earliest of all, the appropriately named Adam (Adam, 1833). It was not, therefore, from any lack of varieties worth growing that the

general cultivation of Tea-scented Roses was so long delayed; nor was it from lack of admiration, for the clause in the National Rose Society's directions to judges, to the effect that in mixed classes Teas and Noisettes are to have *no especial favour* shown to them, must remind many exhibitors of the days (not very long ago) when judges, almost as a matter of course, awarded additional points to any bloom of a Tea Rose in a box, as though the growing and showing of any Tea were something of a *tour de force*.

The real reason why in so many Rose-gardens the Tea-scented Roses have been so long in obtaining the recognition they deserved is probably twofold.

In the first place, after the introduction of the Manetti as a stock, all Roses were very soon worked on it, including, of course, the Teas, which, however, refused permanently to thrive on it out-of-doors. An explanation of this is not easy to find, as Teas will grow on Manetti under glass, and it can hardly be that the stock is too vigorous, since upon other even more vigorous stocks, such as the so-called Polyantha (*Rosa multiflora*) or de la Grifferaie, Tea Roses do well; but the fact remains that Teas on Manetti stock were and are out-of-doors a complete failure. The fine maiden-plants that can be obtained of almost any Rose upon Manetti not unnaturally caused the stock to be universally adopted, and the result was that people endeavoured to grow plants of Tea Roses, which for no very obvious reason proceeded shortly to die; so that the Teas got an undeserved reputation for delicacy through being worked on an unsuitable stock.

In the next place, the Roses (other than Teas) that were in general cultivation in early days were mostly so hardy and vigorous that beside them the plants of Tea Roses must have looked small enough probably—especially after a hard winter—to give the impression that they needed special care or coddling. No doubt, after pruning a series of plants of the vigour and hardiness of (say) Charles Lawson or Blairii No. 2, a grower coming to a dwarf plant of Souvenir d'Elise Vardon, when after a winter like the past it would probably need to be cut down level with the ground, would be struck by the contrast; yet although these vigorous old summer Roses are generally in bloom before any of their modern successors, the Hybrid Perpetuals, the Tea Roses will nevertheless be in flower earlier than either, even

when after a hard winter they have to start their growth afresh from the base of the plant.

No doubt the idea that the Teas are hopelessly tender has been maintained by the fact that, owing to the habit of the plant in always continuing to make fresh growth until brought to rest by actual frost, the plants are often full of young sappy shoots when the cold weather comes, and these, of course, are immediately destroyed by a hard frost; their destruction involves no damage to the ripened wood, but their appearance, all blackened, on the plants at pruning-time in the spring certainly might conduce to the mistaken impression that very little frost has been sufficient to half kill the tree.

Then, again, prior to the advent of the Manetti practically all Roses were grown as standards—a form of stock which undoubtedly does not conduce to the safety of the Teas in winter. If the heads are fine, they are very liable to be broken down by snow, or twisted off by a gale of wind; if they are not fine, they are not ornamental. And it is further to be noted that while, if a dwarf Tea be killed to the ground-line, it will shoot up strongly from the base in spring, and be a good plant again by midsummer; on the other hand, of a standard, if the part above ground be killed, the plant is wholly destroyed. It is true that some growers have defended standard Teas, and have even maintained that they withstand a hard winter better than dwarfs, but such has not been my own experience. I had a nice collection of standard Teas once, but I lost the whole of them one winter; and now I hear of a friend in Norfolk who has lost nearly four hundred during the past winter, so that I do not feel tempted to resume the culture of standard Teas on a large scale. At the same time it is only fair to say that standard Teas with large, well-grown heads form very beautiful objects, and that they often produce extremely fine flowers, which, from their position, are at any rate secure from the fate (that sometimes overtakes blooms grown on dwarf plants) of getting all splashed with mud after a heavy shower.

Having endeavoured to indicate the causes that have led to the prevailing impression that the Tea-scented Roses are exceptionally tender, it now remains to point out the conditions under which they may be successfully cultivated out-of-doors. It is simply a question of proper stocks. On suitable stocks it is con-

tended that Tea Roses are, in the South of England at any rate, and in many parts of Scotland, practically hardy plants; not in the sense that the wood is not liable to injury from frost, but that, even when in winter the whole wood of the plants is killed to the ground-line, the plants will nevertheless in the spring throw up shoots from the base with such vigour and rapidity that they will still be in bloom before the Hybrid Perpetuals, and make fine plants again before autumn. During the past winter the whole of my collection of Tea Roses, numbering some thousand plants, was left entirely unprotected beyond the mulching of manure which all the Rose-beds get in November—no fern or straw being placed among the branches of the plants; and though nearly all the wood of the plants was killed to the ground-line, less than a score of plants were killed outright, and the rest are shooting strongly from the base and are already making good-looking plants again.

I have alluded to the *protection* of the plants with fern in hard weather; but, as a matter of fact, I am not at all convinced of the efficacy of bracken-fronds, as ordinarily employed, in preserving Rose-shoots from severe frost. In the winter of 1886–7 I left a bed of several hundred of dwarf Teas, planted on somewhat strong ground in an exposed situation, without artificial protection of any kind, having neither bracken among their tops nor a mulching upon the surface of the bed. Under these conditions the plants passed through the whole winter, during which on two successive nights the registered temperature four feet from the ground was 7° Fahr., or 25 degrees of frost, but the only variety of which some plants were killed was Madame Bravy; and at pruning time no appreciable difference could be found in the state of these exposed plants and in that of the rest of the collection which had been carefully protected with an abundance of fern, of which therefore the utility seems rather doubtful; for in a mild winter a wrapping of bracken-fronds is not only unnecessary, but may be even harmful, while as a protection from severe frost it does not appear efficacious.

The point, however, is not very material in view of the fact that unprotected dwarf Teas, even after exposure to 30 degrees of frost (or a temperature of 2° Fahr.) in an exceptional winter like the past, to say nothing of that of 1886–7, are alive and flourishing, and already (June 23) coming finely into flower.

The best stocks on which to grow Tea-scented Roses successfully are three in number—namely, briar-seedling, briar-cutting, and Polyantha-cutting. I should perhaps specify that by briar I mean the common Dog-Rose (*Rosa canina*) of our hedges, and by Polyantha the rampant Japanese species, which, although generally known under this name, ought properly to be called *Rosa multiflora*. Of the two forms of briar-stock, seedling and cutting, if I were buying I should choose plants on the seedling, though I might find it difficult to give very precise reasons for the preference, as both forms of dwarf briar-stock are good, and on either fine plants may be obtained; but if I were planting stocks to bud myself I should be more disposed to plant briar-cuttings, for there is no denying that the seedlings are not a little tedious to bud, with their thin bark, and stems often crooked. The chief difference between the seedling and cutting briars lies in the form of the root-stock, which in the case of the seedling consists mainly of a powerful central root that goes straight downwards into the soil, whereas the roots of the cutting are disposed more horizontally in a circle that has for its centre the base of the cutting; so that in all probability the cutting would prove the best stock to grow on a shallow soil, while on deep land, whether heavy or light, the preferable stock of the two would be the seedling-briar.

It is, however, a constant source of wonder to me that nurserymen do not more largely cultivate the Polyantha-cuttings for Tea Roses. This stock I have made use of for the past nine years, with annually increasing satisfaction. I have plants on it that were budded in 1882, both of Teas and Hybrids, including Comtesse de Nadaillac, Etoile de Lyon, and Victor Verdier, which are still among the best plants of the varieties that I possess. Briar-seedlings are admittedly somewhat troublesome to bud; briar-cuttings are found by some people (though I own this has never been my experience) difficult to propagate; Polyantha-cuttings are neither. They root even more quickly and certainly than Manetti, their stems are always straight and smooth and easy to bud on, they grow luxuriantly on light or on heavy soil, and, moreover, they do not get smothered with mildew in the quarters, as do briar-seedlings (especially in the young state) and de la Grifferaie; the last-named, a stock of great vigour, which it may perhaps be well to mention as one

rather to be avoided, since the few Roses that will thrive on it do no better than on dwarf briar or on Polyantha-stocks, even if, as has been sometimes contended is the case with the Dijon Teas, they do as well; and the stock itself is such a mildew-trap as to be quite a nuisance in the budding-ground. I have many groups of plants of the leading varieties of Teas on Polyantha-cutting stocks in various situations and of various ages, all thriving admirably; while it is noticeable that one can obtain larger plants of Teas on Polyantha-stocks in a shorter time than on briars, especially on poor soil.

With a view to ascertaining their value as stocks, I have lately been budding on *seedling* plants of numerous other species of Roses in addition to Polyantha, including *R. rugosa*, *R. conspicua*, *R. rubrifolia*, &c.; and while my experiments have as yet been neither on a sufficiently extensive scale nor sufficiently prolonged to enable me to speak at all definitely, I may mention that I have some good plants of Teas on seedlings of *R. rugosa* and *R. conspicua*.

There is no necessity, however, to await the demonstration of the value of additional stocks for the cultivation of Tea-scented Roses. We have three that are admirably adapted to their requirements, and whether on briar-seedlings, briar-cuttings, or Polyantha-stocks, Teas ought nowadays to be cultivated without difficulty in every garden. For it is a fact that, budded on these dwarf stocks, the Teas are the easiest of all Roses to grow; they require less attention, less knowledge, and less consideration in the matter of soil than any other Roses. They may be pruned anyhow—or even not at all; after a mild winter, when the wood has been little harmed by frost, then the plants, whether they are left unpruned or whether they are cut hard back like Hybrid Perpetuals, will in either case afford a fine crop of their beautiful flowers; and if the winter may have been severe, it only remains, when the plants start into growth in spring, to cut away with a secateur the dead sticks—an operation requiring no special skill! Then, again, in the case of dwarf Teas grown in the open, there is never anything like the trouble with grubs, or with greenfly, or even (except in the case of Etoile de Lyon) with mildew, that is experienced with other kinds of Roses. Moreover, the Teas, as a class, are the earliest of all Roses to begin flowering and the last to leave off, and

withal they are the freest bloomers into the bargain ; their blooms are the most graceful in form and the most delicate in colouring of all Roses, and in the cut state they last three times as long as the flowers of the Hybrid Perpetuals ; so that they are the most valuable and deservedly the most highly esteemed wherever Roses are required for vases, for bouquets, and for button-holes, and that not only in summer, but all the year round, for the Teas are also far the best as well as the easiest Roses to force. Flowers may be had without difficulty under glass until May, and by that time plants in sunny situations on walls or fences out-of-doors will be coming into bloom, while from June until cut off by autumn frosts the plants in the open will keep up the supply. There is another good point about the Tea-scented Roses, in that the flowers produced upon plants that have been transplanted the previous autumn are frequently as good as the blooms carried on established plants ; in fact, plants of Tea Roses seem to feel removal much less than Hybrid Perpetuals—their recuperative power being unquestionably greater ; so that quite old plants of Tea Roses may be transplanted with good results. This is the more fortunate as it is rarely possible to obtain very large blooms of Teas (such as are seen at exhibitions) except on plants of a certain age ; for unlike many of the Hybrid Perpetuals, whose maiden bloom is so often the most beautiful they ever produce, the maiden blooms of the Teas are hardly ever at all fine.

Admirers of these lovely Roses, however, who have not as yet cultivated them very much, will not be likely to begin by troubling about "maidens" ; and upon such intending cultivators I would strongly urge the desirability of growing as many plants as may be, but not too many varieties to begin with. Having decided on the space to be devoted to Teas, and the number of plants required to fill it, the next step is to divide that number by six or twelve, to find the number of varieties needed. Even if the available space were so limited that there were only room for eighteen plants, it would be found that three plants of each of six varieties would afford far greater satisfaction than a bed of eighteen distinct varieties; and if there were room for more plants, six, or even twelve, of each variety will give infinitely more pleasure, and be far more generally useful, than a large

collection in which each variety is represented by a single plant. To anyone who thought of making a start in the growing of Tea Roses I would strongly recommend, in the order in which the names occur, the following varieties, to be planted in groups of from six to a dozen plants of each, to begin with:—1. Hon. Edith Gifford, the best of all Teas for out-of-door culture; a very beautiful creamy-white flower, produced in unending profusion. 2. Marie van Houtte, a vigorous plant with pale lemon flowers margined peach colour. 3. Caroline Kuster, pale yellow, very vigorous and free. 4. Madame Bravy, creamy white, always perfect in form, and very free blooming. 5. Madame Lambard, one of the hardiest of Roses, and a very charming one, and always in flower; colour variable, but generally bright rose. 6. Souvenir d'un Ami, another hardy and reliable rose-coloured variety. 7. Souvenir de S. A. Prince (syn. The Queen), the exact counterpart of the preceding, from which it is a sport, except that the flowers are pure white. 8. Anna Olivier, a very handsome creamy flower with a deep rose-coloured base. 9. Madame Hoste, very similar to the preceding in form, habit, and freedom, but with clear pale yellow flowers. 10. Catherine Mermet, the most perfectly formed of all the Tea-scented Roses; colour pale rose. 11. The Bride, a sport from the preceding, from which it differs only in having white flowers of equal beauty. 12. Francisca Krüger, a plant of great vigour and freedom, with tawny yellow flowers, shaded orange at the base.

For climbers out-of-doors, Bouquet d'Or, the best by far of the Dijon Teas, and William Allen Richardson, whose bright orange flowers are so well known as to need no more than mention, may be specially recommended. For under glass there is, of course, Maréchal Niel, and a very beautiful pure white in Lamarque.

Where Roses are wanted for button-holes, there should be specially cultivated Ma Capucine, the loveliest of all Rose-buds for the purpose, and Madame Chedane Guinoisseau, a beautiful long bud of a clear rich yellow colour. Most Rose-buds are too fat for button-holes, or, if small enough, do not show their colour sufficiently; but the two above-named varieties seem to have been raised expressly for the purpose.

There is no question as to which is the loveliest of all the Teas—Comtesse de Nadaillac is unsurpassed; and as it is well

known that this Rose and Souvenir d'Elise Vardon have between them been selected as the best bloom in the show more often than all the other Teas put together, it may perhaps create surprise that neither has been included in the selection that I have just made. But it is unluckily the fact that neither variety, beautiful as the flowers are when at their best, is among the easiest to cultivate successfully. Comtesse de Nadaillac is not tender in the sense of being specially susceptible to injury from frost; the growth is sturdy but short, so that it is difficult to obtain large plants; and the same remarks apply, more or less, to Souvenir d'Elise Vardon—so that neither of these rival beauties is among the best for an inexperienced grower to begin with. But anyone who started the cultivation of Tea-scented Roses with the varieties and in the way I have suggested would no doubt soon be growing all other good varieties, including Comtesse de Nadaillac—beyond question of the most beautiful Roses the most beautiful.

Discussion.

The Rev. H. H. D'Ombrain, Ashford, as an old Rose-grower desired to express his thanks to the lecturer for the paper he had read. There were one or two points, however, in it with which he was not in accordance. One of these referred to the Manetti stock, it being stated that the cause of failure in many cases was due to Roses being budded on this stock, which was somewhat more tender than the British briar. The speaker said he had been collecting information from all parts of the country regarding the effects of the past winter of 1890–91 on Tea Roses, and he was informed by several correspondents that the Roses on the Manetti stock were in a better condition than those which had been budded on the seedling briar. It had been said by a few that the Manetti, being an Italian Rose, was the cause of some failures, but he did not appreciate this view. He was under the impression that Mr. Girdlestone said that Roses on the Manetti did well when grown in pots, and this he thought was sufficient proof of the value of the Manetti, although Roses in pots were apt to suffer from having insufficient material for the roots to feed upon. In reference to "earthing up" Roses, Mr. D'ombrain said the idea originated many years ago with Mr. Radclyffe, and when he himself began it he was laughed at for his pains. Most

people now, however, find that earthing up is an excellent practice, as it preserves the roots from frost.

As to Tea Roses, he did not think they were, as a rule, quite so hardy as Hybrid Perpetuals, but there was no reason why they should not be grown south of the Trent without being injured by the winter; and certainly there was no class of Roses so beautiful and worthy of cultivation. Besides, their flowers lasted such a length of time. He had known a certain Tea Rose to take a medal at a Rose show, and two days afterwards the very same bloom was in the firstprize box at another show. Indeed, after being cut the blooms of Tea Roses seemed positively to improve in appearance, and he advised everyone interested in these beautiful flowers to grow them extensively.

Mr. George Bunyard, Maidstone, said that among Tea Roses Madame de Watteville and Louise Gigot were worthy of cultivation. Madame Berard, however, he had found impossible to grow on account of the mildew which invariably attacks it. Mildew was a terrible enemy of Roses, and a strong remedy was required to cope with it. He asked if it were not the fact that Roses grown on walls were more liable to mildew than others.

Mr. Girdlestone said such was the case. He did not know whether an explanation might not be found in the fact of plants grown at the foot of a wall being in an abnormally dry state at the roots. He thought it advisable for the stems of Roses to be kept some distance away from the wall at the base, otherwise a harbour was made for insect pests, difficult to dislodge. He had, however, not found this plan prevent mildew, which could only be checked by giving liberal supplies of water to the plants, as it was notorious that soil at the foot of a wall had hardly any moisture in it.

He did not quite agree with Mr. Bunyard in his choice of Louise Gigot, and he should hesitate to recommend everyone to grow Madame de Watteville. The latter is a tender Rose, and often produces oddly formed flowers.

CONFERENCE ON HARDY SUMMER-FLOWERING PERENNIALS.

TUESDAY, JULY 7, 1891.

THE manifest interest taken in the cultivation of hardy plants of late years was in itself sufficient reason to induce the Council to hold this Conference in the Society's Gardens at Chiswick. By means of the papers read and printed below, and the subsequent discussion, it was hoped that a greater amount of information would be diffused concerning hardy plants and their peculiarities, and thus both assist and stimulate those with small gardens to persevere in the culture of hardy perennial plants.

The exhibition of hardy plants was of a very interesting nature, and served to show the great variety of sorts cultivated. With a view to assisting the cultivator in selecting useful hardy plants, lists have been prepared and appended to the papers read, showing the kinds most suitable for various purposes.

The Conference began at two o'clock, the chair being taken by W. MARSHALL, Esq., who opened the proceedings with the following remarks :—

I presume the Council has arranged that the subject of this Conference should be "Hardy Summer Perennial Plants." These constitute a class of flowers which have been, as a rule, overlooked by gardeners, and have not received that attention to which they are justly entitled. I should be the last to decry any class of plants, but I think it will be admitted that such plants as Orchids are luxuries, and are only grown by those who have a large balance at their banker's ; in fact they are the plants of the few. On the other hand, the flowers which we have come to see to-day and to discuss are the flowers of the many. For a reasonable outlay a large collection can be got together, and, if judiciously chosen, can be made to last nearly the whole year round. They are, moreover, very good-tempered plants, and will for the most part put up with a good deal of ill-treatment. There are some, of course, which require careful management, and it will not do to treat all alike. The proverb that "What is one man's meat is another man's poison" applies with great force

to the cultivation of these plants. You cannot expect a plant from a boggy situation, for instance, to grow in a desert. Unless common sense is used in cultivation the plants soon attain that condition known to gardeners as "miffy." This becomes discouraging, and many despair of ever growing such plants at all. However, this is the sort of plant I like to take up myself and endeavour to find a means of growing it successfully. It *must* grow somewhere, and a man who is afraid to try to grow it can hardly be called a gardener. Of course, everyone is not in a position to grow these difficult examples, and it is in order that we may reap the wisdom of those who *have* successfully mastered them that this Conference has been called. I am quite sure that if all who attend this Conference, and the others which are to follow, can at the end honestly say that they have learnt something, the Council will be more than repaid for the trouble they have been put to in connection with these meetings.

I will now call on the Secretary to read Mr. Robinson's paper.

WILD GARDENING IN MEADOW GRASS.

By Mr. W. Robinson, F.L.S.

Having during the past five years planted several hundred thousand bulbs and roots in meadow grass, the results may, perhaps, be suggestive to others. An advantage of this method is the delightfully artistic arrangements of which it permits. It is also a deliverance of flower-beds from the poor thing known as spring bedding. This system of "bedding," which began in France, and is there still seen in all its bareness, spread to many of our gardens—consisted of putting out in formal masses a few biennial plants, such as the Wood Forget-me-not and Silene. This necessitated a complete change in the contents of the beds every year, or, rather, twice a year, and therefore prevented their being given to the nobler kinds of flower gardening. It is possible to have all the flower-beds proper devoted to noble and enduring plants, such as Tea Roses, Carnations, and the various plants that require time for development, by the adoption of this system. Perhaps the result will be more clearly seen if we

take one flower and see what is done with it. We begin with the blue Apennine Anemone. Of this I planted several thousand roots in grass. Not having any beds or borders near the house where I wanted it, I put it in meadows around the house in light broken groups and masses. It flowers and increases every year without the slightest attention; and, being early in growth as compared with grass, ripens and disappears before the meadow grass has to be cut in summer. This is a most important point, and typical of what may be done with many beautiful spring flowers. One has the pleasure of seeing them year by year flowering in their seasons, and giving delightful effects, as these did this year, both in groups in the open sunny fields, and also clustering thickly round the base of old Elm-trees on their margin. Among the blue Anemone here and there stood groups of Narcissus, and in cases where the Anemones and Daffodils flowered together the effect was often very beautiful. This Anemone is perfectly hardy, and always grows freely in grass, and never deteriorates. In Greece this year I saw on the mountains many acres of the blue Greek Anemone, and think it is equally as hardy and as free as the Italian one, and quite as useful for naturalisation in the grass. The simplicity of the culture of plants like this, which thrive in meadow grass, and the foliage of which withers before the grass need be mown for hay, makes them a most important group, as so much meadow grass comes near most country houses. A very great number of the spring flowers of the northern world may be treated in this manner, and give us beautiful spring gardens.

The most important group of all these early flowers is the Narcissus. Five years ago I planted many thousands in the grass, the most numerous group being the Star Narcissus in great variety. I never doubted that I should succeed with them, but I did not know I should succeed nearly so well. They have thriven admirably, bloomed well and regularly, the flowers are large and handsome, and, to my surprise, have not diminished in size. In open, rich, heavy bottoms, along hedgerows, in quite open loamy fields, in every position I have tried them. They are delightful when seen near at hand, and also effective in the picture. The leaves ripen, disappear before mowing time comes, and do not in any way interfere with farming. The harrowing and rolling of the fields in the spring are a little against the

foliage, and probably a better result could be obtained with the finer Narcissus by wood walks and open copses, which abound in so many English country places. With the great group of forms of the common English, Irish, and Scotch Daffodils I have had good results; they thrive better and the flowers are handsomer than in the wild plant—not uncommon in Sussex. The little Tenby Daffodil is very sturdy and pretty, and never fails us. The only one that has failed is the Bayonne Daffodil. A very delightful feature of the Narcissus meadow gardening, is the way great groups follow each other in the fields. When the Star Narcissi begin to fade a little in their beauty the Poets follow, and as I write this paper we have the most beautiful picture I have ever seen in cultivation. Five years ago I cleared a little valley of various fences, and so opened a pretty view. Through this field runs a streamlet. We grouped the Poet's Narcissus near it, and in a little orchard that lay near, and through a grove of Oaks on one side of the field. We have had some beauty every year since; but this year, the plants having become established, or very happy for some other reason, the whole thing was a picture such as one might see in an Alpine valley! The flowers were large and beautiful when seen near at hand, and the effect in the distance was delightful. This may, perhaps, serve to show that this kind of work will bring gardening into a line with art, and that the artist need not be for the future divorced from the garden, as he has been before, by geometrical patterns which cannot possibly interest anybody accustomed to drawing beautiful forms and scenes. I need say no more to illustrate the capacities of this magnificent group of plants for wild gardening, many places having much greater advantages than mine in showing their beauty in the rich stretches of grass by pleasure-ground walks. Various kinds of places may be adorned by Narcissi in this way—meadows, woods, copses, wood walks, and drives through ornamental woodland and pleasure grounds, where the grass need not be mown until late in the summer.

Dog's Tooth Violet.—This beautiful and delicate-looking plant surprises me by the free way it grows in grass in several places where I have planted it, varying a good deal, according to the soil, in its size, but never failing to interest by its beautiful leaves and flowers. It withers rather early, and is a perfect plant for meadow culture.

Last autumn I made a trial of the Grape Hyacinth (*Muscari*), and was delighted with the result this spring, with the pretty clouds of blue, quite distinct and new in the grass.

Snowdrops in various forms are indispensable, and do fairly well, though they vary very much on different soils. They look much better in the grass than in bare earth.

Among the flowers in the meadow grass there is nothing more beautiful than the varieties of Snakeshead (*Fritillaria*). It is the very type of plant for this work, and the white and pretty purple flowers are admired by all who see them in the early grass.

The Crocus, from its early brilliancy, is indispensable, and the hardier forms are able to take care of themselves. In all this kind of work if we could get the wild types of plant it would be all the better, because such beauty as they possess is certainly never the result of cultivation. When we buy bulbs highly cultivated we may expect some reduction in the size of the flower when it assumes a semi-wild state; but nobody who cares for the form and beauty of the flowers will mind this reduction. Flowers from bulbs planted several years are somewhat smaller than the newly planted kinds, but certainly no less beautiful. While we have proof enough that Crocuses grow well in meadow grass on a large scale, they seem particularly suitable for growing under groves of trees, their growth coming before the trees spread forth their leaves. In many country places without the garden proper there are many spaces under trees often possessed by Goutweed and other weeds which should be given to the Crocus and like early flowers.

Tulips.—I have only tried one wild Tulip, the Wood Tulip (*T. sylvestris*), sent me from Touraine to the extent of a thousand roots, and I do not think we have lost any; they bloom gracefully every year. The shortness of bloom which Tulips show should lead one to try the wild kinds in grass. Their broad, fragile leaves are apt to be injured by the harrow. They are better tried in copses or drives through woods, where they are free from this injury.

Stars of Bethlehem (*Ornithogalum*).—The starry trusses of the common old border kind are quite different in effect from our other early flowers, and very pretty. In this genus there is much difference in habit, the greenish, drooping-flowered kinds,

like *nutans*, giving quite a different effect from that of the common white border kind. There is no trouble in growing these in the grass.

The Snowflakes (*Leucojum*) do admirably, the early one being a more precious flower than the Snowdrop, useful to gather, and all brightly effective very early. The later ones are also graceful things, free and handsome in rich grass.

Living in a world of Wood Hyacinths, there was less need to try the Scillas than the strictly non-British flowers, which give us new aspects of flower life ; but so far the results have been good with the Spanish Scilla and the new Scilla-like plants (*Chionodoxa*), which are early and disappear early.

To this sort of flower-gardening, which extends so much the interest in flower life, the trade might do great good by offering such bulbs and roots as these at lowest possible rates by the thousand. It would pay cultivators well to grow such roots in quantity for the public, as it now pays Lincolnshire farmers to grow the Snowdrop for the trade in that popular flower. The whole success of wild gardening depends on arranging bold, natural groups with a free hand, and it cannot be done without quantity. It means an enormous addition to the bulb trade, and to a healthy, and what ought to be a British industry, the growth in quantity of the hardier bulbs, for which many parts of our country are perfectly suited.

The scope of this paper, it will be seen, leaves out several very important phases of wild gardening, in which the plants do not die early in the year, but adorn it long after those mentioned have perished, if not with bloom, at least with foliage—such as the tall Polygonums, too free for the flower-garden, which do admirably with me in rough places outside the garden, the stems being handsome even in winter. So also are the Solomon's Seal, Lily-of-the-Valley, Evening Primrose, Globe Flower, Japan Anemone, and many other flowers of later bloom and growth. Indeed, it mainly concerns that beautiful early hardy flower life which blossoms before the grass of our fields begins to grow freely.

SOME OF THE SUMMER FLOWERS OF MY GARDEN.

By the Rev. H. Ewbank, M.A., F.R.H.S.

There is no flower during the whole circle of the year which awakens sadder reflections in my mind than does *Anemone rivularis*, and the reason is this: It for the most part says to me that the spring flowers have all passed away, and that a new succession has come.

Narcissus patellaris gave a warning note, but *Anemone rivularis* is like a funeral knell. I cannot say that I care for summer flowers so much as those of spring. Extreme delicacy both of colour and form are characteristic of the latter, and with some exceptions, such, for instance, as that of *Omphalodes Luciliæ*, we look in vain for them in the others.

But what we do find in summer flowers, I think, is vivid colouring, stateliness of form, and a general lusciousness which would have been altogether out of place if it had come earlier in the year. In great measure insect fertilisation has play, and insects affect blossoms of some very gaudy hue or some marked design, or those from which a strong fragrance is emitted. Nor is this general brightness inharmonious to ourselves. The summer-time is that of restful quiet enjoyment, rather than that of tender new-born hope, and we should, I think, say that a more pronounced colouring is acceptable to us in June than would have been the case in February or March. A gardener has nothing to do when the year has come to its zenith beyond keeping things as they are. He has no need to look forward, he has no preparations to think about, and a *carpe diem* sort of feeling best expresses the mood in which he finds himself living. And his flowers answer to this. They are productive of present enjoyment, rather than symbolical of some future delights. In my own garden I never go in for effects; there is not room for it, even if I had any wish of the sort, and all I think about is to try to make individual plants do well in my hands as best I can. In fact I am quite contented with these, and at Midsummer I am glad if I have a sufficient number of striking beauty and worth to show to my friends. I shall confine myself (as I am told to do) in the following remarks to hardy summer perennials, and

I suppose that covers the time when the last of spring flowers has faded away till signs of autumn appear. Between the departure of Scillas and Narcissi towards the end of May, and the commencement of the long reign of Composite flowers in August, lies the period of the year with which I am concerned.

All I can attempt to do is to give a few running notes, or memoranda of what has occurred under my own eyes, for it is utterly beyond my power to offer anything new to the members of the Royal Horticultural Society, and with which they are not already familiar.

Of very striking plants, then, which blossom at Midsummer or thereabouts, I should give high rank to Eremuri. I have often wondered why they are so seldom seen in our gardens. In my judgment they have only one fault which cannto be obviated. They flower up the stalk, and one part of the spike is clothed with the very highest possible beauty, while the other part of it is in a dying-off state. Of course, this cannot be helped; but take an Eremurus at its best—*Eremurus Bungei* for instance—when it is sufficiently out, and before any part of it has begun to fade away, and I doubt if anything more arresting to the eye can be oftentimes met with. The clear bright yellow colour is so very good, and it stands up so well in the border, and the foliage befits it so nicely, that it would be difficult to say where a more beautiful picture could be found in all of Flora's domains.

I remember once returning home after the absence of a year, and the first thing that caught my eye after I had passed through the garden gate was the unlooked-for spectacle of *Eremurus robustus*, which was more than twelve feet high. It quite took away my breath for a moment, and I saw that till then I never had the slightest idea of what an Eremurus could do. There are, of course, many species of it, and they come into flower one after the other in a most convenient way. A specimen which I have, without a name, from the Sairem Sea usually leads the van, and the rear is made up by *Eremurus Olgæ*, which flowers latest of all some weeks afterwards. Pink, yellow, a sort of brickdust-red, white—these are the colours which the Eremuri seem to affect. The yellow is of the very clearest sort, and the white is white beyond all suspicion, and very pleasant to look on. I suppose that *Eremurus himalaicus*, which is the white sort to which I refer, would be considered one of the best of

them. It certainly seems to be one of the strongest, but it takes several years before it makes up its mind to blossom, and a good deal of waiting is called for on this account. It has quite lately flowered with me, and I have been very much pleased with it. Max Leichtlin has a form which he calls *Eremurus robustus nobilis*, or something of that sort, and I am told that it is greatly superior to the plant which we are accustomed to meet with. But when I use the word "accustomed," I think it must be done with some mental reservation. What surprises me most of all is that these very splendid acquisitions of Central Asia, Siberia, and the Caucasus are so very little grown. I cannot imagine anything that would set-off the grounds of some lordly mansion or humble vicarage garden more than these Eremuri would do it. But for the most part they are conspicuous by their absence, and one well-known garden near Cambridge is the principal exception I can think of to the above remarks. What then are the causes why this comparative failure obtains? I do not profess to know; but the following considerations occur to my mind. They are supposed to be much more difficult to manage than is really the case, and this bars them at the outset, Next, if they are occasionally tried, they are sometimes planted in the midst of other things, and they do not succeed well in that way; thirdly, they come up too soon in the year, and the flowering spike is at once very seriously injured. I have suffered from the latter inconvenience very often indeed. But, as a rule, I find that an Eremurus will stand many degrees of frost before it is injured; and I am told that if the plant is taken out of the ground as soon as it has flowered, and kept dry for a few weeks. its growth will be sufficiently retarded to free it from the danger I have named. I have not yet tried this plan, but I am intending to try it as soon as I can. I am sure that the Eremuri like a well-worked rather rich soil, and the roots should be able to spread out in their starfish manner as much as they like. Whenever I have gone against this and have planted an Eremurus carelessly among shrubs, or anywhere else, I have found that it very soon resents the inattention, and we are likely to part company altogether. The best thing I can suggest for them is that they should have sufficient space allotted to them by themselves in a well-prepared border, and if the above precautions are followed I think they will do well.

Of stately plants which blossom in the summer in my garden, *Centaurea babylonica*, *Ferula tingitana*, and *Acanthus latifolius* are as good examples as could be named, but they are known to everybody. I like *Campanula latifolia* very much, and in moister spots than any which I have it soon becomes very ornamental indeed. *Melianthus major*, from the Cape of Good Hope, has very handsome and distinct pinnate leaves, but then it cannot be called quite hardy in every locality. Irises are the pride of my garden during the bright days of summer, and what can be more beautiful, and even stately too, than *Iris pallida*, *Iris ochroleuca*, *Iris aurea*, and several others that might be named? But it is not of these that I would especially say a word now. They can be grown anywhere, and my especial delight is in those which are much more difficult to manage, and even more commendable. I refer to the members of the Oncocyclus group, which form the *ne plus ultra* of gardening, and which should be cultivated with the greatest possible care wheresoever there is a chance of their doing well. These Oncocyclus Irises begin, of course, to blossom in May; but they run on into June, and sometimes even into July. I know that they have been specially dealt with by such experts as Professor Foster and Herr Max Leichtlin of Baden-Baden, to both of whom my deepest obligations are owed; but in a review of my best summer flowers it is impossible for me to make no allusion at all to their crown and their glory. I may say at once that they cost me a great deal of trouble and a great many mistakes, and some time and money, before I could at last aver that I have these Irises in my hands, and now nothing in my garden affords greater satisfaction to me than they do. I have at last been able to pilot nearly thirty specimens through a difficult autumn and a very horrible winter indeed without a single loss, and I may therefore, I think, say that I know how to grow them at last. My list includes the best among the best, viz. *Iris Susiana*, *I. Gatesii*, *I. paradoxa*, *I. Korolkowi*, &c., &c., and I can now almost guarantee the life of any member of this group that may be named. But this measure of success has not been arrived at all at once. Disappointment after disappointment had to be met and battled with from time to time. In a much-esteemed gardening quarter the word of direction ran thus: "The non-bulbous Irises like rich soil full of decomposed vegetable matter," and similar advice has

been given by writers in the gardening periodicals more than once. This brought failure on my efforts for some three or four years, and I do not know how long I should have gone on with it if Professor Foster had not paid me a visit one spring, and he told me that they must be treated to no decomposed matter, either animal or vegetable. I tried good loam and roadside grit the very next autumn, and the difference has been immense. Of course all my Irises of the Oncocyclus group are dried off for seven or eight weeks in July and August. I put lights over their heads so that no rain can come near them at all, and they are literally baked. But there is one thing more which they meet with in my hands, and which I suspect they do not find anywhere else. It may seem to be a little thing, but on little things great consequences often turn, either of weal or of woe. It is sometimes the little rift within the lover's lute by which great mischief is done. When the bright days of summer are over and the winter rains have begun I fix a small piece of glass securely over the rhizome of an Oncocyclus Iris so as just to cover it and not to do any more. The influence of this is, I am sure, beneficial in the extreme; it does not interfere with growth, nor does it prevent sufficient moisture being drawn in by capillary attraction for the roots, but it just covers the plant itself. In a very useful and well-known book, "The English Flower Garden," the following passage occurs: "The rhizome of an Iris should be kept comparatively dry, and is very impatient of moisture." I believe those words to be quite true, and this is accomplished for the Irises in their native habitats by a deep covering of snow. But as we cannot have snow at command, it struck me that a small bit of glass might be a sort of apology for it, and this has proved to be the case. Until lately, I never knew how it could be secured over a plant; there is now no difficulty about this of any kind, and it answers completely. I am sure that *Iris paradoxa* and several others can seldom live through the winter if they are quite unprotected by any covering at all, but in this manner they seem to be satisfied, and they reward me handsomely for my trouble. I need not say it would not do at all to use garden-lights in the place of these glasses, nor to use these glasses when the lights are desirable. Of course, as spring comes on the leaves of some Irises, *e.g. I. Korolkowi*, are very much crumpled up under a bit of glass; but they do not seem to mind that at all,

and when the winter is over they straighten themselves at once. For a very long time indeed Kæmpferi Irises have mocked me, and they have laughed all my efforts to scorn. Their wants may be summed up very briefly in this way: They need both sunshine and moisture, and so do a great many other things besides Kæmpferi Irises. The problem of problems is how to accommodate them the best. If you can supply them with one it does not follow that you can accommodate them with the other, and that by itself will not do. I have had buckets of water poured over their heads, and it all ran through my porous soil and very soon disappeared. The border has been very deeply mulched without any return for it, and Kæmpferi Irises in my hot and arid garden have been a snare and a delusion. But at last they are happy. They declare themselves to be so in that unmistakable way in which plants say "All right."

I have a bed of 30 feet by 7 feet, excavated to the depth of 3 feet, and the whole of the sides and bottom plastered over with thick heavy clay about 6 inches deep. This has made all the difference in the world. The bed is now quite sufficiently retentive of moisture to be of great use, and Venus and Othello and Ida and Rutherford Alcock, &c., are growing as they have never done before. It is a very simple way of adding moisture to sunshine, but it makes the greatest possible difference. How beautiful these Kæmpferi Irises are, and how seldom they are seen! The colours range from the purest white to a sort of violet-purple. They are sometimes beautifully veined and mottled and picked out with yellow, and when all the six petals are of nearly equal size (three not being suppressed as is sometimes the case), and the flowers are 6 inches, or even 7 inches, in diameter, they are objects worthy of the highest admiration as they lie flatly open to the summer sun and drink in its blessed influence on their lives.

Another plant which I would especially like to notice, as adding great beauty to my garden during the summer months, is that singular Californian Poppywort which is found on the borders of streams near San Diego. In a rather recently published and interesting American work by Ellwanger, to which Mr. Wolley-Dod has given his imprimatur by writing the preface, the following passage occurs: "There is no flower that combines so many good qualities—such fragrance, beauty, and general effect—

as this plant does"; but then he very considerably detracts from its usefulness by saying: "Unfortunately it will not survive our rigorous climate, and I believe it has failed to establish itself in most gardens where it has been tried in England." This is a very formidable detraction indeed, and Mr. Ellwanger seems to take away with one hand what has been given by the other; but I cannot think there is any justification for such a sweeping indictment. It is true I live in the Isle of Wight, and that is supposed to be one of the most favoured spots in the kingdom; but I can only say that *Romneya Coulteri* gives me no trouble at all. It has grown to such a large size that I do not attempt to protect it, and last winter it stood in a little border in front of my greenhouse and braved all the frosts of the hardest winter we have known. Perhaps it only proves that, salubrious as California is, the Isle of Wight is even more salubrious. There is, however, one thing I always do for this plant, which I find to be of the greatest use to it. I cut it down to the ground every spring. This seems to give it renewed energy at once, and it makes wonderful shoots. It certainly deserves the encomium which Mr. Ellwanger has given it. The very large crumpled white flowers appear at the end of the branches, and also the lateral shoots, and they are set off by the very pretty glaucous foliage, which is produced in abundance. Perhaps the only fault that can be noted is that they come too intermittently. They do not begin very early in the summer, and with me they go on in a desultory sort of way till late autumn has come to them. I can sometimes increase it by taking off a side-shoot in the spring with a bit of root to it; but this is not a certain operation at all, and it is best propagated by seed. Wherever *Romneya Coulteri* can be made to succeed, there I am sure it should be tried.

As I am not writing a book, but only a paper, which should be of moderate length, I must confine myself to very short notes in what remains for me to say. I cannot attempt to give an exhaustive list of my summer plants, but I will make just a few remarks on some of the best of them. Of very gorgeous flowers, *Papaver orientale* and *P. bracteatum* may be perhaps placed at the head. Of flowers which are of the most brilliant red colour, there is nothing which is superior to *Tropæolum speciosum*. I cannot admit that there is any difficulty at all in growing this splendid climber. It is quite as much at home in the southern

counties of England as it is said to be in Scotland. *Capparis spinosa* does very well in my rockery; it loves a horizontal position, and is quite as happy there as if it were growing on the shore of the Lago di Como. The large white petals form a beautiful cup, and this, with the parti-coloured stamens, commands great admiration. The ovary is borne on a long stalk, so as to be level with the purplish anthers. *Cypripedium spectabile* should never be forgotten; it will grow either in sun or in shade, but it takes the latter for choice. I imagine that the secret of success with a great many Lilies is to give them a border quite exposed to the south, and yet to prevent its being ever dried up. *Lilium auratum* undoubtedly does better in such a position than anywhere else, and it is a great advantage to it if the bed in which it is planted has a concreted bottom (it keeps in the moisture), and which is a little inclined, so as to prevent any chance of stagnant water settling on it. One of the most imposing plants at any time of the year is, after all, the old familiar cottage garden *Lilium candidum*, and it seems with me to have no special requirements at all. *Lilium giganteum* must be grown in the shade, and the great point is to keep it from flowering too soon, if that can be managed. But Lilies are a study by themselves, and there is no room for it here. My midsummer garden is not quite innocent of Roses, though I only have representatives of some few interesting species, and do not grow hybrid perpetuals at all. I have been very much pleased with the manner in which Fortune's Yellow Rose got through the ordeal of last winter in my hands. It is a very nice thing, but in England it is, I fancy, for the most part kept in a greenhouse, and can never attain to any large size. I believe it to be much more hardy than it is generally supposed to be, and it is certainly worth trying in other places beside the Isle of Wight. *Rosa rugosa*, *R. bracteata*, *R. rubrifolia*, *R. indica*, and *R. lucida* are, of course, great favourites with me. *Rosa berberidifolia* was once considered to be an intractable, impossible creature. Dr. Lindley gave it a bad name, for which it has suffered a good deal. Mr. Watson, however, manages it with conspicuous success in a greenhouse at Kew, and I have had it for several years in my garden. Unfortunately, it was only a grafted plant, and so after a time it wore out. The only difficulty that I know about it is to get hold of a specimen on its own roots, and then it is bound

to succeed. This, however, has at last been promised to me, and I set very great store on the promise. From some reason or another, whenever suckers come up with this Rose—and also with some other things—they are quite sure to be hardy. I believe it can stand many degrees of frost, but I did not think so once.

The rest of my summer favourites must be little more than mere names with me on this occasion. There is just one, however, that I cannot altogether pass by, because, though I must confess it cannot be called a hardy plant, is very closely connected in my mind with an old friend who was to have spoken to you to-day if he had not been called away from us, to our very great regret—I allude to the late Mr. Rawson. I have had the most minute directions from him as to the manner in which *Clianthus Dampieri* must be grown. Suffice it to say, on the old lines one must almost have lived for *Clianthus Dampieri* if it was to do well at all. The game was not worth the candle, but now there is no trouble with it at all. Grafted upon *C. puniceus*, this most gorgeous of all Australian plants, and I suppose inferior in point of splendour to very few things on the face of earth, will live and grow and blossom to the astonishment of all beholders, and be a sight to see which is not easily forgotten. It does well either in greenhouse or in open ground during the summer months, and is very much admired by those who have met with it. *Ranunculus Lyalli* I have in two or three places, and it quite responds to my treatment of it, which is of the simplest description. *Ostrowskya magnifica*, according to Max Leichtlin, should be dried off in summer. I manage it in that way. *Pæonia Wittmanniana* should never be absent from any garden, however small it may be, so very grand is its display. *Mandevillea suaveolens* and *Poinciana Gilliesii* are both hardy here; but I am sure I have now said enough, and more than enough, about the summer flowers of my garden. I have by no manner of means exhausted their number. I only fear that I have exhausted your patience and time. The Pæonies for the most part, the Delphiniums altogether, the Dianthuses, the Funkias, the Anthericums, the Ramondias, and I wot not what else besides, must bear to be passed over by me in silence on the present occasion. I would only add one short word in concluding. There are some plants which not infrequently obtain a foothold among us which, in my judgment, should never have a

place at all in a good collection of flowers. I refer more than anything else to Summer Chrysanthemums, which are now very frequently grown where one would least have expected it. Chrysanthemums are all very well in their way, and at their own proper dark, dreary, season of the year. Then they do serve to gladden us by the bright and varied colours which they display; but why should we go out of our way to make the year go faster than it needs to go? A reminder of October is no pleasure to me in the glorious sunshine of July and August, and who can say that the flowers which properly belong to those months have been used up so that something else must be introduced? I would sooner fall back again on yellow Calceolarias and red Geraniums if I had to take my choice between them and Summer Chrysanthemums; and yet I know of a garden—a very delightful garden—in which many good things are to be found, where this antedating of autumn invariably takes place, and I expect that others resemble it. The best and most interesting collection of plants which I have ever seen in late summer is that of Mr. Wolley-Dod at Edge Hall. There both variety and colour have indeed a full run, and one could never be tired of looking at the multitudinous specimens of fine herbaceous plants which abound on every side. In a garden such as that, and in many like it, a bright glorious summer day brings its own especial delights. If spring is the tender harbinger of hope, summer speaks of fruition—which has really come; and when insect life is everywhere on the wing, and flowers are throwing back their petals to the sun, one cannot but feel that we live in a happy world after all. I defy anyone to be a pessimist in such a scene and under such circumstances as these, and I for my part subscribe *ex animo* to the well-known words of the poet:

> 'Tis my faith that every flower
> Enjoys the air it breathes.

THE PICTURESQUE USE OF HARDY SUMMER PERENNIAL PLANTS.

By Miss Jekyll, F.R.H.S.

A great French artist has said "Painting is an art of many sacrifices." Gardening, from the picturesque point of view, is

also an "art of many sacrifices," for inasmuch as it is practically the making of pictures with living flowers, so the artist-gardener must make a restricted selection of just such material as will, according to his taste and knowledge, give the most beautiful ewect in the particular garden-picture he aims at producing.

The object of this paper is briefly to point out the desirability of such a careful selection, and to give a few examples of pleasant garden-pictures obtained by putting it in practice.

It is not suggested that those who love all beautiful flowers should not grow them. On the contrary, let them be grown by all means; but this should be in a separate place, a sort of nursery or reserve, where they can be well grown and observed, and enjoyed for the sake of their individual merits; then from time to time, as their best use may be observed, suitable plants from among them can be promoted to the ornamental garden.

Two qualifications on the part of the operator are absolutely necessary for such gardening as we are now considering—first, an intimate acquaintance with the plants themselves, and sympathy with their wants and likings, and then such tasteful discrimination as will place a plant to exactly the best advantage, and where it will be perfectly at home. Every step in the acquirement of these two branches of garden knowledge is full of delightful and wholesome interest—an interest that never flags, but steadily increases as years go by.

A garden that already possesses old walls, a matured shrubbery, or that adjoins woodland, has advantages that greatly favour the garden-artist; but so great is the wealth of material, and so abundantly varying the conditions suited to different kinds of vegetation, that there is scarcely a space of ground, under natural conditions, that cannot in a few years be clothed with plant-beauty.

An essential feature in a garden of hardy flowers is a well-arranged mixed border. It is here that we can show the true summer flowers at their best; but it is here, more than anywhere else, that the "art of many sacrifices" must be put in practice. For the main spaces plants should be chosen of bold and striking beauty, but as a border of all large plants would have a kind of monotony, certain spaces, chiefly towards the front, but also running back in many parts among groups of taller things, should be planted with those of lower growth. The chief plants

for such a border are Oriental Poppies, Pæonies, the boldest of the Irises, Day Lilies, herbaceous Spiræas, Œnotheras, a few of the best Campanulas, Delphiniums, Lilies, three or four of the best perennial Sunflowers, the tall blue Sea Holly, Tritomas, Mulleins, Thalictrums, Dahlias, Hollyhocks, and a few others. These are the plants that will form the great effects of the border. The nearer parts and some spaces between the taller growths should have groups of plants of lower stature, and yet of a somewhat bold form of foliage. Of these the broad-leaved Saxifrages and Funkias are among the best. Still dwarfer plants, such as Pinks and Pansies, are suitable for the extreme edge. Each kind of plant in the mixed border should stand in a bold group, and the groups, differing in size and shape according to the aspect of the plant, should follow one another in a carefully arranged sequence of colour; keeping plants of a colour together, such as Mulleins with Œnotheras, and Tritomas with Oriental Poppy. In the case of the last-named it is convenient to actually intergroup the two kinds, for the foliage of the Poppies dies away early, and the blank space it would have left becomes covered by the later-growing leaves of the autumn-blooming Tritoma.

Groups of red, orange, and strong yellow follow well, and help each other by forming a rich colour-harmony. Flowers of a strong blue colour, like Delphiniums, seem to ask for a contrast, such as that of white Lilies, or the pale yellow of *Œnothera Lamarckiana* and *Verbascum phlomoides*, the best of the Mulleins. In practice it is perhaps best to exclude bulbous plants from the mixed border (especially in light soils that need frequent enrichment), as the disturbing of the ground occasioned by division of the plants and manuring is perilous to the bulbs, whose foliage has disappeared by autumn, and whose places are probably forgotten unless marked by unsightly labels; but exception should be made in favour of three common Lilies, the white, the orange, and the Tiger. Labels must be absolutely abolished in the ornamental garden.

Some families of plants, especially those whose beauty is in infinite variety, may best be enjoyed in places almost by themselves, where the eye would be undisturbed by the consideration of other kinds of flowers. A garden of Lilies may be made of great beauty, the groups of Lilies appearing among dwarf and

moderate-sized shrubs and hardy Ferns. The Pæony family is another example of a large range of summer flowers that deserves such treatment, in addition to their use in other places. A whole wealth of garden beauty exists in this one tribe alone, for, apart from those best known—namely, the double varieties of the old garden kind, the Chinese herbaceous, and the old Tree Pæony—there are many other kinds, both species and their cultivated varieties, that are now happily available for garden use. We owe a great deal to the taste and labours of some of the Continental nurserymen, who have turned their attention to producing new and beautiful forms of tree and herbaceous Pæonies, while those at home have put at our disposal many good species invaluable for garden use. When they are better known, everyone who cares for good hardy flowers will wish to grow the delicate pale yellow *Pæonia Wittmanniana*, the rosy-scarlet *P. lobata*, *P. hybrida* with its delicate foliage and brilliant flowers, also *P. Broteri* and *P. triternata*, two of the noblest as foliage plants.

Many a beautiful garden-picture may also be made by the placing of quite a small number, or even a single example, of some stately plant in a quiet place by itself, such as a group of *Lilium giganteum* with its noble flower-spikes and its broad glistening leaves. A group of this grand Lily in partial shade, and backed by trees or small shrubs, shows one of the stateliest forms that can be seen of a flowering plant of one year's growth.

Such another example is offered by the Californian Tree Poppy (*Romneya Coulteri*), which, when well established, will grow in one season into a bush seven feet high, and as much through. It is a remarkably beautiful plant, and to an eye trained to harmonies of colour singularly pleasing in the relation of its large milk-white flowers and pale blue-green leaves. It delights in a sunny, well-sheltered place in a light soil.

The limits of this paper do not admit of more than just touching upon the many beauties to be derived from climbing and trailing plants, and those suitable for special or difficult conditions.

Old walls are easily made beautiful by sowing a few seeds of Wallflowers, Snapdragons, Red Valerian, and Rock Pinks, and even a heap of hungry sand will grow to perfection the handsome Lyme Grass and the beautiful native Sea Holly.

There is no end to the interest of this kind of gardening, and

the harder the problem the greater the triumph, when, for instance, a difficult or ugly piece of ground has been *compelled* into beauty, and what was before unsightly is made delightful to the eye, and with such skill that the result looks not as if it had been *done*, but as if it had *happened*.

It should be remembered that a beautiful garden is a place of pleasant labour and of happy restfulness, and that the more it can be filled with perfect pictures, the more it gives delight to the eye and solace to the mind, and the nearer it approaches to the making of an earthly paradise.

Discussion.

In reference to some remarks in Mr. Robinson's paper, Miss Browning-Hall (Algiers) asked whether wireworms would not eat the bulbs which were left in the ground year after year.

The Chairman replied that there could be no doubt that they would do so; and Mr. Charles Pearson said the best remedy for these pests was to spread broken rapecake near the roots, which the wireworms would eat in preference to the plants.

Referring to Miss Jekyll's statement that labels must be absolutely abolished from the pleasure-garden, the Rev. W. Wilks remarked that Miss Jekyll must have a most wonderfu head to remember all the varieties in her garden when a visitor happened to say to her, "Oh, what is that? It is pretty!' He knew every flower in his own garden, but he could not name them at the moment, and if he were to abolish labels he was afraid he should soon get into inextricable confusion. Speaking entirely for himself, his experience was that gardeners, as a rule, were not educated in the best grammar schools, and would, without the assistance of labels, give the most extraordinary names to flowers to any visitors who might call during the absence of the family. He strongly deprecated the removal of labels, which spoke for themselves, and prevented the lover of flowers from getting a little bit mixed.

Dr. Masters said he should like to know the method pursued by Mr. Ewbank in the great label question. For his own part he had no difficulty at all in following Miss Jekyll's

injunctions, as the labels abolished themselves in his garden in the most surprising manner.

The Rev. H. Ewbank said he could not at all agree with Miss Jekyll in this matter. He looked upon gardening with a totally different object to that of Miss Jekyll, who regarded it more from the æsthetical point of view. In his own garden he used zinc labels and indelible ink, and he had found this the best method.

Miss Browning-Hall spoke of a method of labelling in which a piece of zinc, six inches long and half an inch broad, was employed; this was bent into a circle, and the name of the plant was written on the inside, and there remained indelible for years.

Mr. George Paul moved a hearty vote of thanks to the writers of the various papers. He said he knew both Miss Jekyll and Mr. Ewbank and their gardens, and he was quite sure from his observations that they carried their precepts into practice. All the writers were ardent cultivators of hardy plants, and enjoyed immensely the difficult task of making a plant grow when nobody else could. The climate of the Isle of Wight was undoubtedly in Mr. Ewbank's favour, as when the same flowers were put into gardens nearer London they disappeared, and Mr. Ewbank had to be asked for a fresh supply. With reference to labels, it was a fact that many people disliked them, as in numerous cases the labels were more conspicuous than the flowers. On one occasion he overheard a certain noble lord remark to his gardener, "Take away those gravestones!"

Mr. Pearson (Chilwell) seconded the motion, which was carried unanimously, and the first day's Conference terminated.

HARDY SUMMER PERENNIALS.

In connection with the Conference on Hardy Perennials held at Chiswick on Tuesday, July 7, 1891, a paper was sent round to a large number of our foremost "hardy" gardeners, both amateurs and nurserymen, asking their opinion of the best varieties for various purposes. The answers have been tabulated with the following results, the names of the varieties being given

in order of merit as the result of this tabulation, equality of votes being indicated by equality of position in the lists. It must be borne in mind that the plants named stand, in each case, only on the authority of the individuals consulted, or some one or more of them, and the Society as a whole is not thereby committed in any way, *e.g.*, on the question of what are hardy herbaceous perennials, or on the relative heights, &c., of the plants recommended.

List I.

The six most useful perennial herbaceous border plants, 4 feet high and upwards.

1. Delphinium:—cardinale, formosum vars., Belladonna, hybridum vars.
2. Rudbeckia:—laciniata, maxima, nitida, purpurea
3. Kniphofia:—caulescens, nobilis, Uvaria
3. Thalictrum: — aquilegifolium, glaucum
3. Althæa rosea vars. (Hollyhocks)
3. Aconitum:—album, autumnale, Napellus
3. Pyrethrum uliginosum
3. Campanula:—lactiflora, latifolia var. eriocarpa, macrantha, pyramidalis
3. Spiræa Aruncus
3. Phlox decussata
11. Ferula tingitana
11. Papaver bracteatum
11. Doronicum plantagineum excelsum
11. Paeonia vars.
11. Eremurus:—himalaicus, robustus
11. Inula glandulosa
11. Bocconia cordata
18. Verbascum olympicum
18. Centaurea:—babylonica, macrocephala
20. Solidago speciosa
20. Galega:—officinalis, o. alba
20. Echinops Ritro
23. Lythrum:—salicaria rosea, superbum
24. Anemone japonica alba
24. Achillea mongolica
24. Iris sibirica
24. Asphodelus ramosus
24. Mertensia sibirica
29. Veratrum viride
30. Gentiana lutea
30. Pentstemon Torreyi
30. Silphium laciniatum
30. Lathyrus:—latifolius, l. albus
30. Crambe cordifolia

List II.

The six next ditto, 4 feet high and upwards.

(The names already mentioned in List I. are omitted from this.)

1. Rudbeckia pinnata
2. Lathyrus rotundifolius
3. Digitalis purpurea grandiflora
3. Helenium autumnale
3. Polygonum cuspidatum
3. Echinops ruthenicus
3. Verbascum Chaixi
8. Clematis coccinea
8. Inula Hookeri
8. Eryngium:—giganteum, amethystinum, Beatsoni
8. Cimicifuga racemosa
8. Centaurea ruthenica
13. Solidago serotina
13. Lupinus polyphyllus
15. Scabiosa elata
15. Veratrum nigrum
15. Buphthalmum grandiflorum
15. Symphytum officinale fol. var.
15. Silphium perfoliatum
15. Lychnis chalcedonica
21. Phormium tenax
21. Lactuca Plumieri
21. Meconopsis Wallichi
21. Dahlia vars.
21. Malva Alcea
21. Aconitum chinense
21. Chrysanthemum latifolium
21. Monarda fistulosa
21. Rheum officinale var.
21. Achillea Eupatorium

List III.

The twelve most useful perennial herbaceous border plants, 2½ to 4 feet high.

1. Campanula: — latifolia, persicifolia, p. alba, pyramidalis, urticifolia alba, celtidifolia
2. Doronicum :—plantagineum excelsum, Clusii
3. Spiræa :—palmata, venusta, Aruncus
3. Papaver :—orientale, bracteatum
3. Anemone:—japonica alba, alpina
3. Phlox decussata and vars.
3. Lychnis chalcedonica
8. Hemerocallis :—flava, fulva
9. Pæonia vars.
9. Aconitum :—japonicum, autumnale, variegatum, Napellus bicolor
9. Aquilegia :—chrysantha, cœrulea vars.
12. Iris germanica :—pallida, p. dalmatica
12. Lilium : —bulbiferum, Szovitsianum, candidum
12. Galega:—officinalis, o. alba
12. Pyrethrum roseum vars.
16. Eryngium :—Oliverianum (amethystinum), giganteum, dichotomum
16. Thalictrum aquilegifolium
16. Lupinus : — nootkatensis, arboreus, polyphyllus
16. Delphinium "Belladonna"
16. Achillea: — Millefolium rosea, ptarmica pl., serrata pl.
21. Echinacea (Rudbeckia) purpurea
21. Rudbeckia:—Newmani, subtomentosa
21. Geranium :—armenum, ibericum, Lambertianum
21. Monarda didyma
21. Dictamnus:—Fraxinella, F. alba
21. Dicentra spectabilis
21. Orobus:—vernus, lathyroides
21. Trollius:—americanus, giganteus
21. Gaillardia grandiflora
21. Alstrœmeria aurea
21. Asphodelus ramosus
32. Sidalcea malvæflora
32. Pentstemon vars.
32. Scabiosa caucasica
35. Echinops:—ruthenicus, sphærocephalus
35. Inula glandulosa
35. Astilbe rivularis
35. Gypsophila paniculata
35. Coreopsis lanceolata
40. Mertensia sibirica
40. Kniphofia Uvaria
40. Statice latifolia
40. Lythrum :—roseum, superbum
40. Cephalaria alpina
40. Phygelus capensis
40. Helenium autumnale grandiflora
47. Ostrowskya magnifica
47. Geum atrosanguineum pl.
47. Erigeron grandiflorum
47. Fritillaria imperialis
47. Gillenia trifoliata
47. Polygonatum multiflorum
47. Verbascum Chaixi
47. Senecio palmatifida
47. Primula sikkimensis
47. Ranunculus speciosus
47. Corydalis nobilis
47. Veronica angustifolia
47. Lathyrus latifolius
47. Rosa vars.

List IV.

The twelve next ditto, 2½ to 4 feet high.

(The names already mentioned in List III. are omitted from this.)

1. Echinops Ritro
1. Eryngium celestinum
1. Iris :— tridentata, sibirica vars.
4. Buphthalmum salicifolium
4. Asphodelus :—luteus, albus
4. Campanula :—latifolia alba, urticifolia pl., macrantha
4. Kniphofia :—Rooperi, Burchelli, glaucescens, caulescens
8. Galega orientalis
8. Veronica longifolia subsessilis
8. Chrysanthemum maximum
8. Thalictrum :—rugosum, adiantoides, purpureum
8. Erigeron speciosum
8. Centaurea :—montana, macrocephala
8. Spiræa astilboides
8. Anthericum Liliastrum
8. Cimicifuga racemosa

17. Baptisia australis
17. Papaver pilosum
17. Trollius napellifolius
17. Thermopsis fabacea
17. Morina longifolia
17. Geranium armenum
17. Anchusa italica
17. Gentiana lutea
17. Lathyrus Sibthorpii
26. Potentilla, Vase d'Or
26. Pentstemon gentianoides vars.
26. Antirrhinum vars.
26. Gaillardia aristata
26. Rudbeckia speciosa
31. Lysimachia punctata
31. Lythrum :—Salicaria, alatum
31. Lychnis Haageana
31. Acanthus spinosus
31. Lilium dalmaticum
31. Montbretia Pottsi
31. Doronicum austriacum
31. Chelone obliqua
31. Veratrum nigrum
31. Verbascum phœnicium
31. Bocconia cordata
31. Polygonum Sieboldi
43. Ranunculus lanuginosus
43. Tradescantia virginica cœrulea
43. Agapanthus umbellatus
43. Lindelofia spectabilis
43. Pascalia glauca
43. Sparaxis pulcherrima
43. Sidalcea candida
43. Geranium Wallichianum
43. Chrysocoma Linosyris
43. Epilobium angustifolium

List V.

The twelve most useful perennial herbaceous border plants, 9 inches to 2½ feet high.

1. Campanula:—Van Houttei, azurea, grandiflora alba, macrantha, Dahurica, persicifolia alba
2. Iris:—stylosa, germanica vars., Kæmpferi vars., barbatus vars.
2. Polemonium :—Fergussoni, pilosum album, Richardsoni, cœruleum grandiflorum
2. Spiræa:—palmata, filipendula pl., astilboides
2. Geranium :—armenum, ibericum, platypetalum, eriostemon
6. Dicentra :—spectabilis, formosa, eximea
6. Aquilegia :—cœrulea, Stuarti
6. Anemone:—japonica alba, alpina
6. Trollius:—europæus, americanus, asiaticus, napellifolius
10. Pæonia:—vars. of officinalis, chinensis, edulis, albiflora
10. Coreopsis lanceolata
10. Ranunculus:—amplexicaulis, aconitifolius
10. Geum coccineum pl.
10. Œnothera Youngi
10. Carnations, Picotees, Pinks
16. Heuchera sanguinea
16. Funkia Sieboldi
16. Dictamnus Fraxinella
16. Helleborus:—niger, n. maximus
16. Papaver:—nudicaule, rupifragum var. atlanticum, orientale
16. Anthericum:—Liliastrum, Liliago
16. Gypsophila paniculata
16. Potentilla vars.
24. Arnebia echioides
24. Inula Oculus Christi
24. Adonis vernalis
24. Lychnis:—Viscaria splendens pl., dioica rubra pl.
24. Sidalcea:—malvæflora, candida
24. Alstrœmeria aurantiaca
24. Gaillardia grandiflora
24. Helenium pumilum
24. Rudbeckia Newmani
24. Monarda didyma
24. Achillea:—ptarmica pl., millefolia rosea
24. Pyrethrum roseum vars.
24. Montbretia: — crocosmæflora, Pottsi
24. Statice:—latifolia, incana
24. Veronica :—spicata alba, longifolia subsessilis
39. Lobelia cardinalis
39. Pentstemon vars.
39. Centaurea montana rubra
39. Codonopsis ovata
39. Linum provinciale
39. Eryngium amethystinum
39. Tiarella cordifolia
39. Mertensia virginica
47. Chrysobactron Hookeri
47. Orchis foliosa
47. Lilium candidum
50. Corydalis nobilis
50. Cypripedium spectabile
50. Delphinium "Belladonna"
50. Dodecatheon Jeffreyanum
50. Linum alpinum

55. Erigeron speciosum
56. Narcissus vars.
56. Belamcanda chinensis
56. Tulipa:—Gesneriana, acuminata retroflexa
56. Calla æthiopica
56. Kniphofia nobilis
56. Cistus vars.
56. Verbascum phœniceum
56. Sisyrinchium grandiflorum
56. Hieracium villosum
56. Gentiana asclepiadea
56. Orobus:—aurantiacus, formosus roseus
56. Hemerocallis flava
56. Tradescantia virginica alba
56. Chrysanthemum: — lacustre, maximum
56. Aconitum japonicum
56. Armeria cephalotes rubra
56. Buphthalmum salicifolium
56. Senecio pulcher

List VI.

The twelve next ditto, 9 inches to $2\frac{1}{2}$ feet high.

(The names already mentioned in List V. are omitted from this.)

1. Campanula:—glomerata, Hendersoni, turbinata, pallida
2. Scabiosa caucasica
3. Geranium:—dahuricum, Endresi
3. Saxifraga cordifolia vars.
3. Funkia:—ovata, Fortunei
3. Lupinus nootkatensis
3. Dianthus:—Atkinsii, Napoleon III.
3. Delphinium:—cashmirianum, nudicaule
3. Agrostemma:—Coronaria, Flos-Jovis
3. Doronicum: — Clusii, plantagineum
3. Hesperis:—matronalis, m. pl.
12. Primula japonica
12. Cheiranthus:—Marshalli, alpinus
12. Caltha palustris pl.
12. Geum miniatum
12. Inula glandulosa
12. Pulmonaria arvenense
12. Trollius Fortunei
19. Œnothera speciosa
19. Sedum spectabile
21. Epimedium pinnatum
21. Helenium grandiflorum
21. Linum flavum
24. Meconopsis nepalensis
24. Thermopsis caroliniana
24. Lythrum alatum
24. Iberis gibraltarica
24. Erodium Manescavi
24. Coronilla iberica
24. Mertensia sibirica
24. Aquilegia chrysantha
24. Polemonium Richardsoni
33. Lychnis vespertina pl.
33. Papaver alpinum
33. Gentiana Andrewsii
33. Asphodelus albus
33. Oxalis floribunda
33. Kniphofia Macowani
33. Senecio Doronicum
33. Galega officinalis
33. Gaillardia maxima
33. Ononis rotundifolia
43. Gillenia trifoliata
43. Lindelofia spectabilis
43. Tufted Pansies
43. Verbascum cupreum
43. Hemerocallis rutilans
43. Orobus aureus
43. Centaurea purpurea
43. Pentstemon Eatoni

List VII.

The twelve most useful perennial herbaceous border plants, under 9 inches high.

1. Campanula:—turbinata, isophylla, i. alba, G. F. Wilson, pulla, muralis, garganica hirsuta, pumila, p. alba, carpatica, c. pallida, imbricata
2. Anemone:—Pulsatilla, palmata, coronaria, fulgens, apennina, blanda, nemorosa
3. Hepatica:—angulosa, triloba
4. Gentiana:—acaulis, verna
4. Dianthus:—alpinus, plumarius, deltoides, annulatus, barbatus magnificus
6. Primula:—rosea, nivalis, Sieboldi vars., vulgaris vars.
6. Iberis:—superba, coriafolia, sempervirens, Prosti, gibraltarica
6. Aubrietia:—Hendersoni, Leichtlini, violacea
9. Cheiranthus:—alpinus, Marshalli

9. Silene:—Schafta, acaulis aurea, maritima
9. Saxifraga:—oppositifolia, Camposii, granulata pl., Wallacei
9. Alyssum:—saxatile reptans, alpestre
13. Iris pumila vars.
13. Phlox:—subulata vars., amœna
15. Œnothera:—eximia, taraxacifolia, macrocarpa
16. Coronilla iberica
16. Geranium sanguineum
16. Viola:—pedata, cornuta vars.
16. Arnebia echioides
16. Achillea:—aurea, Clavenæ
16. Potentilla nitida
16. Heuchera sanguinea
16. Trillium grandiflorum
16. Pulmonaria:—officinalis, virginica, azurea
16. Armeria vulgaris vars.
16. Veronica:—rupestris, gentianoides
16. Papaver:—nudicaule, alpinum
16. Lychnis Viscaria splendens pl.
29. Fritillaria vars.
29. Dodecatheon integrifolium
29. Ranunculus amplexicaulis
29. Tiarella cordifolia
29. Geum montanum
29. Lithospermum prostratum
35. Pansies
35. Adonis vernalis
35. Auriculas
35. Epimedium pinnatum
35. Erigeron aurantiacum
35. Onosma tauricum
35. Helianthemum:—vulgare vars., luteus
35. Cistus florentinus
35. Linaria borealis
35. Hypericum reptans
35. Arabis alpina
35. Phyteuma orbiculare
47. Myosotis alpestris
47. Bellis perennis vars.
47. Doronicum austriacum
47. Helleborus niger
47. Convallaria majalis
47. Polemonium Brunonis
47. Statice Limonium album
47. Chrysogonum virginicum
47. Valeriana pyrenaica
47. Daphne rupestris
47. Chionodoxa sardensis
47. Oxytropis Halleri
47. Funkia Sieboldi
47. Saponaria ocymoides splendens
47. Tropæolum polyphyllum
47. Oxalis floribundus
47. Mimulus vars.
47. Sisyrinchium grandiflorum
47. Genista sagittalis.

List VIII.

The twelve next ditto, under 9 inches high.

(Those mentioned in List VII. are not repeated here.)

1. Campanula:—Portenschlagiana mollis, pelviformis, Rooperi
2. Veronica:—saxatilis, prostrata, corymbosa
3. Polygonum:—sphærostachyum, Brunonis
3. Arenaria:—montana, grandiflora, Laucheana
5. Iberis:—jucunda, petræa
5. Ourisia coccinea
5. Epilobium:—latifolium, obcordatum
5. Dianthus:—cinnabarina, plumarius "Mrs. Sinkins"
5. Geranium:—Endresi, cinereum
5. Achillea:—umbellata, argentea
5. Phlox:—divaricata, frondosa
5. Platycodon:—grandiflorum, Maresii
13. Cortusa Matthioli
13. Phyteuma comosum
13. Dodecatheon Jeffreyanum
13. Sanguinaria canadensis
13. Cyclamen vars.
13. Caltha palustris pl.
13. Aubrietia deltoides
20. Cardamine pratensis pl.
20. Silene alpestris
20. Jeffersonia diphylla
20. Dondia Epipactis
24. Liatris spicata
24. Polemonium reptans
24. Thymus Serpyllum
24. Armeria alpina
24. Hieracium villosum
24. Genista:—villosa, tinctoria pl.
24. Dracocephalum grandiflorum
24. Gentiana septemfida cordifolia
24. Erigeron Roylei
33. Hypericum Coris
33. Hedysarum obscurum
33. Galium rubrum
33. Lithospermum canescens
37. Ramondia pyrenaica

37. Primula spectabilis
37. Lamium maculatum aureum
37. Viola lutea
37. Potentilla splendens
37. Trollius americanus
37. Myosotis elegantissimus
37. Geum coccineum
37. Soldanella alpina

List IX. (*a*).

The twelve most useful bulbous plants for borders in spring (January to June).

1. Narcissus:—Sir Watkin, Emperor, Empress, Barri conspicuus, nanus, minor, Horsfieldi, poeticus pl., p. ornatus, Leedsi
2. Scilla:—campanulata, sibirica, bifolia, b. alba, taurica
3. Tulipa:—sylvestris, Greigi, persica, altaica, Dutch vars.
4. Chionodoxa:—Luciliæ, sardensis
5. Galanthus:—nivalis, Elwesi, plicatus, Fosteri
5. Iris:—reticulata, Xiphium, xiphioides
7. Fritillaria:—imperialis, i. lutea, Meleagris, M. alba, armena.
8. Leucojum:—vernum, æstivum
8. Anemone:—fulgens, apennina, sylvestris, amplexicaulis, nemorosa
8. Crocus:—Imperati, Dutch vars.
11. Erythronium:—Dens Canis, D. C. album, giganteum
12. Muscari:—botryoides, lingulatum
13. Hyacinthus: — amethystinus, Dutch vars.
14. Anthericum:—ramosum, Liliago, Liliastrum
14. Ornithogalum:—nutans, pyramidale.
14. Camassia esculenta
17. Triteelia:—uniflora, u. lilacina
17. Lilium:—umbellatum, candidum
19. Sisyrinchium:—grandiflorum, g. album
20. Bulbocodium vernum
20. Eranthis hiemalis
20. Gladiolus Colvillei albus
20. Puschkinia libanotica
20. Colchicum vars.
20. Dodecatheon integrifolium
20. Trichonema roseum

List IX. (*b*).

The twelve best ditto in summer (June to September).

(Those named in List IX. (*a*) are omitted from this.)

1. Lilium:—pardalinum, auratum, croceum, Martagon, M. album, M. dalmaticum, tigrinum splendens Leopoldi, testaceum, speciosum vars., Hansoni, Szovitsianum, pomponium, Fortunei, F. pl., Chaixii, Krameri
2. Montbretia: — crocosmæflora, Pottsii
2. Gladiolus:—Lemoinei, gandavensis vars., Saundersii
4. Crinum:—capense, Powelli, P. album
4. Hyacinthus:—candicans, comosus.
4. Schizostylis coccinea
7. Colchicum:—autumnale, speciosum, s. rubrum, variegatum
7. Milla:—laxa, biflora
9. Alstrœmeria vars.
9. Sternbergia lutea
9. Tigridia vars.
9. Trillium grandiflorum
9. Crocus speciosus
9. Allium: — carinatum, McNabianum
15. Orchis foliosa
15. Tropæolum speciosum
17. Bravoa geminiflora
17. Pancratium:—maritimum, illyricum
17. Calochortus:—lilacinus, splendens, venustus
17. Oxalis lobata
17. Iris juncea
17. Sparaxis pendula
17. Calliprora lutea
17. Ornithogalum umbellatum

List X. (*a*).

Desirable plants best suited for rockwork in exposed situations.

Acæna:—microphylla, nova zealandica
Achillea tomentosa
Androsace:—carnea, lanuginosa
Anemone vernalis
Arabis alpina
Arenaria: — balearica, cæspitosa, grandiflora
Armeria:—Laucheana, maritima
Aster alpinus
Aubrietia:—Leichtlini, purpurea
Calystegia pubescens
Campanula:—abietina, alba, alpina, muralis, nobilis, Portenschlagiana, pulla, pumila, turbinata
Cerastium tomentosum
Cheiranthus alpinus
Cistus:—alyssoides, florentinus
Coronilla iberica
Crucianella stylosa
Daphne: — Blagayana, Cneorum, rupestris
Dianthus:—alpinus, Caryophyllus, deltoides, neglectus
Draba aizoides
Edraianthus dalmaticus
Erinus alpinus
Erodium Manescavi
Genista:—tomentosa fl. pl., triquetra
Gentiana:—acaulis, verna
Geranium:—cinereum, lancastriense
Geum montanum
Globularia vulgaris
Gnaphalium Leontopodium
Gypsophila:—prostrata, repens
Helianthemum vars.
Hepaticas
Heuchera sanguinea
Hieracium aurantiaca
Hippocrepis comosa
Hutchinsia alpina
Iberis corifolia
Iris reticulata
Linaria:—alpina, Cymbalaria
Lithospermum: — petræum, prostratum, purpureo-cœruleum
Loiseleuria procumbens
Lysimachia Numularia
Morisia hypogæa
Omphalodes Luciliæ
Onosma tauricum
Papaver alpinum
Pentstemon;—Menziesii, humile
Petrocallis pyrenaica
Phlox:—frondosa, Nelsoni (white), Nelsoni hybrids, setacea, s. atropurpurea
Phyteuma: — comosum, orbiculare, Schechuzeri
Polygonum vaccinifolium
Potentilla nitida
Primula: — marginata, minima, vulgaris
Ruta patavina
Salix lanata
Saponaria:—ocymoides, o. Loderi
Saxifraga: — aizoides aurantiaca, ajugifolia, Andrewsii, aretioides, Boydii, Burseriana ceratophylla, Cotyledon, Geum, hypnoides, McNabiana, nepalense, oppositifolia, retusa
Sedum:—acre, variegatum, Sieboldii
Sempervivum californicum
Silene: — maritima pl., pumila, rupestris, Schafta
Thymus: — hirsutus, lanuginosus, Serpyllum coccineus
Tropæolum polyphyllum
Veronica: — cupressoides, prostrata, rupestris (Hort.)
Zauschneria californica

List X. (*b*).

Desirable plants for sheltered situations

(The names already mentioned in List X. are omitted from this.)

Acantholimon:—glumaceum, venustum
Alsine Rosani
Alyssum alpestre
Andromeda fastigiata
Androsace: — foliosa, Laggeri, sarmentosa, villosa, Vitalliana
Andryala lyrata
Anemone:—apennina, blanda, fulgens, Robinsoniana
Antennaria tomentosa
Arenaria cæspitosa aurea
Arnebia echioides
Asperula odorata
Astragalus alpinus
Aubrietia Hendersoni

Bellium bellidioides
Campanula : — fragilis, garganica, pulla, Waldensteiniana
Cyananthus lobatus
Cyclamen :—Atkinsii alba, repandum, &c.
Cypripedium : — acaulis, Calceolus, pubescens, spectabile
Dodecatheon Meadia
Edraianthus serpyllifolius
Epilobium obcordatum
Erigeron aurantiacum
Gentiana :—affinis, cruciata
Geranium vars.
Globularia bellidifolia
Glossocomia ovata
Haberlea rhodopensis
Hedysarum vars.
Hepatica angulosa
Hyoscyamus orientalis
Linnæa borealis
Lunaria pallida
Linum flavum
Myosotis :—alpestris, rupicola
Opuntia Rafinesquiana
Phlox :—ovata, The Bride, Vivid
Plumbago Larpentæ
Polemonium humile
Polygala Chamæbuxus purpurea
Potentilla dubia
Primula :—ciliata, c. purpurea, villosa, viscosa
Pyrola rotundifolia
Ramondia pyrenaica
Ranunculus :—alpinus, Lyalli
Saxifraga :—longifolia, mutata, oppositifolia major, pyramidalis
Sedum glaucum
Sempervivum :—arachnoideum, triste
Shortia galacifolia
Silene : — acaulis alba, a. rubra, alpestris
Soldanella :—alpina, montana
Spergula aurea
Trifolium uniflorum
Tropæolum polyphyllum
Veronica saxatilis

List XI.

Desirable border plants requiring slight shade.

Aconitum vars.
Anemone nemorosa
Aquilegia vars.
Asclepias vars.
Astilbe vars.
Auricula
Bocconia cordata
Caltha palustris pl.
Campanula vars.
Cardamine pratensis pl.
Centaurea montana
Clintonia Andrewsiana
Cyclamen vars.
Cynoglossum apenninum
Cypripedium vars.
Dentaria : — polyphylla, digitata, pinnata
Dicentra spectabilis
Digitalis
Doronicum caucasicum
Gentiana septemfida
Geranium pratense album
Gillenia trifoliata
Helleborus vars.
Helonias bullata
Hypericum calycinum
Inula vars.
Iris Kæmpferi
Lilium :—testaceum, giganteum
Lupinus polyphyllus
Meconopsis :—nepalensis, Wallichii
Mertensia vars.
Mimulus :—vars., cardinalis
Monarda vars.
Myosotis sylvatica
Orchis foliosa
Orobus vars.
Pæonia Browni
Podophyllum :—Emodi, peltatum
Polemonium humile album
Polyanthus
Primula : — japonica, cashmiriana, vulgaris
Sanguinaria canadensis
Saxifraga Fortunei
Spiræa vars.
Tradescantia vars.
Trillium :—grandiflorum, sessile var. californicum
Xerophyllum asphodeloides

List XII.

Desirable plants for deep shade.

Ajuga reptans
Asperula odorata
Astrantia major
Buphthalmum salicifolium

Convallaria majalis
Cortusa Matthioli
Dodecatheon vars.
Doronicum plantagineum
Epigæa repens
Epimedium :—pinnatum, niveum
Eranthis hiemalis
Funkia Sieboldi
Gentiana asclepiadea
Geranium phæum
Helleborus vars.
Hypericum calycinum
Mimulus moschatus
Polygonatum
Ranunculus aconitifolius pl.
Salvia glutinosa
Senecio japonicus
Smilacina bifolia
Trillium grandiflorum
Tussilago fragrans
Uvularia grandiflora
Vinca vars.

List XIII.

Plants most useful for cutting purposes.

Achillea :—ptarmica pl., mongolica
Agrostemma Coronaria
Anemone japonica vars.
Aquilegia vars.
Arundo colorata
Asparagus tenuissimus
Astilbe japonica
Caltha palustris
Campanula :—persicifolia alba, p.a. pl.
Centaurea :—montana, m. rubra
Cephalaria alpina
Chrysanthemum Leucanthemum
Coreopsis lanceolata
Delphinium formosum vars.
Dianthus (Mule Pinks)
Doronicum plantagineum excelsum
Echinops vars.
Erica australis
Erigeron speciosum
Eryngium vars.
Gaillardia grandiflora
Galega :—officinalis, o. alba
Geum miniatum
Gypsophila paniculata
Helenium pumilum
Helleborus niger vars.
Iris :—germanica, barbata
Lathyrus latifolius albus
Lilium :—Harrisi, speciosum, candidum
Lychnis : — Viscaria splendens pl., vespertina pl., dioica rubra
Matricaria inodora pl.
Montbretia :—crocosmæflora, Pottsi
Myosotis :—rupicola, alpestris
Narcissus vars.
Olearia Gunniana
Pæonia vars.
Papaver :—nudicaule, Rhœas, Shirley vars., bracteatum
Phlox decussata vars.
Polemonium Richardsoni
Pyrethrum :—roseum vars.,uliginosum
Rosa rugosa
Rudbeckia :—Newmani, nitida
Scabiosa caucasica
Spiræa Filipendula pl.
Thalictrum adiantifolium
Trollius europæus
Tufted Pansies

List XIV.

Plants with ornamental foliage, variegated or otherwise.

Acanthus :—latifolius, mollis, spinosissimus
Achillea ægyptica
Andryala lyrata
Artemisia tanacetifolia
Arundo conspicua
Astrantia variegata
Bambusa vars.
Bocconia cordata
Centaurea babylonica
Crambe cordifolia
Cynara Scolymus
Dicentra eximea
Diphylleia cymosa
Epimedium pinnatum
Eryngium maritimum
Eulalia japonica
Ferula :—campestris, conspicua
Fœniculum vulgare
Funkia :—ovata, Fortunei variegata, Sieboldi
Gunnera :—scabra, manicata
Gynerium argenteum
Helleborus fœtidus
Iris fœtidissima variegata
Lamium maculatum aureum
Lavatera arborea variegata
Ligularia macrocephala

Melianthus major
Meum athamanticum
Phalaris arundinacea
Podophyllum Emodi
Polygonum sachaliense
Rheum :—palmatum, officinale
Rodgersia podophylla
Saxifraga peltata
Senecillis carpatica
Spiræa Aruncus
Stachys lanata
Thalictrum vars.
Veratrum vars.
Verbascum olympicum

List XV.

Desirable plants for groups on lawns, &c.

Aciphylla Colensoi
Anemone japonica
Arundo conspicua
Bambusa Metake
Bocconia cordata
Cordyline australis
Cynara Scolymus
Dracæna indivisa
Echinops sphærocephalus
Eremurus robustus
Eryngium pandanifolium
Erythrochiton palmatifidum
Ferula tingitana
Gunnera scabra
Gynerium argenteum
Helleborus angustifolius
Kniphofia :—caulescens, nobilis
Laserpitium crithmifolium
Meloposperma cicutaria
Onopordon Acanthium
Pæonia vars.
Phormium :—tenax, t. variegata, recurva
Rheum vars.
Rodgersia podophylla
Veratrum viride
Yucca :—gloriosa, filamentosa

List XVI.

The best perennial climbing plants.

Akebia quinata
Ampelopsis Veitchi
Apios tuberosa
Aristolochia :—gigas, Sipho
Calystegia :—grandiflora, pubescens pl.
Clematis:—coccinea, cœrulea, odorata, Fortunei, Jackmani, lanuginosa, montana
Codonopsis grandiflorus
Convolvulus :—dahuricus, mauritanicus, sepium pl.
Forsythia suspensa
Humulus Lupulus
Ipomœa pandurata
Lapageria rosea
Lathyrus :—Drummondi, grandiflorus, latifolius splendens, l. albus, maritimus, rotundifolia, Sibthorpi, tuberosa
Linaria Cymbalaria
Mandevilla suaveolens
Mutisia decurrens
Passiflora cœrulea
Periploca græca
Solanum crispum
Stauntonia latifolia
Tropæolum :—speciosum, tuberosum
Vicia sylvatica
Wistaria chinensis

List XVII.

Plants requiring particular soils.

Alpine Primroses (peat)
Andromeda fastigiata (peat)
Bryanthus erectus (peat)
Gentianas (lime rubbish)
Gnaphalium Leontopodium (chalk)
Menziesia empetriformis (peat)
Omphalodes Luciliæ (chalk)
Ourisia coccinea (peat)
Philesia buxifolia (peat)
Saxifraga longifolia (chalk)

CONFERENCE ON SMALL FRUITS.

WEDNESDAY, July 8, 1891.

This Conference was convened for the purpose of dealing with such small hardy fruits as Strawberries, Gooseberries, and Raspberries. Lists of the best varieties in order of merit have been carefully tabulated, and are given at the end of the papers.

The chair was taken by Mr. Geo. Bunyard, and in opening the proceedings, at 2 p.m., he expressed the hope that the Conference would be the means of spreading a large amount of information about what were technically called "small fruits." The importance of the Conference was perhaps greater than appeared on the surface, because the whole of the subjects to be discussed required only ordinary treatment, and needed no very great horticultural skill, and the fruit supplied a vast amount of jam, in which form it reached homes where it would not be procurable in any other way.

STRAWBERRIES FOR PRIVATE GARDENS.

By Mr. W. Allan.

A daily supply of Strawberries during four to five months in the year from the open garden was unthought of even a few years back, as it is generally known that when the early and late kinds are subjected to the same cultivation a period of three or four weeks is the average duration of the crop.

By making the most of the various sites that our walled-in gardens give us, either for forwarding the earliest or retarding the latest varieties, a daily supply for the above period is not only possible, but certain.

My system, which I have practised now for some years, has never failed, and has become part of our annual rotation of crops.

Annual Planting.—The making of new Strawberry-beds, or plantations, every season is now generally adopted in private gardens, and is acknowledged to be the best method for the production of extra fine fruit, the yearling plants always producing the heaviest and finest specimens; but the greatest

weight of fruit will be gathered when the plants are two years old. For the making of new beds the best runners will also be obtained from the young plantation.

Destroy the plants after the second crop is gathered. Two seasons is long enough for them to be on the ground, which may be planted with Broccoli, or any other winter crop, as soon as cleared. This method, it will be seen, entails the making of one bed and the destruction of another annually.

The preparation of the ground must be done thoroughly. Bastard trenching I prefer, when necessary to trench at all, and heavy manuring, as the land is required to produce three crops from this one preparation. The winter season is the best in which to undertake the work; the extra labour can best be spared when other subjects are not so pressing.

It is not necessary to keep the ground fallow until the first week in August (when the young Strawberry plants ought to be ready for transplanting), but a crop, say of Onions or Carrots, may be sown in rows 30 inches apart, as that distance will allow ample space for the young Strawberry plants to grow without being shaded.

Varieties to Grow.—I will only name the highest flavoured (out of some sixteen varieties that I must own I cultivate) in their order of ripening, leaving the selection of the large, showy varieties to the fancy or taste of the cultivator—La Grosse Sucrée, Vicomtesse Héricart de Thury, Sir J. Paxton, President, The Countess, Auguste Boisselot, British Queen, Dr. Hogg, Loxford Hall, Elton Pine, and Waterloo.

If strong runners of La Grosse Sucrée are planted at the foot of a south wall in August, and the border well mulched, they will produce an excellent crop early in the following June. At Gunton I can rely upon it being ready by the middle of the month. In warmer districts it would be ready ten days or a fortnight earlier. A succession of fruit may be obtained by planting Vicomtesse Héricart de Thury on a south border, to come on before the main crop is ready in the open garden.

For north borders, to prolong the supply after the bulk is over, I plant Loxford Hall, Elton Pine, and Waterloo. The latter is the most valuable of the late varieties, and may be planted quite at the foot of the north wall, thus prolonging the crop to the end of August. Forced plants that were planted out in

April will be in full bearing by this time, maintaining a supply through September and October.

Autumn-bearing Strawberries after forcing are limited. I am only acquainted with two kinds—viz., Vicomtesse Héricart de Thury and La Grosse Sucrée—that are amenable to this treatment. They may truly be termed all-round varieties, and as such are greatly valued by gardeners in general.

STRAWBERRIES FOR FORCING.

By Mr. George Norman, F.R.H.S.

Forcing Strawberries is an important section of gardening, so much so that, next to Grapes, Strawberries are grown under glass in a greater number of gardens than any other kind of fruit.

When the season commences for indoor Strawberries other kinds of fruit are scarce, therefore they are of more importance than the actual value. Most gardeners give a great deal of attention to them; I do for one, and I am pleased to give my practical experience of them.

Strawberries may be had in all the months of the year, but the forcing season is generally considered to be as early in the year as the fruits can be had, until they are ripe out of doors. Strawberries are expected in many establishments in March. I think about the first of that month is as early as they can be had profitably; if attempted much before, a greater number of plants fail to throw up flowers, thus entailing a loss of room and plants.

I have been kindly asked to name a few of the best kinds for forcing. I have grown many kinds in pots; most seasons I try two or three with which I am not acquainted by the side of and under the same conditions as those I have grown for many years. The points that a variety should possess to be a good one are flavour, size, colour, and with a constitution to set freely.

I will name the merits of the following kinds as I have found them:—

Vicomtesse Héricart de Thury.—Good flavour, medium size, good colour, and sets freely.

La Grosse Sucrée.—Good flavour, large, good colour; does not set quite so freely as the first-named kind.

Noble.—Second-rate flavour, large, good colour, and sets freely.

Sir C. Napier.—Sharp flavour, large, good colour, and sets freely.

President.—Good flavour, large, good colour, and sets freely.

Sir J. Paxton.—Good flavour, large, good colour, and sets freely.

For early forcing I recommend the first three kinds, and the last three for succession. Of the six kinds there are two which I consider the best—Sir C. Napier and Vicomtesse Héricart de Thury. Take one season with another these two produce the greatest weight of fruit.

In the past season I have given a limited trial to Auguste Nicaise and Latest of All. Both have some good points; they are large and set freely. I purpose trying them again next season.

When the kinds are decided upon, the first thing is to prepare a piece of ground, exposed to the sun, for runners, to produce runners the following season. The ground should be well trenched and manured some time before the runners are ready to plant, to give it time to settle. The runners should be planted as early in the season as they can be procured, in rows a yard apart and eighteen inches from plant to plant in the rows. The following season take off all the flowers, so as to induce the growth of strong early runners. About the 1st of July is the time the runners are ready to place on pots. Strawberry plants require a great deal of labour bestowed on them to prepare them for forcing. Generally the best way pays the best in the end; it is certainly so with Strawberry plants. Good plants do not take any more room in the houses than second-rate ones.

Strawberries thrive best in rather heavy soil out of doors. In pots a more porous soil suits them. Sandy, fibrous loam is what they require. If the loam is heavy it may be made porous with burnt earth, so that water passes through freely, which is most essential while they are out of doors. In times of heavy rains add to the soil 100th part of soot; it is a good manure, and distasteful to worms.

There are different ideas about the sizes of flower-pots for the plants. For forcing early I like 48's ($4\frac{1}{2}$-inch pots). Good drainage is necessary. For this nothing answers better than

an inch of crocks. Place over these some kind of loose material, such as a little moss or the most fibrous part of loam, to prevent the soil going amongst the drainage, and on this shake a little soot. This is a good preventive against worms entering the pots. The soil should be in a medium state of moisture, neither wet nor dry. It is better to err on the side of dryness. It may be evenly rammed into the pots, as hard as one can fairly do it with a potting-stick, to within one inch of the rim, so as to leave space for water.

The runners may be placed on the pots and pegged down with pegs made from old brooms or from the trimmings of pea-sticks. In fine weather they may be slightly watered in the afternoon, to encourage them to make roots; but on no account should they be watered unless the soil is dry on the surface, as there is great danger in soddening the soil with over-watering—indeed, there is danger of the soil being over-watered with heavy rains—before the runners are rooted. In four weeks the roots will have reached the sides of the pots in sufficient numbers to support them, when they may be cut from the parent plants and placed in an open space, on a firm bottom, with sufficient space between the plants to allow them to grow. From this time until the growth is finished they must be examined on fine days for water.

The runners of succession kinds I like to place on 60's (3-inch pots). As soon as the roots reach the sides they should be potted into 32's (6-inch pots) and placed in a similar position as recommended for those laid on 48's, and receive the same attention as to watering. A good hard syringing on fine evenings does them a great deal of good. If it is directed to the underside of the leaves it prevents and washes off mildew.

When the plants are growing freely the crowns multiply; one or two strong ones are better than more. To regulate this the plants should be looked over every week, and the small crowns and runners taken off.

By the 1st of November growth will be completed; the crowns should be prominent and firm, and the pots filled with roots containing stored-up sap, ready to support growth when excited by heat. The plants having finished growth, they should be placed in their winter quarters. I believe many failures occur through Strawberry plants being kept too dry at the roots and

too warm in the winter season, when they should be at rest until taken in for forcing.

Plunged in ashes in cold pits, with the lights on only in severe weather and at the time of strong cutting winds, is no doubt the correct treatment for them. But few gardeners have sufficient protection of this kind for them. I for one have not. About the date named I plunge my plants in ashes, on a well-drained hard bottom. The situation is sheltered from the north. All dead leaves are left on the plants; this is their natural protection, which is all they have. Some pots are broken by the frost—from 100 to 200. As I grow 5,500 annually, the breakage is not very large; but I think they are more than compensated for by the soil being thoroughly sweetened by nature.

Strawberry plants are not long intact in their winter quarters. Before November is past the forcing season must commence, so as to have ripe Strawberries early in March. I like to give them as long a rest as possible; the third week in the month is a good time to take the first batch into the forcing-house. I mix half a pound of sulphur in three gallons of water, and immerse every plant before taking it indoors, to destroy and prevent mildew. Where a Strawberry-house does not exist, other houses will do for them. They must have a place near the glass, where a good circulation of air can be admitted when required. I prefer placing them where they are to grow, rather than starting them in bottom-heat, as the roots are liable to receive a check after moving them to the shelves.

When they are in the house the details of their requirements want thoroughly studying and carrying out. Watering is very important. The soil should never be allowed to get dry. When the plants are first put in, water when slightly moist; increase the quantity of water as the growth becomes stronger. By the time the fruit is "set" water may be given when the soil is not very wet, until the fruit begins to colour, when it must be partially withheld, to give flavour. In the last part of the forcing season Strawberries frequently require watering twice a day, and sometimes three times.

Strawberry plants begin to grow out of doors when the temperature is low, so it is necessary to commence forcing with a low temperature—50° at night, 55° on dull days, and 60° by sun-heat suits them. Slightly increase the temperature with the

growth, so that the mean temperature is about 58° to 60° when the blooms begin to open, which is the same as when Strawberries are in bloom outside. After the "setting" stage the mean temperature may be 65°, or the fruit may be forced hard, according to the time it is required. After the fruit is formed everything is easy, strict attention being paid to the ventilation. In forcing Strawberries it should be borne in mind that they are hardy plants, and dislike a close, stagnant atmosphere in all stages of growth; therefore at all times when the external temperature is above 32° Fahrenheit air should be on the structure, with an increased amount while they are in bloom, and a greater amount of heat in the pipes at the same time, to keep up the required temperature.

Except when in bloom, Strawberry plants are much benefited by having the syringe freely used on fine days, up to the time the fruit begins to colour; it assists to check insects. The plants are liable to be infested with green-fly. Fumigating is the best preventive; an extra fumigating should be given before the blooms begin to open. If they are infested with fly while in bloom they will not set, neither will the blooms bear fumigating.

Red-spider is another enemy, for which syringing is the best remedy, and also assists to prevent mildew. This latter disease is sometimes very troublesome, particularly if there is a continuance of dull, damp weather. If it appears, the pipes should be painted with sulphur, and extra heat got in them, which soon destroys it.

The Strawberries are much improved in size by limiting the number of fruits according to the size of the pots. Six are sufficient for a 48, and eight to ten for a 32, according to the kinds. By reducing them to the above numbers a greater weight of first quality fruit will be the result. Thinning should be attended to in good time. I thin mine as soon as the blooms begin to open, so that the strength of the plant is not wasted on superfluous blooms. As soon as the fruit is set the plants should be fed with some kind of manure, of which there is a good choice in the present day. From the time the fruit is set until it ripens is but short, therefore a kind of manure that suits them and acts quickly is what is required. It should contain phosphate, ammonia, and lime, freely soluble. It should be used according to the strength, spread on the surface of the soil, or a portion

put into the water occasionally. It may be discontinued when the fruit commences to colour. A dry, airy atmosphere should be maintained to finish them.

If the details are carried out as advised, the result will be firm, well-finished forced Strawberries.

THE GOOSEBERRY.

By Mr. D. Thomson.

The Gooseberry is undoubtedly the most generally cultivated of all our hardy fruits. In the humblest gardens of our poorest peasantry, in the most remote and outlandish districts, a few Gooseberry bushes are found where no other fruit is attempted or cared for. Being indigenous in Britain, as well as in other parts of Europe, it thrives and ripens in latitudes and at elevations where none other of our hardy fruits come to maturity. It succeeds in a latitude 16° north of London, but not in a latitude so far south of it. Hence much finer Gooseberries are grown in the cooler climate of Scotland, and in England north of York, than in the hotter and drier parts of the South of England. And owing to the cooler and moister climate of the north, the season of ripe Gooseberries is much longer than it is possible to make it in the south. This fact alone indicates the desirableness of choosing as cool a situation as possible for the culture of this fruit in the southern half of Britain. The usefulness and the refreshing deliciousness of the well-matured Gooseberry, render it a most popular fruit among all classes, from the humblest cottar to the peer; and in a green state it is most important to our toiling thousands in towns, supplying as it does a most wholesome and relishable ingredient for tarts at a season when no other fruits are largely available for the purpose. For this reason, if for no other, the Gooseberry has long been the most popular of fruits in the densely populated Midlands, the working classes of which parts have long been famous for their interest in and devotion to the culture and production of new varieties, especially large show sorts—a result that has been amply attained, but, as in the case of other fruits, it is to be feared at the expense of quality in

flavour. The Gooseberry competitions of Lancashire in particular have long been famous, and in Scotland, during the Gooseberry season, Gooseberry or Grozat fairs used to be common in the small county towns, and are so in certain of them to this day.

Propagation.—Of course there are various ways of propagating the Gooseberry—from seeds (a method only adopted when new varieties are the object), from layers, suckers, and cuttings, the latter being by far the most generally adopted, and also the better method for the production of symmetrical and fruitful bushes. The simplicity with which propagation by cuttings is effected renders it unnecessary to dwell at any great length on the minute details of it. There are some points of much importance to the future well-doing of the bushes that must be pointedly referred to. Any time after the wood is ripe and leafless, onwards till the buds begin to burst into growth, may be termed the season for putting in the cuttings. Still it is better not to delay after the end of November, for soon after the turn of the year Gooseberries begin to move. Stout, well-matured growths, and as straight as possible, of not less than 1 foot and not more than 14 inches long, should be selected. These are generally best got from comparatively young and vigorous bushes. All the buds on the lower half of the cutting should be carefully removed, especially where there are clusters of small buds round the base. If these are not effectually removed they become troublesome in after years as sucker-producers, a growth that should never be allowed. Three or four good buds should be left at the top of the cuttings to form the first growths for a foundation to the bush; and there should not be any buds left between these and the base of the cutting, for it is most desirable to have a clean stem of at least 6 or 8 inches above the ground before any growths are allowed, because when the first branches start at just the surface of the soil the bush is sure in after years to get more or less soiled up, and the points from which the first branches start become a nest of sucker growths that are most troublesome and injurious, crowding the centres of the bushes and robbing the primary fruit-bearing portions. The cuttings root freely in any light, moderately rich, loamy soil. An open situation should be chosen in preference to one that is shaded with trees. The cuttings should be firmly fixed in the soil, always bearing in mind the clean stem of at least

6 inches between the soil and the first bud. The rows will be wide enough apart at 14 inches, and the plants at 8 inches in the rows.

Young Plants.—The cuttings should produce three or four growths about a foot in length (according to the sorts) the first year; these at pruning time to be cut back to three or four buds, which will the following year produce sufficient growths to form the main branches of the bush. In spring, before growth commences, they should be run out into nursery lines, 2 feet by 2 feet between the plants, it being undesirable to allow them to remain crowded in the cutting lines to make attenuated and ill-matured growths. The ground should be moderately manured if the soil be heavy and cool, giving more in lighter and drier soils. Keep them free from weeds, and apply some mulching material in summer to prevent over-dryness, of which the Gooseberry is very impatient. If the plants have thriven well, the stronger-growing sorts will be large enough the third year to be planted in their permanent quarters. But, as a rule, it is the fourth year before it is indispensable to move them, particularly if ground is scarce, so that they may be allowed to make their third year's growth before being planted out permanently.

The second year's growth should be carefully examined when the plants have fairly started into growth, and assuming that the cuttings the first year sent away three to four shoots for foundations, as already referred to. And should these foundation growths be sending away more than three to four young growths they should be reduced to that number, leaving the stoutest and best placed. The young bushes will thus the second year produce twelve to sixteen growths, which are quite sufficient for the framework of a sufficiently large bush. At the third year's growth these framework growths should not be cut too hard back—say to about 1 foot each.

The Fruit-bearing Situation.—In selecting quarters for making permanent plantations the locality and climate should determine whether an open or a partially shaded situation should be preferred. There can be no doubt that in the warmer and drier parts of England, and especially on light soils, a partially shaded situation is best. In the North, where the climate is cooler and moister, I give preference for the main crop to an open situation. In my own experience I have had Gooseberry crops

rendered quite useless in England in hot, dry, open quarters, the bushes suffering severely and the fruit parboiled and nauseous. The method frequently carried out by growers for market of planting rows of Gooseberries betweens rows of standard Apple, Pear, and Plum trees is as good a system as can be adopted in such localities as are warm and dry. In private gardens a border behind a north kitchen garden wall is a good situation. In the North, again, I should always prefer an open quarter of good loamy soil. In all cases a rather deep, cool soil is best. And before making a new plantation it should be well manured and trenched, for in after years the manure applied should at most be only forked into or laid on the surface of the ground, as it is injurious to dig or fork deeply amongst the roots of fruit-bearing bushes.

The fixing of the distances at which bushes should be planted is also a point to be regulated by the locality, soil, and the consequent vigour the plants usually attain. In England I found 5 feet by 5 feet sufficient, while in Scotland, where the bushes grow more robustly, 6 feet by 6 feet is not by any means too much room to give them. In planting the bushes it is very undesirable to plant deeper than they were in the nursery lines. Deep planting is an evil, and has a tendency to produce suckers, always to be avoided. For the formation of symmetrical bushes, if labour can be afforded it is a good plan to fix a hoop to three or four stakes round each bush, about 2 feet from the ground, when they are planted, and to these hoops fix or tie the outer shoots of the plants, so as to get them into equidistant positions. Not more than three leaders should occupy the centre of the bush.

The pruning of these bushes during the time of their fruit-bearing existence is very simple. Supposing the bush when permanently planted to consist of twelve to fourteen leading growths or branches shortened back to about 1 foot of the previous year's growth, at next pruning time there are to be dealt with a leading growth and a number of laterals on each limb. The leader should be shortened back a little, according to the vigour of the variety, and the lateral growths spurred or cut back to two or three buds. This process of pruning goes on yearly till the leaders are the desired height—say 4 to 5 feet high—when they also are cut back closely the same as the laterals. In addition to

this winter pruning, the bushes should be carefully gone over about the beginning of June, if time can possibly be spared, and the superfluous lateral growths disbudded or removed, so that the bush does not become a thicket of young growths that do not, in consequence of being so crowded, get properly ripened. Strong growths that over-master others should be stopped or removed altogether. As they get aged and the bushes past their best, whole limbs often die back, and young shoots must be encouraged to take their place. But when plantations show unmistakable signs of giving way it is well to be ready with their successors.

If the ground has been well manured before planting, and is naturally good, little or no manure is needed till the bushes get into heavy bearing, when rich farmyard manure should be laid on as a summer mulching, and be forked in after the bushes are pruned in winter. This is especially applicable to England and warm, dry soils and climates.

The protection of the fruit from birds in almost all gardens is indispensable, and my method of doing this is to drive stakes into the ground 12 feet apart all over the quarter. The stakes stand 5 feet out of the ground, and light rails 12 feet long are fixed on the tops of these stakes and nets drawn over the whole quarter, and at such a height as completely clears the bushes and admits of the fruit being gathered and the bushes being otherwise cared for without removing the net. The stakes and rails are permanent, and if of larch will last many years.

In wet localities such as my own (Dumfriesshire) the bushes soon get covered with lichen unless it be kept down, which is effectually and easily done by dusting the bushes with caustic lime after pruning and when they are damp.

Caterpillars are very troublesome some seasons, and the easiest and most effectual remedy I know of is to dust the bushes when damp with Hellebore powder, and to syringe it off after it has served its purpose. A very good practice is to remove in winter a few inches of the soil for a radius of 2 feet round each bush, and to replace the old with fresh loam. This removes the larvæ and nourishes the bushes as well, for they root freely into the fresh soil.

Nice fresh Gooseberries are always appreciated at dessert, or more especially for breakfast and luncheon, and to prolong the

season is therefore desirable. This in the northern part of the country can easily be accomplished, even to the end of October. It is quite usual to see fine fresh Gooseberries at Scotch shows about the middle of September. These, as a rule, are gathered from ordinary bushes that have perhaps been shaded with mats or canvas after becoming ripe. The best way to lengthen out the season of Gooseberries is to plant a portion of a wall with a due north aspect with some Warringtons, and train them on the multiple-cordon system, and keep the laterals spurred in precisely the same as is adopted with Red Currants on fences or walls, or in fact with Gooseberry bushes grown in the ordinary way. The main shoots should not be closer than 10 inches. If a coping of wood be placed on the wall to throw off wet, using a net to protect the fruit from birds, they can be kept fresh till far into October, and are then very useful and acceptable.

As to the varieties of Gooseberries, their name is legion, and I do not profess to be acquainted with such as are now grown by some for prizes offered for mere size. Their flavour is, I believe, in inverse ratio to their size, and, so far as I am aware, the older varieties have never been superseded for flavour. These are, among others :

Red.
Ironmonger.
Keen's Seedling.
Red Champagne.
Red Warrington.
Turkey Red.
Wilmot's Early Red.

Yellow.
Early Sulphur.
Leader.
Perfection.
Yellow Champagne.

White.
Bright Venus.
Hedgehog.
Mayor of Oldham.
Whitesmith.

Green.
Glenton Green.
Green Gascoigne.
Green Overall.
Pitmaston Greengage.
Model.

The twenty-nine degrees of frost we had here (Drumlanrig, N.B.) on March 17 has so crippled our Gooseberries that I doubt if they will ever recover. I never saw Gooseberries suffer from cold before, but then they had grown considerably when this unusually severe frost for the date occurred.

RASPBERRIES.

By Mr. George Wythes, F.R.H.S.

There are probably many Fellows of this Society who have had more to do with the cultivation of market fruit than I have, and my remarks apply chiefly to garden varieties, garden culture, and what I may term the most prolific or profitable kinds. For market cultivation I do not presume to enter into details, but merely sketch out the plan adopted, and hint at what it is possible to adopt as the best means to secure a heavy crop. As is usually known, the Raspberry is a native of these isles, and is found in many other countries, and may be readily propagated from seeds or suckers, and in the case of choice varieties from cuttings. Indeed the greatest fault of this fruit is that it produces itself too freely, and unless suckers are kept well down they greatly impoverish the plants. In some parts of the country I have seen large tracts of these fruits in a wild state, and when once they get a foothold on good soil it is a difficult matter to eradicate them. Wherever fruit is extensively cultivated in this country for the market or for preserving, in Kent for example, Raspberries are largely grown, and the mode of culture is to plant in the autumn in heavily manured land, or land that has only recently been utilised for a shallow-rooting crop. This is prepared for the canes, and in some instances as much as one hundred loads of manure to the acre is used; and this is a great point, as gardeners do not feed this plant nearly enough. I myself must plead guilty to this, for the simple reason that the necessary manure required for this and many other similar crops cannot be procured.

When the ground has settled down, large growers plant their canes early in October, or the beginning of November at latest, either singly or in pairs, having been cut to about 2 feet above the surface. I find that the lower a cane is cut the better and stronger it shoots from the base, and I advise cutting hard back to 9 or even to 6 inches, the only difficulty being that in severe winters the cut-back stem usually dies some distance lower down the stem, so that some protection in the way of litter to the roots is advisable, and as in large plantations this could not readily be given, the cutting back in them is not so severe; but in private gardens with a limited quantity I

would advise cutting hard back, thus getting stronger shoots from the base, as if the canes are left long they break weakly all up the old canes, and never grow away so freely. I also note the large grower plants the rows 6 feet apart, the plants being placed about 1 foot from each other, and I must say the largest and best fruits I ever grew were at that distance, and being very strong required little staking; but in small gardens I advise more room between the rows, say 12 feet, with other low-growing crops planted between them. This is more necessary on poor land, or when at all shaded, as the fruit thus gets more light and air, and the wood is better matured. Another point often overlooked in private gardens is clearing away the old canes as soon as the fruit is gathered. If left they rob the stools greatly and prevent the canes required for next season's fruit from growing as large and strong as possible, and getting thoroughly ripened for the following season. I have seen the old canes left for months after the fruit has been gathered. This should not be, as it prevents the new canes from growing and ripening. Ample room between the rows is necessary. I prefer from 6 to 9 feet or more, and at least 18 inches to 2 feet from plant to plant in the rows, only leaving three to five canes to a stool. With strong stools the smaller quantity is ample, restricting the suckers to this number at an early period, viz., in the spring, and destroying all others (if stock is not required) as soon as they appear. When Raspberries are newly planted in the autumn they do not throw many shoots the next season (usually one or two each), and if they have not been cut back hard they sometimes shoot up the stem and not from the base. Such side-shoots are no use, but the cultivator should endeavour to get two or three strong shoots from the base of the newly planted canes and discourage fruiting branchlets the first season after planting, as the cane is not sufficiently strong to bear fruit, and its whole energy should be directed to forming two or three strong fruiting canes for the next season. Very little more is required the first year beyond keeping the ground clean and well mulched with manure. But as I intend to give a few words to mulching later, I need only remark that the newly planted canes should have their roots covered with good manure as soon as the soil round them has settled, and another mulching in the spring. This will carry the plants

through the summer, and on no account should digging be allowed near the roots—it is a bad practice ; and, if the ground is cropped, care must be taken to keep clear of the roots. And here I may remark that the plan adopted in market gardens of only planting 6 feet apart has great advantages, as it prevents over-cropping and preserves the roots from getting injured, as at that distance there is no room for a crop in between.

Soils, Pruning and Training.—Much diversity of opinion exists as to the latter, and I do not attempt to give the only best method, as much depends upon individual circumstances, space, strength of canes, and aspect. The Raspberry delights in an open, sunny position, and not too dry or light a soil—a good loam of fair depth, and not on gravel ; and though ground may be prepared by making it suitable, deep cultivation is essential to success. The Raspberry, if grown in poor soils and situations, develops weak canes yearly, and the produce is not satisfactory. Large fruit should be aimed at and secured by timely attention to details, and by the introduction of improved kinds to take the places of worn-out stocks. Of late years Raspberries have received more attention, greater quantities being required for preserving purposes, and I consider this a healthy sign, as I feel sure home-grown fruit should find a ready market. The foreign importer being unable to despatch these soft fruits in a ripe state, it gives the home-grower an advantage, and when growing on a large scale he will be careful to choose those varieties most suitable for the purpose. I believe one of our largest growers for market scarcely trains his Raspberries at all, but merely ties a few canes together—a plan, which, if adopted, readily enables one to gather the fruit when ripe. Others arch their canes over, but very few large growers use stakes or wires of any kind. No doubt in private gardens the neatest way is to put a stout post at the end of each row and strain a couple of wires to support the canes, or in country places where young larches can be obtained they last a long time and are not heavy. Hurdles are also good when made of light iron, and last many years if kept painted. A neat and inexpensive method, if planted a good distance apart, is to place three or four stakes along the row, with a single wire attached, and to tie two canes together, forming a bow, tying them to the wire to keep them in position. The fruit may be readily gathered

from the fruiting branches all up the canes if these are not too long—3 feet to 4 feet being a fair length. Very little pruning is required if the shoots are restricted, as previously advised, by cutting away those not wanted, and shortening back the fruiting canes either in the autumn or early spring to 3 or 4 feet long. I advise two prunings—that is, first, to go over the canes in the autumn and lighten them of heavy growth, but not to shorten back as much as required, and then in the following spring the heavy canes may be shortened to the required length. By this plan the canes do not die back lower down the stem, as is sometimes the case in severe winters, and at the final pruning the necessary ties can be given and the stakes or supports made good for the fruiting season. Whatever system is adopted in training and pruning, the best method is that which allows the fruit-bearing branchlets the most space and the greatest amount of light and air, so that crowding should be avoided. Much depends upon the vigour of the canes, and if at all weak it is much the best plan to renew the plantation, choosing new ground well prepared. This fruit may be had for a considerable time if due attention is paid to varieties, position, cropping, and pruning for late supplies. The early lot should be thoroughly exposed on an open sunny border, another may be planted under a wall on a north border, and these will last till the latest or autumn-fruiting kinds, so that a long fruiting season may be secured if desired; and these all require plenty of feeding—a good dressing of decayed manure in the autumn and one again in the spring, and when I say a good dressing I mean several inches, as the plant pays well for good treatment; and as I have previously observed, no digging or forking near the roots, only keeping free of weeds and not allowing the stools to remain too many years in one position, if large fruit is desired.

Varieties.—I prefer Superlative of the newer introductions; it is a heavy cropper and a vigorous grower, with a large dark red berry, of excellent flavour. Indeed, plants of this variety, in good soil and position, need little support in the way of stakes; and another recommendation, it makes an excellent preserve. Baumforth's Seedling—an improved Northumberland Fillbasket—is also good, bearing large fruit. Carter's Prolific—a heavy cropper of large size—is also excellent for garden cultivation. Hornet and Yellow Antwerp are good, also Fastolf and Northum-

berland Fillbasket. For preserving purposes Semper Fidelis is one of the best grown, being of a beautiful bright colour, a great cropper, and later than other kinds, and possesses a more acid flavour, which is much liked by many people for preserving. Red Antwerp is also a good sort; but when only a few kinds are grown, I should prefer Superlative for dessert or table purposes and Semper Fidelis for preserving. Of white or yellow varieties the choice is more limited, and this is as it should be, for the white kinds are not much used—chiefly for the table—and not nearly as much now as in former years. When glass was not extensively used, and our forefathers relied more on outdoor fruits, the Raspberry found more favour, and white kinds were largely grown. The best at the present time are Magnum Bonum and Yellow Antwerp, and these require similar treatment to red sorts.

There are also other varieties of great merit; but it is a mistake to grow too many kinds. Those that do well and fruit the longest are most suitable. For the latest supply, or autumn fruit, Belle de Fontenay, Yellow Four Seasons or Large Monthly, and the October Red and Yellow are good; but, as may be expected, their fruit does not equal the summer fruit—still it is most useful in many ways. The canes require special attention as to pruning in spring for autumn fruit, as they produce their fruit on the shoots made during the summer. They also require good cultivation, and should get abundant supplies of manure in the spring, and the growth kept thin, as, if crowded too much, they seldom produce a heavy crop. I feel sure that there is yet room for improvement in the varieties of this fruit, and if we can secure by patient hybridisation the larger fruits, like those sent out of late years, with improved flavour, colour, and keeping properties, we may hope for further improvement, as we have already got much later sorts and a longer fruiting season. The chief points of success are to feed the plants and to thin the shoots well, to plant in good soil in open positions, and to renew the plantation as soon as it shows signs of exhaustion from over-cropping or poorness of soil, and to plant strong canes in new ground well trenched. I would not allow the plants to remain longer than six years in one place if the fruit did not come up to the standard quality, but would follow the plan advised for Strawberries, of often renewing to secure large fruit, with the

most suitable varieties, and in dry seasons to water freely and mulch the surface of light soils. I am sure heavier crops can be secured by not crowding the plants and paying due attention to moisture and feeding, at the same time allowing abundance of sun and air to get to the wood to prevent drawing and weakly growth.

Discussion.

The Chairman invited questions and discussion. After waiting a short time for any remarks, he said it appeared that the papers were so excellent as to leave no loophole for anyone to begin a discussion. He would, however, like to make a few remarks himself. As to Gooseberries, he was of opinion that they ought to try for more upright kinds, as many of the best Gooseberries crept on the ground in a most unfortunate way, so that every shower spoilt them just at the time they were ripe. Then, again, large Gooseberries were deficient in flavour, and, like Melons, had to be eaten at a particular time in order to get the flavour at its highest point. They required more late kinds and more early ones; and to show the value of getting an early Gooseberry for market purposes, even if the quality was not very good, he mentioned that a grower in Kent had found a Gooseberry (which might possibly be identified at some future time) which produced from ten days to a fortnight before any other. The consequence was that he got £120 an acre for them in a green state. As far as flavour went, he thought he might mention Cheshire Lass, Green Gascoigne, White and Red Champagne, Ironmonger, Warrington—these are the very best for flavour. Then, as to size, there were Bobby and Antagonist among the reds, Ringer and Drill among the yellows, and Stockwell and Telegraph among the greens. That was a series of Gooseberries from which a hybridizer should obtain good results. Then there was not sufficient enterprise in getting Gooseberries trained on walls, in which case the berries matured a little before any others, and in gardening that was a matter of great importance. He had built a Gooseberry-house which had been much admired. It consisted of iron arch-ways, covered with wire netting, which was found to be most useful in keeping off birds. He also commended the culture of the Gooseberry in the form of cordons. In that form the two

branches would take up very little room, and then would produce some splendid fruit. With regard to manuring, he had found the most successful plan to be to manure in the autumn, and prune through the winter. After that, manure was again dug-in as soon as the first crop of the green berries was taken off. The trees being thus thinned out and manured were enabled to carry a fine crop of ripe berries, and to go on bearing year by year without losing their vitality.

In reference to Raspberries, he thought there was a field for white varieties, and that it was possible, in the course of time, to get a white Raspberry of a different race, and of a very much larger size, than that which they had obtained at the present moment. Autumn Raspberries were well worth growing. The yellow one was at present the best flavoured.

As to Currants, they should strive for longer bunches and larger berries, and to get longer bunches the present sorts might be crossed with the Reine Victoria; but in the way of Currants they seemed to have reached almost the utmost limit—it was only a matter of cultivation. In Black Currants a very important thing was to get early leafage to protect the fruit, as on Whit-Sunday last the frost was so severe as to annihilate the crop.

Speaking of Strawberries, he said they still wanted late Strawberries of the British Queen flavour, and he entirely agreed with Mr. Allan that for early fruit the plants ought to be cultivated on the one year's system, which might save at least a week or ten days. The Waterloo was a very good fruit, but it lacked flavour, and if it could be got with the Queen flavour it would be much more appreciated. All Strawberries should have strong foliage. Dr. Hogg was the best fruit of all, and President the next best for general purposes, and in them they had very good parents from which to work. Of course these desirable results could not be brought about in a minute, and they could only expect to go on step by step till they got what they required.

There were, he said, many other fruits which could be discussed, such as the Cranberry, the Mulberry, and the Bilberry, which would make a welcome change, but these could be dealt with on another occasion.

SMALL FRUITS FOR PRIVATE GARDENS.

In connection with the Conference on Strawberries, Gooseberries, Raspberries, Currants, and other small fruits, held at Chiswick on Wednesday, July 8, 1891, a paper was sent round to a large number of the foremost practical gardeners, making inquiry of what in their opinion were the best varieties of each class of Small Fruits for growth in private gardens. The answers to these inquiry papers have been carefully tabulated with the following results, the names of the varieties being given in order of merit as the result of tabulation, equality of votes being indicated by equality of position in the list.

List I. (*a*).

The two best early Strawberries for light soil.

1. Vicomtesse Héricart de Thury
1. Noble
3. King of the Earlies
4. Pauline
4. La Grosse Sucrée
6. Keen's Seedling
6. Crescent

List I. (*b*).

The best early Strawberries for heavy soil.

1. Vicomtesse Héricart de Thury
2. Keen's Seedling
2. King of the Earlies
4. La Grosse Sucrée
4. Noble
6. President
7. Black Prince

Note on List I. (*a*) *and* (*b*).—It is somewhat surprising to find "Noble" ranking as equal first for light soil, and only as equal fourth for heavy soil, there being no manner of doubt but that on light soils Noble is often lacking in flavour, whereas on heavy soils it is not so generally open to reproach on this head.

List II. (*a*).

The four best mid-season Strawberries for light soil.

1. Sir Joseph Paxton
2. President
3. James Veitch
4. Vicomtesse Héricart de Thury
5. Sir Charles Napier
5. Lucas
7. Countess
7. Bicton Pine (a white Strawberry)
9. Eliza
10. August Boisslot
10. Marshal MacMahon.
10. Georges Lesnir

List II. (*b*).

The four best mid-season Strawberries for heavy soil.

1. President
1. Dr. Hogg
1. Sir Joseph Paxton
4. Sir Charles Napier
4. British Queen
6. James Veitch
7. Vicomtesse Héricart de Thury
7. La Grosse Sucrée
7. A. F. Barron
10. La Constante
10. Goliath (John Powell)
12. Lucas

Note on List II. (*a*) *and* (*b*).—In perusing these lists, it must be carefully borne in mind that Lists I. (*a*) and (*b*), have exercised a somewhat disturbing influence on Lists II. (*a*) and (*b*), and had there been no Lists I. (*a*) and (*b*) asked for, it is safe to prophesy that in Lists II. (*a*) and (*b*) the relative positions of Sir Joseph Paxton and Vicomtesse Héricart would have been reversed, but some of those who had voted for the Vicomtesse in Lists I. (*a*) and (*b*) evidently considered her Ladyship's position already secured, and refrained from mentioning her again in Lists II. (*a*) and (*b*).

LIST III. (*a*).

The two best late Strawberries for light soil.

1. Waterloo
2. Elton Pine
2. Hélène Glœde
4. Countess
5. Frogmore Late Pine
6. Jubilee
6. Mrs. Laxton
8. Filbert Pine
8. Enchantress

LIST III. (*b*).

The two best late Strawberries for heavy soil.

1. Dr. Hogg
1. British Queen
3. Elton Pine
3. Eleanor
5. Waterloo
5. Frogmore Late Pine
7. Hélène Glœde
8. Loxford Hall
9. Cockscomb
9. Mr. Radcliffe

LIST IV. (*a*).

The two best Strawberries for preserving, for light soil.

1. Vicomtesse Héricart de Thury
2. Grove End Scarlet
3. Elton Pine
3. Sir Joseph Paxton
5. Eleanor

LIST IV. (*b*).

The two best Strawberries for preserving, for heavy soil.

1. Vicomtesse Héricart de Thury
1. Elton Late Pine
3. Grove End Scarlet
4. Newton Seedling
4. Keen's Seedling

LIST V.

The two best Strawberries for forcing.

1. La Grosse Sucrée
2. President
3. Vicomtesse Héricart de Thury
4. Sir Charles Napier
4. Keen's Seedling

LIST VI.

The best Raspberries for general use.

1. Carter's Prolific
2. Superlative
2. Hornet
4. Fastolf
5. Northumberland Fillbasket

LIST VII.

The best Red Raspberry for dessert.

1. Superlative
1. Fastolf
3. Hornet
4. Baumforth's Seedling
5. Northumberland Fillbasket
5. Carter's Prolific

LIST VIII.

The best White Raspberry for dessert.

1. Yellow Antwerp
2. Magnum Bonum

LIST IX.

The best early Raspberry.

1. Red Antwerp
1. Fastolf
3. Hornet
4. Carter's Prolific

LIST X.

The best late summer Raspberry.

1. Superlative
2. Northumberland Fillbasket
2. Semper Fidelis

LIST XI.

The best autumnal Raspberry.

1. October Red
2. Quatre Saissons (yellow)
3. Belle de Fontenay

LIST XII.

The two best Gooseberries for use in an unripe state.

1. Whinham's Industry
2. Lancashire Lad
2. Crown Bob
4. Whitesmith
5. Rifleman
6. Green London
6. Gipsy Queen
6. Freedom

LIST XIII.

The two best early Gooseberries for dessert.

1. Early Sulphur
1. Golden Drop
3. Green Gascoigne
3. Early Green Hedgehog
5. Broom Girl
6. Greengage
7. Yellow Champagne
7. Early Red Hedgehog
9. Stripling White

LIST XIV.

The six best Gooseberries, mid-season, for dessert.

1. Ironmonger
1. Whitesmith
3. Greengage
3. Crown Bob
3. White Champagne
3. Red Champagne
7. Whinham's Industry
7. Keen's Seedling
7. Broom Girl
7. Pitmaston Greengage
11. Yellow Champagne
11. Warrington Red
11. Catherine
11. Lancashire Lad
11. Rumbullion
16. White Hedgehog
16. Green Gascoigne

Note on List XIV.—This list is greatly influenced by Lists XIII. and XV. (*vide* Note on List II.). Besides the above, the

following are named once or twice: Lofty, Bright Venus, Merry Monarch, Glenton Green, Pilot, Golden Lion, Orleans, Keepsake, Walnut, Golden Ball, Cheshire Lass, Parkinson's Laurel, Nonpareil, Roaring Lion, Lord Scarborough, Careless, Jenny Lind, Thumper.

List XV.

The two best late Gooseberries for dessert.

1. Warrington
2. Whitesmith
3. Pitmaston Greengage
3. Rifleman
3. Ironmonger
3. Rumbullion
7. Bright Venus
7. Parkinson's Laurel
9. Freedom
9. Oldaker's Late Black
9. Helburn Prolific
9. Husbandman

List XVI.

The two best Gooseberries for preserving when ripe.

1. Warrington
2. Ironmonger
3. Old Rough Red
4. Keen's Seedling
4. Scotch Red

List XVII.

The six best Gooseberries for exhibition.

1. Leveller
1. Telegraph
3. Ringer
3. Bobby
3. London
6. Catherina
6. Antagonist
8. Drill
8. Guido
10. Marlboro'
10. Speedwell
10. Mount Pleasant
10. Lion's Provider

Note on List XVII.—There appears to be little unanimity in the returns for this list, different names being given by almost every grower. The number of varieties named only once is so great that we have been unable even to record them here.

EARLY PEACHES AND NECTARINES.

By Mr. T. Francis Rivers, F.R.H.S.

[Read July 21, 1891.]

The catalogue of fruits of the Royal Horticultural Society, published in 1842, was the most complete and comprehensive catalogue published in Europe at that time. The fruit department of the Society was presided over by the most accomplished pomologist either in England or in Europe, and the Society,

recognising the value of the quality of fruit, and of accuracy in the names of sorts, spared no pains or expense in determining and publishing an account of the several kinds of fruit-trees which the garden then possessed. Fruit enters into and forms a serious condition in the daily life and enjoyment of most people in these islands, and indeed over the whole world, and the Society was an ultimate court of appeal to those who were interested in fruit culture, and who were somewhat uncertain as to the names and kinds which they were in the habit of placing on their tables for daily consumption. If they were not entirely satisfied with the quality, those who were in any way connected with the Society, by themselves or their friends, had an infallible authority to refer to in the Royal Horticultural Society and its leading pomologist, Mr. Robert Thompson. Now, the Society still possesses the fruit garden and an authority, and in this particular it differs very much from the societies which have been lately formed for the extension of the knowledge of fruit; it has the gardens and the fruit-trees, and it has added, and does add, to its collection of fruit-trees all those sorts which may in any way be of service to the fruit-grower of the present day. It is hardly possible to suppose that the catalogue of 1842, which is the last comprehensive fruit catalogue printed by the Society, is quite in a line with the development which has taken place since that time; but a good fruit has such an exceedingly long life, that a very large percentage of the fruits there described are still deservedly the favourites of the dessert-table and the kitchen of the present day, and I venture to hope that the Royal Horticultural Society will be found ready and anxious to maintain the high position which it has always held. In the matter which I have to speak about to-day, the fruit catalogue of the Society contains interesting information of altogether nearly 600 Peaches and Nectarines, with their synonyms, the determination of the synonyms being a very arduous work, and really meaning the cultivation of many sorts absolutely useless except for this purpose. The early Peaches named in this catalogue of 1842 are not many, and if by early Peaches we are to understand those which ripen in July, only two kinds are given, the Red and the White Nutmeg, the comment of the catalogue being that these sorts have little merit except that of being the earliest. In the beginning of August the Petite

Mignonne comes, which is said to succeed the Red Nutmeg, and to be larger. As the Red Nutmeg is about the size of a Kentish Filbert and the Petite Mignonne of an ordinary Walnut, there is not much to be said in its favour. The next early Peach is the Early Anne, which is said to be handsomer and tolerably well flavoured, but its earliness is its chief recommendation. It is a characteristic feature in these English-raised Peaches that they endure the open-air climate better than the American varieties. Passing from July into August, the Horticultural Catalogue gives the names of the Acton Scott, Yellow Alberge, Early Downton, Ford's Seedling, Hemskirke, White Incomparable, Madeleine de Courson, Malta, Grosse Mignonne (end of August), Smith's Newington, Noblesse (end of August), Pourprée Hâtive (middle and end of August), Royal George (end of August), Spring Grove (much like Acton Scott), Sulhampstead (very like Noblesse), Sweet Water (end of August), and Williams's Early Purple (end of August). With the exception of Madeleine de Courson, Malta, Grosse Mignonne, Noblesse, Pourprée Hâtive, and Royal George, all these varieties are forgotten, and justly, for the catalogue does not commend them. In place of these sorts we have a sufficient number of August Peaches which appeared some years subsequent to the catalogue, viz.: the Early York (American), good, but subject to mildew (from this Peach were raised the Rivers' Early Victoria, which, one of my friends in Yorkshire says, is one of the hardiest and best Peaches he has); the Rivers' Early York, which is one of the hardiest and most useful Peaches grown; the Early Silver, the Early Alfred; the large Early Mignonne, which precedes the Early Grosse Mignonne; the Condor, the Merlin, the Magdala, the Grosse Mignonne; the Dr. Hogg, which is sometimes grown to an extraordinary size, but which must be picked before it ripens on the tree; and the Crimson Galande. All these Peaches will ripen in an unheated orchard-house during August, and will give a constant succession of fruit to the skilful cultivator. If the culture on walls out of doors could be depended upon, I believe that in fair and good seasons all these sorts would ripen in August in the south of England. Once I had a letter from the extreme north of Scotland to say that the Rivers' Early York had ripened in an orchard-house, and that the owner of this variety had invited several of his friends to celebrate the event, as a ripe Peach had

never been seen before in the Highlands. The Horticultural Catalogue contains the names of only two Nectarines ripening in the beginning of August, and therefore coming within the range of early Nectarines; these are the Fairchild's Early and Hunt's Tawny. The Fairchild's is characterised as "being esteemed by some for its earliness," which is very faint praise; the Hunt's Tawny "as being a very distinct sort, worthy of cultivation for its earliness." It seems, however, to have disappeared from cultivation, as it is very seldom met with, although I have no doubt it may still be found in some gardens. These two early sorts are, however, superseded by earlier and better kinds. I have been fortunate to raise from seed the Advance, which ripens in July, and the Lord Napier, which is, perhaps, not only the best early Nectarine, but the best Nectarine known. With good cultivation it may be grown to a very large size, and it ripens in a cool orchard-house during the first week in August. I notice that at exhibitions of fruit the first prize is generally accorded to this kind. The next sort which may be called early is a yellow Nectarine, the Goldoni, which has a singular origin. It was raised from a stone of a white Nectarine, which originated from a stone of the Bellegarde Peach. I was careful to keep a note of the parentage. This Nectarine is closely followed by the white Nectarine, which ripens towards the end of August. The season of August Nectarines is closed by the Stanwick Elruge, which ripens some days before the well-known and ancient sort, the Elruge. Some day the season of early Nectarines will be much extended. It is not, however, a fruit much grown in the United States, its smooth skin rendering it more liable to the attacks of the curculio, while does not penetrate the rough skin of the Peach. As many of the Peach orchards in the United States are raised from seed, the varieties of seedling Peaches there are very numerous, and the small number of seedling Nectarines may be accounted for by the unwillingness of the owners of orchards to grow fruits which will not be profitable.

I have only to add that in giving the descriptions of early Peaches and Nectarines my examples are all taken from a cool orchard-house. Fruit growing on walls is so precarious that continusus observations are almost impossible; but from the orchard-house system, founded in 1850, I have been able to

record the experiences of forty years. During these years the raising of seedlings has never ceased, and it is a proof of the unwillingness of nature to deviate from its fixed rules, that the few varieties which I have been able to record, result from the work of many years, and have been selected, I may say, from thousands of seedlings, most of which have not materially departed from the ordinary varieties which have been known for centuries.

Thus you will see that, as it ought to be, a very considerable improvement has taken place in the production of Peaches and Nectarines in the months of July and August. Owing to the introduction of the orchard-house system, that is of assembling a large number of sorts of Peaches and Nectarines under one roof, it became possible to make experiments in the way of raising seedlings by crossing the early and small varieties with those of larger size and better flavour; and, in conjunction with my father, I paid a great deal of attention to this matter, with the result of producing sorts of fair quality and size in the same house with the Early Nutmeg and Early Mignonne. These very early and worthless sorts ripened in an unheated orchard-house on July 25th; but the seedlings, with the same attention, the same climate, and the same conditions, ripened, according to the notes made by my father in 1865: the Early Beatrice July 5th, the Early Louise July 8th, the Early Rivers July 13th, the Early Leopold July 14th. In 1868 the American Peach, Hale's Early, came in. Of course, seasons vary very much, and this year the July Peaches are much later than usual, but they are still ripe in July; and we are still at the time when no Peaches ripened according to the Horticultural Society's catalogue. The statement that Peaches which ripened in July had been raised in an unheated house was received with much doubting and incredulity. This was only to be expected; but out of England some industrial use was made of them. In an account of the Texan Peach crop, published in the *Garden* of June 26th, 1875, the reporter says: "The Texan Peach crop is said to be unusually fine this year, but, owing to the backwardness of the spring, it is nearly a fortnight later in ripening than usual. Rivers' Peaches succeed extremely well in Texas, and now (June 6th) cultivators are picking most beautiful samples of Early Beatrice, Early Louise and

Early Rivers, and that too before they have got a single fruit from Hale's Early or Plowden's Early. Rivers' Early Victoria ranked amongst their finest Peaches last year." In 1874 I received a shock to my feelings, for in that year I had a drawing sent to me from America of a beautiful crimson Peach, said to ripen in June. Making allowance for the spirit of the artist who coloured the fruit, I at once asked for plants, which I received, and in the summer of 1878 I had the satisfaction of ripening the Early Alexander Peach on June 28th, about ten days before the Early Beatrice. At the same time I received the Early Amsden, ripening at the same time, but not so good. I am rather of opinion that the names of these two Peaches have been transposed in France, because the French cultivators have adopted the Early Amsden in preference to the Early Alexander. Perhaps the Russian Emperor, from whom I understand it was named, was not quite so popular in France then as he is now. In any case I am certain that of the two varieties, which I received from the same house and at the same time, the "Alexander" was the best. These Peaches which I have named constitute a very fair proportion for July. The Early Rivers Peach, which my father was very proud of, and to which he consented to give his name, has disappointed some from a bad habit of cracking at the stone; but the original tree did not produce cracked fruit, and this fault may proceed from the stock on which it has been worked, or it may require greater heat than our climate affords, for in a letter I received from a fruit farm at Youngstown, N.Y., ten miles below the Niagara Falls, my correspondent says: "Allow me to say that the Early Rivers Peach in this section leads them all for size, flavour, fine appearance, and as a healthy tree it has no equal." On walls out of doors these Peaches will ripen in warm seasons from the 20th of July. I have known Early Louise ripen very fine fruit on the open wall by July 26th. In the *Gardeners' Magazine* of September 15, 1888, Mr. Clarke says: "With regard to the early Peaches raised by Mr. Rivers, of Sawbridgeworth, I have grown them and seen them growing in different gardens, but I always thought Early Rivers and Early Silver too small to meet with much favour. Early Alfred and Early Beatrice have larger fruit, and have invariably produced good crops in good seasons. Early Beatrice was ripe on a south wall on August 12th, and Early Alfred a week later,

and the fruit was quite as large as I have seen it on any previous occasion. I am fully aware that in favourable summers these Peaches ripen much earlier, but I think, looking at the character of the weather that prevailed at that time, a Peach that will ripen as early as the second week in August is worthy of having the fact recorded."

Discussion.

Mr. George Bunyard, of Maidstone, referred in very complimentary terms to the useful work which Mr. T. Francis Rivers and his father had done for fruit culture, and then proceeded to make some remarks as to the behaviour in his county of the early Peaches named in Mr. Rivers' paper. He stated that Early Rivers and Early Louise were very tender and generally failed on open walls in Kent, as did also the fine (indoor) Peach, Dr. Hogg. Early Beatrice was small, wanting in flavour, and of a thin, wiry growth, which made it tender in a spring frost; but the advent of the American Peaches, Amsden June and Alexander, and the more recent Waterloo, made it unnecessary to grow Beatrice. Mr. Bunyard considered Waterloo the best of this trio, and it succeeds admirably on walls, in pots, and as a forcing variety. It is six weeks before Royal George in the same house. Amsden was not such a good cropper as Alexander, but richer in flavour. These kinds were closely followed by the American, Hale's Early, which, with Rivers' Early York, Alfred, and Victoria, kept up a succession until Dagmar came in, when the mid-season varieties were ripening. All these do well in the open air. Mr. Bunyard remarked that although these Peaches did not possess the exquisite flavour and texture of the Royal George, they were quite indispensable, and under good culture were admirable. He feared the fine examples of Peaches which were presented from under glass had often led planters to adopt them on open walls, with unfortunate results: many of the late kinds being too late in ripening for our climate. Mr. Bunyard considered that the Lord Napier Nectarine raised by Mr. Rivers was the finest of all the seedling fruits of this class, being hardy in all modes of culture. Goldoni and Dryden were also stated to be very fine.

ORNAMENTAL STOVE AND GREENHOUSE PLANTS.

By Mr. James Hudson, F.R.H.S.

[Read August 11, 1891.]

When we give a backward glance over the past twenty-five years in its relation to horticulture in general, we may well be astonished at the progress which has been made in all departments. If so many flowering plants have not been introduced into prominent notice during that period from other and remote regions of the globe, it cannot be said that there has been any lack of new and distinct additions to those grown for the value attached to them as plants of ornamental leafage. Not only by fresh importations has this been accomplished, but the efforts of the hybridist have been most amply rewarded by the valuable and varied contributions to many families of plants. Take, for instance, such as the Nepenthes, the Sarracenias, the Caladiums, the Dracænas, the Crotons, and also the Coleus. No one will, I think, deny that there has been a distinct advance made in the new varieties added to each of the genera just named, as well as to others. This increase, both by importations of new plants and by the raising of others, has led undoubtedly to a far more extended system of culture for varied purposes. Plants are used now in so many ways, and with decided advantage also, as compared with a quarter of a century back. This demand has been fostered and well met by our large and well-known trade-growers, who supply plants for all purposes. It has, however, taxed the resources of the gardener in many a private establishment to a considerable extent in keeping up the requisite supply of what are usually termed "decorative plants," of which those with ornamental foliage form a most considerable portion.

Embracing the period I have just named, I think that by far the most important feature has been the vast increase in the cultivation of Palms, which are now raised by tens of thousands and employed in various ways. It requires no great effort of the memory to revert to the time when in some establishments Palms were rarely seen, with the exception of a few of specimen size. They are peculiarly adapted to purposes of ornamentation, whether it be in the conservatory, the mansion, or the open air. Nothing lends such a tropical appearance as Palms of noble proportions, whilst for elegance of outline they are excelled

by no other race of plants. Their utility in a small state is well known, particularly so in the case of the lighter and more elegant kinds; but there is room for extended use for those between plants of small size and the specimens. They vary so much in character of growth, thus affording abundant choice for all purposes. The most important additions of late years to the Palms are the Kentias, which, if not consisting of many varieties, embrace within the few those which are of well-known durability and usefulness. Omission should not be made of the Cycads. Probably, through being of slower growth, these are not seen in such numbers. Many kinds will, however, when well cared for, develop into useful plants in no unreasonable time. As conservatory plants, or for plunging out of doors in sheltered spots during the summer time, they rival the Palms, and are well suited to a dry atmosphere. To these should also be added the Dasylirions, which, when arrived at maturity, are fine objects. The Greenhouse Yuccas can be utilised from a small state upwards, and, although they grow slowly into specimen plants, when that point has been reached they are fine ornaments and very distinct. The varieties of the Rhopala are distinctly ornamental plants, being of an enduring character also. They look best, I think, if upon single stems, and are seen to better advantage when standing by themselves. The Lomatias and Grevilleas are also worthy of more attention; so also is *Erythrina marmorata*. *Cyanophyllum magnificum* is now seldom seen in collections. It can, however, be used whilst in a small state as a table-plant, and as it increases in size is equally useful for vases, its massive foliage being so distinct from plants usually employed for that purpose.

The merits of the Acalypha are now being better recognised, and most deservedly so; they are plants which look well under artificial light. Another useful class of plants is the Phyllanthus; these are well suited to grouping. *Eurya latifolia variegata* is very useful for rough-and-ready work. The semi-hardy Phormiums and Cordylines should be cultivated more extensively, both for sub-tropical purposes during the summer months and also for cool houses at all seasons. All plants with silvery variegated foliage, as *Pandanus Veitchii*, *Eulalia japonica variegata*, *Anthericum argenteo-lineare*, and *Cyperus alternifolius variegata*, are exceedingly useful as vase plants or for grouping. Tree Ferns do not seem of late years to have met with that favour which

they did formerly. Give them, however, but a fair chance and they will prove all that one can desire. Probably many of the imported stems, of which such numbers were received into this country some few years back, did not permanently establish themselves, and have now succumbed or are barely existing. When these are planted out in capacious houses no plants could possibly present a finer appearance. Those, for instance, which are to be seen in the Temperate House at Kew Gardens are grand examples of luxuriant vegetation. As an instance of how well they succeed in pots when carefully attended to and under favourable conditions, those at the Crystal Palace may be quoted; they are magnificent plants.

Amongst stove plants, during the past few years, the most remarkable additions have been made to the Crotons, Caladiums, Nepenthes, and Dracænas. Each of these genera now possesses such variations in form and colouring as to render plants of them simply indispensable where much decoration has to be accomplished. The gain in Crotons has been immense. Time was when all of the best could be counted on the finger-ends. Not so now, with such an abundant choice both in habit, form, and colour. There are those with broad and massive foliage, as Baron James de Rothschild, *C. Andreanum*, and *C. Mortii*; those with narrow leaves, of which *C. angustifolium* is still one of the best of the drooping kinds. Mrs. Dorman is, however, a good type, more erect in habit. With extra long and narrow drooping leaves, *C. Warreni* is an excellent example. Then there are those with recurved foliage, as *C. recurvifolium*; of the trilobed kinds, *C. Disraeli* is one of the best; whilst with foliage of medium width, the type represented by Queen Victoria and Sunset should be noted, these being of brilliant colour when well grown. Altogether, Crotons are most valuable plants both in and out of the stove. Dracænas also afford us a great variation, from the narrow but highly coloured *D. superba* to the broad and noble foliage of *D. Thompsonii* and *D. Youngii*. *D. terminalis* is not beaten in its way, nor is *D. stricta*, which is a stronger grower. *D. Lindenii* and *D. Goldieana* are both quite distinct varieties, the former being the most showy and of more value as a decorative plant; the latter, however, rivals it for use as a table-plant. The comparatively new *D. Doucettii* bids fair to be a valuable addition; this would, I think, succeed well in a cool

house. The Aralias now furnish us with greater variety, being also of an enduring character.

With such a wealth of ornamental foliage plants as we now possess there is hardly any place or purpose to which either one or another may not be adapted. There is, I think, room yet for a more extended use of foliage plants of small proportions. Good examples of many useful plants can be had for various purposes in thumb-pots even, but better in those of 3 or 4 inches diameter. These can be turned to a good account, either in small vases or for dinner-table plants. A great deal more use may be made of such plants for the latter purpose than is generally done, and of considerably lesser size than the stereotyped examples usually seen at flower shows. Many dwarf-growing plants with ornamental foliage, and Ferns also, can be thus employed in thumb-pots, but better still those in shallow ones now used for Orchids. Strawberry pans, or a size smaller, when well furnished with such dwarf-growing plants as *Fittonia argyroneura* and *F. Pearcei*, *Panicum variegatum*, *Cyrtodeira metallica*, and *Selaginella cæsia*, could be effectively employed in various ways. On the other hand, plants for the dinner-table could, I think, be used much taller than they generally are, when they are of light and elegant growth; such, for instance, as *Cocos Weddelliana*, *Chamædorea glaucifolia*, *Euterpe edulis*, and others. Plants up to 3 feet in height may be employed effectively upon large tables, yet they need not be in pots exceeding 4½ or 5 inches diameter. Shifted into a larger pot, these same plants will afterwards be found of service for larger vases in other positions where their height will add to their effect. There is also room for considerable improvement in the arrangement of plants in the houses in which they are usually grown. Too often they are overcrowded, with damage to the foliage, whilst the effect is lessened. In some cases plants are attempted to be grown in houses which are not suited to them, nor calculated to display them to advantage. The stages and beds are oftentimes too high in both stoves and greenhouses. The effect is far better when the plants can be looked down upon, particularly in large houses where a greater variety could be got together. Far more use should be made of creeping and dwarf-growing plants for a finish to the front, just as one sees done in a well-arranged and finished group at a flower

show. Many such can be employed as an undergrowth to larger plants, and frequently with very pretty effect. There is no reason why pots should not in these ways be hidden to a great extent. Ferns, such as the British Maidenhair, *Nephrodium molle*, *Pteris longifolia*, and other kinds, can be advantageously displayed to clothe damp and unsightly walls that are otherwise an eyesore and stand in need of frequent cleansing. With a little patience these and other Ferns will soon acclimatize themselves (even without any soil in some instances) where the surface is not of cement. When a little soil can be used the ornamental foliaged Begonias will soon become established. If any difficulty arises with either of the foregoing it is possible to fall back upon *Ficus repens*. The appearance of our stoves, greenhouses, and conservatories could frequently be improved by making more use of climbers, a due proportion of which would not be any detriment to other plants. Hence houses which could be made to look well-furnished give an impression of bareness. For the stove *Cissus discolor*, one of the most ornamental of plants with fine foliage, and the varieties of Asparagus could be usefully employed. Of plants deserving of far more notice there are the Dipladenias, which, if not of ornamental foliage, are truly ornamental plants. The best of the highly coloured varieties of the Dipladenia are well known, but the merits of *D. boliviensis* are not nearly so much appreciated as they should be; it can be had in flower from April to November, being most useful for cutting purposes. There are also *Aristolochia elegans*, *Passiflora Kermesina*, and *Gloriosa superba*, neither of which are seen too frequently. The varieties of the African Asparagus are also suited to a cooler house. I have them planted out where the temperature falls below 40° Fahr. in the winter, yet they thrive. They can therefore be used for covering the walls, pillars, and glass sides of conservatories; *Lygodium scandens* being also useful for the same purpose, but it succeeds better in a temperate house. *Myrsiphyllum asparagoides* should be allowed space, being so useful for cutting. When it is not advisable to occupy all the roof space next the glass with climbers, some may at least be trained up the rafters, selection being made from those of moderate growth. Fuchsias, for instance, are thus seen to decided advantage in a cool house. For training thinly over the roof of a conservatory the Tacsonias are well adapted, and the Passifloras with the smaller leaves.

Hanging baskets deserve far more notice than they receive as a rule. It matters not whether it be a stove or cool house, there are plenty of selections to suit each case. The Nepenthes, to which such splendid additions have been made of late years, both by imported species and hybrids, should be grown more extensively for suspending in the stove. They are quite unique and singularly effective, always creating an interest when in good condition. Particular mention should be made of *N. Mastersiana*, which is undoubtedly the finest hybrid yet raised. *Asparagus deflexus* does not appear to be sufficiently known as a basket plant. It is quite distinct from the kinds usually grown, and equally ornamental. Several Ferns are excellent for the same purpose. Notably so amongst the Maidenhairs is *Adiantum amabile*; another good basket Fern is *Gymnogramma schizophylla gloriosa*. For a cool house in the summer some of the Davallias are well suited. *Cheilanthes elegans*, although it cannot be considered as one of the best for the purpose, I have found to grow better in a basket than a pot. Amongst flowering plants *Hoya bella* is excellent in a warm house, so also are some of the varieties of the Æschynanthus and Achimenes when well cared for. In the greenhouse there is an abundant choice, but the merits of *Lobelia gracilis* do not meet with that recognition which this plant deserves. Basket plants do not at all times receive sufficient water, hence they often present but a poor appearance. A plant of singular effect for the stove when well grown is *Thyrsacanthus rutilans*. It is seen to the best advantage when trained as a standard some 3 or 4 feet in height, and producing its long pendulous racemes of scarlet flowers. For the stove, again, there are the Ixoras, which, although met with of specimen size in exhibitions, are not by any means to be considered as being only fit for such purposes. They are, when well cultivated, the finest of all our bush-growing stove plants, being valuable as decorative plants whilst still in quite small pots, and also of the greatest service in a cut state.

In the arrangement of large conservatories there should be ample scope to make good use of ornamental foliage plants as permanent objects of interest. For my own part, I prefer to see the beds planted out, and on a level, or nearly so, with the floor, having a marginal line of *Selaginella denticulata*, amongst which small bulbs can be dotted for early flowering. When such beds

are planted so that each one has plenty of room and a little to spare, smaller examples of flowering plants can be introduced between them, the pots of course being plunged. Where this is done it is a good plan to have empty pots sunk level with the soil; into these the plants can be dropped. Some permanent specimens, as Agaves and other succulents, would be found to do better if retained in pots or tubs. Many plants which are of ornamental character can be transferred from the stove to the conservatory during the summer months—Crotons in variety, Dracænas, such as *D. terminalis*, *D. Baptistii*, *D. Youngii*, *D. amabilis*, and *D. Shepherdii*, with the hardier of the Stove Palms, as *Areca lutescens*. Both the Crotons and Dracænas will afford a pleasing change and lighten up the sombre appearance of other foliage plants when there is a deficiency of flowering examples. *Clerodendron fallax*, a plant of noble growth when of specimen size, can also be kept in good condition in the conservatory for several weeks. Greater care is necessary in the watering of stove plants so employed, less being required.

Rockwork, when well clothed with plants of ornamental foliage of suitable character, is a splendid addition to conservatories, particularly where a wall which is unsightly has in a manner to be hidden. These places are most suitable for the foliage Begonias, *Ligularia Kæmpferi argentea*, the variegated grasses and Ferns. Of the latter, where it is possible to use them to advantage, the larger forms of the Nephrolepis should not be overlooked. Ferneries composed of either natural or artificial rockwork, with the Ferns planted out, are most attractive features. The hardier of our exotic Ferns may be thus grown without any fire-heat at all, particularly several of the Filmy Ferns, fine examples of which may be seen in the fernery at the York nurseries of Messrs. Backhouse. This is sunk below the ground-level, hence partially protected. With a fair command of heat, many tender kinds can be successfully grown when planted out. The adaptation of rockwork and Ferns to Orchid-houses is, I think, an excellent idea, adding a charm even to those popular and attractive plants. A capital example of this description is that which can be seen at the Chelsea nurseries of the Messrs. Veitch. A new and suggestive departure in the same nurseries has recently been made in another Orchid-house, where rockwork with Ferns surround a tank in which Aquatics are grow-

ing. Both Orchids, Ferns, and Aquatics are evidently quite at home. More use ought, I think, to be made of aquatic plants; many of them are most ornamental. If the cultivation of such as the *Victoria regia* cannot be carried out for want of a sufficiently high temperature, it is not a difficult matter to select others suitable to a cooler house.

It must be a strange matter if the obstacles which present themselves to the cultivator cannot in one way or another be overcome and the houses rendered both attractive and ornamental by the use of plants with fine foliage. Each case in point should be studied, and those things used in its ornamentation which by previous observation have been found to succeed. In this way I am fully persuaded that our plant-houses may be made more interesting and attractive than they are to be seen at times. Plants which have ceased to be in anywise ornamental by reason of failing health should not be tolerated except for stock purposes. It is an utter mistake to attempt to bring round into a healthy state small or medium sized plants such as Crotons, Dracænas, and others which are of quick growth, when young ones can be raised in less time and with much better results. If not wanted for propagating purposes, the rubbish-heap is the best place for these, room being thus afforded for growing other and more promising plants. The culture of the majority of ornamental stove and greenhouse plants cannot be considered a difficult matter when the means at disposal are fairly good. We who are gardeners have to contend against disadvantages in one form or another; this is, I think, oftentimes to our profit. These difficulties arise in the culture of the plants under consideration as in other instances. The mealy-bug, where it exists, is undoubtedly the greatest plant pest we have. When once clear of it a great sense of relief is afforded, to say nothing of the saving of labour in cleaning, which can hardly be effected without injury if the case be a bad one, the plants at the same time being weakened by the presence of the insects themselves. Amongst Crotons I have, in common with some other growers, been troubled with the leaves dropping from the points of the shoots at times. This, if not detected in time, goes on until the points are completely denuded of any semblance of a leaf. This is caused by a very minute species of spider, which can only be seen with any distinctness through a powerful glass. I would

term it the white spider to distinguish it from our old enemy the red spider. When I was first troubled with this, I tried insecticides without avail. Speaking about it one day to Mr. Thos. Baines, I was advised by him to syringe frequently with water strongly impregnated with soot. This I found most effectual. Tobacco powder will answer the same purpose; but as Crotons delight in plenty of moisture, I consider the other by far the better remedy.

In the cultivation of ornamental plants (and others also) I attach great importance to good and suitable soil for each respective kind. Peat of fibrous character, with the best loam obtainable, and leaf-soil from Oak or Beech leaves, form the staple composts. Good soil is far better by itself than poor soil with either artificial or natural manure added to it. The latter may sustain a plant for a time, but must fail much sooner than the former. It is better to pot into good soil, and then to feed with manure when the pot is well filled with roots. The work of potting pays for being done carefully. Rushing this work through in a hurry does not compensate for the immediate gain in point of time. Firm potting for all plants of permanent character is far preferable to a loose state of the soil, the ultimate gain being less labour with respect not only to watering, but also repotting sooner than would otherwise be required.

The culture of plants for decorative use in small pots is deserving of more recognition in respect to the foregoing remarks than it would at first glance appear to be. When a plant has fairly well filled its pot with roots, and it should perchance have the appearance of not being in the best possible condition, it may be inferred that another shift will have a good effect. Thus the plant when in a larger pot is not so well adapted to its uses, even if the remedial measure be beneficial. Stove plants, which are used in various ways for house decoration, will bear repotting better, and will suffer less from exposure when in proportionately smaller pots. No plants should be repotted until they have thoroughly well laid hold of the soil of their last shift; otherwise the younger roots will suffer through the soil remaining moist for too long a time, being consequently cooler also. Ornamental foliage plants when in good health will bear liberal treatment as regards watering.

Palms in particular thrive well when watered freely ; in fact some might be termed semi-aquatics. More Palms are, I think, brought into a sickly condition for want of water than from any other cause. Crotons also are something like our common Willow in this respect.

In conclusion, I would draw attention to the effect produced by a judicious use of plants of ornamental leafage in mixed groups, as seen now so frequently at our horticultural shows. They are indeed the chief factors employed, for it is easier to dispense with flowering plants altogether than it is to take the opposite course and rely solely upon those in flower.

Discussion.

Mr. James Douglas remarked that Fuchsias were fine greenhouse plants, and were well worthy of cultivation. There were many other kinds of plants which could be easily grown if only a love for the work was brought to bear on the matter. He mentioned the case of a working man in the North of England who began with growing greenhouse plants. Soon he grew these well, and would not be satisfied until he tried to cultivate more difficult plants requiring a warmer temperature. He built himself a hothouse, and by diligent exertions managed at length to produce an entirely new and beautiful plant. This was now well known as *Dipladenia Brearleyana*, and the raiser of it succeeded in obtaining from a London nurseryman the sum of £150 for it. To raise such a plant, accounts of which filled the horticultural papers at the time, he considered a great credit to a working man, and it served to show what could really be done if people would only try.

Mr. George Wythes said he could not but call attention to a beautiful class of plants which, although not really coming under the heading of "Stove or Greenhouse Plants," at any rate well repaid the additional trouble of being grown in a cool greenhouse. He referred to that charming Canterbury Bell, *Campanula pyramidalis*, of which a fine group was present at the time, and attracted great attention.

THE GLADIOLUS.

By the Rev. H. H. D'Ombrain, B.A., F.R.H.S.

[Read August 25, 1891.]

Although there are many sections of this beautiful flower—the early-flowering varieties of *Colvillei*, *nanus*, and *ramosus*, and the more recently introduced so-called hardy ones of the *Lemoinei* and *nanceanus* sections—I presume that it is of the *gandavensis* section that I am particularly called upon to speak to-day. I labour under some disadvantage in so doing, not arising from inexperience, for I have been for thirty-four years growing it, but because last year my friend Mr. Kelway gave a very exhaustive lecture on them, and as that lecture has been published in the Journal of the Society,* you can all refer to it, and think perhaps that I am trespassing on his preserve. In excuse for myself, I may say that there is a good deal of difference between the experience of a cultivator of twenty-four acres, with its hundreds of thousands of bulbs, and the amateur who grows only a few hundred bulbs, and yet perhaps the experience of the latter may be as useful to the great bulk of gardeners from the very smallness of his culture.

The late Mr. Rivers, in his "Amateurs' Rose Guide," says at the commencement that writers too often take for granted that their readers know more than they really do; and as I quite agree with that, I shall at the outset state what a Gladiolus is, and how it grows, for some people have the most delightfully vague notions on this subject. Without, then, harassing you by technical terms, I may safely say that it is a corm; it is not a bulb like a Lily, nor a tuber like a Ranunculus. If you strip off the outer skin of one of these corms you find that there are almost always two eyes, and that from these the shoot is emitted. As the stem grows so does the corm which is to form the plant for next year, and by the time that the flower has reached maturity this corm for next year is fully formed, the old corm perishing, after having supplied nutriment to the new one. Around this, in various positions and of different shapes and sizes, are to be found a number of small ones, which we call spawn, the French bulbules, and it is from these that the supply of corms is kept up. They differ much in

* Vol. XII., Part 3, p. 564.

size, and varieties differ much as to the quantity they produce. Thus I have taken as many as a hundred of these little bulbs from one root of Horace Vernet, while I have grown others for years without obtaining a single one from it, and this to some extent explains why some sorts rapidly fall in price, and others retain theirs for years.

The cultivation of the Gladiolus has been written about a good deal, and Mr. Kelway, in his exhaustive paper read last year, detailed the method of culture adopted by a large grower—for in truth he is a big grower who has 24 acres—and I do not in the least intend to encroach on his preserves when I detail the method of culture adopted by an amateur whose collection does not comprise more than seven or eight hundred bulbs. I will begin with the soil. There have been many opinions mooted on this matter, and experience has considerably modified our opinions. The French growers say that a good market-garden soil is best suited for them; this would, I suppose, mean a good friable loam, but I think that a good stiff loam, provided it be well drained, is the most suitable. Like all bulbs, they very much dislike stagnant water about their roots, and consequently it is an absolute necessity that the drainage be good. This being provided for, a soil that is well suited to Strawberries and Roses is one which will do equally well for them. It ought to be open, and not under the shade of trees. My plan is in the autumn to put a good quantity of old hotbed manure on the ground, and then what is called bastard trench it. This places the manure about nine inches below the surface, so that in planting none of it touches the bulbs—an important point. During the winter, if frosts occur it is well to turn the soil up roughly, so that it may be sweetened in the process, and become in better condition for planting when suitable weather occurs.

I generally plant during the first or second week in March, according to the state of the ground. It is much better to defer it than to plant when the ground is sodden—not, I think, that it makes much difference as to their time of flowering, whether you plant early or late. There are certain kinds which are sure to come early whenever you plant, and other late-blooming kinds refuse to bloom early—plant when you will. Now and then a single root of these may come out of its ordinary course, but, as a rule, they come true to time. Thus Shakespeare, even in this

late season, showed colour at the end of July. After the beds have been made somewhat smooth with a fork (I never use a rake if it can be helped), the rows are drawn about five inches deep and about one foot apart. The bulbs are then prepared. The outer coat is taken off, when it will be seen that there are generally two eyes. I then, with a sharp knife, cut the bulb in two, leaving an eye to each half. I place round each bulb some rough powdered charcoal or charred vegetable refuse, planting them about five inches apart. Some growers allow more—a foot; so probably should I if I were not circumscribed as to room. But as the roots do not spread, but go down straight from the bulb, I do not think this is a matter of much consequence, and I am convinced that I have had as good flowers from those planted closely as when planted a foot apart. When the bed is planted the rows are then filled in, and the whole smoothed with a light fork. They will now require but little attention for some weeks. The beds must be kept clear of weeds, but in all other respects they will take care of themselves. In the month of July they will begin to show their flowering stems, and it will then be necessary to see about the staking. When flowers are grown for exhibition this is an absolute necessity, and where it can be done each one should be staked separately, to keep the spike straight and to prevent its being injured by the wind. When it is not required to be so particular a couple of stakes may be placed at each end of the row, and a wire or strong piece of cord stretched along, to which the stems may be fastened, but to stake them singly is by far the best plan.

Some growers mulch their beds. I have tried both plans, and have come to the conclusion that, except in a very dry season, it is unnecessary. Artificial manures and nitrate of soda and muriate of potash have also been used, but the beneficial results are not, I think, very perceptible.

Leaving the grower to enjoy his stately blooms, let me now say something about harvesting the bulbs. After the flowering season they begin to dry off, and towards the end of October or beginning of November many of them will be fit to take up. As I do not care to save the seed, I cut off the flower-stems as soon as they have bloomed, take away the stakes, and then, as they show symptoms of ripening, take them up. The best place in which to dry them off is a cool vinery out of the sun, where

the process will be gradual. When they are dried the old bulb should be taken off, the stem removed, and the bulbs housed. I take off the outer rough skin, and then write the name on each bulb. This ensures correctness, a point on which all florists are very careful. Some put them away in bags, but I place mine in an open lattice-work frame, with drawers similarly made, and take them into the house, where they are free from frost and yet get air.

I have already alluded to the very exhaustive lecture given on this subject last year by Mr. Kelway. There are, however, one or two points on which I must beg to differ from him. He does not admit that it is a desirable thing to cut the bulbs. Now this is a point on which, to use a homely phrase, the proof of the pudding is in the eating. You have seen the beautiful stands of flowers exhibited by Mr. Fowler. Now all these are from cut bulbs, as were those exhibited by Mr. Lindsell and myself at the Aquarium and Crystal Palace last year, and I think we might challenge comparison with any exhibited from bulbs which were not so treated. Another of Mr. Kelway's opinions was that the French do not care for such closely set spikes as his own seedlings manifest. Here again I appeal to facts, and not to opinions. Compare some of the spikes shown to-day which are of French origin with English-raised flowers, and I do not think that the objection can be maintained. There is another point on which he and I have for many years differed. Gladioli are very apt to die off, and the root when examined is found to be thoroughly bad. Mr. Kelway says this is not a disease, but arises from exhaustion. Yes, but what causes the exhaustion? During the progress of that grievous malady, the influenza, many people died from exhaustion, but it was the disease that caused it. So with the Gladiolus. We lose our bulbs sometimes in very considerable numbers. There seems to be no preventive, and certainly no cure, and we must only, I suppose, "grin and bear it." We are happily free from one plague from which the French growers suffer—the devastating "ver blanc," the grub of the cockchafer. I remember that my dear old friend M. Souchet once told me that he employed during the time this fearful insect was abroad, sixty women and girls to pick them up as they settled down on the earth to deposit their eggs, and that bushels of them were every evening taken and destroyed. The nearness to the Forest of Fontainebleau made them a perfect

plague. There is sometimes to be found a caterpillar—I think that of the gamma moth (*Plusia gamma*)—which gets into the unexpanded blooms and disfigures them. They are sometimes, in very dry seasons, affected by thrip, but this is of rare occurrence.

Where it is desired to keep up a stock and to make up for losses the spawn should be saved. When the bulbs are taken up the spawn will be found round them in various positions and quantities. They should be all rubbed off and kept in small bags or boxes very dry during the winter; in March or April they should be sown out of doors in drills in a place specially allotted to them, and they will come up here like barley. Some, however, of them will remain dormant till the second year. As some of them will form spikes, these should be nipped off in order to secure larger bulbs and more strength. They ought to be lifted much earlier than the flowering bulbs—in fact early in September—and there is no necessity to wait for the foliage decaying. Some varieties come to maturity sooner than others—the whites and yellows being the longest. As I have not done much in this way myself, I have obtained this information from Mr. Burrell, of Cambridge, and from Mr. Kelway, of Langport.

I have said nothing on the subject of exhibiting them, as my desire was rather to encourage the growth of this beautiful autumn flower by showing that its culture is by no means so difficult as many seem to imagine.

Discussion.

Mr. W. Roupell said, although he could not pretend to be an expert in growing Gladioli, still he ventured to differ from Mr. D'ombrain on a few points. He did not quite see the value of cutting the bulbs in two, although it was evident that good results were obtained by this method. If, however, performed by a clever hand, doubtless there was no danger involved, but he thought there was some fear of allowing the rough-and-ready hand of the gardener to perform the operation. By cutting the bulbs they were exposed to the attacks of insects. He was of opinion that the disease of Gladioli did not appear in plants which were grown in fresh and clean ground, but only where the soil had been heavily manured, and had grown crops of Onions and other things. His advice was to avoid dirty soil and everything that tended to

promote insect life. He thought the Gladiolus disease began in some way at the root first of all by a kind of nematoid worm, and gradually worked itself into the corms.

Mr. D'OMBRAIN, in reference to the danger of cutting the bulbs in two, said there was no more danger attached to the operation than there was in cutting up Potatoes before planting.

The Rev. W. WILKS, referring to Mr. Roupell's reason for the disease being that the bulbs were grown in old gardens or manured soil, said that twenty-five years ago he grew Gladioli, and, as he thought, very well. They were all grown in an old garden, which had grown other crops for centuries previous, and had also been well manured. Last year, being partly convinced by Mr. Kelway's lecture, he bought a few of the commonest sorts, and planted them in a piece of land which had within a year or so been a field, and had only been manured once since turned up for cultivation. He planted thirty-six bulbs of Brenchley-ensis in this new, fresh soil, and out of the whole there were only four at that time which had not succumbed to the disease. He could not, therefore, think that old or new soil had anything whatever to do with producing the disease. He had examined the corms, and in the centre he discovered a black mark, from which he concluded that the disease was not acquired, but peculiarly inherent to Gladioli.

Mr. W. MARSHALL suggested that the cause of failure this year was due to the great amount of wet.

Mr. D'OMBRAIN, in reference to Mr. Marshall's remark, said he recollected sustaining his greatest loss during one very dry season.

HARDY WATER AND BOG PLANTS.

By Mr. GEORGE PAUL, F.R.H.S.

[Read September 8, 1891.]

MY paper was to have been on the subject of Hardy Bog Plants, in the culture of which I have had some experience. The Secretary has, I find, coupled them with Water Plants, of which I know but little. My remarks, therefore, on these last must be confined to giving my limited experience with them

an enumeration of the difficulties I have had in planting them in somewhat difficult places and under exceptional circumstances, and to giving a description of a very pretty and successful, if a comparatively small, water-garden which my friend Mr. M. F. Campbell has made at Hoddesdon. I will append a list of plants which I have found to be useful. In the first place, I was led to pay special attention to hardy bog-plants from possessing a small patch of natural bog, which, as a haunt of Rushes and Sphagnum, was an eyesore in an otherwise well-cultivated garden. Such a patch is to be found in most large gardens and pleasure-grounds situate on the hillsides of our valleys—a springy patch developing into a tiny marsh, and beautiful with masses of such flowers as the Yellow-rattle and the Cuckoo-pint, or covered with big Docks, Rushes, or giant Hemlock.

Then turning to many of the moisture-loving perennials, such as the Spiræas, I was struck with their great beauty of development when by chance they found a moist and favourable spot, whereas when planted as usual in the mixed herbaceous borders one never saw their full beauty; with the setting in of dry weather they failed to finish their growth or to produce their flowers satisfactorily, and if subjected to two dry autumns consecutively many of them died out altogether. Here there were two things—a site wanting furnishing and plants seeking such a site, for there are few more lovely plants in their full beauty than the Spiræas, to name only one family of plants. From the common Meadow-sweet of our valley marshes all over England, through the beautiful Japanese forms, such as *S. palmata* and its white variety, up to the gigantic *kamtschatica* exhibited two years ago in this hall, with spikes six to eight feet high of light feathery flowers, all are plants of great beauty when fully developed, and to attain this development a moist, boggy spot is essential.

There are several families of plants, which I will enumerate later on, which lend themselves to a like cultivation. I have made two bog-gardens, both devoted to the growth of bog and mud plants. The first was a natural Sphagnum and Drosera-producing bog on the Bagshot sand formation, which with some little difficulty was brought into cultivation, so that I may perhaps briefly describe the process.

It was a spongy piece of land about twelve yards square, about

half-way down the slope of a hill, at the foot of a bed of gravel. It was treacherous walking to reach the little bed of Sundew, and the one difficulty in forming the garden was to make suitable paths. This slight difficulty was overcome by firmly driving in posts, and resting some long split trees on them; the split branches of the same trees were then nailed crosswise, thus forming what the Americans call a "corduroy" path. The top black soil was cleared away until we reached the clay or watery sand (in which was found an old Oak trunk fast passing into bog oak). The whole was then arranged in terrace beds by means of clay banks, on the top of which ran the corduroy paths. The water after use in the top beds was led in pipes through these clay banks to the next lower beds, and so onwards, varying the quantity of water according to the amount of moisture required in each bed.

A small pond, in which the Cape Pondweed flourishes, was made, and from it the water not required for the lower beds, flowed into a narrow watercourse, along the sides of which, with their roots in the water, Kæmpfer's Iris blossoms well. The highest bed is the wettest owing to the spongy water-spring, and just at this point the variegated *Iris pseudacorus* luxuriated. Other mud-plants used were some varieties of Caltha or Marsh Marigold, which for nearly a month are sheets of yellow blossom; the variety in this family is more noticeable from the time of blooming than from the shape and variation of the flowers. On the sloping bank, above this bed, are naturalised masses of the beautiful Fern *Hypolepis millefolium*, while Lily-of-the-valley, which had originally grown on the bank, is preserved *in situ*; the Blood-root, the Musk and Creeping Jenny, both famous London window-plants, the native Club-moss (*Lycopodium clavatum*), two or three British kinds from Westmoreland, and the Alpine Blackberry (*Rubus arcticus*), which fruits, it is said, beneath the snow of the Arctic regions, were added.

Some curious instances of the travelling powers of plants have also occurred. From the drier part of this bed the Iris moved down into the water of the pond, whilst the Trollius, or Globe Flower, and the American Fern, *Onoclea sensibilis*, have gradually moved up on to the drier bank above.

The two next beds on a lower level were planted with the North American Pitcher or Side-saddle Plants, *Sarracenia purpurea*, *S. Drummondii*, and *S. flava*. The purple variety soon

made itself at home, flowering and seeding and producing offsets abundantly. Drummond's variety exists, while *flava*, a native of the more southern States, succumbed to the first hard winter. On this level the beautiful Madeira Orchis, *O. foliosa*, produces spikes of flowers 18 inches high, whilst I learn that it is almost extinct in Madeira from the effects of two or three dry seasons. The double white and pink Ragged-robins are beautiful in this place; the tall yellow Meadow-rue, and its purple and other forms, grow and flower freely, as do also the North American Liatrises, with their noble spikes of dense purple flowers, and our English Bog-bean, or Menyanthes. Borrowing a hint from Kew, we planted the blue Himalayan Poppies (*Meconopsis*), which have not yet had time to flower, but evidently intend to do so next season. The finer sorts of *Iris Kæmpferii* are here as well as on the margins of the brooks.

On the sides of the pond are varieties of *Osmunda regalis*, which have shed their spores in the interstices of the corderoy path; the Alpine Willows, and the fine big-leaved Saxifrages *peltata* and *Hirculus*.

The next lower beds soon became the home of the Japanese Primula and the Himalayan *P. rosea* and *denticulata*, which, once planted, seed freely after the manner of biennials. The alpine *Primula viscosa* and other water-loving kinds thrive here.

The lowest beds of all were made to hold the Spiræas, of which the most beautiful are *S. Aruncus*, *S. palmata*, the white *Spiræa Ulmaria plena*, and the newer *S. astilboides*, with its better kind, *S. floribunda*. The other kinds I give in a list at the end of this paper. The North American Lilies, such as *pardalinum* and its varieties, also *superbum*, give autumn flowers, mingled with the Spiræas in this bed. The double Cardamine is a weed here carpeting the ground, and the Zebra Reed (*Eulalia*) is most effective.

Some very pretty variegated Sedges (*Carex*) do well in these beds. I am getting Sphagnum established on the wet top bed, on which no doubt the Sundew will also re-establish itself. I had forgotten one plant which I owe to Mr. Wilson, of Wisley—the large American Cranberry.

From these remarks I think it is evident that a bog-garden may be made into a useful as well as a very bright and interesting spot, as my High Beech garden has been for some years. Now

as to the second garden made on an entirely different site and strata, and in a different manner. I venture to think that such a place may be made in any of the damp, springy spots such as I spoke of as existing in most gardens, or indeed wherever the clean waste from a pump, a tap, or from the house-top can be led. I wanted soil to raise what my friend Mr. D'ombrain has facetiously styled "The Broxbourne Alps," and as I had only a flat surface to deal with, I formed a square pond at the foot of the line of one side of this projected hillock, using the earth for the hillock. I kept to the terrace formation, making about three levels, and into them I led the drains from the paths adjoining the nursery quarters, taking means also for artificially flooding them occasionally, in case of drought. After very heavy rains the beds on all three levels are entirely covered with water, which gradually sinks down into the pond-like hole in the centre, in which Bulrushes, the giant Dock, and the Water Iris flourish.

It will be noticed that the idea of the clay banks is preserved, to retain the water a short time in the upper reaches of the pond. This pond was carefully puddled, as the loam resting on gravel is thoroughly porous. All the beds were then filled up with black peat and leaf-soil, into which the plants were put. Most of the kinds thriving at High Beech do well here, and have the advantage of more space. The bolder foliage plants, such as the Bamboos *Metake*, *viridis*, *glaucescens*, and the large *Polygonum sachaliense*, attaining 8 to 10 feet in height; the dwarfer varieties *P. compactum* and *molle*, with their Spiræa-like blooms, are useful at this time of year. Then two or three of the American plants, such as the *Andromeda pulverulenta* and the dwarf Ledums, are beautiful winter evergreens and love the moisture. *Primula farinosa* and *involucrata* or *Munroii*, *Asclepias tuberosa* and its pink form, are at home, and the Astrantias are almost too free. *Claytonia sibirica* becomes a weed. *Corydalis nobilis* and *lutea*, in the higher beds, form beautiful yellow patches, and the Trillium and Cypripedium do well in peat on the banks just above the water-levels. *Dielytra spectabilis* assumes quite another form to that usually seen, and *Dodecatheon Jeffreyanum* is a foot and a half high. The Willow Herbs have to be banished, from their determination to monopolise all the space. Euphorbia, Cyperus, and *Stylophorum*

japonicum make dwarf groups. *Helonias bullata*, a beautiful pink-spiked plant, wants the moistest place ; and all the purple Hellebores, or Lenten Roses, thrive. *Iris aurea* is beautiful in June or July, and some of the Mertensias thrive well there. The Duck-feet, or Podophyllums, are also at home. *Senecio pulcher* takes wonderfully to the moist upper beds, and some few other plants which I have named in my list of bog-plants. I am inclined to think that some such wet, peaty beds should surround all well-constructed rock-gardens. There are so many of the Alpine plants which love moisture at the root, with in some cases full exposure to the sun, and in others enjoying shade. Some of the Alpine Primulas would grow well in shaded bog. I have *Primula involucrata*, *nivalis*, and *Wulfiana* all doing well in such positions, as well as the Dryas and several Campanulas, which soon dry up on the higher shelves of the rock-garden ; and with the many North American and Himalayan plants, such as Meconopsis, which are likely to enrich our Alpine gardens, this is the secret of culture. Where water can be retained, all bog-gardens should have their central or through-running pond, and here the culture of water-plants can be judiciously and easily joined with that of bog-plants. Such is Mr. Campbell's garden, which I will attempt to describe somewhat to you.

His water supply is the overflow from the house-roofs, stored in two or three tanks of various kinds, to secure a constant supply in case of need. It is on the sloping side of a hill, and consists of a series of small basins, very artistically surrounded with small rocky banks, on which many Alpine plants succeed. Each part is devoted to one or two, or at most three, kinds of Water Lilies in the deeper part, while the rather shallower sides have some water-plants which do not require any great depth of water. Thus the upper pool, three feet deep, is devoted to yellow Nuphars of various sorts. In the next is *Nymphæa tuberosa odorata*, with a red centre, and a very fine form of the white Water Lily ; in the shallower water being *Arum virginicum*, the flowering Rush (*Butomus umbellatus*), and the three forms of Bulrush (*Typha latifolia*, *angustifolia*, and *minor*). The third pool is full of Aponogeton, or the Cape Pondweed, the yellow Iris and a locally found white variety, the *I. Kæmpferii*, *I. fœtidissima*, and *I. pseudacorus*, a variegated form of *Carex riparia*, and the Zebra Rush (*Juncus*

zebrina). On the rocks close down to the water, looking north, Ferns seem to do exceedingly well. The Marsh Ferns, North American Claytonia, and even the two Hymenophyllums cover the rocks; while the Spiræas and other bog-plants to which I have alluded clothe the banks. A little island of Sphagnum rising out of the water on a clay hillock has Pinguiculas, or Grass of Parnassus, and the mealy Primrose of the Scottish moors. Altogether this picturesque little garden, filling what would be otherwise a shady, damp corner, is, throughout the spring and summer months, one of the most interesting parts of the garden.

In Mr. Lynch's water-garden at Cambridge there is a large central pond with narrower beds on either side, and a much more extensive collection of plants are there grown.

I understand he has all the newer and rarer of the hybridised Water Lilies, including, I believe, the pink one, which is now beautifully in flower in several Hertfordshire gardens. The Sagittarias, or Arrow-heads, with the beautiful double one, thrive well in such a water-garden. The Marsh Plantain is a distinct and bold-looking plant. The Water Mimulus (*M. luteus*) on the margin of the banks makes glorious masses of yellow.

During the past year I have had great difficulty in planting pieces of water with suitable plants. One was a piece of water where, the bottom being cemented, there was no roothold for the plants. This difficulty was obviated by putting the water-plants in paraffin tubs cut in half, and sinking them to the required depths. The plants succeeded admirably, and are easily kept free from weeds. The other was a swift-running stream, about four feet deep, through the chalk. Some large specially made drain-pipes, into which the plants had been put, had the lower ends worked into the chalk bottom, and some large burrs built up in a hollow manner round groups of three or five prevented the plants and pipes being washed away, and at the same time gave plenty of shelter to the trout with which the stream abounded. A small island formed in the same manner, and covered with Calthas and Sarracenias, has been successful. I append a list of a few of the most easily cultivated of the water-plants, with which any pond can be easily planted and made interesting.

LIST OF WATER-PLANTS, AS DISTINCT FROM BOG-PLANTS.

For Deep Water.

Alisma Plantago, the Water Plantain
Aponogeton distachyon, the Cape Pondweed
Hippuris vulgaris, the Mare's Tail
Nuphar advena, with red stamens
,, lutea, the common yellow Water Lily
,, minor, the small form, for small ponds
*Nymphæa alba
,, candida
Nymphæa lutea (not very hardy)
,, rosea
,, tuberosa
Sagittaria montevidensis (this has not proved hardy at Cambridge)
,, sagittifolia
,, ,, plena
Villarsia nymphæoides, a small yellow Thames Lily

For Shallow Water about Edges.

Alisma Plantago
Butomus umbellatus, Flowering Rush
Caladium virginicum
Caltha palustris (from its bank home it throws its shoots into the water)
Carex paniculatus, Sedge
Cyperus longus
,, vegetus
Menyanthes trifoliata, the Bog Bean
Rumex hydrolapathum, the large Water Dock
Typha latifolia, Bulrush

LIST OF BOG-PLANTS SUITABLE FOR BOG-GARDENS.

Caltha intermedia
,, monstrosa plena (the earliest)
,, nana plena (the latest)
,, palustris plena
Claytonia sibirica
Dodecatheon Jeffreyanum (the finest)
,, Meadia
,, ,, alba
Drosera longifolia (on sphagnum)
,, rotundifolia ,,
Epilobium angustifolium and var. album, white and red Willow Herbs
Epipactis palustris, the Fen Orchid
Iris fœtidissima
,, ,, variegata
,, fulva (in Cambridge Botanic Garden on mound in water)
,, Kæmpferi or lævigata
,, pseudacorus, Yellow Flag
Lilium canadensis
,, carolinianum
,, pardalinum and var. californicum
,, superbum
Liatris pycnostachya
,, spicata
Lobelia syphilitica
Lychnis Flos-cuculi alba plena
Lychnis Flos-cuculi flore pleno
Lythrum Salicaria splendens
Orchis conopsea
,, foliosa
,, latifolia
Primula denticulata
,, farinosa
,, japonica
,, Munroi
,, rosea
Sarracenia Drummondi (on mounds rising from bog)
,, purpurea
Saxifraga Hirculus
,, peltata
Spiræa Aruncus
,, astilboides
,, astilboides floribunda
,, elegans
,, kamtschatica
,, palmata
,, ,, alba
,, Ulmaria plena
,, venusta
Thalictrum flavum glaucum
,, purpureum
Typha angustifolia
,, major
,, minor

* Some of the newer hybrids are under trial at Cheshunt. We recently saw some in the North of England, which were planted in tubs and had survived the winter.

The following plants are also doing well, either at Cambridge or in my bog-garden :—

Acorus gramineus
Arundo Donax
Arundinaria, sorts
Asarum cordatum
„ Hartwegi
Bambusa, sorts
Carex acuta variegata
Cyananthus lobatus
Eomecon chionantha
Equisetum, British forms
Eulalia, sorts
Helonias bullata
Hottonia cordata
Juncus zebrina
„ spiralis
Lastrea Thalictrum (from the Fens)
Lysimachia clethroides
„ Numularia
„ vulgaris
Monarda didyma
Osmunda regalis and varieties
Polygonum compactum
„ Sieboldii
Ranunculus Lingua
Rodgersia podophylla
Scrophularia nodosa variegata
Senecio pulcher
„ retusa
Sium latifolium, Water Parsnip
Struthiopteris pennsylvanica
Symphytum bohemicum
Trollius europæus (on the banks)

INSECTIVOROUS PLANTS.

By Mr. R. Lindsay, F.R.H.S.

[Read September 22, 1891.]

Insectivorous plants are of two kinds—first, those in which there is a true digestive process; and, second, those in which there is merely decomposition and absorption of the liquid products. To the first group belong Drosera, Drosophyllum, Dionæa, Roridula, Byblis, Aldrovanda, Pinguicula, Nepenthes, and Cephalotus; and to the second, Sarracenia, Darlingtonia, Heliamphora, and Utricularia. These are all dicotyledonous plants, and consist of several hundreds of species, which in one way or other capture insects and use them as food. They are remarkable for the adaptations of structure and function by which insects are secured, and for their obvious approach to the animal mode of nutrition. The distribution of insectivorous plants is somewhat remarkable, many being restricted to very small areas, and one half of the genera being monotypic. The large genus Drosera has an all but world-wide distribution; its congeners, however, are restricted to well-defined and usually comparatively small areas. Thus Drosophyllum occurs only in Portugal and Morocco, Byblis in Tropical Australia, Roridula in South Africa; and although Aldrovanda is found in Queensland, in Bengal, and in Europe—a wide distribution explained by its aquatic habit—Dionæa is

restricted to a few localities in North and South Carolina, mainly around Wilmington. Cephalotus occurs only near Albany in Western Australia, Heliamphora on the Roraima Mountains in Venezuela, and Darlingtonia on the Sierra Nevada of California. The six or eight known species of Sarracenia are scattered over the Eastern States of North America. The forty species of Nepenthes are mostly natives of the hotter parts of the Indian Archipelago, but a few range into Ceylon, Bengal, Cochin China, and some even into Tropical Australia, on the one hand, and into the Seychelles and Madagascar on the other. Pinguicula is abundant in the North Temperate zone, and ranges down the Andes as far as Patagonia. The 150 species of Utricularia are mostly aquatic, and found in all save the Polar regions. Their unimportant congeners, Genlisea and Polypompholix, occur in Tropical America and in Western Australia respectively. It is remarkable that all insectivorous plants agree in inhabiting damp heaths, bogs, marshes, and similar situations where water is abundant—a peculiarity perhaps due to their habit of copious secretion, and consequent need of water. Although our knowledge of insectivorous plants dates from 1768, when Ellis sent to Linnæus a remarkable letter giving a description of the "Fly-trap" and its habits, it was not till 1860, when Charles Darwin began the thorough experimental study of insectivorous plants, comparing their sensitiveness, mobility, and digestive powers with those of animals, culminating in his classical work, that their physiological import was rightly understood. Since then the investigation of these plants has been kept steadily in view, the analysis of their vital processes becoming with each year more complete.

Beginning with *Droseraceæ*, and choosing the common *Drosera rotundifolia*, we find that the leaves are beset with numerous hair-like structures with glandular knobs, to which Darwin has applied the term "tentacles." Each tentacle consists of a stalk, at the extremity of which is a glandular knob surrounded by an extremely viscid fluid secretion, which, from its glittering in the sun, has given the plant the name of "Sundew." When a fly alights on a leaf it is immediately entangled amongst the glands; these, on becoming excited, transmit a motor impulse to all the surrounding tentacles, which immediately bend over and soon kill it. The time during which the tentacles remain

inflected depends on the age and vigour of the leaf, and Darwin mentions that they so remain for a much longer time over soluble nitrogenous substances than over those which yield no such matter. When a fly or small piece of meat is placed on certain glands of a leaf, the secretion from the other glands is increased in quantity and becomes acid, and this takes place before they come in contact with the object. At the same time a remarkable movement of the protoplasm takes place, first within the cells of the glands and then within those of the pedicels. This movement Darwin calls "aggregation." When this occurs the cells present a different appearance. Instead of being filled with a homogeneous purple fluid, they now contain variously shaped masses of purple matter suspended in a colourless fluid. The secretion appears to possess, like the gastric juice of the higher animals, some antiseptic power. During warm weather Darwin placed two equal-sized bits of raw meat, one on a leaf and the other on wet moss. After forty-eight hours that on the moss swarmed with infusoria, while that on the leaf was quite free from them. Small cubes of albumen placed in similar circumstances showed that those placed on the moss became threaded with mould, while those on the leaves remained clear, and were changed into a transparent jelly. Although the leaves appear at a glance to be of a reddish colour, they nevertheless contain chlorophyll in their petioles, both surfaces of the blade, and the pedicels of the tentacles, so that they are able to decompose the carbonic acid of the air; but, owing to their feeble root-development, the plants would not be able to obtain a sufficient supply of nitrogen if they had not the power of obtaining that important element from captured insects.

Regarding the other species of Drosera, of which there are fully a hundred scattered over the globe, it is a matter for regret that so few are as yet in cultivation. Many of the species are highly ornamental and exceedingly beautiful. Besides the British species, there are only about a dozen in cultivation. Of these the most amenable to culture are *Drosera dichotoma*, *D. binata*, *D. capensis*, and *D. spathulata*. *D. dichotoma* is a handsome, strong-growing species; when well grown it has leaves a foot high, each divided into four leaflets. It does not, however, capture insects so freely as some of the smaller-growing kinds; probably, from its having such strong roots, it may

not depend so much on what it captures by the leaves. *D. binata*, though considered by many as synonymous with the last-mentioned, is a much more slender-growing plant, having the leaves constantly binate ; the glands are also redder in colour, and it is altogether distinct, and even more graceful than *D. dichotoma*. Both are natives of Australia. *D. capensis* is also a strong-growing species, having long, undivided leaves, thickly beset with glands that secrete copiously and capture large numbers of insects. *D. spathulata* is a very elegant, round-leaved species from Australia, one of the easiest of all to cultivate, as it flowers and seeds very freely. Self-sown seedlings come up in abundance on the surface of the pots where they are grown. Other species in cultivation are *D. auriculata*, *D. Burkei*, *D. cistiflora*, *D. capillaris*, *D. filiformis*, *D. madagascariensis*, and *D. Whittakeri*.

Drosophyllum lusitanicum, the Portuguese "Fly-catcher," is a shrubby-growing plant closely allied to Drosera. It captures large numbers of small flies during the season, but is not a long-lived plant in cultivation. It, however, seeds abundantly, and is best when raised every second or third year. Its large handsome yellow flowers render it peculiarly attractive. The most gigantic member of the family is *Roridula dentata*, a native of South Africa, where it attains to a height of six feet. It is of a shrubby habit, and has long pinnatifid leaves which are covered with an extremely viscid secretion. It captures enormous quantities of flies, and even wasps, the leaves and branches becoming literally covered with insects of various kinds. A plant in the Royal Botanic Garden, Edinburgh, is now 5 feet 6 inches in height. At Stellenbosch, South Africa, where the plant grows wild, the Boers utilise cut branches of it in their rooms for the purpose of catching flies. These are hung up, and soon become covered with flies. The branches are then dipped in water to clean the insects off, and again hung up, when more secretion is exuded by the leaves. This process may be repeated over and over again with the same branch.

One of the best known examples of an insectivorous plant, and also one of the earliest known, is *Dionæa muscipula*, or "Venus' Fly-trap." It belongs to the *Droseraceæ*, and is a native of South Carolina. The leaf-blade of Dionæa is bilobed and the petiole foliaceous. The lobes of the blade

stand at rather less than a right angle to each other, and the edges are set round with bristle-like projections, which interlace like the teeth of a rat-trap when the leaf closes. The upper surface of each lobe towards the midrib is thickly covered with minute red glands, which give it a rosy appearance, and the lobes also bear three erect sensitive filaments arranged in a triangular manner. The filaments are further provided with a joint or hinge near the base, so that when the leaf closes they fold down, and thus escape injury. These filaments or hairs are sensitive over their whole surface, and respond so readily to a momentary touch that an insect alighting on the leaf is almost certain to cause it to close. When touched a motor impulse is conveyed from the excited hair through the cellular tissue of the leaf-blade to the midrib, the result being that the lobes instantly close. This closing, however, is not at first perfect, the teeth only slightly interlacing, so that if the insect is small it is allowed to escape, but if it is large the glands are induced to secrete and absorb the animal matter, which, according to Darwin, has the effect of causing the lobes to press closely against the body of the insect. The pressure is often so great that the outline of the body of the insect can be seen on the outside of the leaf. When the lobes are induced to close by mechanically touching the sensitive hairs, they remain closed only for a short time ; but when an insect is caught they remain closed for about eight days generally. Darwin mentions a case where a leaf remained closed for thirty-five days over a large Tipula. On an insect or other animal substance being thus entrapped by a leaf, the peptic glands on the upper surface of the lobes pour out an acid secretion immediately the animal matter comes in contact with them. Moist nitrogenous substances when placed on the glands of a leaf, even although the sensitive hairs are untouched, not only cause the glands to secrete, but the lobes slowly close. Regarding the capability of Dionæa to feed on nitrogenous matter, a very simple experiment will be sufficient to convince the most sceptical on this point. Let a small cube of white of egg be enclosed in a leaf of the plant, and one can actually watch the process of digestion going on day by day. By carefully inserting the blade of a penknife between the lobes of the leaf and catching the marginal spines with the fingers, the lobes can then be opened sufficiently wide to examine the interior. A good deal of

force is necessary to do this. The first thing observable is that the piece of egg is bathed with a secretion which colours litmus-paper red when touched. In a day or two more the corners of the cube will be found to be rounded, and this process goes on until the piece of egg is dissolved. This may take a fortnight or three weeks' time to accomplish, according to the amount given. The secretion is absorbed by glands in the interior of the leaf. It does not pass down the leaf-stalk to the root, because litmus-paper tied round the leaf-stalk shows no reaction.

The order *Nepenthaceæ* is limited to the single genus Nepenthes, or "Pitcher-plant," which consists of about forty species and a large number of hybrid varieties. They are shrubby, climbing, and dicœcious plants. The pitcher of Nepenthes, which is its most striking feature, is an appendage of the leaf, developed at its apex, and is furnished with a stalk, often a very long one. This stalk, in the case of pitchers formed high up on the stem, has the power of twisting like a tendril round neighbouring objects, and thus the plant climbs to a great height in the forests. In most species the pitchers are of two forms—one appertaining to the young state of the plant, when they are short and inflated; the other belonging to the old state, when they are longer and more funnel-shaped. The mouth of the pitcher is furnished with a thickened corrugated rim, which serves three purposes: first, it strengthens the mouth, and keeps it distended; second, it secretes honey; and third, it forms a row of teeth, which descend into the pitcher and prevent the escape of insects. In some species this row of teeth is strong enough to retain small birds, should they thrust their body beyond a certain length in search of insects. The pitchers are often highly coloured, and vary in size from an inch or two to a foot or eighteen inches in length in the different species. They invariably contain a fluid.

The minute structure of the interior of the pitcher is of a very complicated nature. It presents three distinct surfaces. The first is the "attractive" surface, which occupies the inside of the lid and the mouth of the pitcher. The inside of the lid is studded over with honey-secreting glands, which are also present round the corrugated rim. The glands consist of masses of cells embedded in depressions of the cellular tissue of the lid, and each is surrounded by a ring of guard-cells.

This is the bait which is cunningly provided, so that the victim may be led pleasantly on its way to destruction. One species of Nepenthes has no honey-glands on the inside of the lid—viz., *N. ampullaria*. Sir Joseph Hooker has shown why this species is thus exceptional. Unlike all the other species, its lid is thrown horizontally back, and therefore honey secretion on a lid so placed would tend to lure insects away from the pitcher instead of into it. Next comes the "conductive" surface, which occupies a variable portion of the upper part of the interior of the pitcher. This surface is composed of smooth, glassy cells, which afford no foothold to insects, and it is generally studded over with minute reniform or crescentic ledges. The remainder of the pitcher is occupied by the "secretive" surface. This is thickly covered with glands resembling those of the lid, but the depressions in which they are lodged have their concavities directed downwards, resembling much in appearance inverted waistcoat pockets. Hooker mentions that in *N. Rafflesiana* three thousand of these glands occur in a square inch. An acid fluid, which is secreted by these glands, is formed at the bottom of the pitcher, and is present in considerable quantity before the lid of the pitcher opens. This fluid has the same digestive properties as that of Drosera, Dionæa, and Pinguicula. Animal matter put into the pitchers, such as small pieces of meat or white of egg, becomes acted on in a very short time. It would appear, however, that the digestive power of the secretion is not due entirely to the fluid first secreted by the pitcher, but that a substance resembling pepsine in its action is given off from its inner wall, chiefly after the placing of animal matter in the fluid. In support of this idea Hooker states that very little action took place on any of the substances placed in the fluid drawn from pitchers and deposited in a glass tube, although the disintegration of the substances was three times more rapid in the fluid than in distilled water. On the other hand, substances placed in the fluid in the living pitchers were acted on in a very rapid manner: cubes of boiled egg had their edges dissolved in twenty-four hours, and their surfaces gelatinised. Fragments of fibrine weighing several grains were dissolved, and totally disappeared in two or three days; while bits of cartilage weighing eight to ten grains were greatly diminished and reduced to a transparent jelly in three days.

Sarraceniaceæ consists of eight species of Sarracenia and one each of Darlingtonia and Heliamphora. Sarracenia, or the American Pitcher-plant, has funnel-shaped leaves, which are radical and collected into tufts. The leaves, or pitchers, are of two forms—one having the lid standing erect, allowing rain to enter freely, as in *S. purpurea*; the other having the lid projecting over the mouth of the pitcher, thus preventing rain from falling into it, as in *S. variolaris*. The internal structure of the pitchers, in most species, is like that of Nepenthes. The under-surface of the lid and the mouth of the pitcher are studded over with honey-secreting glands, forming the "attractive" surface. Occupying the upper part of the inner surface of the pitcher proper, and extending some distance down its cavity, is the "conducting" surface. In this each epidermal cell is prolonged downwards into a short, glassy, sharp-pointed hair, which is finely striated. These hairs overlap like the tiles of a house, and they thus afford no foothold to insects. The whole of the cavity of the pitcher below the conducting surface is occupied by the "detentive" surface. In this many of the epidermal cells are prolonged into enormously elongated downward directed hairs, which increase in length towards the bottom of the pitcher; and as the cavity diminishes in width they meet in the centre, and thus completely prevent the escape of any insect which may have been lured into it. Numerous secreting glands are embedded in the detentive surface. Insects are induced to visit the honey secretion of the lid and mouth of the pitcher, and are thus led on to the conducting surface. This affords no foothold, and they glide down till they reach the detentive surface, when, once among the hairs of this part of the pitcher, there is no possibility of returning, their struggles only serving to wedge them deeper and more firmly. The liquid contained in the pitchers is not distinctly acid, and does not show digestive properties very markedly, but it wets an insect much more rapidly than water, causing it to die of asphyxia. The liquid product of decomposition is probably taken up by the roots of the plant.

The flower of Sarracenia is very remarkable. In spring the plant sends up long slender stalks, each of which bears a solitary flower. The style terminates in an umbrella-like expansion. This is five-lobed, the stigmatic surface being situated

at the deflexed point of each lobe. The singular aspect of the flower caused the first English settlers in their native place to give it the name of "Side-saddle Flower." In Gerarde's "Herbal" (1597) there is a characteristic figure of *Sarracenia purpurea*, where it is called "Hollow-leaved Sea-Lavender." *Darlingtonia californica* is a notable member of this family. The pitchers differ from those of Sarracenia in being twisted, and in widening as they reach the apex, which forms a hood. This appendage appears as if perforated at the upper part, and terminates in two fish-tail-like prolongations, which give it a most curious appearance.

The only remaining member of this family is *Heliamphora nutans*, which was discovered on Mount Roraima some years ago. Living plants were brought to this country, and it is now being cultivated by the Messrs. Veitch at Chelsea. It differs from all the other members of the family in having several flowers on a scape, which are destitute of a corolla.

The *Utricularias*, of which there are 150 species, are mostly aquatic, but some exotic species are terrestrial or epiphytic. The aquatic plants are entirely destitute of roots, and the submerged stem and branches are clothed with leaves which are cut up into slender filiform segments, and on these segments numerous little bladders or ampullæ are developed. The leaves are tipped with short, straight bristles. The plants float near the surface of the water, above which they send their flowers, supported on slender stalks. The bladders of Utricularia possess a most ingenious trap-door mechanism which only opens inwards, so that when a Cyclops or other animalcule is once in, it must remain there. All over the interior of the bladder small processes called "quadrifids" are placed, which are supposed to be the active agents in the absorption of the liquid products. As in Sarracenia, the insects captured are not digested, but simply undergo decomposition. When Darwin's work first appeared numerous objections were made as to accepting his conclusions, on the *a priori* ground that digestion was too purely an animal function to be conceivable of plants. So little is the matter now doubted by physiologists, however, that it is all but unanimously accepted by them as a modification of the universal process of digestion alike in animals and plants. The most serious objection, to my mind, was that raised

by cultivators, who pointed to some kinds of insectivorous plants growing and flourishing apparently without any insect food, and who doubted whether any advantage accrued to these plants from the absorption of nitrogenous matter. This is the weak point in Charles Darwin's work—no attempt was made to prove experimentally the amount of benefit accruing to the plants by nitrogenous food. His son, Francis Darwin, however, has proved conclusively, in the case of *Drosera rotundifolia*, that insect-fed plants bear heavier and more numerous seeds than unfed ones. The experiments were conducted with great care, all likely sources of fallacy having been avoided. He grew two lots of plants under similar conditions; one lot he fed with roast meat, one-fiftieth of a grain being placed on the secreting glands, while from the other all such material was carefully excluded. The results were most marked in the number and weight of the seeds. The number of seeds produced by the fed plants was as 240 to 100 of the unfed ones, while the total weight of the seeds was as 380 to 100. The number and weight of the flower-stalks and seed-capsules were also greatly in favour of the fed plants. After the flower-stalks had been removed, the plants were allowed to rest in a greenhouse during winter. On being examined in spring, it was found that the fed plants had laid up a much larger store of material than the unfed ones, for the total weight of plants was in the proportion of 251 to 100 of the unfed plants, and the average weight of each plant was as 213 to 100. While Darwin was performing these most interesting experiments, Drs. Kellerman and Raumer were, all unknown to him, prosecuting almost identical inquiries, and reaching almost exactly similar conclusions.

My own experience in the culture of Dionæa is, that when two sets of plants are grown side by side under the same conditions in every respect, except that insects are excluded from the one and admitted to the other, the latter, or fed plants, are found to be stronger and far superior to the former during the following season. But we must never forget that the natural conditions under which these plants are found are different from what they are under cultivation. In their native habitats they grow in very poor soil and make feeble roots, and under these conditions may require to capture more insects by their leaves to make up for their root deficiency. Under culture, however, fairly

good roots for the size of plant are developed. Darwin mentions that the roots of Dionæa are very small: those of a moderately fine plant which he examined consisted of two branches, about one inch in length, springing from a bulbous enlargement. I have frequently found Dionæa roots six inches in length; but they are deciduous, and I can only conjecture that the roots mentioned by Darwin were not fully grown at the time they were measured. What is here stated of the natural habits of Dionæa applies more or less to all insectivorous plants.

Such is a brief survey of a few of these most interesting plants, whose habits, in some respects, as already said, are curiously allied to those of members of the animal kingdom. In conclusion, I should like to add a few words on their cultivation. They all require pretty much the same description of soil and general treatment. Nepenthes alone demand much heat, an average temperature of 70° suiting the majority of them very well. The soil should consist of good fibrous peat, with the earthy matter shaken well out. To this should be added from a third to a half of chopped Sphagnum moss, with a sprinkling of charcoal, potsherds, and silver sand, all thoroughly well mixed. This will form a free, open compost. Owing to the large amount of water required, good drainage must also be given. In repotting Nepenthes, care should be taken not to injure the delicate roots. It is better not to shake the old soil out, unless it has become soured and unwholesome. In that case the soil should be washed away, thus preserving the roots. Very small pots or baskets should be used in comparison with the size of the plants. The best time for repotting is about the middle of February. The plants should be placed near the glass, and not shaded too heavily unless in very bright sunshine. To have abundance of pitchers produced, the plants should be frequently cut back, as when growing too freely they fail to produce pitchers—and this is just what might be expected, bearing in mind what has been said regarding their habits. So long as the plant is deriving plenty of nourishment from its roots it has the less need to develop pitchers, and hence also the necessity for confining the roots in small pots. In the seedling Nepenthes, the first leaves produced after the cotyledons are small winged pitchers, and a succession of these is developed before a lamina becomes apparent on the young leaves. With

few exceptions, Nepenthes are readily increased from cuttings, the simplest way being to insert the cuttings through the bottom of an inverted flower-pot without any soil, placing it in a heated case—in fact, rooting the cutting in moist air, and afterwards potting it in the usual way.

Sarracenias and Darlingtonia may be treated similarly to Nepenthes, except that they require very little fire-heat: an ordinary greenhouse suits them best. In repotting, a good deal of the old soil should be shaken out. They should be placed near the glass in full sunshine, with plenty of moisture, to ensure which the pots should stand on Sphagnum moss. This retains the moisture, and is better than standing the pots in flats of water, as the soil is not so liable to become soured. All the species are readily increased by division and from seed.

The various species of Drosera, including Dionæa and Drosophyllum, require nearly the same treatment as Sarracenia, except that the soil used should be a little less rough. They are easily raised in quantity from seed. Several of the stronger-rooting kinds of Drosera, such as *D. binata*, *D. dichotoma*, and *D. capensis*, grow readily from root-cuttings. If the roots are cut up into the smallest pieces about February, strewn over the surface of a seed-pan, covering them slightly with sandy soil, and put into a warm case for a few weeks, each little bit of root will grow and develop into a fine plant. In this way an unlimited quantity of these elegant plants may be raised in a single season.

As a rule, there is no great difficulty attending the cultivation of insectivorous plants, and I shall be glad if the foregoing remarks help to make them better known and more frequently grown.

Discussion.

The Rev. Prof. Henslow observed that the digestion of nitrogenous matters presented to insectivorous plants was not only a well-recognised fact, but that it was merely a very highly specialised instance of a much more general phenomenon in the vegetable kingdom. He drew attention to the fact that in germinating seeds the embryo is provided with food, upon which it lives until it has developed roots and leaves. This food consists of starch or oil and a nitrogenous substance called "aleurone."

In order to assimilate them, the embryo secretes ferments of different kinds, one called "diastase" converting two thousand times its volume of starch into sugar; another changes the solid aleurone into an assimilable peptone; while a third enables oil to become emulsionised. In each case the process appears to be identically the same as in our own digestive organs.

As instances of other leaves secreting digestive fluids than those of insectivorous plants, may be mentioned the leaves of the Papaw and Fig trees. Mr. Henslow mentioned that in some tropical countries it was a common habit to wrap up tough meat in the leaves of the former, which soon began to secrete a fluid which, by bringing about incipient digestion, rendered the meat tender. The principle called papaine had been extracted from the juice of the fruit and utilised in the form of digestive pills. It had also been found efficacious in dissolving the false fungoid membrane in diphtheria.

Another example was to be seen in the formation of roots; for, when new ones are formed, they take their rise from certain spots in a special layer called the "pericycle" within the interior of the mother-root. The young root has a so-called "digestive pocket" at the apex, which dissolves and absorbs the cortical tissue of the mother-root until it makes its exit at the surface.

Again, parasitical fungi which penetrate the tissues of stems, leaves, tubers, and even solid wood, are enabled to do so by secreting ferments which dissolve those tissues, however hard they may be, and enable the slender tubes to penetrate and feed upon them.

Lastly, it occasionally happens that underground stems of grasses meet with tubers or bulbs in their course, and, instead of passing round, they burrow through them. It has lately been discovered that the presence of the organised body induces the apex of the shoot to secrete a ferment, which dissolves the tissues, and so enables the grass-stem to literally bore its way through the tuber.

Mr. Henslow concluded his remarks by observing that these few instances show how general is the process of ferment-action—a vegetable rennet or cheese-forming ferment having even been discovered—and that it would seem to be in no appreciable way different from the kindred digestive processes in the animal kingdom.

Dr. Masters remarked that the process of assimilation or digestion as carried out by insectivorous plants was similar to what took place in human beings. Plants required suitable food as well as animals. The main fact with regard to them was absolutely undisputed: namely, when they received suitable food, in the shape of pieces of meat or insects, they digested it by means of a ferment, as animals do. What was not quite so certain, however, was the means by which this process of fermentation was brought about. At one time it was thought that the plants secreted the digesting fluid entirely by their own organisation; but now many considered that bacteria had a great deal to do with inducing fermentation. Some authorities, however, doubted whether the plants really gained any advantage whatever from animal food. At any rate growers of Nepenthes, Sarracenias, &c., did not seem to think so, as they generally stopped the orifices of the "pitchers" with a piece of cotton-wool to prevent the insects gaining admission. If this means of prevention were not adopted, the insects would enter much more abundantly and quickly than the plant could digest them, and after a time their decaying bodies would sadly spoil the outward appearance of the beautiful pitchers. Dr. Masters, however, was of opinion that the rotting of the insects and also of the pitchers was for the benefit of the plants. If the carnivorous properties of these plants were denied, it might be asked of what use were these elaborate traps, such as were to be found in the Nepenthes, Sarracenias, Dionæas, Droseras, Pinguiculas, &c.?

INSECT-CATCHING PLANTS.

By Mr. Lewis Castle, F.R.H.S.

It is not my intention in these few notes to review the whole of the subjects grouped together under the rather misleading titles of "insectivorous" or "carnivorous" plants, as this task has been already so fully and clearly performed by Mr. R. Lindsay that I shall prefer taking a different course, though it is difficult to say anything fresh upon a matter which has been so exhaustively treated in recent years.

The opinion is now generally accepted that certain plants, amongst which *Dionæa muscipula* and the Droseras are conspicuous, are specially adapted for catching and retaining many small insects, the decomposition of which is beneficial to the plants in some way—perhaps by direct absorption; and this is where so much misconception has arisen, for popular writers have seized on the subject as one exactly suited to the fluent pens and prolific imaginations of contributors to daily and weekly papers. Exaggeration has crept in, and most extravagant notions have been formed on the subject. People have come to regard the so-called "carnivorous plants" as vegetable monsters, constantly lying in wait for their prey, which they seize and devour with the ferocity of carnivorous animals in a smaller degree. To such a length has this gone that when the shelves in the porch of the Orchid-house at Kew were railed off, and the poor plants were protected from the too attentive visitors anxious to test the meat-consuming abilities of the Dionæas and Droseras, a report was spread (and it was gravely repeated in a widely circulating paper) that the railing was intended to preserve the onlookers from any possible accidents which might befall them if the plants were in an especially famished condition.

Under such circumstances it is not surprising that many reasonable people have gone to the other extreme and freely expressed their disbelief in all that has been said about them. A few days ago I was conversing with the manager of one of the largest nurseries in Great Britain—an able cultivator, a most experienced plantsman, well educated, and even accomplished in some respects—and he summed up his views in these words: "I do not believe that these plants are insectivorous or carnivorous in any sense of the words. That they catch and kill flies and other insects I know quite well, for I have had some hundreds of the plants under my notice during many years; but I also know that very often this fly-catching business is positively injurious to them, for leaves and pitchers decay by scores when they become partially filled with the decomposed mass, and I cannot perceive what advantage the plants gain from this. I am certain that in a few years the whole theory will be exploded as ridiculous." I have good reason for knowing that others still share this opinion, or I should not have given it so much prominence,

but it is a proof that there is room to say a little more on the matter.

Many seem to run away with the idea that there is something very modern in the statements about the insect-eating plants, yet with regard to some of them it is certainly not novel. For instance, in referring to the common Sundew (*Drosera rotundifolia*), Dr. Withering records this statement from a correspondent: "In August 1780, examining the Drosera in company with Mr. Whately, on his inspecting some of the concentrated leaves we observed a small insect or fly very closely imprisoned therein. On Mr. Whately centrically pressing with a pin other leaves yet in their natural and expanded form, we observed a remarkable, sudden, and elastic spring of the leaves, so as to become inverted upwards, and, as it were, encircling the pin, which evidently showed the method by which the fly came into its embarrassed situation."

I have also a work on botany, published in America in 1804, which gives an excellent plate of *Dionæa muscipula*, and refers at some length to its peculiarities in capturing flies.

Popular attention was drawn to the subject by Sir Joseph Hooker in his address before the British Association in 1874, and this was followed by Mr. Darwin's work on insectivorous plants, in which some most interesting experiments were recorded. Thousands discovered for the first time that these plants constituted some of the wonders of the vegetable kingdom, and began to observe their peculiarities with the keenest interest.

Like many others, feeling only partially convinced by what I had read on the subject, I determined to try a few simple experiments myself on somewhat similar lines to those previously adopted. *Dionæa muscipula* was first taken in hand, and six plants were placed in small pans of sphagnum and peat, in exactly the same proportions and of the same character. They were grown under identical conditions of heat, light, and moisture, the only difference made being in the following points: The framework of two square "cages" or "covers" was made of stout wire, and this was covered with a fine gauze, which, while excluding all insects, interfered in scarcely a perceptible degree with the access of light. The "cages" were each sufficiently large to cover two pans, allowing ample room for the growth of the plants, and four of the Dionæas were thus provided for, two

under each, the remaining pair being placed near them without any covering.

The treatment then pursued was directed to ascertain the relative effects of artificial and insect stimulants and "total abstinence." Two of the plants under the cages were supplied only with clear water; the other two in the next cage received a weekly supply of much-diluted liquid manure from an ordinary stable-tank. The uncovered pair were supplied with clear water like the first, but they were left to exercise their insect-trapping propensities unchecked in any way; and as the house occupied a low, rather damp situation, they were fully engaged during a good portion of the season, for flying insects of various kinds were that year unusually abundant.

The plants were carefully watched, and the progress noted with much interest for a considerable time, and, without giving the minute details, the results can be summarised as follows: All the plants grew well, and there was little difference in the size of the leaves or the general strength. Those supplied with diluted liquid manure were perhaps a shade darker in colour than any of the others; but on the uncovered plants three leaves which had been very actively engaged in the fly-catching business began late in the season to assume a yellowish tint, and ultimately decayed, two on one plant and one on the other. As far as the vegetative organs were concerned this was all the difference observed, but when the flower-spikes appeared the case was altered. Only one of the "unfed" plants produced flowers, and these were at once seen to be weaker in all points than any of the others; the liquid-fed and the insect-fed plants had flowers exactly alike in size and strength, but one of the last named produced an imperfect spike, which did not develop freely. Readily perceptible differences were noted as the capsules swelled; those on the total-abstinent plant were the smallest, and those on the other two were full-sized, well-developed fruits. When the seed was gathered the difference was still more marked in favour of the nitrogen-consuming plants of the second and third series. Taking the same number of seeds of each, the weight was found to be in the proportion of nearly one to two; those from the two series of "fed" plants giving almost double the weight of the other, and they had

altogether a more promising appearance from a gardener's or seedsman's point of view.

Unfortunately my experiments were stopped at this point, or I had intended testing the germinating power of each set; but I entrusted the seeds to a careful friend, and he subsequently gave me the following results, which I am satisfied are quite reliable. Of the seeds from the unfed plant, about sixty per cent. germinated, of those from the others fully ninety per cent. germinated; in the former case twenty per cent. died before they reached full size, and only five per cent. of the others were lost in the same way.

Some time afterwards I tested *Drosera rotundifolia* in a similar way, and with practically the same results, so that I felt amply satisfied in having confirmed the results obtained by several distinguished observers.

In the following year Dr. Regel published in the *Gartenflora* a description of very similar experiments undertaken with four pairs of Droseras, and the results were summarised in the *Gardeners' Chronicle*, as here quoted:—

"*Drosera longifolia.*—The unfed plants bore exactly twice as many seed-capsules as an equal number of fed plants, and these forty-two capsules contained three times as many seeds as the twenty-one capsules, or 3,720 seeds against 1,300 seeds. On the other hand, 1,000 seeds of the unfed plants were somewhat lighter than the same number from the fed plants, being as twenty-five to twenty-seven.

"*Drosera rotundifolia.*—In this experiment the fed and unfed plants produced an equal number of seed-capsules, but the thirty-four capsules of the unfed plants contained nearly three times as many seeds as those of the fed plants. On the other hand, 1,000 seeds of the unfed plants weighed little more than half as much as an equal number of the fed plants."

Dr. Regel was opposed to the views which had been previously set forth on the subject, but the only respect in which his experiments confirmed his opinions was in the number of seeds produced, though this does not seem to have been carried out to the logical conclusion by testing the germinating power and proportion of the various seeds.

Since that time I have observed the Sarracenias and Nepenthes rather closely, and I am convinced the plants derive an

advantage in their seed production from manurial aids, whether obtained from the decomposed insects which so often crowd their pitchers, or from direct artificial applications to their roots, or through the atmosphere ; in the case of the Nepenthes, it must be remembered that under cultivation so many circumstances are altered that it is often difficult to predict results likely to follow certain causes. It is certain, however, that in all these plants there is a manifest adaptation for enticing insects into the modified leaves, and there retaining them until they are lifeless. It is equally certain that whether any portion of the decomposed substance is absorbed direct by the leaf, or aids in fertilising the surrounding soil, or in imparting gases to the atmosphere, the influence must be of a stimulating character, exactly as under cultivation we endeavour to assist plant-growth by various artificial means. Why so few plants should be thus strangely modified when so many others have exactly similar requirements, it is difficult perhaps to understand, but the student of nature is always meeting with difficulties of this kind, that only serve to humble him to a due sense of his own limited capacity and knowledge.

FRUITS FOR COTTAGERS AND SMALL FARMERS.

Attention having lately been directed to the advantages which may be gained by a more general and more careful cultivation of fruit, the Council of the Royal Horticultural Society have requested their Fruit Committee (which consists of forty of the leading experts in fruit culture in this country) to prepare a list, for the information of cottagers and small farmers, of those varieties which they would recommend as being most suitable for the purpose.

In preparing the list the Committee were particularly requested—

(i) To consider the matter entirely from a cottager's or small farmer's point of view ;

(ii) To make it applicable, as far as possible, to the whole of England ; *

(iii) To include in it none but varieties possessing the

* A revised edition has since been prepared for Scotland.

four most necessary characteristics of quality, fertility, good growth, and hardiness; and

(iv) To attach such short notes as were thought desirable.

Copies of this paper for distribution may be obtained at the Society's office. Price, post free, single copy, 1d.; or per 25, 1s.; 50, 1s. 6d.; 100, 2s. 6d.

By order of Council, W. WILKS, *Secretary.*

VARIETIES OF FRUITS FOR ENGLAND.

Note.—(i) The lists are arranged in alphabetical order, and not in order of merit.

(ii) Before deciding which variety to choose, read the whole list through carefully with the notes which follow each sort.

(iii) The dates following the names indicate the season at which the particular variety is in perfection for use. It may, of course, be used earlier or may keep later; it will vary slightly with each varying year, and will be somewhat later in the North of England than in the South and West.

Apples for Cooking.

1. *Blenheim Orange* (November to February).—This has been included in the list because it is an excellent all-round Apple, but those who plant standards of it must be prepared to wait some years for them to begin fruiting. It is not so long in coming into bearing when grown as a bush tree. It is a very fair dessert Apple as well.

2. *Bramley's Seedling* (December to April).—A very fine late-keeping variety and a good bearer. The best Apple for an exposed situation.

3. *Ecklinville* (September and October).—The best of the Codlins; larger and better than No. 4.

4. *Keswick Codlin* (August to October).—A well-known early Apple, and very hardy.

5. *Lane's Prince Albert* (November to April).—One of the finest keeping Apples; bearing so abundantly that the weight of fruit often brings the branches down within the reach of cattle, and is therefore best as a bush tree.

6. *Lord Suffield* (September and October).—A very fine Codlin for a warm, light, stony soil.

7. *Lord Grosvenor* (October and November).—A Codlin; a great bearer and more generally reliable than No. 6.

8. *New Northern Greening* (November to March). A most valuable late Apple for the Midlands and North Country, where it succeeds better than No. 5.

9. *New Hawthornden* (November and December).—A large and first-rate variety.

10. *Potts' Seedling* (August and September).—An invaluable Apple; very large fruit; compact growth; succeeds better in towns than any other.

11. *Stirling Castle* (October and November).—Very large and fertile; best as a bush, as it bears too abundantly to support itself as a standard.

12. *Warner's King* (November and December).—Fruit of enormous size; best in warm, light soils and as a half-standard or spreading bush.

Apples for Eating.

1. *Braddick's Nonpareil* (October to December).—Best grown as a bush tree.

2. *Cox's Orange Pippin* (November to January).—The finest eating Apple; best as a bush, and likes a warm place.

3. *Duchess of Oldenburg* (August and September).—Best as a bush or half-standard; does not keep long.

4. *Irish Peach* (August).—Best as a bush or half-standard; must be used quickly.

5. *King of the Pippins* (October to January).—Best as a bush; likes a warm place.

6. *Red Quarrenden* (August).—Best as a bush or half-standard.

7. *Sturmer Pippin* (February to June).—Best as a bush, and should be left on the tree as long as possible to thoroughly ripen, when it is a very fine variety.

8. *Worcester Pearmain* (September).—May be grown as a standard, but all eating Apples are better in the bush form of tree.

Note.—In really good Apple soils all the above may be grown as standards. "Ribston Pippin" has not been included because—(i) The trees canker so quickly on many soils, and (ii) it is a poor bearer.

Pears for Eating.

1. *Beurré d'Amanlis* (September and October).—Large and well-flavoured; succeeds as a standard.

2. *Durondeau* (October and November).—Large and delicious; succeeds best as a bush or on wall or fence.

3. *Doyenné du Comice* (November).—The best of all Pears, but should be grown on a wall or fence.

4. *Jargonelle* (August).—A good early Pear, but will not keep. It succeeds well as a standard, and is suitable for training up very tall buildings.

5. *Louise Bonne* (October).—Excellent; of medium size; succeeds in most places as a standard, but is worthy of bush or wall culture.

6. *Marie Louise* (October and November).—Succeeds best on a wall or fence, and requires a sheltered spot. In some places it does well as a bush tree.

7. *Pitmaston Duchess* (October and November).—The largest of all, and a very strong grower. Succeeds best as a bush, or on fence or wall, though in good Pear districts it is sometimes grown as a standard. It must by no means be confused with Duchesse d'Angoulême, which, in Great Britain, is a very inferior variety.

8. *Williams's Bon Chrétien* (September).—Very widely known; large and well-flavoured. Succeeds as a standard or bush, and grows to a large size on wall or fence. Will not keep long.

Note.—As a rule, Pears are not a very profitable class of fruit for cottagers and small farmers to grow, but if they are required the above will suit for their purpose.

All Pears require great judgment in gathering; for example, Nos. 4 and 5 should be gathered as soon as ever they will part easily from the tree, while Nos. 3 and 6 should be allowed to hang as long as possible. Pears require great care in handling and packing, so as not to allow them to sustain the slightest bruise or injury, or otherwise they will rot.

If later keeping sorts than the above are required the two best would be Josephine de Malines and Winter Nelis, both of which keep till Christmas; in very favoured spots they will succeed in bush form, but certainly deserve a wall or fence.

Pears for Cooking.

1. *Beurré Clairgeau* (October and November).—A long, handsome Pear, and good bearer; will sometimes sell as a dessert Pear.

2. *Catillac* (December to March).—Very large, round, solid fruit; the best stewing Pear. Should be allowed to hang on the tree late. Best as a bush.

3. *Uvedale's St. Germain* (January to April).—Very large, and for that reason not suited for a standard. Also known as "Belle Angevine."

4. *Verulam* (December to March).—A large and very hardy Pear; succeeds as a standard, the tree growing to a great size.

Note.—Stewing Pears may often be grown with more profit by cottagers and small farmers than dessert Pears, as they generally crop better and always keep and travel better, being less sensitive to injury; care, however, in picking and packing will be amply repaid by the increased value of the fruit.

Plums for Eating.

1. *Belgian Purple* (late August).—Dark red; a great bearer; also cooks well.

2. *Bryanstone Gage* (mid-September).—Green; fine flavour; better on bush or wall, but succeeds as a standard in warm soils.

3. *Denniston's Superb* (late August).—Green; of Greengage flavour; a constant bearer.

4. *Greengage* (early September).—An old favourite, but not a very free bearer. Should not be grown as a standard except in very favoured spots.

5. *Jefferson's* (September).—Green; a large and magnificent dessert Plum; the best "all-round" table kind.

6. *Rivers' Early Transparent* (early September).—Green; the finest early dessert Plum; best on a bush or on wall or fence. This must not be confused with "Transparent" or with "Late Transparent," which are distinct varieties.

Plums for Cooking.

1. *Cox's Emperor* (early September).—Dark red; of the Orleans type; a strong grower.

2. *Gisborne's* (early September).—Yellow; somewhat like "Pershore"; a great bearer.

3. *Rivers' Early Prolific* (early August).—Purple; the most valuable early Plum; of superb flavour when cooked; spreading in growth.

4. *Rivers' Czar* (mid-August).—Dark red; a good bearer; of strong, upright growth.

5. *Rivers' Monarch* (mid-September).—Black; very large; the best late Plum.

6. *Victoria* (late August).—Pink; an enormous bearer; the best for general purposes.

Damsons.

1. *Bradley's King* (mid-season).—Medium size; excellent flavour.

2. *Farleigh Prolific* (early).—Small; an enormous bearer; the best for exposed situations. It is sometimes called "Crittenden," or "Kent Cluster."

3. *Prune Damson* (late).—Large; of Plum shape; of spreading growth, and stouter than other Damsons. It is sometimes called the "Cheshire" and the "Shropshire" Damson, or the "Michaelmas Plum." It must not be confused with the "Gloucester" or "Hereford" Prune, which is smaller in size and of more upright growth.

Cherries for Eating.

A. Dukes: 1. *Archduke* (mid-season).—Bright mulberry.

2. *Mayduke* (early).—Dark red.

B. Yellow-fruited: 1. *Elton* (very early).—Good on heavy soil.

2. *Kent Bigarreau* (early).—Large and fine. Hardy.

C. Black-fruited: 1. *Black Eagle* (mid-season).—Very hardy; rich flavour.

2. *Early Rivers'* (very early).—A magnificent Cherry in every respect.

Cherries for Cooking.

1. *Kentish* (mid-season).—Bright red; very juicy; of the finest flavour.

2. *Morello* (very late).—Good, but only fit for wall, fence, or bush. The "Wye Morello," a small sort, succeeds well as a standard, but the fruit, though excellent, is very small.

Note.—Cherries are not, as a rule, very profitable fruit for cottagers to grow. The above are the best for their purpose.

Raspberries.

1. *Carter's Prolific.*
2. *Superlative.*—Both are excellent red Raspberries.
3. *White Antwerp.*—A good white Raspberry.

Currants.

1. *Red Dutch* (early red).
2. *Raby Castle* (late red).
3. *White Dutch* (white).
4. *Lee's Prolific* (black).

Gooseberries.

1. *Crown Bob.*
2. *Early Sulphur.*
3. *Ironmonger.*
4. *Lancashire Lad.*
5. *Pitmaston Greengage.*
6. *Red Champagne.*
7. *Warrington.*
8. *Whitesmith.*
9. *Whinham's Industry.*

Note.—Nos. 1, 4, and 9 are the best to gather green, and of these No. 9 has the largest fruit. Nos. 5 and 8 are the best white dessert sorts. Nos. 1, 6, and 7 are the best red dessert sorts. No. 2 is the best yellow dessert sort. Nos. 4 and 7 are the best for preserving in a ripe state. Nos. 3, 5, and 6 are the best small sorts for flavour. Other good varieties are Early White Hedgehog, Rumbullion, Golden Drop, Leader, and Broomgirl.

Strawberries.

1. *President.*
2. *Sir Joseph Paxton.*
3. *Vicomtesse Héricart de Thury.*

Note.—All three are thoroughly dependable Strawberries. No. 1 is perhaps finest in flavour and equal in size and cropping with No. 2. No. 2 is firmest in flesh, and therefore travels best. No. 3 is the largest cropper, and almost equal in flavour to No. 1; it is a grand Strawberry for preserving.

Note on Planting.

The best time for planting all fruits is October and November, except for Strawberries, which should be planted in August or early in September. Just digging a hole, cramming the roots in, shovelling the soil over, stamping it down, and leaving it, is *the wrong way to plant*, and can only result in failure.

The *right way* is :—

i. Break up all the earth to a depth of eighteen inches, either in a square or circle of at least three feet across, but without bringing the bottom spit to the top.

ii. If the roots are in any way jagged or torn, cut the points cleanly off with a sharp knife, and shorten back all straight downward roots.

iii. Place the tree in the hole at such a depth that when the planting is finished it will be at the same depth as it was in the nursery, which will be seen by the soil mark on the stem. The depth should be such that the highest up roots will be about three or four inches below the surface when finished.

iv. The roots will generally be found to be growing from various parts of the stem. Spread out the lowest roots carefully on the soil and scatter a little fine earth over

them ; then spread out the roots next above these, adding more soil ; then those above them, and so on, giving a little shake now and then to let the soil run in between the fine roots.

v. When all the roots are spread out and covered, give the tree a good vigorous shake ; add a little more soil, and then tread it in firmly (not hard) and fill up the hole slightly above the surrounding soil, as it will sink one or two inches.

vi. Put a strong stake to the tree, and be sure that the way the two are fastened together is such as to make it impossible for the stem of the tree to chafe itself against the stake when the wind blows.

vii. Protect the trees from rabbits, cattle, and sheep.

It is impossible to exaggerate the importance of all the above details of planting.

If the natural soil is very poor, a little better garden soil may be brought for (iv) shaking in amongst the roots, just to give the tree a good start, but no dung whatever should be used under the ground, though a thin layer over the surface when the planting is done will be helpful.

It is very important not to plant too deep (iii), especially in wet or heavy land. In very wet land it is a good plan to plant the trees almost on the surface, and to mound the earth up to and over the roots.

It is very important to spread out *all* the roots, down to the smallest fibres (iv), and none should be allowed to take a directly downward direction, but every one duly spread out, slanting very slightly downwards from the point at which they grow out of the stem.

It is very important that the soil should not be left loose about the stem and roots (v), but firm treading does not mean hard ramming.

It is very important to fill up the hole two or three inches above the level (v), and not leave a hollow for stagnant water to fill.

It is very important to stake the tree (vi) firmly, so that the roots are not strained by the wind ; but better not stake at all than so as to let the stake chafe through the bark.

It is better to lay the tree in, just lightly covering the roots

up with soil, for a week or so, than to plant in wet, sticky weather.

No turf should be laid over the roots of newly planted trees, but keep the ground clean from weeds and lightly stir it at intervals for two years all over the surface two or three inches deep, to let in sun and air.

Strawberries.—In planting, the collar or neck must be only just below the ground, and the roots be well spread out on all sides.

Raspberries.—When planting, spread out the roots and shorten back the canes to four or five eyes, in fact to a height of six inches. You must not expect fruit the first season, but you will have fine fruiting canes for the next.

Note on Pruning.

Apples, Pears, Plums, Damsons, and Cherries.—Cottagers will do well to ask some neighbouring gardener to prune their trees the first and second years, if they require it. After the first year's growth has been made, standards will only need the removal of shoots that cross one another, and about nine inches cut off the points of strong shoots. Bush trees should have the side-shoots of the branches well shortened back to three or four eyes, and the leading shoots to eight or ten eyes.

Strawberries.—When not wanted for fresh planting, the "runners" should be cut off as they appear, so as to throw all the strength into the plant. Do not cut the leaves off. Fresh beds should be made every third or fourth year.

Raspberries.—Thin out the young growths in early summer by *pulling up* the superfluous ones, and cut out the old canes altogether as soon as they have done fruiting. Manure should be laid over the roots, but Raspberries should never be dug near the canes.

Currants.—Red and White Currants should have the side-shoots of the summer's new growth shortened back to a couple of eyes, and the main leading shoots to five or six eyes, more or less, according as it is wished to let the bush increase in size or not. The centre of the bushes should be kept quite free from growths. Black Currants should be pruned on the exactly opposite plan, cutting out the old wood and leaving the young summer growths

their full length, only removing shoots in the centre to let in the sun and air. Red and White Currants bear chiefly on the old wood; Black Currants on the new (*i.e.*, last year's) growth.

Note on Manuring.

It is a mistake to give young trees heavy dressings of manure, as the ordinary soil of gardens is rich enough. For the first few years aim at laying the foundation of a good tree; keep the boughs rather thin, *i.e.*, well apart, not crowded, but fully exposed to sun and air, so as to ripen the wood, and thus form a sturdy basis for future good crops. Some kinds will bear the second year, and may then be assisted by manure laid on the surface after the fruit is well set, or by waterings of liquid manure, or soapy water, &c., in summer; but fruit trees, young or old, if they are growing and healthy, should only have manure applied when they are bearing a crop, so as to enable them to bring this year's fruit to perfection, and at the same time form fresh blossom-buds for next year.

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETING.

JANUARY 13, 1891.

Dr. MAXWELL T. MASTERS, F.R.S., &c., in the Chair.

ELECTIONS.

Fellows, 20.—R. C. Appleton, J. J. Beale, Ashley Bird, Oswald Bird, William Brass, Vice-Admiral R. B. Cator, Miss Darbishire, Miss Dunlop, Fred. Frith, Edw. Hunt, C. C. Hurst, W. J. James, Maurice Jewell, Frank Lees, Hugh Low, Fred. S. Moseley, P. F. Portway, S. W. Seagrave, Lady Selby Smythe. C. Penny (Associate).

Society Affiliated.—Eastbourne Horticultural Society.

Mr. W. Warren, F.R.H.S., read a paper on "Persian Cyclamen"; and the Rev. W. Wilks, M.A., read a paper on "Hardy Cyclamen." (*See* pp. 153 and 156.)

FLORAL COMMITTEE.

W. MARSHALL, Esq., in the Chair, and nineteen members present.

Award Recommended:—

Award of Merit.

To Begonia (hybrid) Winter Gem (votes, unanimous), from Messrs. James Veitch & Sons, Chelsea.

A most useful winter-flowering plant. Its corymbs of rich scarlet-crimson are thrown up well above the foliage, and remain in perfect condition for some weeks. This new hybrid is the result of a cross effected between the winter-blooming B. socotrana and a crimson-scarlet summer-flowering tuberous variety, the former being the seed-parent.

Cultural Commendation.

To Mr. T. S. Ware, Tottenham, for some well-flowered plants of the Hoop Petticoat Narcissus—N. monophyllus.

Other Exhibit.

The Duke of Northumberland, Albury Park, Guildford (Mr. W. C. Leach, gardener), sent flowers of several American varieties of Chrysanthemums.

ORCHID COMMITTEE.

H. J. Veitch, Esq., F.L.S., in the Chair, and thirteen members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. B. S. Williams & Son, Upper Holloway, N., for a group of Orchids effectively arranged with Ferns and Cliveas. The principal plants in the group were Cypripedium vexillarium ×, C. Fitchianum ×, with six flowers; C. Crossianum ×, C. insigne albo-marginatum, C. Dauthierii × and C. D. marmoratum × ; C. Williamsianum ×, C. Io grandis ×, C. Leeanum ×, C. Sallierii ×, and C. S. aureum × ; C. Ashburtoniæ ×, two fine plants of Lælia anceps Dawsoni, each with several spikes ; Zygopetalum crinitum roseum, Epidendrum Wallisii, Brassia antherotes, Oncidium Phalænopsis, and several species of Odontoglossum, among them being a fine variety of O. blandum with two spikes.

Award of Merit.

To Lælia anceps grandiflora, Chamberlain's variety (votes, unanimous), from the Right Hon. Joseph Chamberlain, M.P. (Orchid grower, Mr. H. A. Burberry), Highbury, Moor Green, Birmingham. This is the best form of the type known as "grandiflora"; its flowers are very richly coloured, and are remarkable for the very broad and handsome labellum.

To Lælia anceps Ballantinei (votes, unanimous), from Messrs. F. Sander & Co., St. Albans. A form closely approaching L. a. Amesiana. The sepals and petals white, flushed with rose, and the rather narrow front lobe of the lip rich purplish maroon.

Other Exhibits.

The Right Hon. Joseph Chamberlain, M.P. (Orchid grower, Mr. H. A. Burberry), sent cut spikes of Lælia anceps Barkeriana,

L. a. oculata, a variety with a conspicuous white area in the centre of the labellum; and typical L. anceps for comparison.

J. Charlton Parr, Esq., Grappenhall, Heyes, Warrington, sent a plant of hybrid Cypripedium, the result of crossing C. Haynaldianum with pollen of C. Spicerianum. The Committee decided it was C. Carnusianum ×.

A. S. Smith, Esq., Silvermere, Cobham, Surrey (gardener, Mr. James Quarterman), submitted a white-flowered Cattleya, which was pronounced to be C. Trianæ alba.

Messrs. James Veitch & Son, King's Road, Chelsea, staged their new Dendrobium euosmum roseum (D. nobile × D. endocharis). Its flowers have a striking resemblance to those of D. Linawianum—white, tipped with rose pink. Messrs. Veitch also sent Cypripedium Creon × (C. œnanthum superbum × C. Harrisianum), which the Committee desired to see again; C. Niobe × (C. Fairieanum × C. Spicerianum); C. Calypso × (C. Spicerianum × C. Boxalli), C. Lathamianum × (C. villosum × C. Spicerianum), and Calanthe excellens (C. Regnieri × C. vestita). The flowers of the last named are very much like those of C. Williamsii—an imported plant and probably a natural hybrid.

S. F. Ebner, Esq., Horton House, Beckenham (Orchid grower, Mr. Franklin), sent Cypripedium Savageanum superbum (C. Harrisianum var. × C. Spicerianum). The Committee requested to see it again when more fully developed.

G. Burnham, Esq., Stoke Newington, staged a good specimen of Cypripedium insigne with many flowers.

Messrs. F. Sander & Co., St. Albans, exhibited a new form of Catasetum near to C. atratum; Cypripedium Kramerianum × (C. œnanthum × C. villosum), Lælia anceps alba, and a spray of Dendrobium Leechianum ×.

Baron Schröder, The Dell, Egham (gardener, Mr. H. Ballantine), exhibited very fine flowers of Cypripedium Harrisianum superbum × and C. Galatea majus ×.

Messrs. Pitcher and Manda, Hextable, Swanley, Kent, staged Cypripedium Masereelianum ×, which, although an undoubtedly fine plant, the Committee regarded as a form of C. Leeanum ×; C. Leeanum, Burford variety, and C. magniflorum ×. No communication respecting the origin of the latter was placed before the Committee, who considered it to be C. longifolium.

FRUIT COMMITTEE.

P. Crowley, Esq., F.L.S., in the Chair, and eighteen members present.

Award Recommended:—

Silver Banksian Medal.

To Mr. J. Watkins, Pomona Farm, Withington, Hereford, for a fine collection of culinary and dessert Apples (fifty varieties) in wonderfully fresh condition and highly coloured, the most noteworthy varieties being Beauty of Wilts, Stoke Edith Pippin, Dumelow's Seedling, Tyler's Kernel, Gloria Mundi, Kirke's Fame, Golden Nobb, Warner's King, Beauty of Kent, King of the Pippins, Striped Beefing, Bedfordshire Foundling, Mère de Menage, Court Pendu Plat, Royal Somerset, Old Winter Queening, and Reinette de Canada. Mr. Watkins also sent a most interesting collection of Cider Apples.

SCIENTIFIC COMMITTEE.

Dr. Maxwell T. Masters, F.R.S., &c., in the Chair, and ten members present.

Culture of Yeast.—Prof. Marshall Ward announced that he had succeeded in confirming Hansen's statement that yeast-cells might be made to produce their endospores by cultivation on dry gelatine at a temperature of 25° to 27° C. (say 80° F.).

Proliferous Oranges.—Two specimens, from Mr. Tharpe and Dr. J. Harvey Gibson respectively, were shown, in which a second smaller Orange provided with its rind was enclosed within another. Dr. Bonavia, in commenting on these specimens, explained his views that the rind of the Orange is really the representative of an outer abortive row of carpels, and that the oil-cells of the rind are the modified equivalents of the pulp-cells.

Dr. Scott pointed out that, according to De Bary, the oil-glands of Citrus were "lysignetic," or the result of the breaking down of certain transitory cells; these cells are smaller than those of the rest of the leaf-tissue and full of granular protoplasm, which is soon replaced by minute drops of ethereal oil. As the delicate partitions between these cells break down and disappear, the small oil-globules coalesce, so as to form one large drop.

Dr. Masters referred to Caruel's explanation of the analogy between the pulp-cells and epidermal hairs.

Dr. Bonavia further referred in support of his views to the disc or outgrowth from the axis which characterises the flowers

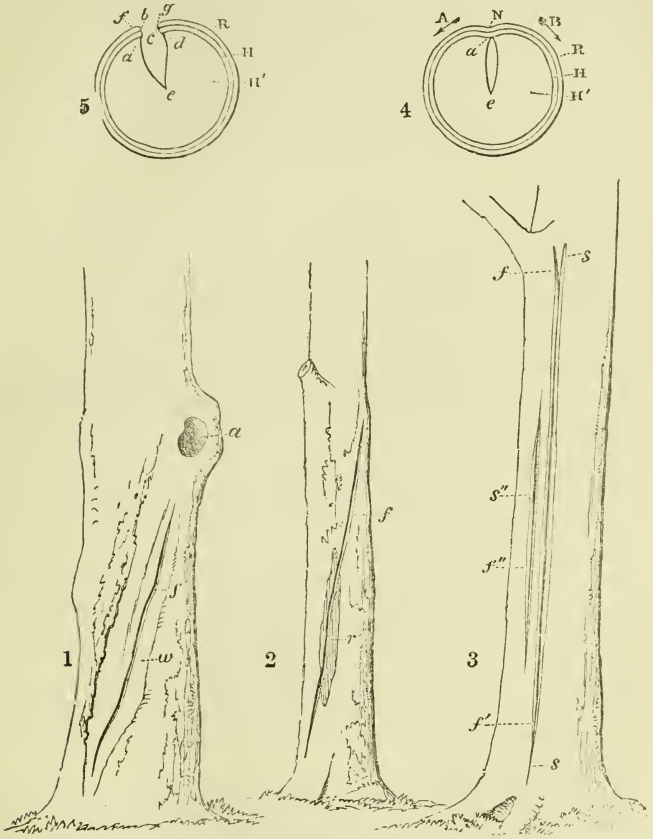

Fig. 45.—Trees Split by Frost.—(From the *Gardeners' Chronicle.*)

of the Orange and its allies, as also of the Moutan Pæony and other plants.

Professor Church commented on the development, in the absence of light, of the colouring matter as well as of the oily constituents as exemplified in these specimens.

Dr. Masters did not consider that the disc had anything to

do with the carpellary whorl, though it was true that A. P. de Candolle had considered the rind of the Orange to arise from the development of the disc. An examination of the flower in the course of its development, and indeed, in the mature state, is sufficient to show that this explanation is not correct. The specimens on the table were instances of "intra-carpellary prolification," and the formation of a second whorl of carpels above and within the first. As the inner carpels had as perfect rind as the outer ones, it was clear that the rind was neither a development of the disc, nor the representative of an outer and abortive row of carpels.

Cracking of Trees from Frost.—From Mr. C. Noble came a characteristic drawing, showing the effects of frost in splitting the bark and the young wood of the Spanish Chestnut. The fissure was longitudinal and of considerable length, and occurred on the north side of the tree.

We append an illustration (fig. 45) of trees ruptured by frost, with the following explanation as made by the late Dr. Caspary :—

No. 1.—Oak with a frost cleft *f* under a knot *a* ; *w*, border of over-growth.
No. 2.—Horse Chestnut with a frost clef *f* which crosses an injury in the bark *r*, whence the decay had penetrated into the wood the depth of half an inch.
No. 3.—Ash. The frost cleft *f*—*f'* follows the direction of a cut previously made in the bark, *s*—*s'*, except in the upper part, where it diverges to the left. In another cut *s''* there is a second frost cleft *f''*.
No. 4.—Plan of a Lime tree previously split by frost, but having an over-growth. *a e*, cavity of old cleft; H', old wood ; H, young wood ; R, bark ; N, place where it has overgrown.
No. 5.—Plan of same tree as No. 4, after being re-split in a subsequent winter. R, H, H', as in No. 4 ; *f b g c*, line of rupture of the bark ; *b a*, *c d*, lines of rupture of the young wood ; *a e*, *d e*, concave sides of cavity.

Plant Diseases.—A letter from Professor Sorauer was read suggesting the desirability of co-operation on the part of the Committee with an association lately inaugurated in Germany for the purpose of studying the diseases of plants grown for agricultural purposes, and of instituting conjoint action in the matter of prevention or remedy. Professor Sorauer's proposals received the sympathy of the members present.

ANNUAL GENERAL MEETING.

February 10, 1891.

Sir Trevor Lawrence, Bart., M.P. (President), in the Chair.

The minutes of the last Annual General Meeting of February 11, 1890, were read and signed.

The following elections took place :—

Fellows, 47.—Robt. Appleby, Arthur Beale, Miss Blacker, G. W. Boteler, Geo. Brycesson, T. J. R. Chalice, Hon. G. W. Cotton, Septimus Croft, James Curtis, F. Deacon, Marchioness of Drogheda, W. Elliott, Welbore Ellis, Rev. J. W. Ewing, Chas. R. L. Fletcher, F. W. Force, F. Baden Fuller, Rev. Francis H. Gall, Gregory Harris, Thomas Hobbs, Fred Howcroft, Mrs. W. F. Kirby, F. Knight, Robert Lake, Emile Lemoine, Edward Luckhurst, Captain G. Spencer Meredith, Mrs. Milne-Redhead, Harry Arthur Needs, Arthur Newall, Osmond G. Orpen, Mrs. N. Page, Thomas James Phillips, Mrs. Raven, H. F. Rosoman, the Very Rev. Dean of Rochester, Frank Rothera, M.D., Rt. Hon. Lord Savile, G.C.B., George Thornton Skilbeck, John Pentland Smith, M.A., Mrs. Charles Stewart, Mrs. R. F. St. Leger, W. Troy, J. Vavasseur, F. Ernest Weiss, F.L.S., Mrs. Williams, F. S. Wrighton.

Societies Affiliated, 4.—Chelmsford and Essex Horticultural Society; Harrow Weald, &c., Horticultural Society; Hayward's Heath Horticultural Society; Royal Jersey Agricultural and Horticultural Society.

Messrs. W. Marshall and J. Cheal were appointed scrutineers of the ballot.

A hearty vote of thanks was unanimously accorded to the retiring members of the Council, viz.: Sir Chas. W. Strickland, Bart., T. Francis Rivers, Esq., and Colonel Beddome.

To fill the vacancies on the Council the following gentlemen were proposed for election, viz.: Sir John T. D. Llewelyn, Bart., Mr. D. Morris, and Mr. George Bunyard.

The following gentlemen were proposed for re-election as officers, viz.: *President*, Sir Trevor Lawrence, Bart., M.P.; *Treasurer*, Philip Crowley, Esq., F.L.S.; *Secretary*, Rev. W. Wilks, M.A.; *Auditors*, Messrs. W. Richards (since deceased), Harry Turner, Henry Williams, and A. H. Pearson.

After careful examination of the ballot papers, the Scrutineers reported the above-named gentlemen to be all duly elected.

The Chairman, in moving the adoption of the Report, reviewed with satisfaction the work of the Society during the year 1890, and directed the attention of the meeting to the Schedule of Arrangements for 1891, in which would be found a programme of greater interest and extent than that of the past year, owing to the larger amount of money which was offered in prizes to amateurs.

Mr. Harry Veitch asked if the election of Mr. Philip Crowley as Treasurer was strictly in accordance with the Bye Laws of the Society. The Secretary read Bye Laws 68, 69, and 76, which had governed the action of the Council in the matter.

Baron Schröder, in seconding the adoption of the Report, called attention to the scheme for building a Central Hall of Horticulture, and said that owing to the late unfortunate crisis in financial affairs in the City of London, the scheme which had received promises of support to more than half the sum required, was temporarily in abeyance. He said that if £35,000 were subscribed, he himself would be happy to subscribe the remaining £5,000.

Mr. W. T. Thiselton Dyer, in moving a vote of thanks to the Chairman, bore testimony to the excellent results produced by the republication of the Society's *Journal*. He considered that the money it cost was thoroughly well spent, and attributed to it the number of Fellows residing at a distance from London and who had lately joined the Society.

The Report for the year 1890, as below, was then unanimously adopted.

REPORT OF THE COUNCIL FOR THE YEAR 1890-91.

The year 1890 has been one of steady work and progress for our Society.

Five Conferences have been held at Chiswick, viz.: on Daffodils, on Carnations, on Ferns, on Dahlias, and on Grapes, and the attendance of Fellows and others at them, as also at the Fortnightly Lectures at the Drill Hall, has been decidedly more encouraging than in previous years. Fellows would greatly assist the Council by making these Meetings and Lectures better

known among the general public. For this purpose, Fellows may obtain at the office packets of tickets of admission for distribution among their friends at the following rates: 12 one shilling tickets, 10*s.*; or 6 for 5*s.*

Sixteen Fruit and Floral Meetings have been held at the Drill Hall, besides those held at Chiswick, and Lectures have been delivered at fourteen of them. The number of awards has been as follows: On the recommendation of the Floral Committee, 40 First Class Certificates against 54 in 1889, 117 Awards of Merit against 84, 2 Commendations against 3 last year. On the recommendation of the Orchid Committee, 56 First Class Certificates against 27 last year, 45 Awards of Merit against 7, 9 Botanical Certificates against 12. On the recommendation of the Fruit and Vegetable Committee, 6 First Class Certificates against 7, and 7 Awards of Merit against 3 last year.

The Society's great Show held (by the renewed kindness of the Treasurer and Benchers) in the Inner Temple Gardens, and opened by His Royal Highness the Prince of Wales, was a greater success than ever, alike in the number of visitors, the quantity and quality of the exhibits, the propitiousness of the elements, and the consequent pecuniary result. The best thanks of the Society are due to all who so kindly brought their plants for exhibition or otherwise contributed to the success of this Show.

The Society's general work of Scientific experiment and investigation, and of the practical trial of various plants, has been going on steadily at Chiswick, under the superintendence of Mr. Barron. Trial has been made of 104 varieties of Lettuce, 25 of Endive, 33 of Celery, 36 of Leeks, and 30 of Broad Beans. Thirty-four new varieties of Potatoes, 23 new Peas, 30 new Tomatos have been tested. In the Floral Department 415 varieties of Carnations and Picotees, 354 Dahlias, 58 Ivy-leafed Pelargoniums, 70 Violas and Bedding Pansies, 112 different strains of China Asters, and 32 of Stocks have been tried. A very large collection of perennial Asters (Michaelmas Daisies) and Sunflowers have been received in view of the projected Conference upon them in October, which will prove of the greatest possible interest, and will, it is hoped, serve to clear away the great existing confusion in their nomenclature in different parts of the country.

The experiment of opening the gardens on Sundays, which was commenced in 1888 for the sole purpose of giving such Fellows as are fully occupied during the week an opportunity of visiting them for scientific or practical purposes, has again, as it did the year before, proved unsuccessful in that particular direction; it has therefore been decided to abandon it, as it not only throws additional work on the officials on their one rest day in the week, but also entails considerable expense on the Society which can ill be spared from the general work of the Gardens.

The Society's *Journal* has been continued so as to enable Fellows at a distance to enter more fully into and reap the benefits of the study and work of those more actively engaged at the centre. Three parts, forming Vol. XII., 707 pages, with 42 Plates of new plants, &c., have been published during the twelve months, and letters are constantly received from the most distant and diverse sources, testifying to the Fellows' appreciation of this renewed branch of the Society's work.

The Council wish to repeat *verbatim* one paragraph of their last year's report, which runs as follows:

"All these Conferences and Meetings, and especially the work and maintenance of the Chiswick Gardens and the publication of the *Journal*, have involved the Society in a very large outlay, and the Council take this opportunity of endeavouring to impress upon Fellows the absolute necessity there is for them all individually (as many as have the Society's welfare at heart) to endeavour to secure new Fellows to the Society if its work is not only to be continued at its present standard, but still more so if the ever-opening and extending opportunities of usefulness are to be embraced and accepted. The adoption of £1. 1*s*. as one rate of subscription was, no doubt, a popular movement, but the Council desire to remind the Fellows that such a low rate of Fellowship can only be self-supporting if it draws into the Society a *very large number* (far larger than at present exists) of additional Fellows. The Council, therefore, venture to express the hope that every Fellow of the Society will make an endeavour to obtain at least one new Fellow during this present year. A statement of the privileges of Fellows and of the aims and objects of the Society, together with a form of nomination to Fellowship, is for this purpose enclosed with this Report."

The following Table will show the Society's progress in regard to numerical strength during the past year:—

Deaths in 1890.

		£	s.	d.
Life Fellows ...	6	0	0	0
4 Guineas	0	0	0	0
2 „	8	16	16	0
1 „	5	5	5	0
	19	£22	1	0

Resignations.

		£	s.	d.
4 Guineas	3	12	12	0
2 „	19	39	18	0
1 „	19	19	19	0
	41	£72	9	0
Total loss	60	£94	10	0

Fellows Elected in 1890.

		£	s.	d.
4 Guineas.....	1	4	4	0
2 „	105	220	10	0
1 „	309	324	9	0
Associates	1	0	10	6
Affiliated Societies	8	10	10	0
New Fellows, &c....	424	£560	3	6
Deduct loss ...		94	10	0
Net increase in income		£465	13	6

New Fellows, &c.	424
Deduct resignations and deaths	60
Increase in number of Fellows	364

The most notable feature in the past year's work has been the excellent commencement made for raising a fund for obtaining for the Society more suitable and worthy premises, and for building a Horticultural Hall to meet the requirements with regard to light and space and position, not only of our own Society, but also of the numerous kindred Associations of this great Metropolis. A scheme for the purpose was put forth in the Spring by which it was proposed to borrow, without interest, from those willing to so lend it, a sum of £40,000, part of which was to be expended on the buildings and part placed in the hands of Trustees to safeguard the annual ground rent, the principal being, it is hoped, gradually repaid to the lenders by annual drawings out of the assets accruing from the rent paid to the Trustees by the Society and by other kindred associations using the building, and by occasional lettings. The trustees are Sir Trevor Lawrence, Bart., M.P.; Baron Henry Schröder (to whom we are indebted for the scheme), and Everard A. Hambro, Esq. The response made to the scheme was at first very promising, and half the amount required was promised during the ensuing summer, but owing to circumstances connected with the condition of financial matters generally it was thought advisable in the autumn to allow the appeal to rest for at least six months, but it is hoped to resume active operations again as soon as the present Spring is advanced.

In conjunction with the Lindley Library Trustees, the Society's Library has received considerable attention. All serial publications have been kept up to date, a large number of untidy but valuable volumes have been bound, and the following books amongst others added to the Library, viz. :—"Annales des Sciences Naturelles," 6 vols.; "Nuovo Giornale Botanico Italiano," 12 vols.; "Revue Horticole;" "Köhler, Medizinal Pflanzen;" "Nyman, Conspectus floræ Europææ;" "Pflanzen-Familien;" "Baillon, Dict. Bot.;" "Archives Nouvelles du Muséum d'Histoire Naturelle;" "Icones Plantarum;" "Amaryllideæ," &c.

The best thanks of the Society are due to all those who, either at home or abroad, have so kindly and liberally presented books to the Library or plants or seeds to the Gardens. Special thanks are due to those who have so kindly contributed Perennial Asters and Sunflowers in view of a much-needed Conference on them in October.

The Council also wish to express, in their own name and in that of all Fellows of the Society, their great indebtedness to all who have so kindly contributed, either by the exhibition of plants, fruits, flowers, or vegetables, or by the reading of papers, to the success of the Conferences and fortnightly Meetings.

The papers read at these Meetings, most of which have been already published in the *Journal*,* are as follows:—

January 14.—"A Method of Winter Gardening," Rev. W. Wilks, M.A.

March 11.—"Hippeastrums (Amaryllis), Mr. Harry Veitch, F.L.S., and Mr. James Douglas.

March 25.—"Saladings," Mons. Henry de Vilmorin.

April 8.—"Spring Flower Gardening," Mr. W. Ingram.

April 16.—"Daffodils," Professor Michael Foster, Sec. R.S., Mr. C. R. Scrase-Dickins, Mr. T. A. Dorrien-Smith, Rev. A. Rawson, M.A., Herr Krelage, Mr. James Walker, Rev. G. H. Engleheart, M.A., Mr. F. W. Burbidge, F.L.S., Rev. C. Wolley-Dod, M.A., and Rev. W. Wilks, M.A.

April 22.—"On Primulas," Rev. C. Wolley-Dod, M.A., and Mr. Henwood.

* Most of the back numbers of the *Journal* can be purchased at reduced prices, but some are now out of print.

May 13.—"Hardy Spring-flowering Shrubs and Trees," Mr. W. Goldring.

June 10.—"Herbaceous Pæonies," Mr. Geo. Paul and Mr. R. Irwin Lynch, A.L.S.

June 24.—"Hardy Herbaceous and Alpine Plants," Rev. C. Wolley-Dod, M.A.

July 8.—"Cultivated Lilies," Mr. H. J. Elwes, F.L.S.

July 22.—"Carnations," Mr. Martin Smith, Mr. M. Rowan, Mr. H. Turner, Mr. R. Dean, and Mr. F. N. Williams.

July 23.—"On Ferns," Mr. C. T. Druery, Mr. J. Birkenhead, Mr. E. J. Lowe, F.R.S., and Professor Bower, F.L.S.

August 12.—"On Fruit Evaporation," Mr. E. W. Badger.

August 26.—"Hollyhocks," Mr. James Douglas.

September 9.—"Gladiolus," Mons. V. Lemoine and Mr. J. Kelway.

September 23.—"On Dahlias," Mr. T. W. Girdlestone, M.A., the late Mr. Shirley Hibberd, and Mr. Walter H. Williams.

September 24.—"On Grapes," Mr. T. F. Rivers, Mr. R. D. Blackmore, and Mr. W. Thomson.

October 14.—"On Crinums," Sir Charles Strickland, Bart.

October 28.—"Trees and Shrubs for Large Towns," Dr. Masters, F.R.S.

November 11.—"Chinese Primulas," Mr. A. W. Sutton, F.L.S.

The hearty thanks of the Society are due to the Chiswick Board and 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 most kind and patient attention which they have severally given to their departments; also to the exhibitors who have contributed to so great an extent to produce the magnificent results of the Daffodil, Carnation, Fern, Dahlia, and Grape Conferences.

The Council have the sad duty of recording the death of 19 Fellows during the year, and amongst them they deeply regret to find the names of Messrs. Wildsmith, MacIntosh, Haughton, Williams, Holmes, Deal, and Shirley Hibberd, Miss North, and Miss Owen. The loss the Society has sustained in this manner has been unusually great, not in numbers, perhaps, but in the relative importance of the gaps left in our ranks, Messrs. Wildsmith, Deal, and Hibberd, and especially the last named, having

been most energetic and loyal supporters of the Society and themselves active workers in all its undertakings.

During the past three years the Council have amongst other matters been considering methods of interesting amateurs more in the Society and its work and of rendering to them a greater personal return for their subscriptions. To this end they have already established the fortnightly Lectures, and the great Temple Show; have promoted various Conferences on interesting Horticultural subjects; and have revived the publication of the *Journal*. They have now further decided to revive the Society's ancient custom of offering prizes to amateurs, a long Schedule of which has been already circulated in the "Arrangements for 1891." The Council cannot afford, with the very limited funds at their disposal, to embark on any very comprehensive scheme this year, but if this new departure should meet with general approval they hope that the Fellows themselves will, by subscriptions to the "Prize Fund for 1892," enable them next year to set forth a much fuller Schedule.

Another revival during the past year has been the following scheme of Affiliation with local societies, and the Council would feel greatly obliged if Fellows who take an interest in the affairs of any local Horticultural Societies would use their influence to secure co-operation in this way.

Scheme of Affiliation of Local Horticultural Societies with the R. H. S.

I.

Local Societies subscribing £1. 1s. per annum will be entitled to:

1. Two copies of the *R. H. S. Journal* for circulation amongst the local Society's members.
2. To nominate one of their members to rank as a £1. 1s. Fellow of the R. H. S. with all the privileges of a £1. 1s. Fellow, with the exception of the *R. H. S. Journal.*
3. One Transferable Ticket admitting to all the R. H. S. Meetings and Shows, which may be used by any member of the local Society.
4. To purchase at cost price one Silver and one Bronze Medal of the R. H. S.

II.

Local Societies subscribing £2. 2s. per annum will be entitled to:

1. Four copies of the *R. H. S. Journal* for circulation amongst the local Society's members.

2. To nominate two of their members, each to rank as a £1. 1*s*. Fellow of the R. H. S., with all the privileges of £1. 1*s*. Fellows excepting the *Journal*.

3. Three Transferable Tickets admitting to all the R. H. S. Meetings and Shows, which may be used by any members of the local Society.

4. To purchase, at cost price, two Silver and two Bronze Medals of the R. H. S.

N.B. Local Societies are invited to send interesting exhibits and specimens of Plants, Plant Diseases, &c., to the R. H. S.'s Fortnightly Meetings of the Floral, Fruit, Orchid, and Scientific Committees, and to correspond with the Secretary of the R. H. S. on any interesting Horticultural subjects or events in their locality.

The Secretary of the R. H. S. will also at any time be pleased to assist the Secretary of any affiliated Society in 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.

Price of Medals to Affiliated Societies.

	s.	*d.*
Silver Flora, 2⅛ inches in diameter, in Morocco Case, complete ...	14	0
Bronze Flora, 2⅛ inches in diameter, in Morocco Case, complete ...	5	6
Silver Banksian, 1½ inches in diameter, in Morocco Case, complete	8	6
Bronze Banksian, 1½ inches in diameter, in Morocco Case, complete	3	6

It has been decided to hold a Conference at Chiswick on Conifers during October, which it is hoped will prove unusually interesting not only as drawing attention to the best of these Trees and Shrubs from a garden or landscape point of view, but also demonstrating the best varieties to plant for English-grown timber as well as the different uses and suitabilities of the various foreign-grown timbers. The unusually hard winter through which we have just passed will prove a most practical commentary on the hardiness of the different varieties. The co-operation of landowners and others who may have planted these trees or shrubs in years past, or who take a present interest in them, is specially invited.

Dr. ANNUAL REVENUE ACCOUNT for the

	Cash Paid. £ s. d.	Debts Payable. £ s. d.	Totals. £ s. d.	£ s. d.
To ESTABLISHMENT EXPENSES—				
Salaries and Wages	305 8 10	...	305 8 10	
Rent of Offices	93 3 0	30 15 9	123 18 9	
Printing and Stationery ...	174 16 2	10 0 2	184 16 4	
Publications—Journal, &c. ...	315 4 1	134 9 5	449 13 6	
Postage	64 4 4	...	64 4 4	
Coal, Gas, and Water ...	4 2 1	0 15 9	4 17 10	
Miscellaneous...	133 2 8	1 1 3	134 3 11	
Library	7 10 0	...	7 10 0	
				1,274 13 6
„ SHOWS, MEETINGS, and CONFERENCES—				
Rent of Drill Hall and Cleaning	65 5 0	32 17 0	98 2 0	
Special Shows—Temple ...	438 14 7	...	438 14 7	
„ Others ...	68 16 9	5 10 0.	74 6 9	
Advertising	22 11 0	3 17 9	26 8 9	
Prizes and Medals	77 10 11	...	77 10 11	
Floral Meetings and Conferences—Printing, &c. ...	38 7 5	...	38 7 5	
Ditto Labour	90 2 4	...	90 2 4	
Superintendent of Flower Shows	50 0 0	...	50 0 0	
				893 12 9
„ CHISWICK GARDENS—				
Rent, Rates, Taxes, and Insurance	293 7 9	60 2 6	353 10 3	
Superintendent's Salary ...	225 0 0	...	225 0 0	
Labour	676 8 10	...	676 8 10	
Manure, Implements, &c. ...	59 7 9	4 7 0	63 14 9	
Coal and Coke	129 0 2	50 11 11	179 12 1	
Repairs	100 5 2	11 14 0	111 19 2	
Water and Gas	13 6 4	0 16 1	14 2 5	
Miscellaneous	74 14 11	...	74 14 11	
				1,699 2 5
„ HORTICULTURAL HALL—	66 16 10	...	...	66 16 10
„ SUBSCRIPTIONS for 1889 unpaid written off	...	...	...	21 0 0
Paid Creditors, Dec. 31, 1889	772 4 11			
Balance at Bank Dec. 31, 1890	156 3 8			
Petty Cash in hand	3 3 4			
„ BALANCE TO GENERAL REVENUE ACCOUNT ...	...	...	...	147 1 11
	£4,518 18 10	346 18 7		4,102 7 5

YEAR ending 31st DECEMBER, 1890. Cr.

	£ s. d.	Received. Cash £ s. d.	Debts Receivable. £ s. d.	Totals. £ s. d.	£ s. d.
By BALANCE AT BANK Jan. 1	400 6 3				
In hand ...	3 17 3				
		404 3 6			
„ ANNUAL SUBSCRIPTIONS, 1890		2,387 13 1	21 0 0	2,408 13 1	
Do. do. 1891		87 3 0			
„ SHOWS, TEMPLE—					
Tickets... ...	£474 7 0				
Advertisements	34 19 0				
Donations ...	38 17 0				
		540 16 0	7 7 0	548 3 0	
„ MEETINGS AND CONFERENCES		48 18 0	...	48 18 0	
„ ADVERTISEMENTS... ...		82 2 3	52 6 0	134 8 3	
„ MISCELLANEOUS—					
Sale of Journal and Reports, &c.		45 11 1	...	45 11 1	
„ DIVIDENDS—					
Davis Bequest and Parry Legacy		56 18 4	...	56 18 4	
„ INTEREST ON DEPOSIT ...		11 4 11	...	11 4 11	
„ PRIZES AND MEDALS ...		34 12 6	...	34 12 6	
					3,288 9 2
„ CHISWICK GARDENS—					
Produce Sold		535 16 3	98 5 5	634 1 8	
Admissions and Members' Tickets		3 2 0	...	3 2 0	
Miscellaneous		8 3 0	...	8 3 0	
Chiswick Horticultural Society	£36 0 0				
Less Expenses	6 4 3				
		29 15 9	...	29 15 9	
„ STORING PLANTS		68 15 10	...	68 15 10	
					743 18 3
„ DONATIONS ACCOUNT—					
Amount transferred against Horticultural Hall Expenses		70 0 0	...	70 0 0	
Received from Debtors Dec. 31, 1889		104 3 4			
		£4,518 18 10	178 18 5		4,102 7 5

We have examined the above Accounts with the Books and Vouchers, and we find the same correct.

(*Signed*) HARRY TURNER,
HENRY WILLIAMS,
A. H. PEARSON,
Auditors.

January 13, 1891.

Dr. **BALANCE SHEET, 31st DECEMBER, 1890.** Cr.

	£ s. d.	£ s. d.	£ s. d.
To SUNDRY CREDITORS ...		...	346 18 7
„ Subscriptions received in advance for 1891 ...		...	87 3 0
„ DONATIONS—			
Balance of Account 31st December, 1889	400 0 0		
Less Transferred to Revenue Account ...	70 0 0		
	330 0 0		
Donations received during the year ...	15 0 0		
			345 0 0
„ GENERAL REVENUE ACCOUNT—			
Balance at credit of that Account, 1st Jan., 1890		1,649 13 2	
Add Balance for the year 1890, as per Annual Revenue Account		147 1 11	
			1,796 15 1
			£2,575 16 8

	£ s. d.	£ s. d.	£ s. d.
By DEBTORS, viz.:—			
Annual Subscriptions outstanding	21 0 0		
Garden Produce	98 5 5		
Temple Show—Donation ...	7 7 0		
Advertisement Schedules ...	52 6 0		
			178 18 5
„ INVESTMENTS—			
$2\frac{3}{4}$% 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.)			
„ CASH AT LONDON AND COUNTY BANK—			
Current Account			156 3 8
„ PETTY CASH IN HAND			3 3 4
„ CASH AT LONDON AND COUNTY BANK on Deposit—Donation Account			345 0 0
			£2,575 16 8

We have examined the above Accounts with the Books and Vouchers, and find the same correct.

(*Signed*) HARRY TURNER
HENRY WILLIAMS } *Auditors.*
A. H. PEARSON

January 13, 1891.

FLORAL COMMITTEE.

W. Marshall, Esq., in the Chair, and twenty-two members present.

Awards Recommended :—

Silver Gilt Flora Medal.

To Messrs. H. Cannell & Sons, Swanley, for a very fine group of Primulas, plants well flowered, of excellent habit, and in beautiful variety.

Silver Banksian Medal.

To Messrs. H. Low & Co., Clapton, for a large and beautiful group of Cyclamen in flower, interspersed with Chorizema Lowii, and other flowering and foliage plants.

First Class Certificate.

To Iris Danfordiæ (votes, 16 for), from Mr. T. S. Ware, Hale Farm Nursery, Tottenham. This is an Armenian species, which has a flowering stem only three or four inches high. The leaves, which are about twice as tall, and are produced after the flowers, are narrowly linear and quadrangular, and suddenly contracted into an oblique cusp at the top. The flowers are about an inch and a half in diameter, having the outer segments orange yellow with brown or greenish spots, the petaloid stigmas being lemon yellow. It is figured in the *Botanical Magazine*, t. 7140.

To Hamamelis Zuccariniana (votes, 10 for, 8 against), from Messrs. James Veitch & Sons, Chelsea. A pale-yellow flowered species of Witch-Hazel sent with H. arborea for comparison. The plants were grown in the open ground.

Award of Merit.

To Primula Kentish Purple (votes, 14 for), from Messrs. H. Cannell & Sons, Swanley. A compact growing plant with deep purple flowers.

To Primula Kentish Fire (votes, 15 for), from Messrs. H. Cannell & Sons. Very bright red flowers of good form and substance.

To Chorizema Lowii (votes, unanimous), from Messrs. H. Low & Co. The "standard" and "wings" of the flower are brilliant scarlet, and the keel rose-purple (fig 46).

IG. 46.—CHORIZEMA LOWII.—(From the *Gardeners' Magazine.*)

Other Exhibits.

Messrs. J. Laing & Sons, Forest Hill, sent a group of Cliveas in fruit, the dull red berries giving the plants an ornamental appearance.

The Duke of Northumberland, Albury Park, Guildford (gardener, Mr. W. C. Leach), sent flowering specimens of Andromeda cassinæfolia, stated to be "one of our finest flowering shrubs, whether as seen growing outside or as a plant for the conservatory, forces well, and in a cut state will last ten days in water."

Messrs. James Carter & Co., High Holborn, sent a pretty Primula called Improved Holborn Blue.

The Right Hon. Lord Foley, Ruxley Lodge, Esher (gardener, Mr. J. Miller), sent cut flowers of Eucharis amazonica.

Mr. C. Holden, Park Road, Ealing, sent a small group of Primulas in flower.

ORCHID COMMITTEE.

Harry J. Veitch, Esq., F.L.S., in the Chair, and twelve members present.

Awards Recommended:—

Silver Gilt Flora Medal.

To Messrs. B. S. Williams & Son, Victoria and Paradise Nurseries, Upper Holloway, N., for an extensive group of Orchids effectively arranged, the species and varieties of Cypripedium and white forms of Lælia anceps being conspicuous.

To Messrs. F. Sander & Co., St. Albans, for a group of rare Orchids. The most prominent plants were a magnificently flowered Odontoglossum Edwardii, Lælia Crawshayana Oncidium Warscewiczii, O. Brunleesianum, Dendrobium Leechianum ×, and two forms of Cattleya Trianæ, with crimson-tipped petals.

Silver Flora Medal.

To F. C. Jacomb, Esq., Cheam Park, Cheam (gardener, Mr. W. May), for a collection of over thirty species and varieties of Odontoglossum, comprising O. crispum fastuosum, and many very large forms of O. crispum, O. Humeanum, O. Andersonianum,

and O. triumphans. With these were arranged Dendrobium Wardianum, D. Leechianum × ; two plants of Saccolabium bellinum, and other showy Orchids.

To Messrs. Pitcher & Manda, Hextable, Swanley, Kent, for a collection of fifty species and hybrid varieties of Cypripediums. Among them were three forms of C. callosum ; three of Harrisianum × ; a good example of C. Laforcadei × ; C. pavoninum ×, C. Sallierii ×, and C. S. Hyeanum × ; the rare C. Schomburgkianum ; C. villosum albo-marginatum, C. Godseffianum ×, and C. Arthurianum superbum ×, a very distinct and handsome form, with the tip of the dorsal sepal pure white with purple spots.

Bronze Banksian Medal.

To Walter Cobb, Esq., Silverdale, Sydenham, for Orchids in flower, viz., Vanda Amesiana, Phalænopsis Stuartiana, Cypripedium calurum Rougieri ×, C. Boxalli superbum, C. Amesianum ×, C. politum ×, and Saccolabium bellinum.

First Class Certificate.

To Cypripedium Creon × (C. œnanthum superbum ♂ × C. Harrisianum superbum ♀). (Votes, 5 for, 3 against.) Raised and exhibited by Messrs. Jas. Veitch & Son.

Award of Merit.

To Cattleya Trianæ-plumosa (votes, unanimous), from Thos. Statter, Esq., Stand Hall, Whitefield, near Manchester (gardener, Mr. Johnson). This is of the C. T. Backhousiana section, with crimson tip and feather on the petals.

To Odontoglossum triumphans, Whiteley's variety (votes, unanimous), from Mr. Wm. Whiteley, Hillingdon, near Uxbridge. A variety with large and handsome flowers, the lip unusually large and flat, of a bright reddish brown, evenly edged with white (fig 47).

Botanical Certificate.

To Masdevallia ephippium (M. trochilus) (votes, unanimous), from Messrs. Pitcher & Manda.

Cultural Commendation.

To Malcolm S. Cooke, Esq., Kingston Hill (gardener, Mr. D. Cullimore), for a specimen of Cattleya guttata Prinzii (C. amethystoglossa) (votes, unanimous), which had for the third year in succession borne about twenty-five flowers on a spike.

Other Exhibits.

The Right Hon. Lord Foley, Ruxley Lodge, Esher (gardener, Mr. J. Miller), exhibited a stand of cut spikes of Cœlogyne cristata.

Malcolm S. Cooke, Esq., exhibited Odontoglossum luteo-purpureum var.

Fig. 47.—Odontoglossum triumphans, Whiteley's variety. (From the *Gardeners' Magazine.*)

Norman C. Cookson, Esq., Wylam-on-Tyne, sent Cypripedium Weidlichianum × (C. Schlimii ♂ × C. Hartwegi ♀).

Messrs. Hugh Low & Co., Clapton Nurseries, staged a pair of Saccolabium bellinum, which was certificated in February 1885.

Sir Wm. Marriott, The Down House, Blandford (gardener, Mr. Denny), exhibited a well-flowered hybrid Dendrobium, obtained by crossing D. heterocarpum and D. nobile pendulum. The Committee decided that it did not differ from the well-known D. Ainsworthii ×.

F. S. Moseley, Esq., 24 Park Village Estate, Regent's Park, N.W., sent Cœlogyne cristata, Dendrobium Wardianum, and Cypripedium villosum.

Thos. Statter, Esq., sent Cattleya Trianæ, Stand Hall variety. It is of the Backhousiana type.

Messrs. Paul & Son, Cheshunt, staged a group of good forms of Cœlogyne cristata, and E. G. Wrigley, Esq., Victoria House, Dukinfield, Cheshire (gardener, Mr. C. Harris), sent a flower of Dendrobium nobile var. for the consideration of the Committee.

FRUIT COMMITTEE.

P. Crowley, Esq., F.L.S., in the Chair, and twenty members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. J. Cheal & Sons, Crawley, for an excellent collection of 80 varieties of Apples and Pears: the majority of the fruits were fine and highly coloured. Of Apples, the most noteworthy sorts were Lord Derby, Dumelow's Seedling, Blenheim Orange, King of the Pippins, Prince Albert, Kentish Fillbasket, and Egremont Russet.

To Messrs. T. Rivers & Son, Sawbridgeworth, for an extensive collection of fruit—including 75 varieties of Apples, 17 varieties of Pears, and 14 varieties of Oranges and Lemons. Among the Apples were very fine examples of Peck's Pleasant, Reinette de Canada, Lord Derby, Gloria Mundi, Buckingham, and Belle de Pontoise. The Pears were very good, and the Oranges excellent examples of home growth.

Silver Banksian Medal.

To Messrs. H. Lane & Son, Great Berkhampstead, for a very good collection of 40 varieties of Apples, Lane's Prince Albert being especially fine and highly coloured.

Other Exhibits.

The Right Hon. Lord Foley, Ruxley Lodge, Esher (gardener, Mr. J. Miller), sent some dishes of fine Apples, which had been well kept in American flour-barrels.

Rev. E. S. Lowndes, Comberton Rectory, Pershore, sent 13 varieties of Apples, accompanied by an interesting letter describing the soil in which they were grown.

W. C. Wemyss, Esq., Westbury Court, Westbury-on-Trym, sent a wooden tray as used for drying French Plums near Bordeaux, and referred to in the *Kew Bulletin* for December 1890.

P. Crowley, Esq., Waddon House, Croydon, sent samples of Peach shoots, showing injury by frost where they had been touched by the wires to which the trees had been trained.

Death of Mr. C. Haycock.—It was proposed by Mr. G. Bamford, and seconded by Mr. R. D. Blackmore, that a letter of condolence be sent to Mrs. Haycock on the death of her husband —a valued member of the Committee.

SCIENTIFIC COMMITTEE.

W. T. Thiselton Dyer, Esq., C.M.G., in the Chair, and ten members present.

Action of Galvanised Wire on Peach Trees.—The Rev. W. Wilks showed specimens of the injuries observed on shoots of Peach trees which were in contact with galvanised wire during the recent severe frost. The shoots at the point of contact with the wire were apparently blackened and frozen through, so that the distal part of the shoot, although for a short time it retains its healthy appearance, shortly dies of starvation. Similar illustrations have been before the Committee on other occasions.

Effect of Fog on Plants.—Professor F. Oliver exhibited a number of water-colour drawings showing the effect of fog on the leaves and flowers of various plants; but reserved a full statement of his observations till a future time.

The Aboriginal Chinese Primrose.—From Mr. Myles, Appley Towers Gardens, Ryde, came plants of Primula sinensis, raised from seed collected at Y-Chang by Mr. Pratt, under conditions very unlike those under which the plant is cultivated in this country. The history of the plant was alluded to at the Primula Conference in 1886, and was also adverted to in Mr. Sutton's paper on the Chinese Primrose, which was published in the *Journal* of the Society, Vol. XIII., pt. I., 1891, p. 99.

Self-sown Seedlings of Chamærops Fortunei.—From the same garden came seedling plants of this Palm, which is growing in the shrubberies at Appley Towers, and beneath whose shade a large number of seedlings spring up.

Species of Pinus.—From Mr. Rashleigh came cones of Pinus El Doctor, which appeared to be very closely allied, if not identical with Pinus patula. A cone of an undescribed species collected by Captain J. Donnell-Smith, at a height of from 10,000 to 12,000 feet on the Vulcan de Agua, in Guatemala, was also exhibited. Mr. Godman and other travellers make mention of the forest composed of this tree, which forms a belt round the mountain at the above elevation, but which does not appear to have been described; indeed, in the Loudon *Herbaria* there are no specimens that correspond with it. It will be described as Pinus aguensis.

Timber and Cones of "Wellingtonia."—From Mr. Leach, gardener to the Duke of Northumberland, Albury Park, Guildford, came a fine cluster of cones of Sequoia gigantea, and also a transverse section of the trunk of a tree that had been planted twenty years, and had grown with great regularity and rapidity, as evidenced by the rings.

Ivies and the Frost.—Various leaves of Ivies from plants growing on the same wall were exhibited, showing the varying effects of frost on the different varieties—some being completely killed, whilst others were scarcely if at all injured. The Himalayan form, as pointed out by Mr. Dyer, was the most severely injured of all.

The Rind of the Orange.—With reference to this subject, Dr. Bonavia read a communication referring to the two specimens shown at the last meeting. "One had of course an enveloping peel. Within this was a whorl of pulp carpels. Within this again was a second whorl without peel on its outside. So that we can hardly consider the peel as the outer side of the pulp carpels. The peel is evidently not an essential part of the pulp carpels. It can be suppressed, while the pulp carpels remain, as in this case of the inner Orange.

"But what is most interesting in this specimen is, that in the centre of the inner Orange there were two strips of peel, adherent to the placental margins of the inner carpels, each strip having its oil-cell-coloured surface directed towards the centre, and not, as is usual, towards the outside of the Orange.

"To my mind, this would indicate that the peel is a distinct whorl independent of the pulp carpels. In the doubling of this Orange, we have (*a*) a peel whorl, (*b*) a pulp whorl, (*c*) another

pulp whorl, (*d*) a peel whorl represented by two strips only, and with the coloured glandular surface twisted towards the central axis of the Orange, showing that these peel strips are no other than transformed stamens, or carpels, or leaves.

"In my opinion, the relation of the coloured peel to the pulp carpels is exactly that of the purple sheath of the Moutan Pæony to the green carpels it encloses. The peel is no more the outer surface of the carpels than the calyx of Physalis Alkekengi is the outer surface of its pulp carpels.

"In the Tangerine Orange there is only slight adhesion between the peel and the pulp-cells. Then take fig. E, pl. 125, and fig. B, pl. 126, of 'Oranges and Lemons,'* and you will find one-third of an inch of space between the peel whorl and the pulp whorl; all degrees of adhesion and non-adhesion are to be found. Some varieties of Citrus have the peel so closely adhering to the pulp that it can only be detached with a knife, while in others the pulp ball actually rattles within the peel envelope.

"What is most convincing of all, however, is that in those species of Citrus in which the peel is divided into segments, with their edges covering, and thus forming a continuous envelope, the segments of the peel do not tally with the segments of the carpel ball. How can I, therefore, believe that each peel segment is the outer surface of a carpel?

"The second specimen you gave me was of common occurrence. The small inner orange was enveloped in its own peel. That is, the doubling occurred—peel pulp, peel pulp. This is exactly what occurs in the doubling of some kinds of Narcissus. In these we have the doubling occurring in this fashion—calyx corolla, calyx corolla, calyx corolla, and so on up to the centre of the flower. In some cases the calyx retains its greenish colour throughout the series.

"The interest of the second specimen was in the smallness of the inner Orange. Its juice vesicles were so small and sessile, that they were almost indistinguishable from the oil-cells of the peel, the prominent difference being, that the former had an acid taste."

* *The Cultivated Oranges and Lemons of India and Ceylon.* Atlas of Plates, with descriptive letter-press. By E. Bonavia, M.D. London: W. Allen & Co. 1890.

Yucca flaccida.—From Mr. Burbidge, Trinity College Garden, Dublin, came leaves of this plant, bearing at or near the margin, and sometimes from one surface, sometimes from the other, short tubular, horn-like processes, the significance of which is not apparent. Dr. Masters gave the details of the histological structure of the leaf, the main points of interest being that, in addition to the central row of vascular bundles, there are two other series of smaller bundles, one between the central bundle and the upper epiderm, the other between the centre and the lower epiderm. In the central bundles the relation of the xylem and phloem is normal, that is to say, the xylem is directed towards the centre of the leaf, the phloem towards the lower epiderm. In the lower or outer series of bundles the phloem is external, the xylem central. In the upper or inner series the phloem is also external, the xylem internal, so that the section of the central bundles and of the uppermost ones taken together resembles a section of a stem. In the horn-like portions, the palisade cells are absent, and the cells are nearly uniform in size and shape, the vascular bundles arranged in a ring, each bundle having its bast towards the periphery, its wood towards the centre. Thus, while the flat portion has the structure of a leaf with indications of stem structure also, the horn-like portion assumes completely the appearance of an axis.

GENERAL MEETING.

March 10, 1891.

Sir John T. D. Llewelyn, Bart., in the Chair.

Elections.

Fellows, 34.—James Allen, J. R. Berry, W. Edward Berry, W. B. Boyd, Rev. A. O'Brien Brandon, Arthur Bull, J. O. Carter, Mrs. G. Crutcher, W. H. Crawford, James Fenning, E. P. Frost, E. W. Grimwade, T. H. P. Hartley, A. C. Hayes, H. H. Hurnard, H. A. Jones, Rev. E. S. Lowndes, George S. Manvell, A. S. Mark, C. Matthews, James T. M'Dougall, T. J. Mills, Charles Murless, Mrs. Meredyth Richards, James F. Ridley, C. S. Ritchie, John K. Rowe, J. Oldrid Scott, J. Leslie Sherrin, Thomas W. Short, Mrs. Watson Smith, E. T. Turner, R. G. Webster, M.P., James Wilson, jun.

Societies Affiliated, 5.—Minster Horticultural Society, Sheffield and District Chrysanthemum Society, Weston Horticultural Society, Bradford Gardeners' Mutual Improvement Society, Petersfield Horticultural Society.

Papers on "Snowdrops," communicated by Mr. James Allen, of Shepton Mallet, Mr. D. Melville, of Dunrobin, and Mr. F. W. Burbidge, of Dublin, were read by the Secretary. (*See* pp. 172, 188, 191.)

FLORAL COMMITTEE.

GEORGE PAUL, Esq., in the Chair, and seventeen members present.

Awards Recommended:—

Silver Gilt Banksian Medal.

To Messrs. Hugh Low & Co., Upper Clapton, for a beautiful group of stove and greenhouse plants in flower, noteworthy being the Cytisuses, Pimelias, Boronias, Chorizemas, Acacias, Ericas, and Cyclamen.

To Mr. G. Phippen, Reading, for an effectively arranged collection of spring-flowering plants, consisting principally of Hyacinths, Tulips, Crocuses, &c.

To Messrs. William Paul & Son, Waltham Cross, for a rich series of Camellias (cut blooms), representing the best varieties in cultivation.

Silver Banksian Medal.

To Messrs. Barr & Son, King Street, Covent Garden, for a splendid collection of Daffodils and other hardy spring flowers.

To Sir Trevor Lawrence, Bart., M.P., Burford Lodge, Dorking (gardener, Mr. W. Bain), for cut flowers of Anthuriums, very striking being A. Leodense, A. Laingii, A. carneum, and several fine seedling varieties.

Award of Merit.

To Amaryllis J. R. Pitcher (votes, unanimous), from Messrs. B. S. Williams & Son, Upper Holloway, a medium-sized, well-formed flower, of an intense crimson colour, with darker veins.

Other Exhibits.

Mr. F. W. Moore, Botanic Gardens, Glasnevin, Dublin, sent a collection of Lachenalias (cut blooms), representing interesting crosses between various types.

Messrs. W. Paul & Son sent a new forcing and bedding Rose named White Lady. The Committee expressed a desire to see it again later in the season.

Messrs. Paul & Son, Cheshunt, N., sent flowers of Bulbocodium vernum, B. ruthenicus, and Iris Rosenbachiana.

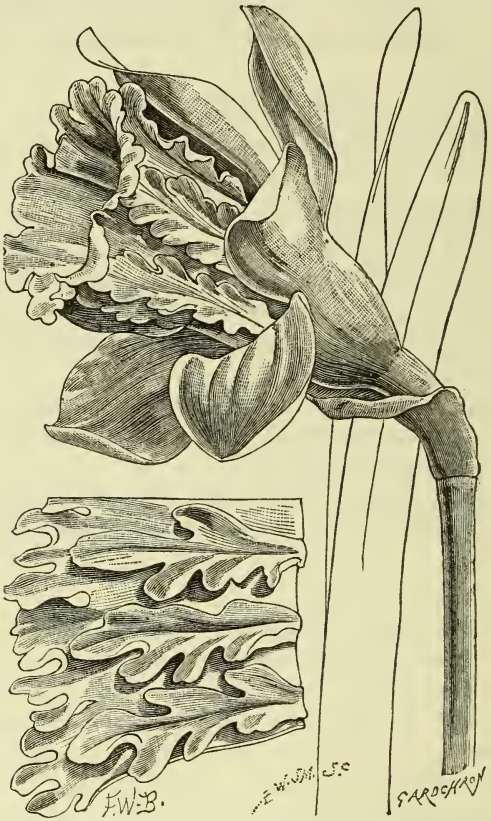

Fig. 48.—Daffodil Crom-a-boo. (From the *Gardeners' Chronicle.*)

Mr. W. E. Gumbleton, Belgrove, Queenstown, Ireland, sent Daffodil Crom-a-boo (fig. 48), in which the "cup" is curiously frilled on the outside. It was requested to be seen again, as was also a new single early Tulip, Queen of the Netherlands, from the same exhibitor.

The Rev. W. Wilks, Shirley Vicarage, Croydon, and Mr.

James Allen, Shepton Mallet, each sent interesting collections of Snowdrops.

Mrs. Whitbourn, Great Gearies, Ilford (gardener, Mr. J. Douglas), sent a clump of Galanthus latifolius, in flower.

ORCHID COMMITTEE.

Harry J. Veitch, Esq., F.L.S., in the Chair, and five members present.

Before commencing the ordinary business of the meeting, the Chairman, in feeling terms, spoke of the loss the Committee had sustained by the death of Mr. John Dominy, one of its ablest and most respected members. As rendering the circumstance still more lamentable, Mr. Veitch stated that rapidly following Mr. Dominy's death came that of his wife and second son. The Secretary was instructed to write a letter of condolence to Mr. George Dominy, of Bank House, Southampton.

There was a fine display of Orchids at the meeting, but some groups which had been entered were not brought on account of the heavy snow-storm which had taken place the night before.

Awards Recommended:—

Silver Flora Medal.

To Messrs. B. S. Williams & Son, Upper Holloway, N., for an extensive group of Orchids, arranged with Palms, &c., and containing some rare species and varieties, viz.: a good specimen of Cœlogyne cristata alba, with fourteen flower spikes; C. lactea, Dendrobium Farmeri aureum, a fine form of Odontoglossum Ruckerianum; O. crispum Cooksoni, O. c. roseum, O. prionopetalum, Oncidium splendidum, a large Cymbidium Lowianum; C. eburneum, with twelve spikes of blooms, and a number of species and varieties of Cypripediums.

Silver Banksian Medal.

To his Grace the Duke of Norfolk, Arundel Castle (gardener, Mr. Burbury), for a magnificent specimen of Cymbidium eburneum, with about fifty spikes of flowers.

Bronze Banksian Medal.

To Mr. William Whiteley, Hillingdon, for a group of good varieties of Odontoglossum crispum, O. Andersonianum, O.

triumphans, &c., with Lælia harpophylla, Cattleya citrina, and Dendrobiums.

To Messrs. F. Sander & Co., St. Albans, for a group of cut flowers of rare Orchids, comprising a quantity of spikes of Cœlogyne cristata alba; some fine forms of Cattleya Trianæ, both pure white and coloured; Dendrobium nobile Cooksoni, Odontoglossum blandum; two distinct forms of Cattleya amethystoglossa, and other species. Messrs. Sander also exhibited the new hybrid Masdevallia Kimballiana, the result of a cross between M. Veitchiana and M. Shuttleworthii.

First Class Certificate.

To Odontoglossum luteo-purpureum var. Amesianum (votes, unanimous), from Messrs. F. Sander & Co., St. Albans. This extraordinary variety has flowers wholly of a pale greenish yellow, and without spotting of any kind.

To Dendrobium nobile, Hardy's var. (votes, unanimous), from George Hardy, Esq., Pickering Lodge, Timperley, Cheshire, (gardener, Mr. William Holmes). The distinguishing features in this variety are its large flowers, broad sepals and petals, and bright colour.

To Cattleya Trianæ Hardyana (votes, unanimous), from Geo. Hardy, Esq. (gardener, Mr. William Holmes). A variety with finely shaped flowers, having very broad white petals; sepals tinged with lilac; lip crimson in the front lobe, stained with primrose yellow in the throat.

Other Exhibits.

Norman C. Cookson, Esq., Oakwood, Wylam-on-Tyne, sent a plant of Dendrobium nobile Cooksoni, which had been obtained from seeds of common D. nobile, crossed with pollen of D. n. Cooksoni. The remainder of the seedlings which have as yet flowered have proved typical D. nobile. Also a plant of Phajus Cooksoni ×.

Messrs. Hugh Low & Co., Clapton, exhibited Saccolabium bellinum, and also a form of it with a yellow ground colour to the flowers.

F. A. Bevan, Esq., Ludgrove, New Barnet (gardener, Mr. B. Phillips), sent cut flowers of two varieties of Cattleya Trianæ and various other Orchids to be named. They were referred to the Secretary of the Committee, who gave the required information.

FRUIT COMMITTEE.

P. Crowley, Esq., F.L.S., in the Chair, and fourteen members present.

Awards Recommended :—

Award of Merit.

To Apple Chelmsford Wonder from Messrs. Saltmarsh & Sons, Chelmsford. Fruit large, flushed, and streaked with red—handsome. Flesh firm, acid, and of very good quality. A useful late culinary Apple.

Other Exhibits.

The Baroness Burdett-Coutts, Holly Lodge, Highgate (gardener, Mr. J. Willard), sent a box of the March Peach received from the Cape of Good Hope. The fruits had evidently been gathered before they were ripe, as the flesh was tough and flavourless.

Dr. Wilks, Ashford, Kent (gardener Mr. Tabor), sent some very fine fruits of Vanilla, which emitted a most fragrant odour.

From the Society's Gardens were sent blanched samples of the following varieties of Common Chicory, or Barbe des Capucins: Witloef, Red-leaved Lombardy, Brunswick, and Large-rooted Magdeburg, together with similar blanched samples of Improved Early Dandelion.

A letter was received from Mr. James Lake, Sheriff Court, Minster, inquiring as to the cause of canker in Apple trees.

Mr. Lake was referred to the Report of the Apple Conference held at Chiswick in 1888, and published in Vol. X. of the Society's *Journal.*

SCIENTIFIC COMMITTEE.

D. Morris, Esq., M.A., F.L.S., in the Chair, and eight members present.

Branches Injured by Cold.—Dr. Masters showed branches of Peach and Rose trees with injuries similar to those shown at the last meeting. These had not been in contact with wire, showing that that is not the only cause of the injuries. Professor Church suggested that the appearance pointed to the rubbing of branches on each other.

Fog Investigation.—Mr. Morris stated that he, as the re-

cipient named in the Royal Society's grant, had sent in a short report, and had made formal application for a further grant of £50. This course was agreed to. Dr. Oliver announced that the interim report promised would be produced at the next meeting of the Committee.

Growths on Yucca flaccida.—Dr. Scott said that he had received very good material from Mr. Burbidge of Dublin, and promised an investigation into them.

Mildew on Vines.—The Council referred to the Scientific Committee a letter from Mr. Tait of Oporto, in which he states that he has discovered a remedy for mildew on Vines, which has been successfully used in Portugal, and which he is anxious to have tried at Chiswick. He wished to know if the Scientific Committee were prepared to appoint someone to conduct an investigation.

The Committee were of opinion that the main constituents of the remedy should be known first, so that no investigation should take place unless they were new and not previously tried. Dr. Masters said that that particular form of mildew did not occur at Chiswick, but it could be tried on Tomatoes. Professor Church pointed out that the composition being patented there would be no difficulty in ascertaining its constituents, and the Committee then resolved to communicate with Mr. Tait about the composition, on the understanding that if new it would be experimented with.

Death of Wellingtonia.—A letter was read from the Duke of Wellington, asking for information as to the cause of death of a Wellingtonia, roots of which were forwarded. There was no obvious cause of death in these, and it was resolved to write for further information as to the history of the tree, character of the soil, &c.

Rhododendron Falconeri.—A plant was shown from Mr. James Bateman of Worthing, described in a letter as "a dismal specimen of Rhododendron Falconeri, which with many other things perished miserably in the late winter. The first to attract attention was a fine specimen of the wild Olive tree, which had been raised from a cutting taken from the one that marks the site of the ghastly well of Cawnpore. It was nearly 20 feet high, and had flowered last summer for the first time; moreover, it retained its freshness after the winter was more than half over,

when my gardener accidentally discovered that it had lost all its bark on the lower part of the stem, and was in fact a corpse. The next to succumb was a New Zealand Olearia Haastii, which perished in exactly the same manner. It was then the turn of a large Fuchsia, of which the bark under similar conditions was stripped off the stem. After the Fuchsia a brigade of Sikkim and Bhotan Rhododendrons was destroyed. And now as to the cause. Before winter set in we had a delicious Indian summer in portions of October and November, and to such an extent that our thrushes and blackbirds took to singing, and, I believe, to nesting. The exceptional warmth no doubt set the sap rising, and in this state it was caught, as in a trap, by the sudden change of temperature." Dr. Müller said he had seen the same thing in plantations of Rhododendrons near Bagshot. Mr. Wilks said the outer bark of R. Falconeri scaled off normally as in a Plane tree. From examination he doubted if the plant were quite dead. He himself had had a very large plant of Erica mediterranea which was throwing its spikelets; on examination the stems were found split open longitudinally, and appeared as if full of cotton wool. This was due to frost. Dr. Masters, after examining the leaves of the plant sent, concluded that the plant would not have lived if left in the ground. The Committee decided that its condition was probably due to the action of frost.

Egyptian Mealy Bug.—Mr. McLachlan showed twigs covered with this insect, and in addition to statements made on previous occasions (December 10, 1889, &c.), said that Mr. Douglas first described it as Crossotosoma ægyptiacum, but Professor Riley had since concluded that it was probably no other than a true Icerya. The Egyptian Government are taking steps to introduce the Australian and New Zealand ladybirds, which had been so successful in America. As the Egyptian species is not the same as the Australian and American pest, and as the climate is so different, the success of the experiment is doubtful.

Peach Yellows.—Dr. Masters produced twigs and leaves of Peach trees from the Cape of Good Hope suffering from this disease. It was common in America, and was supposed to be bacterial. This had not been determined, and the specimens were referred to Professor Marshall Ward.

Diseased Roots of Dracæna.—A root of Dracæna, probably

swarming with Tylenchus, was referred for examination to Dr. Masters.

Snowdrop Mildew.—The Rev. C. Wolley-Dod sent decayed bulbs of Snowdrop. He wrote: "These are Snowdrop bulbs of which the leaves last year showed slight symptoms of the Snowdrop mildew. Often there is no trace left of the bulb in the following spring. I lose all my best Snowdrops from it, and have as yet found no remedy. These were dressed with solution of sulphate of copper last year when in leaf." Dr. Masters said he had successfully prevented the disease by treating bulbs of Iris reticulata with sulphate of copper before planting.

Effect of Fog.—Dr. Masters showed panes of glass from glass houses at Gunnersbury and Feltham with a dense black deposit due to fog. Mr. Morris stated that 20 square yards of glass at Kew produced, when scraped, 20 grammes of solid matter. This could not be removed by mere drenching with water, and the whole of the glass in the Royal Gardens would require scrubbing to cleanse it. Dr. Oliver said that an analysis of the deposit showed that 20 per cent. consisted of tarry and oily matters. Dr. Masters also showed Rose leaves which had fallen off under glass in consequence of the fog. No details had been sent.

Abnormal Mushroom.—A Mushroom with a very large gouty stem was shown. There was no history to it. The stem was much split longitudinally.

Magnolia conspicua.—Dr. Masters showed a photograph taken last year of an unusually fine plant in bloom at Gunnersbury House.

GENERAL MEETING.

March 24, 1891.

James Douglas, Esq., in the Chair.

Elections.

Fellows, 19.—Mrs. J. C. Arkwright, F. S. Balestra, W. Brown, Rev. E. T. Clark, B.A., Ralph Darlington, James Flower, W. F. Lawrence, M.P., Edw. Lester, Hon. Robt. T. Litton (Melbourne), R. Mitchell, John Parsons, Rev. S. M. Ranson, S. H. Ridge, B.A., W. Stevenson, Lieut.-Col. E. Thomas, W. W. Warde-Aldam, Miss H. Watier, Richard Weller, H. N. Young.

Societies Affiliated, 4.—Wolverhampton Horticultural and Floral Society, Stourport District Horticultural Society, Dundee Horticultural Association, Chislet Horticultural Society.

A paper on "The Cultivation of Hardy Bulbs and Plants," by Herr Max Leichtlin, was read by the Secretary (*see* p. 210).

FLORAL COMMITTEE.

W. Marshall, Esq., in the Chair, and eighteen members present.

Awards Recommended:—

Silver Gilt Flora Medal.

To Messrs. B. S. Williams & Son, Upper Holloway, for a very excellent collection of Hyacinths, Tulips, Clivias, Azaleas, &c., in flower.

Silver Banksian Medal.

To Messrs. James Veitch & Sons, Chelsea, for a pretty group of forced flowering Shrubs, noticeable being Spiræa confusa, with clusters of white flowers like Hawthorn; and several varieties of Azalea mollis, two of which were certificated, and are described below.

To Mr. H. B. May, Upper Edmonton, for a well-grown group of Ferns and other foliage plants.

To Messrs. J. James & Son, Farnham Royal, for a beautiful collection of Cinerarias, with large and finely-shaped flowers.

To Messrs. Barr & Son, Covent Garden, for a collection of Daffodils and hardy spring flowers.

To Mr. S. Ware, Tottenham, for a pretty collection of early bulbous and other hardy spring plants in flower.

To Messrs. Paul & Son, Cheshunt, for an interesting collection of seedling Amaryllis in bloom, and masses of early spring flowers.

First Class Certificate.

To Chionodoxa grandiflora (votes, 10 for, 3 against) from Mr. T. S. Ware.

> This fine species was introduced from Asia Minor about 1887, and is still known to many under the specific name of "gigantea." For a Chionodoxa the flowers are very large, and of an ultramarine blue, but without the white

"eye" in the centre, which is such a distinguishing mark of its co-species, *C. Luciliæ*. It has a free and vigorous habit, and is easily grown in sandy loam.

To Camellia "Beauty of Waltham" (votes, 14 for, 1 against) from Messrs. W. Paul & Son, Waltham Cross. Flowers, pale pink, of fine shape.

To Bertolonia "Baron A. Rothschild" (votes, unanimous) from Mons. J. Linden, Brussels. A beautiful variety, having richly-coloured rosy-purple leaves, blotched with deep green.

To Bertolonia "Madame Léon Say" (votes, unanimous) from Mons. J. Linden. Leaves large, veined with silver on a dark green ground.

To Saxifraga Boydi (votes, unanimous) from Messrs. Paul & Son. Flowers small, bright yellow, freely produced; an effective rock plant.

To Arum palæstinum (votes, 10 for, 1 against) from the Hon. H. Dudley Ryder, High Ashurst, Dorking (gardener, Mr. Gold).

A remarkable Aroid, the spathe and spadix being of a velvety blackish purple, and each about six inches long. It was discovered by the late M. Boissier, near Jerusalem, whence it was introduced to cultivation by Messrs. J. Veitch & Sons, of Chelsea. Our illustration, for which we are indebted to the Editor of the *Journal of Horticulture*, gives a good idea of the general character of the plant on a reduced scale.

Award of Merit.

To Rose (H.P.) "Danmark" (votes, 6 for) from Messrs. W. Paul & Son, Waltham Cross. Flowers of a rosy-pink colour, well formed, and sweetly scented.

To Clivea "Prince of Orange" (votes, unanimous) from Messrs. B. S. Williams & Son. Fine trusses of rich orange-coloured flowers.

To Amaryllis "Olivia" (votes, 8 for, 3 against) from Messrs. James Veitch & Sons. Flowers white, veined with reddish-crimson on the upper petals, good shape.

To Amaryllis "Vandyke" (votes, 12 for, 1 against) from Messrs. J. Veitch & Sons. Flowers, rich scarlet, of fine form.

To Azalea mollis fl. pl. "Norma" (votes, 5 for, 1 against) from Messrs. J. Veitch & Sons. Flowers, rich orange, trusses of good size, freely produced.

Fig. 49.—Arum palæstinum.

To Azalea mollis fl. pl. "Mecene" (votes, unanimous) from Messrs. J. Veitch & Sons. Flowers, creamy white, sweetly scented, and borne in abundance.

Other Exhibits.

Messrs. H. Cannell & Sons, Swanley, sent some splendid trusses of Zonal Pelargoniums in good variety.

From the Royal Gardens, Kew, was sent a basket of hardy plants that had been flowered under glass, consisting of Puschkinia libanotica compacta, Chionodoxa Luciliæ alba, Primula denticulata, Saxifraga Burseriana, and Narcissus nivalis.

O. T. Hodges, Esq., Lachine, Chislehurst, sent cut blooms of Hellebores in variety.

Mr. R. Dean, Ealing, sent some well-flowered plants of Primrose Blue Gem.

The Duke of Northumberland, Syon House, Brentford (gardener, Mr. G. Wythes), sent a promising seedling Anthurium somewhat resembling A. Scherzerianum, Ward's var.

Prizes.

Prizes were awarded in the following classes for Amateurs:—

Class 1.—Group of Spring Bulbs, comprising 12 Hyacinths, 8 pots of Tulips, 6 pots of Narcissi, 12 pots or pans of any other Bulbs. *First prize*, Withheld. *Second prize* (£2. 10*s*.), M. Hodgson, Esq., Shirley Cottage, Croydon (gardener, Mr. H. Shoesmith).

Class 3.—9 Cinerarias. *First prize* (*Bronze Flora Medal* and £1) to M. Hodgson, Esq.

ORCHID COMMITTEE.

Dr. Maxwell T. Masters, F.R.S., in the Chair, and eight members present.

Awards Recommended:—

Award of Merit.

To Dendrobium melanodiscus pallens × (votes, unanimous), from Sir Trevor Lawrence, Bart., M.P., Burford Lodge, Dorking (Orchid grower, Mr. White). The variety D. melanodiscus ×, obtained in the Burford collection by intercrossing D. Findlayanum

and D. Ainsworthii ×, is very variable, but beautiful in all its forms, the variety "pallens" (fig. 50) being one of the most attractive. Its sepals and petals are white, tipped with pale pink; the lip white, with a light primrose strain at the base, instead of the orange-coloured blotch so conspicuous in other varieties.

Fig. 50.—Dendrobium melanodiscus pallens.
(From the *Journal of Horticulture*.)

To D. melanodiscus "Rainbow" × (votes, 7 for), from Sir Trevor Lawrence, Bart., M.P. The flowers of this variety resembled those of a good D. Ainsworthii ×, but the broad lip had brownish crimson radiating marks at the base, bordered with rich yellow.

Botanical Certificate.

To Cirrhopetalum Mastersianum (votes, unanimous), from

Sir Trevor Lawrence, Bart., M.P. This is a new species, with showy coppery-yellow flowers. Figured in the *Lindenia*, Vol. 6, t. 255.

To Cirrhopetalum picturatum (votes, unanimous), from Sir Trevor Lawrence, Bart., M.P. A curious species, with greenish white flowers, spotted with purple. Introduced about fifty years ago from Moulmein. It is figured in the *Botanical Magazine*, t. 6802.

Cultural Commendation.

To T. Statter, Esq., Stand Hall, Whitefield, near Manchester (gardener, Mr. Johnson), for a very fine and well-grown plant of Lycaste Skinnerii alba, named gigantea.

To C. J. Lucas, Esq., Warnham Court, Horsham (gardener, Mr. G. Duncan), for two fine plants of Dendrobium Brymerianum, the flowers of which were remarkable for the well-developed branched fimbriations of the lip.

To His Grace the Duke of Northumberland, Syon House, Brentford (gardener, Mr. G. Wythes), for Dendrobium thyrsiflorum, which bore nine pendulous clusters of flowers.

Other Exhibits.

Sir Trevor Lawrence, Bart., M.P., exhibited a number of plants of his hybrid, Dendrobium melanodiscus and D. Chrysostele × ; also a plant of a very beautiful hybrid Dendrobe, of unknown parentage, named "The Pearl"; its flowers were white, with purple lines at the base of the lip. It has some resemblance to D. euosmum leucopterum. From the Burford Lodge collection also came the extraordinary Bulbophyllum mandibulare, a large-flowered Bornean species, with reddish brown sepals and petals, longitudinally striped with purple. The lip is pale yellow, covered with deep purple asperities on the upper surface.

Thos. Statter, Esq., Stand Hall, Whitefield, near Manchester, sent Dendrobium nobile Backhousianum, in which the backs of the sepals and petals are tinged with rosy purple; also a plant of the typical D. nobile, and D. n. Sanderianum, for comparison; and cut spikes of Lælia crispa superba, Odontoglossum Humeanum, and Bifrenaria Harrisoniæ.

F. Wigan, Esq., Clare Lawn, East Sheen (gardener, Mr. Young), staged a neat little group of Orchids made up of two good plants of Aëranthus Leonis, Dendrobium Farmeri,

Cœlogyne sparsa, Oncidium Phalænopsis, Dendrobium thyrsiflorum, and some Cypripediums and Odontoglossum maculatum and O. crispum.

Malcolm S. Cooke, Esq., Kingston Hill (gardener, Mr. Cullimore), exhibited Cattleya Lawrenceana, Sophronitis grandiflora, and cut spikes of Ansellia Africana var. lutea, and varieties of Odontoglossum Rossii majus.

From L'Horticulture Internationale, Parc Leopold, Brussels (M. Lucien Linden), came an extraordinary form of Odontoglossum luteo-purpureum, named "Linden's variety." It had a very broad fringed white lip, with a brown blotch at the base. Also Cypripedium Bragaianum × (C. hirsutissimum var. × C. Boxalli atratum).

Fred G. Moseley, Esq., 24 Park Village East, N.W., sent a pretty white-petalled D. nobile, nearest to D. n. intermedium, but named "nivale."

R. N. Dale, Esq., Bromborough Hall, Bromboro', Cheshire (gardener, Mr. J. Gould), sent a fine spike of Odontoglossum coronarium to know whether it was that species or O. brevifolium. It was pronounced to be O. coronarium—O. brevifolium, Lindl., probably not being in cultivation.

Mr. J. B. Munro, High Street, Brierly Hill, Staffordshire, sent a flower of a form of Cypripedium insigne, which was thought to be the upland C. i. Sylhetense.

FRUIT COMMITTEE.

P. Crowley, Esq., F.L.S., in the Chair, and twenty members present.

Messrs. Bourne & Son, Beckington, Somerset, sent examples of a seedling dessert Apple.

Mr. W. Whiteley, Hillingdon, Uxbridge, sent some excellent specimens of Mushrooms.

SCIENTIFIC COMMITTEE.

W. T. Thiselton Dyer, Esq., C.M.G., in the Chair, and twelve members present.

Rhododendrons, &c., Killed.—With reference to the opinion expressed at the last meeting that R. Falconeri and other plants

described by Mr. T. Bateman of Worthing had been killed by frost, he writes to say that he thinks it was more probably heat, and not frost, which was the primary cause, though frost proved to be "an accessory after the fact." The exceptionally high temperature in November had apparently stimulated them into growth, and so rendered them more susceptible to the subsequent extreme cold. Mr. Bateman also mentions that he has been compelled to abandon the out of doors culture of Himalayan Rhododendrons, not because of the winter's cold, but because they pushed their buds too readily in March, only to be cut back by late frosts. He adds that while other species were severely injured, R. fulgens, R. Thompsoni, R. Campbelli, R. lanatum, R. campylocarpum, R. Roylei, and R. album did not suffer in the slightest degree. Lastly, he refers to Olearia Haasti, described as killed, but having had one branch layered, this remained perfectly unaffected. Mr. Wilks observed that this could be readily accounted for by its having probably been covered with snow.

Observations were made by Mr. Dyer upon the fact that shrubs at Kew—*e.g.*, species of Cistus, though apparently having withstood the frost, and being perfectly healthy, yet suddenly died. Mr. Wilks said he had no doubt that the stems would be found to have been killed at the base, as the cold was always more intense for a short distance above the surface of the ground than higher up. The shrubs, therefore, had sufficient vitality above to continue for a time to appear healthy, and even to break into growth, but of course soon perished. He remarked that Holly bushes are often denuded of leaves to a height of two or more feet from the ground.

Fog Report.—Dr. Oliver presented a "Preliminary Report on the Effects of Urban Fog upon Cultivated Plants," which is printed in full in the Society's *Journal*, vol. xiii., pt. i., p. 139. It was decided by the Committee to forward copies to the gardening and leading daily papers with the hope that readers may be inclined to communicate their experiences, so that as much information as possible may be acquired. The following are the chief lines of inquiry:—(1) urban fog and country mist; (2) extent of the London fog area; (3) the fogs of the winter, 1890–91; (4) constitution of fogs; (5) physiological and microscopic work; (6) possible remedial measures. With reference to the statement

that "an increase of temperature, other things being equal, aggravates the poisonous action of the sulphurous acid in the air, a difference of a few degrees of temperature being apparent," Dr. Müller observed that one cause of this would be probably due to the fact that sulphurous acid is converted into sulphuric by an elevation of temperature. With reference to temperatures, Mr. Dyer remarked on the importance of keeping the temperature of houses as low as possible at night compatible with the limits of resistance peculiar to the plants themselves, allowing for some kinds which are peculiarly sensitive; as a rule, gardeners are apt to keep the temperature higher than is desirable. Mr. Henslow observed that the late Dr. Lindley was continually advocating the same procedure. The thanks of the Committee were tendered to Dr. Oliver for the trouble he had undertaken in preparing the report.

GENERAL MEETING.

April 14, 1891.

Philip Crowley, Esq., F.L.S., in the Chair.

Elections.

Fellows, 17.—M. Balestra, G. W. Burrows, R. Clout, Mrs. Davidson, Mr. Sheriff Farmer, Ed. F. Fitch, R. Gofton-Salmond, Lady Grantham, Captain Hicks, J. H. A. Hicks, J. Lyons, A. M. McKenzie, R. G. Muller, Miss Dorothy M. Newton, C. A. Oliver, B. Shepheard, E. D. Shuttleworth.

Societies Affiliated, 2.—Cannington Horticultural Society; Sheffield Chrysanthemum Society.

A paper on "Lachenalias" was read by Mr. F. W. Moore of the Botanic Gardens, Glasnevin, Dublin (*see* p. 216).

FLORAL COMMITTEE.

W. Marshall, Esq., in the Chair, and nineteen members present.

Awards Recommended:—

Silver Gilt Banksian Medal.

To Messrs. H. Low & Co., Upper Clapton, for an attractive group of Cytisuses, Pimeleas, Azaleas, Boronias, Heaths, Erioste-mons, &c., in flower.

Silver Flora Medal.

To Messrs. Barr & Son, Covent Garden, for an excellent collection of Hardy Spring Flowers, consisting of Daffodils (in variety), Anemone fulgens, Chionodoxas, and Primulas.

Silver Banksian Medal.

To Messrs. W. Cutbush & Son, Highgate, for a beautiful collection of Spring-flowering Plants, the most noteworthy being a very good strain of Mignonette Snowdrift.

To Messrs. B. S. Williams & Co., Upper Holloway, for a well-grown collection of Amaryllis, Ericas, and Boronias in flower.

Award of Merit.

To Primrose James Nimmo (votes, unanimous), from G. F. Wilson, Esq., F.R.S., Weybridge Heath. Large, well-shaped dark-blue flowers.

To Begonia Triomphe de Nancy (votes, unanimous), from Sir T. Lawrence, Bart., M.P., Burford Lodge, Dorking (gardener, Mr. W. Bain). A dwarf variety, bearing a profusion of small rosy-red flowers.

To Camellia The Duchess (votes, unanimous), from Messrs. W. Paul & Son, Waltham Cross. Flowers rich pink, and of fine form.

Cultural Commendation.

To E. C. Smith, Esq., Silvermere, Cobham, for a dozen very fine Guelder Roses (cut).

Other Exhibits.

Miss Jekyll, Munstead, Godalming, sent well-flowered plants of Bedding Primrose—Munstead Early White.

Mr. J. T. Gilbert, Dyke, Bourne, Lincoln, sent cut flowers of Primulas, Daffodils, and Fritillarias.

The Duke of Northumberland, Syon House, Brentford (gardener, Mr. G. Wythes), sent a well-flowered group of Spiræa confusa.

Messrs. Paul & Son, Cheshunt, sent some well-flowered Amaryllis.

Professor M. Foster, F.R.S., Shelford, Cambridge, sent Iris Fosteriana, having yellowish standards and purple-black falls.

From the Royal Gardens, Kew, were sent some choice hardy plants in flower, conspicuous being Shortia galacifolia.

Messrs. W. Paul & Son sent three Roses, viz., Duchess of Albany, White Lady, and Corinna.

Prizes.

Prizes were awarded in the following classes for Amateurs :—

Class 1.—Collection of Daffodils (Tazettas excluded) grown in the open, not more than three blooms of a sort. *First Prize*, Silver Challenge Cup, to C. W. Cowan, Esq., Valleyfield, Pennycuick, Edinburgh.

Class 2.—Nine varieties of Daffodils (distinct), five blooms of each. *First Prize*, Bronze Flora Medal and 15*s*., to C. W. Cowan, Esq.

Class 3.—Six varieties of Daffodils (distinct), three blooms of each. *First Prize*, Bronze Banksian Medal and 10*s*., to Rev. W. Wilks, Shirley Vicarage, Croydon.

Class 6. *Open.*—Collection of Daffodils, Polyanthus excluded. *First Prize*, withheld. *Second Prize*, Small Silver Medal (presented by Messrs. Barr & Son), to Miss B. F. Doyne, Seafield House, Gorey, Ireland.

The Rev. W. Wilks, Shirley Vicarage, Surrey, exhibited two seedling Daffodils, both of the Ajax or Trumpet section : Hilda, a white, of good form and habit, in the way of Dr. Hogg, but of a decidedly purer colour; and Cressida, a chance seedling from Troilus, probably insect or wind fertilized with pollen from one of the Spurius type. It is a very stout, robust, self-yellow Ajax, with an enormously wide open trumpet very deeply frilled round the mouth (fig. 51).

ORCHID COMMITTEE.

Dr. Maxwell T. Masters, F.R.S., in the Chair, and eleven members present.

Awards Recommended :—

Gold Flora Medal.

To Baron Schröder, The Dell, Egham (gardener, Mr. H. Ballantine), for a magnificent group of rare Orchids, among which were Cattleya Digbyana-Mossiæ ×, with two flowers; Odontoglossum crispum Veitchianum, O. c. Stevensi, O. c. Wolstenholmiæ, and other beautiful spotted Odontoglossums;

Fig. 51.—Daffodil Cressida. (From the *Journal of Horticulture.*)

O. Dellense ×, a new hybrid with flowers suggesting a cross between a spotted O. Pescatorei and O. prænitens; and a very singular and beautiful form of O. maculatum with a spotted labellum of the form of O. Rossii. Among the Cattleyas were a finely-bloomed mass of C. Lawrenceana, the pale C. L. concolor, and the slate-blue C. L. Vinckii. Other noteworthy objects were Cypripedium Morganiæ, having four and five large flowers on a scape. Some large specimens of Masdevallias, one of the M. ignea having over 100 flowers; two varieties of Cymbidium Devonianum, the one with six spikes, each bearing from forty to fifty flowers; C. eburneo-Lowianum ×, Lælia Jongheana, Dendrobium nobile nobilius, Epidendrum Dellense × (E. xanthinum × E. radicans), and the white Dendrobium superbum Dearei.

Silver Gilt Flora Medal.

To Messrs. F. Sander & Co., St. Albans, for a good group of Orchids in flower, the forms of Maxillaria grandiflora being very interesting. A fine specimen of M. Sanderiana was shown, and under the name M. Kimballiana the yellow, chocolate-spotted species previously exhibited as M. tabularis. The group also contained a fine show of Odontoglossums, species and hybrids; some hybrid Cypripediums, Dendrobium Brymerianum, Lælia elegans Arnoldiana, various Masdevallias, Scuticaria Hadwenii, and a new yellow Lycaste, provisionally named L. Mastersiana.

Silver Flora Medal.

To Sir Trevor Lawrence, Bart., M.P. (Orchid grower, Mr. White), for a display of fine examples of Masdevallias, profusely bloomed, and comprising several varieties of M. Harryana, M. Lindenii splendens, M. Shuttleworthii, M. xanthocorys, M. Arminii, several forms of M. ignea, the best being M. i. Massangeana; and M. Fraseri, M. splendida, and M. triangularis.

To Mr. William Whiteley, Hillingdon, for a group of showy Orchids, in which the forms of Dendrobium nobile and D. Wardianum were prominent.

Silver Banksian Medal.

To F. C. Jacomb, Esq., Cheam Park (gardener, Mr. May), for an effective arrangement of Orchids in flower, composed chiefly of fine forms of Odontoglossum crispum, with some good O. citrosmum; Phalænopsis leucorrhoda, P. Sanderiana,

P. amabilis, P. Schilleriana, Oncidium concolor, Platyclinis glumacea, and Dendrobium Devonianum and other Dendrobes.

Bronze Banksian Medal.

To F. A. Bevan, Esq., Ludgrove, New Barnet (gardener, Mr. Phillips), for a group in which were some fine specimens of Dendrobium thyrsiflorum, Aërides Fieldingii, Eria stellata, Odontoglossum Rossii majus, and Catasetum tridentatum.

To Malcolm S. Cooke, Esq., Kingston Hill (gardener, Mr. Cullimore), for small group, comprising Odontoglossum Andersonianum, O. Cervantesii, Chysis bractescens, Oncidium sarcodes, Dendrobium crepidatum.

First Class Certificate.

To Dendrobium × Venus (D. nobile × D. Falconeri) (votes, unanimous), from Norman C. Cookson, Esq., Wylam-on-Tyne. The flowers of this fine hybrid resemble in a great degree those of D. Falconeri giganteum.

To Epidendrum Dellense ×, from Baron Schröder. This is from a cross between E. xanthinum and E. radicans. The flowers are of the form of E. xanthinum, but larger, and of an orange-scarlet colour.

To Odontoglossum Dellense × (? O. Pescatorei × O. prænitens), from Baron Schröder. This resembles a heavily spotted O. excellens, but differs materially in the crest and column (fig. 52.)

Award of Merit.

To Lycaste Mastersiana (provisionally named), a distinct species with bright yellow flowers freckled with orange on the petals. From Messrs. F. Sander & Co.

Cultural Commendation.

To W. Bryant, Esq., Stoke Park, Slough (gardener, Mr. David Kemp), for a finely grown plant of Cypripedium bellatulum.

To Arthur T. Playne, Esq., Longfords, Minchinhampton (gardener, Mr. W. Driver), for a fine specimen of Cœlogyne pandurata in flower.

Other Exhibits.

His Grace the Duke of Northumberland, Syon House, Brentford (gardener, Mr. George Wythes), sent a very fine specimen of Cymbidium Lowianum, bearing seven heavily flowered scapes.

Messrs. James Veitch & Son, Chelsea, exhibited Miltonia Bleuiana splendens × ; and H. M. Pollett, Esq., Fernside, Bickley, a spotted Odontoglossum named O. Parksianum.

Messrs. Charlesworth, Shuttleworth & Co. sent two botanical Orchids, which were referred to Kew.

Messrs. Pitcher & Manda, Hextable, Swanley, Kent, submitted Cypripedium Rowellianum × (C. villosum × C. venustum). It was a good example of its class, but considering that

Fig. 52.—Odontoglossum Dellense. (From the *Journal of Horticulture.*)

C. Amesianum ×, C. Measuresianum ×, and others were of the same parentage, the Committee made no award to it.

Cut flowers of two very large forms of Dendrobium Wardianum were sent by E. G. Wrigley, Esq., Howick House, Preston (gardener, Mr. C. Harris).

G. O. Sloper, Esq., Westrop House, Highworth, submitted a flower of a massive form of Cypripedium Curtisii ; and Messrs. W. Heath & Son, Cheltenham, sent a plant of Dendrobium, said to be D. lituiflorum × D. nobile, but which did not appear to differ from a small D. nobile.

FRUIT COMMITTEE.

P. Crowley, Esq., F.L.S., in the Chair, and twenty-two members present.

Awards Recommended :—

Silver Banksian Medal.

To A. H. Smee, Esq., The Grange, Wallington, Surrey (gardener, Mr. G. W. Cummins), for twenty-fine varieties of Apples and Pears in excellent condition, the most noteworthy varieties being—Apples: Bismarck, Cox's Orange Pippin, Wadhurst Pippin, Dumelow's Seedling, Nonpareil, Claygate Pearmain, and New Hawthornden; Pears: Uvedale's St. Germain and Catillac.

Cultural Commendation.

To Messrs. H. Lane & Son, Great Berkhampstead, for very fine examples of Apple Lane's Prince Albert.

To the Marquis of Exeter, Burghley House, Stamford (gardener, Mr. R. Gilbert), for fine fruits (forced) of Strawberry John Ruskin. The Committee requested to have samples from the open air shown with Vicomtesse Hericart de Thury or other sorts.

To the Duke of Northumberland, Albury Park, Guildford (gardener, Mr. W. C. Leach), for excellent examples of Lady-bird and Ham Green Favourite Tomatoes.

Other Exhibits.

Lord Foley, Ruxley Lodge, Esher (gardener, Mr. J. Miller), sent good examples of Mère de Menage and Blenheim Orange Apples; also Mushrooms from outdoors and indoors.

Messrs. R. H. Vertegans & Co., Birmingham, sent examples of the "Melon Pear" (*Solanum guatemalense*).

Mr. Bradshaw, Davenham Gardens, Malvern, sent a Seedling Melon.

SCIENTIFIC COMMITTEE.

R. McLachlan, Esq., F.R.S., in the Chair, and seven members present.

Bigener.—The Rev. W. Wilks exhibited a plant named Chionoscilla, which was considered to be undoubtedly a bigener between Chionodoxa and Scilla bifolia. It was received from Mr. J. Allen, Park House, Shepton Mallet.

Blue Primroses.—Mr. Wilson exhibited several specimens illustrative of different shades of purple and blue Primroses.

Lemon Malformed.—Dr. Bonavia exhibited a Lemon remarkable for a ridge from top to bottom. He suggested that it might be due to an adherent filament, and that the rind was an independent structure. Mr. Henslow observed that an anatomical investigation into the distribution of the fibro-vascular cords of the carpels of Oranges did not appear to support that view. He added, that the well-known peculiarity of horn-like structures arising from the surface of Oranges was due to the adhesion of pistiloid stamens, which are not at all uncommon in Orange flowers.

Theobroma Leaves Diseased.—Mr. McLachlan exhibited leaves of the Cacao tree badly infested by Capnodium citri, which forms a soot-like sheet over the surface, but does not penetrate the tissues. It was received from Mr. Smith, the Curator of the Botanic Gardens in Grenada, W.I. The leaves are attacked first by two species of coccidæ, one stellate, the other linear in form. The coccids produce a secretion by which the fungus is nourished and thrives. Mr. Blandford observed that the same fungus occurs upon Oranges in California, which have in consequence to be washed. Mr. Riley, in his report of the U.S. Department of Agriculture for 1886, speaks of the large masses of secretion produced by coccids. In Florida, this fungus, known as black blight, is a regular consequence of the presence of the coccidæ in Oranges, and lives in the honeydew secreted by them. The names of the coccidæ are Vinsonia stelliformis, Westwood, and Ischnaspis filiformis, Douglas. The first or stellately-formed species is found on a species of Saccolabium introduced from Assam, on Mangos in Demerara, as well as on the Theobroma in Grenada. With reference to remedies, Mr. Smith recommends petroleum emulsion for the coccidæ, but for the fungus Dr. Müller suggested polysulphides—*e.g.*, sulphur boiled with caustic lime.

Injury to Plants at Kew.—With reference to the remarks made by Mr. Dyer at the last meeting as to the effects of the recent frosts on plants, it was stated that the object of keeping the temperature as low as possible in glasshouses in the winter was, because it was found to be practically impossible to retain a humid atmosphere with a high temperature, in consequence of the low external temperature and nocturnal radiation. The subject will be found fully discussed in

Lindley's *Theory and Practice of Horticulture*, p. 207. With regard to exposed plants injured by frost in Kew Gardens, Mr. Dyer added that, notwithstanding the long persistence of a low temperature at Kew, the bulk of the shrubs and evergreen trees did not at the close show the amount of injury which might have been anticipated. As soon as the sun came out, and milder weather followed the frost, the shrubs began to go off wholesale, the green colour of the leaves disappeared, and they turned, not brown, as in autumn, but pale and grey. His conviction was, that they bore the low temperature with comparative immunity, but that they could not bear the sudden transition from a low temperature to a high one. Mr. Morris informed him that precisely similar phenomena are observed at high levels in the tropics after frost. Mr. Wilks's theory that the shrubs are killed at the base is not the explanation at Kew, though, from local circumstances, it may be true of his own garden; and certainly it is not the case that any of the shrubs pushed forth buds before their premature decease.

GENERAL MEETING.

April 21, 1891.

Sir Chas. W. Strickland, Bart., in the Chair.

Elections.

Fellows, 17.—F. Brewer, T. P. Caldicott, S. Castle, John E. Cockett, W. F. Cooling, J. S. Cousens, W. Stewart Forster, T. Gabriel, Montague Gluckstein, W. T. Hindmarsh, F.L.S., P. L. Hudden, Mrs. Hudden, Lieut. W. P. C. Lethbridge, F. W. Moore, T. W. Platten, H. B. Rowan, and E. E. M. Royds.

Society Affiliated, 1.—Northamptonshire Horticultural Society.

A Paper on "Cape Bulbs" was read by Mr. James O'Brien, F.R.H.S. (*see* p. 232).

FLORAL COMMITTEE.

W. Marshall, Esq., in the Chair, and thirteen members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Barr & Son, Covent Garden, for a beautiful group of Daffodils (in variety), Anemone fulgens, &c.

Silver Banksian Medal.

To Messrs. Ryder & Son, Sale, Manchester, for an excellent and well-flowered collection of Primula Sieboldi, containing many fine varieties.

Bronze Banksian Medal.

To Messrs. Paul & Son, Cheshunt, for a pretty collection of hardy herbaceous and Alpine plants in flower.

To Mr. G. Phippen, Reading, for a collection of brightly coloured Primroses, in rich variety.

Award of Merit.

To Azalea indica Pharailde Mathilde (votes, 8 for), from Mr. C. Turner, Slough. A double flower, white spotted with rose.

To Azalea indica M. Labrousse (votes, unanimous), from Mr. C. Turner. Single-flowered variety, having flowers of a rich rosy-crimson colour.

To Azalea indica Princess Clementine (votes, unanimous), from Mr. C. Turner. A beautiful semi-double white flower, of fine form.

To Primrose Mary Erskine (votes, 10 for), from G. F. Wilson, Esq., F.R.S., Weybridge. Lavender blue, small yellow eye edged with pale red.

To Primrose Covenanter (votes, 9 for), from G. F. Wilson, Esq., F.R.S. Dark blue, golden eye.

Botanical Certificate.

To Rhododendron Championæ (votes, unanimous), from Messrs. James Veitch & Sons, Chelsea. A species having long wavy white petals, upper one being spotted with yellow. The lanceolate leaves are dark green above, rusty-coloured beneath, and fringed with bristly hairs. The plant was first discovered in 1849 by Captain and Mrs. Champion, growing abundantly among rocks in a ravine at Fort Victoria, Hong Kong. It was figured in the *Botanical Magazine*, t. 4609 (1851), but the flowers as there depicted are of a much more rosy than white colour.

Other Exhibits.

Mr. R. Dean, Ealing, sent a small but interesting group of double-flowered Auriculas.

Mr. W. Melles, Sewardstone, sent well-flowered plants of Iris fimbriata.

Sir J. T. D. Llewelyn, Bart., Penllergare, Swansea, sent a

collection of Rhododendron blooms, among them being several fine varieties cut from plants grown in the open air. It was stated that the plants were uninjured by the winter, but the flower-buds had partly suffered from severe frosts in March and April.

Prizes.

Prizes awarded in Class 3, the medals being presented by Messrs. Barr & Son:—

Collection of Daffodils, Polyanthus excluded. *First Prize*, Large Silver Medal, to H. J. Adams, Esq., Roseneath, Enfield (gardener, Mr. C. May). *Second Prize*, Small Silver Medal, to Rev. S. E. Bourne, Dunstan Vicarage, Lincoln. *Third Prize*, Large Bronze Medal, to Rev. G. P. Haydon, Hatfield Vicarage, Doncaster. *Fourth Prize*, Small Bronze Medal, to Miss B. F. Doyne, Seafield House, Gorey, Ireland.

ORCHID COMMITTEE.

Dr. Maxwell T. Masters, F.R.S., in the Chair, and seven members present.

Awards Recommended:—

Silver Gilt Medal.

To Messrs. F. Sander & Co., St. Albans, for a fine group of Orchids in flower, among which were four specimens of Odontoglossum Edwardi, several Trichopilia suavis, an interesting selection of Masdevallias—M. Chestertoni, M. radiosa, &c.; several Odontoglossum crispum, O. Pescatorei, O. Halli, O. Ruckerianum, Lælia purpurata; several good forms of Cattleya Mendelii, C. citrina, Angræcum sesquipedale, A. Sanderianum, and various Dendrobes, among which the white-petalled form of D. densiflorum named D. Schröderi was conspicuous.

First Class Certificate.

To Odontoglossum Pescatorei "Prince of Orange" (votes, unanimous), from Sir Trevor Lawrence, Bart., M.P. (Orchid grower, Mr. White). This beautiful form has flowers of a bright yellow, spotted with brown on the segments.

To Oncidium Larkinianum (votes, unanimous), from Mr. Larkin, Delrow, near Watford. This fine variety had previously received an Award of Merit. It appears to be intermediate between O. Marshallianum and O. curtum.

Other Exhibits.

Sir Trevor Lawrence, Bart., M.P. (Orchid grower, Mr. White), staged a small group of rare Orchids, among which were forms of hybrid Odontoglossum Pescatorei, such as O. excellens, O. Pescatorei Prince of Orange, and a variety resembling a small, pale O. excellens. Also a finely flowered Dendrobium Brymerianum.

Fig. 53.—Vanda tricolor. (From the *Gardeners' Magazine*.)

Messrs. J. Laing & Son, Forest Hill, exhibited Lælia Schröderi.

Col. Trevor Clarke, Welton Place, Daventry, was accorded a special vote of thanks for cut spikes of a very fine form of Cattleya Lawrenceana.

Reginald Young, Esq., Fringilla, Linnet Lane, Sefton Park, Liverpool (gardener, Mr. Poyntz), exhibited cut flowers of Lycaste Skinnerii, Poyntz var.

Messrs. de Rothschild, Gunnersbury House, Gunnersbury (gardener, Mr. J. Hudson), sent a spike of a variety of Vanda

tricolor, the terminal flower of which presented the peculiarity of possessing two lips and two columns, the other segments being normal, but somewhat reduced in size (fig. 53).

FRUIT COMMITTEE.

P. Crowley, Esq., F.L.S., in the Chair, and fifteen members present.

Awards Recommended:—

Silver Banksian Medal.

To Messrs. J. Cheal & Son, Crawley, for a good collection of Apples and Pears. Amongst Apples the most noteworthy sorts were Prince Albert, Bramley's Seedling, Wellington, Mère de Ménage, Round Winter Nonsuch, Beauty of Kent, Royal Russet, Brownlee's Russet, Cockle's Pippin, and Claygate Pearmain.

Cultural Commendation.

To the Marquis of Exeter, Burghley House, Stamford (gardener, Mr. R. Gilbert), for excellent fruits of Tomatoes, Selected Criterion and Wynne's Early Forcing.

To the Duke of Northumberland, Syon House, Brentford (gardener, Mr. G. Wythes), for good examples of Black Hamburgh and Foster's Seedling Grapes of the present year.

Other Exhibit.

The Duke of Northumberland sent a dish of Seedling Strawberries, raised from Keen's Seedling; plant very dwarf.

SCIENTIFIC COMMITTEE.

D. Morris, Esq., M.A., in the Chair, and six members present.

Primroses.—Col. Clarke forwarded flowers of a cross, showing the effect of a "blue" (female parent) with a very dark purple (male). The colour was a bluish purple. He reports that it is a first attempt to form a blue tint with a yellow eye. Mr. Wilson also exhibited a number of flowers showing new shades of light and dark blue, varying to purple. In some the red circle round the yellow eye had quite disappeared.

Auricula Hybrid (?).—Rev. A. Rawson, of Fallbarrow, Windermere, sent two umbels. One was of the typical yellow form, the other being striped with crimson. The latter is a presumed hybrid by intercrossing with a crimson Polyanthus. Upon division of the plant in order to propagate it the stripe disappears,

and the plant reverts to yellow. No plant taken from the yellow ever produces a striped flower.

Grapes Grown in the Dark.—Messrs. T. Rivers & Son sent a portion of a Vine bearing a well-shaped and good-sized bunch of white Grapes. They were very pale-coloured, and apparently unable to ripen. The rod appeared to have formed no leaves, the whole shoot having been developed in total darkness.

Foliage Injured by Sulphuric Acid.—Professor Church exhibited leaves of various plants which were dried, shrivelled, and blotched, or streaked with red. They were taken from plants in a hothouse, and also from a second, the door of which faced that of the first. The injury resulted from the presence of free sulphuric acid, which, there was little doubt, arose from some small leakage in the flue. The subject of injury by gases will be found discussed by Herr L. Just and H. Heine ("Landwirthsch. Versuchsstat." xxxvi. 1889). See also "Bot. Centralbl. xl. 1889, p. 296). The authors consider sulphurous acid to be the most injurious. When taken into the tissues it is oxidised into sulphuric, which destroys the protoplasm, and ultimately causes the death of the plant.

Kæmpferia Tubers.—Mr. Morris exhibited specimens of tuberous roots produced by a species of Kæmpferia at Trinidad, and used as food under the name of *Toppee Tambo*. Mr. J. H. Hart, F.L.S., the sender of the specimens, stated that the small tubers are preferred, and these are boiled and eaten like a Potato with salt and butter. They have an agreeable nutty flavour, and are much liked by the people. Similar tuberous roots are used at Dominica under the name of *Tokkee Tambo*. Mr. Morris added that this was an interesting record of the use of the swollen roots of a Scitamineous plant for purposes of food, and he suggested that they might be carefully investigated. Professor Church was good enough to undertake an examination of the specimens, and report the results at a subsequent meeting.

NATIONAL AURICULA AND PRIMULA SOCIETY.

The Southern Section of the above Society held its Annual Exhibition in the Drill Hall in conjunction with the Society's meeting. Notwithstanding the lateness of the season, the display of Primulas and Auriculas was much better than had

been anticipated, and the exhibits, though not up to the usual standard, were on the whole very satisfactory.

In the class for "Show Auriculas," Mr. T. E. Henwood, of Reading, was first with Lancashire Hero, Abbé Liszt, Rev. F. D. Horner, Black Bess, and others, including a fine specimen of George Lightbody, which latter was adjudged to be the Premier Auricula. Mr. James Douglas, gardener to Mrs. Whitbourne, Great Gearies, Ilford, came second. His plants seemed to have suffered somewhat, but his Mrs. Moore, Acme, and Sapphire were good. The third prize was won by Mr. A. J. Sanders, gardener to Viscountess Chewton, Brockham Lodge, Cobham, with good plants of Rev. F. D. Horner and Black Bess. Mr. P. J. Worsley, Rodney Lodge, Clifton, was fourth, and Mr. R. Dean, of Ealing, fifth.

In the class for six Auriculas, Mr. Henwood was again first, Mr. Douglas second, Mr. A. J. Sanders third, and Mr. P. J. Worsley fourth, the varieties exhibited being Rev. F. D. Horner, Abbé Liszt, and Lancashire Hero, with green edges; George Rudd and Marmion, grey edge; Mrs. Dodwell, Elaine, and Heatherbell, white edge; and Black Bess, a self-coloured form.

There were altogether nine classes for Auriculas, five for Alpine Auriculas, three for Polyanthuses, and eight extra ones for miscellaneous exhibits of each of the above, with the addition of Primroses, single and double, and distinct species of Primulas.

The Alpine Auriculas were very fine, especially those from Mr. C. Turner, of Slough, and Mr. James Douglas.

The gold-laced Polyanthuses were fairly numerous, and Mr. J. Douglas, Mr. J. Weston (gardener to D. Martineau, Esq., Clapham Park), Mr. R. Dean, and Mr. A. J. Sanders exhibited some fine varieties.

The Primroses and Primulas presented a much brighter appearance than the Auriculas, and were more appreciated by that portion of plant lovers who do not care so much for the floury appearance of the latter. The exhibitors were almost the same in this group as in the others, with the addition of Mr. O. T. Hodges, of Chislehurst; Messrs. Paul, of Cheshunt; and Sir J. T. D. Llewelyn, Bart., of Swansea. Among the species of Primula shown were *P. japonica*, *P. amœna*, *P. cashmeriana*, *P. obconica*, *P. nivea*, *P. floribunda*, *P. verticillata*, *P. intermedia*, *P. rosea*, *P. latifolia*, *P. denticulata*, &c.

GENERAL MEETING.

May 12, 1891.

Sir J. T. D. Llewelyn, Bart., in the Chair.

Elections.

Fellows, 29.—W. R. Barker, T. H. Barnett, W. McKenzie Bradley, John P. Cregoe, Jno. Coppen, Chas. Dalby, F. W. Forrester, W. O. Forrester, Joseph Hall, Geo. Haywood, Miss H. B. Johnstone, Mrs. F. Kelly, James Martin, Sam. Prout Newcombe, E. G. Niesigh, J. Paddon, H. B. Raven, John Reid, Mrs. Eliz. C. Routh, W. B. Sadgrove, Mrs. Tatton, H. A. Tracy, F. J. Underwood, Arthur B. Wadds, W. F. Walters, C. D. Wise, H. Wood, H. F. Wooderson, Francis Worsley.

Societies Affiliated, 2.—Reading and District Horticultural Society; St. John's Amateur Horticultural Society, Sevenoaks.

A paper on "Hybrid Rhododendrons" was read by the Rev. Professor Henslow, M.A. (*see* p. 240).

FLORAL COMMITTEE.

W. Marshall, Esq., in the Chair, and twenty-one members present.

Awards Recommended:—

Silver Gilt Flora Medal.

To J. C. Tasker, Esq., Middleton Hall, Brentwood (gardener, Mr. P. Perry), for a well-flowered group of Roses in pots.

Silver Banksian Medal.

To Messrs. Barr & Son, Covent Garden, for a beautiful assortment of cut Daffodils, Anemones, Chionodoxas, and Tulips.

To Sir J. T. D. Llewelyn, Bart, Penllergare Swansea, for cut blooms of an interesting series of Hybrid Rhododendrons.

Bronze Banksian Medal.

To Mr. G. Phippen, Reading, for an attractive group of Polyanthuses and Primroses.

To Stafford F. Still, Esq., Lismore, Woodside, Wimbledon Park (gardener, Mr. J. Curtis), for a pretty group of seedling Amaryllis in flower.

First Class Certificate.

To Anthurium Laingii (votes, unanimous), from Sir T.

Lawrence, Bart., M.P., Burford Lodge, Dorking. Large white spathe; noble foliage.

To Anthurium Burfordiense (votes, unanimous), from Sir T. Lawrence, Bart., M.P. Bright crimson spathe; very beautiful.

To Pteris cretica crispata (votes, 13 for, 1 against), from

Fig. 54.—Hybrid Sweet Briar. (From the *Gardeners' Chronicle.*)

Messrs. James Veitch & Sons, Chelsea. A valuable decorative Fern of compact habit.

To Lilac Léon Simon (votes, 10 for), from Messrs. Paul & Son, Cheshunt. Flowers very double, and of a pale clear lilac tint.

To Myosotis Bexley Gem (votes, 14 for, 1 against), from W. Marshall, Esq., Auchenraith, Bexley. Plant of very dwarf habit, with large bright blue flowers.

To Sweet Briar Lady Penzance (votes, 11 for, 1 against), from Lord Penzance, Easling Park, Godalming. A single variety, with metallic rosy-red flowers, with a yellow base. It was stated to be a "graft or bud on the Manetti of a seedling from the common Sweet Briar, crossed with the pollen of Austrian Copper Briar in 1886. The seedling came up in the spring of 1887, and flowered for the first time in 1889, but had only one flower. It is now a vigorous plant four feet high, the wood a sort of purple colour like that of the pollen-parent" (fig. 54).

Other Exhibits.

E. M. Nelson, Esq., Hanger Hill House, Ealing (gardener, Mr. E. Chadwick), sent plants in flower of Arthropodium cirratum.

Mr. Coppin, Battersea Park, sent a plant of Puya Whytei, with a flower stem 7 feet high, bearing at its summit large bright-metallic green flowers.

W. E. Gumbleton, Esq., Belgrove, Queenstown, Ireland, sent some well-executed paintings of Daffodils, Snowdrops, and Chionodoxas.

Stafford F. Still, Esq., sent two baskets of Auriculas, well flowered.

James Bateman, Esq., Home House, Worthing, sent a flower-stem of Chamærops Fortunei.

Messrs. W. Paul & Son, Waltham Cross, sent a plant in flower of Spiræa multiflora arguta.

NARCISSUS COMMITTEE.

The Narcissus Committee held, as usual, four meetings this season, when the majority of the flowers shown were fine forms selected from bulbs collected wild and seedlings raised in this country. Of the latter those due to the Rev. G. H. Engleheart were of great interest, a careful record having been kept of the parentage, and a distinct advance in colour and form being noticeable in many cases. Moreover, by his experiments the origin of many of the varieties now cultivated in gardens is shown clearly. Only one variety was registered this year, viz., "Flora Wilson."

Awards Recommended.

Silver Gilt Flora Medal (presented by Messrs. Barr), for the best English-raised seedling Daffodil.

To the Rev. G. H. Engleheart, Appleshaw, Andover, for

Fig. 55.—Narcissus Albatross. (From the *Journal of Horticulture.*)

Poeticus Albatross. Mr. Engleheart sent to this meeting a very interesting exhibit of a dozen hybrid Narcissi—some remarkably fine—accompanied by flowers of the parents. The most

remarkable was a variety called "Albatross" (fig. 55), the result of crossing N. poeticus ornatus with N. pseudo-Narcissus Empress.

Prizes.

Prizes were awarded in Class 6 (Open) for Collection of Daffodils, Polyanthus excluded. *First Prize*, Silver Flora Medal, Rev. G. P. Haydon, Hatfield Vicarage, Doncaster. *Second Prize*, Silver Banksian Medal, H. J. Adams, Esq., Roseneath, Enfield (gardener, Mr. C. May).

The medals were presented by Messrs. Barr & Son.

ORCHID COMMITTEE.

Harry J. Veitch, Esq., in the Chair, and nine members present.

Awards Recommended :—

Award of Merit.

To Odontoglossum Hallii leucoglossum (votes, unanimous), from Gustav R. Le Doux, Esq., Langdon House, East Moulsey (gardener, Mr. H. J. Chapman). A very fine form of this excellent species, with a pure white lip.

To Odontoglossum crispum Wrigleyanum (votes, unanimous), from E. G. Wrigley, Esq., Howick House, Preston (gardener, Mr. G. Beddoes). The sepals and petals are mauve, heavily blotched with reddish brown.

To Phalænopsis speciosa Imperatrix (votes, unanimous), from F. Wigan, Esq., Clare Lawn, East Sheen (gardener, Mr. W. H. Young). The flowers were large and of a deep mauve purple.

To Cattleya Schröderæ, Temple's var. (votes, unanimous), from J. W. Temple, Esq., Leyswood, Groombridge (gardener, Mr. E. Bristow). The sepals and petals are pale rose ; the lip is deeper in colour, with an orange throat and a finely frilled margin.

To Cattleya Mossiæ gigantea (votes, unanimous), from Malcolm S. Cooke, Esq., Kingston Hill (gardener, Mr. Cullimore). The flowers were remarkably large and delicately coloured.

Cultural Commendation.

To Sir Chas. W. Strickland, Bart., Hildenley, Malton, for Cattleya citrina, nine plants of which were exhibited growing on blocks, in the most healthy and vigorous condition.

To Mr. W. H. Young, gardener to F. Wigan, Esq., Clare Lawn, East Sheen, for Lælia majalis, the flowers of which were large and remarkably well coloured.

To Mr. W. Murray, gardener to Norman C. Cookson, Esq., Oakwood, Wylam-on-Tyne, for a striking example of Cypripedium Rothschildianum.

Other Exhibits.

R. B. White, Esq., Arddaroch, Garelochhead, N.B. (gardener, Mr. Brown), contributed cut blooms of about twenty beautiful varieties of Cattleya Mendelii, and a few Lælia purpurata, and was accorded a special vote of thanks.

T. Statter, Esq., Whitefield, near Manchester (gardener, Mr. R. Johnson), sent Cypripedium Lawrenceanum expansum, with a very large upper sepal; and Cattleya Mendelii cœlestis, a form almost pure white, except for the pale purple tinge on the lip.

F. Wigan, Esq. (gardener, Mr. W. H. Young), sent Phalænopsis speciosa, Dendrobium clavatum, and Cymbidium tigrinum, the latter being a well-flowered plant in a small pot.

Gustav R. Le Doux, Esq. (gardener, Mr. Chapman), contributed a few Masdevallias and several Odontoglossums—O. nebulosum being particularly fine.

F. A. Bevan, Esq., Ludgrove, New Barnet (gardener, Mr. B. Phillips), staged Odontoglossum crispum, Cypripediums, and a soft-tinted form of Sobralia macrantha known as delicata.

Mr. Martin Standing, The Gardens, Patching, Worthing, exhibited Dendrobium densiflorum.

Messrs. F. Sander & Co., St. Albans, sent the curious Cypripedium viridiflorum, which, as the specific name implies, has green flowers.

Messrs. Seeger & Tropp, East Dulwich, staged a small group of interesting Orchids, comprising Cypripediums, Masdevallias, and Cattleyas.

FRUIT COMMITTEE.

PHILIP CROWLEY, Esq., F.L.S., in the Chair, and sixteen members present.

Awards Recommended:—

Cultural Commendation.

To the Duke of Northumberland, Albury Park, Guildford (gardener, Mr. W. C. Leach), for fine fruits of Strawberry James Veitch.

To Messrs. T. Burton & Son, Bexley Heath, for excellent examples of Peach Waterloo from a pot-tree.

Other Exhibits.

Mr. E. Bradshaw, Davenham Gardens, Malvern, sent a seedling Melon.

Mr. C. Turner, Slough, sent good samples of Apples from Tasmania.

The Duke of Northumberland sent fruits of Strawberries Noble and Auguste Nicaise.

From the Society's Gardens, Chiswick, were sent ten varieties of Rhubarb.

SCIENTIFIC COMMITTEE.

Dr. MAXWELL T. MASTERS, F.R.S., in the Chair, and nine members present.

Growth in Darkness.—Dr. Masters received a communication from Gloucestershire, in which it was stated that wooden props in a coal-mine at a depth of 1,000 feet had sent out shoots with perfectly blanched leaves. They had grown vertically upwards, and proved to be Oak and Sweet Chestnut. He also exhibited a large mass of interlacing roots, apparently of a Lime-tree (judging by their bitterness and mucilaginous character), which had grown underneath the floor of a house in Bayswater. No tree was known to be anywhere in the neighbourhood. It was suggested that the root had grown along some drain-pipe, and finally found an exit where it could develop into branches.

Acacia dealbata.—Dr. Masters showed flowering branches from a tree which had been killed down to the ground ten years ago, but had sent up suckers. These proved to be hardier than the original plant, as they were uninjured during the past winter,

and were now in full bloom. As another instance of a late recovery he mentioned an Ailanthus glandulosus, which sent up suckers fifteen years after it had been cut down.

Malformed Narcissi.—Rev. C. Wolley-Dod exhibited specimens of different varieties of Narcissus, showing a constriction of the mouth of the trumpet or "corona." It was suggested that it might be due to some check or enfeeblement, since it was always the later flowers which exhibited the peculiarity. An analogous constriction in corollas sometimes occurs in flowers reverting to self-fertilisation—as, *e.g.*, in Gentiana Andrewsi.

Excrescence on Willows.—Mr. Blandford exhibited a branch with a tumour-like growth, 3 to 4 inches in diameter. They appear to be common on Willows by the river Meuse. It was suggested that a species of saw-fly might prove to be the cause. Mr. MacLachlan undertook to report further upon it.

Oak Wood Destroyed.—He also exhibited a piece of Oak completely converted into powder by attacks of Lyctus canaliculatus. It is a beetle which causes great mischief to gun-stocks in Birmingham. He also showed specimens of wood from barrels perforated by Carpophilus hemipterus. In a previous case the staves were perforated on both sides; in the present instance the attack by the insects was made after the barrels had been completed, as the perforations only occurred on the exterior.

Primrose Seedling.—Miss Woolward sent a new and remarkable form of a Primrose which accidentally appeared in a cottage garden at Belton, near Grantham. Its peculiarities consist in the corolla lobes being red below and yellow above, as well as in possessing a sweeter and more powerful perfume than most varieties.

Heterœcismal Fungi.—Dr. Plowright exhibited specimens of Puccinia Digraphidis, *Soppitt*, on the leaves of Phalaris arundinacea, which were found by Dr. D. Franzschel near Wiborg in Finland, growing in the vicinity of Æcidium Convallariæ; also specimens of Puccinia Agrostidis, *Plow.*, on Agrostis vulgaris collected by the same gentleman near Lewaschow, in Russia, growing in the vicinity of Æcidium Aquilegiæ. He further stated that he had this year produced the Cæoma Laricis upon Larch by infecting this plant with the germinating teleutospores of Melampsora betulina, the converse experiment of producing the Melampsora on Birch from the spores of Cæoma Laricis having

been made last year. This culture is the more interesting as it shows that the Larch is the host plant for the æcidiospores of two species of Melampsora. Hartig had previously demonstrated that a Melampsora on Populus tremula similarly affects the Larch foliage.

"*Anti-blight*," *a Preparation for the Destruction of Mildew.*—A visitor, Mr. A. Buchanan, of Glasgow, was invited to give an account of a preparation recommended by Mr. Tait, of Oporto. It was found to be beneficial to Vines in the north of Portugal, and as the Potato disease was due to another species of Peronospora, it was suggested as a remedy for it. He read a communication presented to the Highland Agricultural Society, in which the results from its use were described as beneficial to port wine growers, as well as being destructive to mould on trees, &c. He gave a description of the composition of "anti-blight," which consisted of lime, flowers of sulphur, and sulphate of copper. The sulphate of copper disappears, and is replaced by a hydrated oxide of copper. The preparation is used in the dry state instead of being in solution, which, excepting the sulphur, is apparently the only appreciable difference between "anti-blight" and other well-known preparations. There appears to be a certain danger in its use, in that if the powder be not ground sufficiently fine, small particles of sulphate of copper may be left on the foliage, unaltered, which destroy it. These have, therefore, to be sifted out, the finer powder being alone used. The dispersion of the powder has to be effected by means of bellows and fans of peculiar construction.

It was observed by Dr. Plowright that the flowers of sulphur, though destructive to the oïdium upon Vines, would have no effect upon the Potato disease. He also referred to the extended use of preparations of sulphate of copper on the Continent—as, *e.g.*, for Tomatoes, the foliage and fruit of which are dressed with it. The practice is even adopted of painting the Vine poles, as this has been found to lessen the disease. Sulphate of copper is also largely used in America.

Mr. Wolley-Dod described his experience with similar materials, only used wet, in the following proportions :—3 lbs. of sulphate of copper, 10 gallons of water, and 2 lbs. of quicklime. Having applied it to growing plants of tender foliage liable to mildew, it proved injurious, because the sulphate of copper had not passed

into the hydrated oxide. He added that flowers of sulphur, though an old remedy for foliage, proved injurious to roots, paralysing root growth by the sulphur probably becoming oxidised and giving rise to sulphurous acid. He suggested that it should never be used as a top-dressing. Bulbs thus arrested had been exhibited at a previous meeting.

Having heard Mr. Buchanan's account, the Committee expressed their willingness to give publicity to his statements; but they did not consider there was sufficient novelty in the preparation to justify them in recommending experiments to be carried out at the Society's gardens. Moreover, the question appeared to them to be rather more of a commercial than scientific nature. The Committee, however, thought that if private cultivators would undertake to try it, its true value might soon be discovered by testing the powder in various ways on different plants, as well as by using the liquid preparations for comparison, to discover if it were really preferable to the latter or not.

THE GREAT FLOWER SHOW, 1891.

Inner Temple Gardens, E.C.

May 28 and 29.

By the kind permission of the Treasurer and Masters of the Bench, the Society was enabled, for the fourth time, to hold its great City of London Flower Show in the gardens of the Inner Temple on Thursday and Friday, May 28 and 29. The Gardens were open to the public at one o'clock precisely, and at three o'clock H.R.H. the Princess Christian, who was accompanied by H.R.H. Prince Christian and their two daughters, arrived and presented the Cups awarded to the most meritorious exhibits. The Royal Party was conducted round the tents by Sir Trevor Lawrence, Bart., M.P., the President of the Society, Baron Henry Schröder, Vice-President, and other members of the Council.

The weather, although somewhat unsettled, with occasional showers of rain, was on the whole fine, and the attendance of visitors was larger than on any previous occasion.

The band of H.M. Scots Guards, under the conductorship of

Mr. E. Holland, was present each afternoon, and was highly appreciated by the great multitude of visitors.

The "City Flower Show," as it has now come to be called, is every year becoming more popular, and perhaps this is due to the remarkable fact that not a single prize was offered and the exhibition is entirely of a non-competitive character. Silver cups and medals are of course awarded by the Council, on the recommendation of the judges and committees, to groups in the various sections possessing more than ordinary merit.

The area required for this great display of flowers under canvas was almost 25,000 square feet, and was covered by means of four large tents, the dimensions of which were respectively: No. 1, 170 × 30 feet, containing Gloxinias, Begonias, Calceolarias, Pæonies, Streptocarpi, and hardy herbaceous plants in general; No. 2, 140 × 40 feet, devoted chiefly to Orchids, Ferns, Azaleas, Pelargoniums, Begonias, and New Holland Plants; No. 3, 160 × 60 feet, was decorated with Orchids from amateurs, Palms, Roses, Azaleas, hardy shrubs, stove and greenhouse plants, &c.; while No. 4, 150 × 30 feet, had a miscellaneous collection of new or rare plants, bouquets, cut flowers, Tulips, Violas, herbaceous plants, fruits, and garden implements.

The tents were so arranged that it was possible to pass from one to the other immediately, and in this way the entire exhibition was conveniently displayed, especially as the public were kept moving in the same instead of opposite directions, and thus unpleasant crushing past one another was avoided. Had the weather been pouring rain instead of being fine, it would have made no material difference to the enjoyment of seeing the unique display, because the pathways in and leading to each tent were neatly boarded and consequently made a much nicer footing.

It would be a very difficult matter to give anything like a proper account of each exhibit, and we will therefore content ourselves with the following summary of the whole.

Orchids.

The display of Orchids was remarkable in every respect, and did more than anything to show the tremendous popularity which they have attained. Altogether, about 3,000 square feet was covered with them. The collection of some amateurs are

becoming so large, and contain so many excellent examples of good cultivation, that this year it was found necessary to draw a distinct line between them and the groups of the nurserymen, and the exhibits were consequently arranged in separate tents.

The first group in the amateurs' section was a splendid one from Sir Trevor Lawrence, Bart., M.P. (grower, Mr. White). The Burford Lodge collection has for many years been noted for the excellence of its plants, and it may be fairly said that the best of these were represented on this occasion. Rare Cypripediums were very noticeable, especially such kinds as *C. Stonei grande*, *C. caudatum Wallisii*, *C. grande atratum*, *C. Fraseri*, *C. Swanianum*, as well as the remarkable *C. Rothschildianum*, which seems to improve more and more since it has been under cultivation. Odontoglossums were represented by *Coradinei*, *Andersonianum*, *cirrosum*, and several varieties of the useful *crispum*. The varieties of Masdevallia were of a very rich hue, and proclaimed the good treatment they had received. Among other kinds were some *M. Harryana* and *M. coccinea*, bearing as many as twelve flowers each. Among the other exhibits were *Maxillaria Lehmannii*, *Kimballiana*, and *Sanderiana*, the latter with its large waxy-white flowers splashed with deep crimson at the base of the sepals, petals, and lip; *Oncidium ampliatum majus*, some exquisite forms of *Cattleya Mossiæ Wagneri*, *Lælia purpurata*, *Masdevallia Schlimii*, *Vanda teres*, *Phalænopsis Sanderiana*, *Bulbophyllum Dearei*, *Ornithocephalus grandiflorus*, several Aërides, Lælias, *Stelis muscifera*, *Calanthe purpurea* and *veratrifolia*.

Arranged next was a magnificent group from Baron Schröder (gardener, Mr. Ballantine). It was a delightful mass of loveliness. One hundred and sixty well-grown specimens were staged, and as many as ninety-two different varieties were represented. To take them alphabetically, there was the brilliant *Ada aurantiaca*; four varieties of Aërides, including the new deep crimson *Savageanum*, imported last year from the Philippines, and the graceful white *Williamsii*; thirteen Cattleyas of surpassing beauty, among them being *Mendelii* and its variety *Bluntii*, *Mossiæ Schröderæ*, *Skinnerii*, two remarkable specimens of the latter bearing hundreds of rosy flowers, *Regnellii* and *Mossiæ Reineckiana*; *Cœlogyne pandurata*, with several of its curious green and black flowers, was *en evidence*; while among

the large group of Cypripediums were to be seen *Elliottianum*, *Rothschildianum*, *ciliolare*, *Dayanum*, *Lowii*, *Hookeri*, *Lawrenceanum*, *caudatum*, *Wallisii*, and others. Dendrobiums were represented by *Bensoniæ*, with its clusters of white flowers, and its yellow variety, *xanthina*; also *D. Jamesianum*. The Epidendrums were remarkable for the two new hybrids, *O'Brienianum* × *dellense*, in addition to good specimens of the showy *vitellinum majus*. *Lælia grandis purpurata*, and its variety *rosea striata*, were also present, and interspersed throughout the group were about thirty brilliant Masdevallias of the *Harryana*, *Lindeni* and *Veitchii* section, one specimen of *Veitchii grandiflora* having as many as thirty large flowers; two plants of *Maxillaria Sanderiana*, and several varieties of *Miltonia vexillaria*.

Several excellent Odontoglossums were staged, the most notable being the charming *O. Cervantesii decorum*, *Pescatorei*, and its rare and richly coloured variety *Veitchianum*; the white *cirrosum*, rendered lovely by its heavily spotted sepals and petals; the blotched *cordatum* and its near relative *maculatum*, besides several forms belonging to the *luteo-purpureum* section. Others to be noted were *aspersum*, *citrosmum*, *crispum*, *Bonneyanum*, *excellens*, *Halli xanthoglossum*, *triumphans*, *Wilckeanum*, *Schillerianum*, and the graceful little *Oërstedii*. The old and beautiful *Saccolabium ampullaceum*, with its erect clusters of bright rose-carmine flowers; the peculiar *Bulbophyllum* (*Sarcopodium*) *Dearei*, the dwarf and brilliant *Sophronitis grandiflora*, *Vanda cœrulescens Boxalli*, *Schomburgkia Tibicinis*, and the remarkable *Spathoglottis aurea* (*Kimballiana*), with its bright canary-yellow flowers, completed this remarkable display.

T. B. Haywood, Esq., Woodhatch Lodge, Reigate (gardener, Mr. Salter), had a most tastefully arranged group, consisting of *Odontoglossum crispum*, *O. Pescatorei* with several spikes, several highly coloured varieties of *Masdevallia Harryana* and *M. Veitchii*, *Dendrobium chrysotoxum*, and *Miltonia vexillaria*, remarkable for the deep colour of its flowers. This group was displayed to great advantage by means of Maidenhair Ferns judiciously intermingled with the plants to serve as a background for the flowers.

Major-General Berkeley, Bitterne, Southampton (gardener, Mr. Godfrey), contributed a small but remarkably fine collection of Phalænopses—*P. speciosa* and its variety Imperatrix, *P. Luddemanniana*, and *P. tetraspis*.

From Malcolm S. Cooke, Esq., Kingston Hill (gardener, Mr. Cullimore), came a choice display made up of *Odontoglossum Uro-Skinnerii*, several Oncidiums, including *O. crispum* and *serratum*, *Leptotes bicolor*, *Epidendrum vitellinum majus* and *E. varicosum*, besides such Cypripediums as *C. Lowii*, *Druryi*, and *hirsutissimum*.

The Right Hon. J. Chamberlain, Highbury (gardener, Mr. Burberry), contributed a few brilliant examples of Masdevallias.

G. Burnham, Esq., Stoke Newington, staged good plants of *Cypripedium bellatulum* and *Lælia purpurata*.

A pretty little group came from W. F. Darnell, Esq., Stamford Hill (gardener, Mr. J. Elliott). It contained well-grown Cattleyas and Lælias, together with some graceful Palms.

Mrs. Arbuthnot, Bexley (gardener, Mr. J. Mitchell), had among her exhibits good specimens of *Miltonia vexillaria*, *Brassia cordata*, *Cypripedium caudatum*, the deep-coloured *Lælia purpurata Brysiana* and the white *L. p. alba*, the golden *Anguloa Clowesii*, the old and distinct *Vanda Roxburghii*, and a plant of *Sobralia macrantha magnifica* with flowers fully bearing out the Latin adjectives applied to them.

Mrs. Haselfoot, Southampton (gardener, Mr. N. Blandford), sent a large specimen of *Dendrobium nobile* completely covered with flowers. The plant was exhibited for the purpose of showing that severe pruning, which had been freely practised on it for some years, was at least not detrimental.

His Grace the Duke of Marlborough, Blenheim (gardener, Mr. T. Whillans), had a large collection, neatly embellished with small Ferns—Cattleyas, Dendrobiums, *Lælia purpurata*, *Aërides virens*, *Odontoglossum citrosmum*, *Cymbidium Lowianum*, and Vandas noticeable among others.

Messrs. de Rothschild, of Gunnersbury Park, Acton (gardener, Mr. G. Reynolds), contributed a group of sixty remarkably fine plants of *Vanda teres*, which seems to thrive better in the gardens of the various members of this family than anywhere else. Most of the spikes bore about four to six large and highly coloured rosy flowers.

From A. H. Smee, Esq., Carshalton (gardener, Mr. C. W. Cummins), came well-grown specimens of *Cattleya Mossiæ*, with delicately shaded flowers of various hues; *C. Mendelii*

hackbridgensis, remarkable for its deeply tinted labellum and purple-striped petals. The Hackbridge variety of *Cypripedium Lawrenceanum*, with its substantial flowers, in conjunction with showy Masdevallias and chaste Odontoglossums, produced a pleasing effect.

T. Statter, Esq., Whitefield, Manchester (gardener, Mr. R. Johnson), sent cut blooms of the Mexican "Flor de Mayo," or May Flower (*Lælia majalis*), with rosy lilac sepals and petals and a blush lip with a white centre speckled with purple; *Lælia elegans*, and its rare varieties *Stelzneriana* and *Philbrickiana*, *L. purpurata Schröderiana*, several Odontoglossums, and the almost pure white *Cattleya Skinneri alba* were also represented, and formed a pretty and interesting group on account of their comparative rarity.

A select group was exhibited by F. Wigan, Esq., East Sheen (gardener, Mr. W. H. Young). Some uncommon things may always be expected from East Sheen, hence it was not surprising to find a finely coloured form of *Cypripedium philippinense* (*C. lævigatum*), its relative *C. Roebelinii*, *C. concolor*, *Pescatorei cerina* with its waxy pale yellow flowers, the dwarf and pretty *Cymbidium tigrinum* with its yellowish green flowers tinged with olive and speckled with red, the rare and handsome *Sarcochilus Berkeleyi* (often called by the generic name of *Thrixspermum*) with its drooping racemes of creamy white flowers with a conspicuous purple stain on the lip, besides *Vanda teres* and *V. suavis*, and a good specimen of *Oncidium Marshallianum*.

We now come to the Orchids staged by trade growers—who were not in such numbers as the amateurs. Their groups were, however, very extensive and extremely important, as showing the great extent to which popular taste has made it neccesary for these wonderfully curious flowers to be grown.

From its extensiveness and the great number of different varieties exhibited, the most important were the Orchids contributed by Messrs. F. Sander & Co., St. Albans. Almost 500 square feet were covered with plants from this firm alone, and the display was most effective and charming, intermingled as the plants were with such graceful Palms as *Areca lutescens*, *Kentia Belmoreana*, *Cocos Weddelliana*, as well as with Maidenhair and other Ferns. About sixty plants of *Odontoglossum*

citrosmum, with their pendulous racemes of white and rosy flowers, were shown off extremely well by the green baize partition of the central stage acting as a pleasing background. *Cymbidium Lowianum* is now a very well known Orchid, but it loses none of its popularity, as it is so easily grown—a fact testified by the six huge specimens in the group, with deep green foliage and long arching racemes of pale yellow and red-streaked flowers. *Miltonia vexillaria* in numerous shades of colour served to form an attractive edging to the group, in which masses of the golden *Oncidium Marshallianum* and *O. ampliatum majus* at once attracted the eye. Odontoglossums were, of course, represented, among them being *O. polyxanthum splendens*, with clear yellow and brown-blotched flowers; *O. Wilckeanum burfordiense*, *luteo-purpureum Arnoldianum*, *tripudians*, *Andersonianum*, *excellens Sanderæ*, *crispum*, and the beautiful *Harryana*, with exquisitely veined lip.

Several varieties of *Cattleya Mossiæ* were to be seen, their large delicate flowers varying in colour from the snow-white *Wagneri* to the deep crimson and maroon of *Measuresiana*. *Lælia purpurata* is a noble Orchid, and will always be sought after on account of its substantial flowers, in which the large lip forms as it were the playground on which nature disports her most beautiful hues of crimson and purple.

There were many fine examples of Cypripediums, the most noticeable being the rare *Juno*, the handsome dwarf *bellatulum*, the long-tailed *caudatum*, and the gold and purple *Rothschildianum* with bearded petals spreading out like waxed mustachios. *Anguloa Clowesii*, with its large golden yellow tulip-like flowers; *Maxillaria Sanderiana*, white and blood-red; *Epidendrum vitellinum majus*, *Ornithocephalus grandiflorus*, *Cœlogyne pandurata*, the inky-brown *Catasetum callosum*, and the white *Cattleya Skinneri alba*, all formed a highly pleasing contrast to one another by their great diversity in form and colour. There were also Oncidiums—*dasystyle*, *macranthum*, *Weltoni*, *cardiochlæna*, and *loxense*, the latter being rarely seen —and also a fine plant of *Grammatophyllum Measuresianum*, which now flowered for the first time in cultivation.

Immediately following this group came that of Messrs. B. S. Williams & Son, of Upper Holloway, containing numerous examples of well-grown specimens. *Dendrobium Bensoniæ*

were remarkably fine, the pseudo-bulbs bearing clusters of beautiful white flowers with a yellow stain on the lip. The drooping yellow clusters of *D. thyrsiflorum* were very conspicuous, and contrasted well with the large canary-coloured *Dalhousieanum*, the old *D. nobile*, *D. suavissimum*, and *D. transparens*. Among the Cattleyas, the bright yellow and highly lemon-scented *citrina*, the rosy *Skinneri*, and several forms of *Cattleya Mossiæ* were conspicuous. Cypripediums were strongly represented by specimens of *C. bellatulum*, *niveum*, *Hookerianum*, *philippinense*, *concolor*, *grande*, *Stonei*, and *selligerum majus*. Among Oncidiums were noticeable the charming *concolor*, with its drooping racemes of yellow flowers, the bronzy and yellow *macranthum*, and the golden *Marshallianum*, besides others. There were several other miscellaneous Orchids, among them being *Calanthe masuca*, *Masdevallia Harryana* and *M. Veitchiana*, *Cœlogyne tomentosa*, *Lælia cinnabarina*, *Miltonia vexillaria*, and *Aërides Fieldingii*. Among the Orchids, and considered as such by many visitors, were two well-grown masses of *Utricularia montana* with clusters of white flowers.

Messrs. H. Low & Co., Clapton, staged an excellent collection of Dendrobiums, including several fine specimens of *Bensoniæ*, *thyrsiflorum*, *Dalhousieanum*, and *Parishii*. There were also some good varieties of *Cypripedium bellatulum* and *C. niveum*, while *Phalænopsis amabilis*, with its gracefully nodding spikes of white moth-like flowers, presented a charming sight.

Among the small but effective group contributed by Mr. J. Cypher, of Cheltenham, were many remarkable species. Mention might be made of *Masdevallia Schlimii*—a wonderfully well-grown plant, with numerous deep reddish-brown flowers with yellowish tails. The curious *M. Chimæra*, several varieties of *M. Harryana*, *M. Shuttleworthii*, *M. Davisii*, and *Maxillaria Sanderiana* were also to be seen, as well as *Calanthe veratrifolia*, with its broad plicate leaves and tall spikes of white flowers. *Dendrobium Dearei*, clothed with clusters of almost pure white flowers, and *Epidendrum radicans* with its fiery orange racemes, together with several Cypripediums and *Oncidium macranthum*, helped to render the whole group one of much interest and attraction.

Messrs. Heath & Son, Cheltenham, sent a few plants, among

them being *Cypripedium Stonei magnificum* and *Masdevallia Heathii*, the latter somewhat resembling *M. Chelsoni*.

From Messrs. J. Veitch & Sons, Chelsea, came a form of *Odontoglossum excellens*, which was interesting as being raised from *O. Pescatorei* and *O. tripudians*, thus confirming the view that *O. excellens* was a natural hybrid between these two species. *Epiphronitis Veitchii* × and *Masdevallia caudata Estradæ* × were also shown.

Roses.

Next in importance and interest to the Orchids must be mentioned the Roses, the specimens of which were remarkably fine, and added a most charming effect to the other exhibits.

The group contributed by Messrs. W. Paul & Son, Waltham Cross, was very effective, and consisted chiefly of dwarf plants in pots, standards, and cut blooms. Among the dwarf forms were Crimson Queen, a good dark H.P., Spencer, Baroness Rothschild, and Souvenir du Rosieriste Gounod. The standards included good plants of W. A. Richardson, the deep lemon Etoile de Lyon, and a few plants of a new Tea, Corinna, which will probably be in demand in the future. Among the Teas, noticeable was a stand of Lady H. Grosvenor, with pointed globular flowers of a blush colour. A new Hybrid Perpetual called Danmark appeared in cut flowers; it has blooms of the old La France type, but of a somewhat darker tint.

The next group was a fine one, displayed by Messrs. Paul & Son, Cheshunt. There were some large and well-trained specimens of Hybrid Perpetuals and Teas, as well as several standards. Among the latter were Her Majesty, a vigorous grower with pale rose-coloured blooms, and Etoile de Lyon. There were also noticeable good dwarf plants of H.P.'s Duchess of Albany and Inigo Jones. A specimen of Polyantha Clothilde Soupert, having white blooms with a pink centre, formed a contrast to *Polyantha grandiflora*, a single white variety with numerous sweet-scented flowers somewhat smaller than those of the "Dog Rose."

Mr. W. Rumsey, Waltham Cross, staged a good collection of Hybrid Perpetuals, Teas, and Noisettes. Among the Hybrid Perpetuals might be mentioned the strong flesh-coloured Duchesse de Vallombrosa, the cherry-rose Marquise de Castellane, Magna Charta, pink suffused with carmine, the old

General Jacqueminot, and Fisher Holmes, with scarlet blooms. Teas Souvenir de Paul Neyron, strong, with creamy white and rose flowers, the old white Niphetos, Marie Van Houtte, yellowish white tinged with rose, the pale rosy-flesh Anna Olivier, and several others of various shades completed the group.

Mr. C. Turner, Slough, had a group made up of good examples of the best sorts of Hybrid Perpetuals and Teas.

Ferns.

The principal exhibitors of these plants were Messrs. W. & J. Birkenhead, of Sale, near Manchester, who staged nearly 400 distinct species and varieties, all admirably grown, and presenting a most healthy appearance. The contrast also

Fig. 56.—Adiantum Farleyense.

between the Ferns and the flowering plants was very marked, it being generally observed that the former presented such a "nice, cool appearance" after the brilliancy of the Orchids, Roses, Azaleas, &c. Among the collection were plants natives of distant climes, suitable for cultivation under almost every condition—

in the stove, the greenhouse, or out of doors in rockeries or shaded nooks and corners. Amongst Stove Ferns there was a goodly display of Adiantum or Maidenhead Ferns, about twenty species

Fig. 57.—Adiantum pedatum.

of this beautiful and popular family being present, with their rich glossy black stems and feathery clusters of fronds variously tinted with green. Noticeable was *A. Farleyense* (fig. 56), an exceedingly beautiful form of the tropical American *A. tenerum*.

Fig. 58.—G. schizophylla gloriosa.

It has a graceful habit, and when well grown is most valuable for exhibition purposes. A nice plant, which may be grown in a greenhouse, or even out of doors in some parts of England, was *A. pedatum* (fig. 57), with light-green ornamental fronds.

Aspleniums and Aspidiums—both very extensive genera—were well represented, the former by *A. brasiliense fragrans*, a pretty plant, the fronds of which emit a fragrant odour when cut and dried; *Nidus*, or the Bird's-nest Asplenium; and *nobilis*, with finely-cut fronds: the latter by *dilaceratum*, the bold and attractive *Plumierii*, and the very ornamental *trifoliatum*. The "Lace Fern" (*Cheilanthes elegans*) does justice to its name, and looked well in company with its brothers—the exceedingly rare and distinct *tenuis* and *viscosa*. The Davallias, or Hare's-foot

Fig. 59.—G. peruviana argyrophylla.

Ferns (so called from the brown hairy rhizomes), are deservedly popular Ferns. The varieties shown were *alpina*, dwarf; the free-growing *decora*; *dissecta*, and its light, graceful variety *elegans*, with finely-cut fronds; *fijiensis*, and about twenty other kinds.

The Gold and Silver Ferns (Gymnogrammes) are always attractive to amateurs, and on this occasion their tastes were gratified by seeing nearly a score of beautiful examples. Perhaps the most remarkably handsome form was *G. schizophylla gloriosa* (fig. 58), which makes a handsome ornament when grown in a basket suspended from the roof of a greenhouse.

It has long, graceful, drooping fronds cut into exceedingly narrow segments, which give it a very light and feathery appearance. *G. peruviana argyrophylla* (fig. 59) is one of the best Silver Ferns, having heavily powdered fronds, which must not, however, be too freely wetted, or their beauty will be much spoiled.

There were many other Stove Ferns exhibited, such as the Climbing Lygodiums, Nephrolepis, &c.; but, perhaps, what attracted most attention were the plants of the remarkable Stag

Fig. 60.—Platycerium alcicorne.

or Elk's-horn Ferns, *Platycerium grande* and *P. alcicorne* (fig. 60). These plants may be grown on blocks of wood, on walls, or stones, to which the "sterile" fronds—those at the base, rounded and shield-like—tightly adhere, while the fertile fronds grow erect and branch into the curious forms which have suggested the horns of the animal after which they are called.

Among the Greenhouse Ferns—that is, those plants which may be grown in a winter temperature of 40° to 55° Fahr.—many genera were extensively represented, *e.g.*, Adiantum, 28 species; Asplenium, 12; Davallia, 6; Nephrodium (Lastrea), 12; Lomaria, 12; Polystichum, 8; Pteris, 14; and so on, there being

often several plants of the same variety. But the Filmy Ferns were one of the chief attractions, and comprised the genera

Fig. 61.—Hymenophyllum tunbridgense.

Hymenophyllum and *Trichomanes*. The Tunbridge Fern (*H. tunbridgense*) (fig. 61) is an elegant little plant, found wild in some

Fig. 62.—Hymenophyllum Wilsoni.

parts of the United Kingdom; as is also the rarer *H. Wilsoni* (fig. 62), remarkable for its compact masses of pretty fronds.

Trichomanes reniforme is a most distinct Filmy, having large kidney-shaped fronds, on the edge of which the fruit (*sori*), when ripe, stand out like the teeth of a saw.

Todeas are highly ornamental Ferns, and require to be treated somewhat in the same way as Filmies. *T. pellucida* (fig. 63) and *T. superba* (fig. 64) are both exceedingly beautiful; the former is very free-growing, and the latter has very dense, almost feathery, fronds of the most delicate texture.

Passing on to the British Ferns, one was struck with the

Fig. 63.—Todea pellucida.

great beauty and variety of them. It is only by careful study of this class that one is enabled to form a correct idea of the great wealth of beautiful forms into which the comparatively small number of British species have been developed, and much is due not only to Messrs. Birkenhead for their labours in this direction, but also to several ardent amateurs.

To particularise, it might be mentioned that Aspleniums and Athyriums were staged in great variety, including many of the rarest forms. There were about a dozen distinct kinds of the "Hard Fern" (*Blechnum spicant*), as well as many of the Male, Buckler, and other popularly named sorts, including a great variety of Polypodiums and Scolopendriums. The latter genus

is not a very extensive one, and is represented in the British Islands only by *Scolopendrium vulgare*, popularly known as the Hart's Tongue Fern. It is easily recognised by its strap-like fronds, more or less heart-shaped at the base, and tapering to a blunt point at the tip. Although, comparatively speaking, a common plant, *S. vulgare* is frequently absent from many situations where one would naturally expect to find it growing freely. The plants thrive on the walls of old ruins as well as in the soil. Under the former condition, however, the fronds

Fig. 64.—Todea superba.

are generally stunted, while under the latter, which seems to be the most favourable, growth is luxuriant, the fronds often attaining a length of two to three feet, especially near the banks of shady streamlets and sheltered copses.

By means of careful cultivation and hybridisation, the ordinary simple fronds have developed innumerable variations of form, all tending in the direction of crispness or dissection.

Many of these beautiful forms were to be seen at the exhibition, the most noticeable being *Coolingii*, *crispum*, *crispatum*, *cristulatum*, *densum*, *fissum*, *grandiceps*, &c.

The "Royal Fern" (*Osmunda regalis*), also often called the

"Flowering Fern," owing to the upper portions of the fronds becoming transformed into spore-bearing panicles, was represented by a few plants, as was also its peculiar crested variety (fig. 65).

Besides the Ferns proper there were several examples of Selaginella, a genus of "Club-mosses," remarkable for their flat feathery branches. The most noticeable were *S. amœna*, a pretty upright-growing variety; *S. cæsia*, creeping, with a metallic bluish tinge suffusing the frondlets; the compact bushy *molliceps*; and the charming *perelegans*, which has dull green foliage and reddish stems.

Fig. 65.—Osmunda regalis cristata.

Mr. H. B. May, Upper Edmonton, also exhibited a large number of beautiful Ferns and Selaginellas, including many of the varieties noted above, and these were tastefully interspersed with such beautiful stove plants as Pandanus, Caladiums, Palms, Phyllanthus (*Xylophylla*) falcatus, numerous Crotons and Aralias, the variegated Pine Apple, &c.

Messrs. B. S. Williams & Son, Upper Holloway, showed for the first time the new *Pteris tremula Smithiana*, which bids fair to become popular with all Fern-lovers.

Begonias.

These popular flowers formed a very dazzling display and were shown in large numbers, occupying an area of about 120

square feet. Messrs. H. Cannell & Sons, of Swanley, had two fine groups of single and double varieties, the colours of which passed from pure white through pink, salmon, deep rose and purple into golden yellow.

The collection of Messrs. J. Laing & Sons, Forest Hill, was equally resplendent in all the subtle variety of colour tints, and the flowers were as large and remarkable for substance and good form as those of Messrs. Cannell.

Calceolarias.

Sir Chas. Piggott, Bart. (gardener, Mr. J. Ford), contributed some fine specimens.

Messrs. J. Carter & Co., Holborn, had a good group of highly coloured flowers belonging to the Victoria and Japanese strains.

From Messrs. J. James & Son, Farnham Royal, Slough, came a collection of very dwarf plants, bearing good flowers.

Messrs. Peed & Sons, Roupell Park, also staged a select group of these plants.

Pelargoniums.

Mr. C. Turner, Slough, staged an effective group in which many fine varieties were represented.

Mr. D. Baldwin, Hillingdon Heath, sent twelve fine varieties, and Mr. Rupert Miller, Shoreham, contributed two boxes of cut blooms, among which a new form known as Pearl was conspicuous by its large trusses of pure white flowers.

Azaleas.

These were not shown by themselves to any great extent, although many beautiful specimens were to be seen here and there, intermingled with various plants in other groups, to the arrangement of which they added great effect. The charming group of well-flowered *Azalea indica* and varieties, neatly arranged with Ferns, contributed to Mr. C. Turner, of Slough, however, deserves to be specially mentioned on account of the fine strong plants, which bore an enormous quantity of blooms.

Miscellaneous Groups.

There were many of these dotted throughout the exhibition. Taking the exhibitors in alphabetical sequence, we noticed that Mr. J. Balchin, Hassocks, had an effective group of the deep blue *Leschenaultia biloba major* (fig. 66), covering a space of about 40 square feet.

Messrs. Barr & Son, Covent Garden, had a remarkably attractive group of large dimensions. In it were a collection of Parrot and other Tulips with fantastic-coloured markings, Pansies, white Violas, Irises of many kinds, Daffodils, *Bulbocodium monophyllum*, single Pæonies, *Saxifraga pyramidalis* with upright masses of pure white flowers, *Centaurea montana rubra*,

Fig. 66.—Leschenaultia biloba major.
(From the *Journal of Horticulture*.)

Camassia esculenta, Anemones, in addition to which were several fine specimen Pæonies grown in pots.

Messrs. J. Carter & Co., High Holborn, staged a fine group of Emperor Petunias and Queen's Prize Mimulus, the colours of which were remarkable. Gloxinias covered an area of about

eighty square feet, and next to these came a collection of Succulents and Cactaceæ, noticeable among which were *Aloe ferox* and *frutescens*, *Opuntia leucotricha*, *Cereus senilis*, Phyllocactus, Echinocactus, Sempervivum, &c.

From Mr. W. Chambers, Isleworth, came examples of the white Viola Snowflake, also wreaths and other floral devices.

Messrs. J. Cheal & Sons, Crawley, contributed a group of "Tom Thumb" Dahlias in pots.

Messrs. J. Cutbush & Son, Highgate, staged an effective group at the entrance to one of the tents. It occupied a space of about sixty square yards, and consisted of Palms, such as *Cocos flexuosa*, *C. Weddelliana*, *Kentia Belmoreana* and *Fosteriana*, Heaths, Dracænas, Boronias, Hydrangeas, *Leschenaultia biloba*, *Spiræa palmata*, and the seldom seen but pretty white-flowered *Leptospermum bullatum* (fig. 67.)

From Messrs. Dobbie & Co. came a collection of cut flowers of Pansies and Violas, to which they pay special attention.

Mr. H. O. Garford, Stoke Newington, staged a neat group of Plants and Cut Flowers suitable for table decoration.

Mr. F. Hooper, Bath, sent cut Roses, Tulips, and Pansies, all neatly arranged.

All the way from Angers, France, MM. Hennequin-Denis & Cie. sent a large collection of Anemones and Ranunculus, which attracted much attention, notwithstanding that the flowers had been cut four days prior to the opening of the show.

Mr. W. Howard, Southgate, contributed several nice plants of the Norfolk Island Pine (*Araucaria excelsa*).

Mr. W. Iceton, Roehampton, sent a tasty group of Palms interspersed with *Dracæna Lindeni*, *Lilium longiflorum*, *Agapanthus umbellatus*, and the variegated *Negundo acerifolia*.

Messrs. Kelway & Son, Langport, had a grand and varied collection of Pæonies, the large flowers of which were displayed on boxes like Roses. There were also Lupines, *Trollius europæus*, *Ulex hispanica*, Pyrethrum, *Iris florentina*, &c., to be seen.

Mr. G. M. Knight, Farnborough Park, Hants, sent specimens of the golden yellow Arum Lily (*Calla Elliottiana*), which were much admired.

Besides Begonias, Messrs. J. Laing & Sons, Forest Hill, exhibited a remarkable group of Palms, Heaths, Orchids, Dracænas, Saxifrages, Ferns, and Caladiums, the latter being particularly gorgeous in the colouring of the foliage.

From Mr. J. Lakin, Temple Cowley, Oxford, came a collection of cut flowers of Tulips.

Orchids were not the only remarkable plants sent by Messrs. H. Low & Co., of Clapton. Hard-wooded plants were also well

Fig. 67.—Leptospermum bullatum. (From the *Journal of Horticulture.*)

represented. Among the fine group of these shown were such plants as *Genista Everestiana*, with clusters of deep yellow flowers, *Metrosideros floribunda alba*, Rhodanthes, Aphelexis, Pimeleas, Heaths, Azaleas, Hydrangeas, and *Dracæna Lindeni*.

R. W. Mitchell, Esq., Bickley Park (gardener, Mr. H. Hazell), sent a group of plants suitable for decorative purposes.

A large and attractive group of herbaceous plants and cut flowers of Alpines were effectively displayed by Messrs. Paul & Son, Cheshunt. The individual plants were well grown, and the flowers were of the largest.

Mr. G. Phippen, Reading, exhibited a great number of tastefully arranged wreaths and bouquets, as well as a collection of Pansies and Violas. One of the bouquets, made of Orchids and other choice flowers, was presented to H.R.H. the Princess Christian.

Messrs. J. Peed & Sons, Roupell Park, S.E., staged a brilliant group of *Anthurium Scherzerianum* and *Andreanum*, whose fiery spathes were effectively relieved by a background of Palms, Ferns, and a few Orchids.

Mr. M. Pritchard, Southbourne, Christchurch, Hants, had a valuable group of herbaceous plants, among which were noticeable *Cypripedium Calceolus*, White Lupines, Cotton Grass (*Eriophorum vaginatum*), *Gentiana verna*, *Clematis montana*, *Geum miniatum* and *aureum*, *Trollius japonicus*, *Ramondia pyrenaica*, *Saxifraga longifolia*, *Arenaria hispanica*, *Heuchera sanguinea*, Yellow Banksian Roses, and several other choice things.

Leopold de Rothschild, Esq., Leighton Buzzard (gardener, Mr. Jennings), contributed a most remarkable bank of Carnation Souvenir de la Malmaison, the flowers of which were unusually large and presented delicate shades of white and pink.

Messrs. Ryder & Son, Sale, near Manchester, sent several fine varieties of *Primula Sieboldii*, which were very attractive; and Messrs. R. Smith & Co., Worcester, sent, besides Ferns, a group of a snow-white *Clematis Jackmani*.

Messrs. Jas. Veitch & Sons, Chelsea, staged two large and important groups consisting of hardy plants and cut flowers, as well as a choice collection of rare and hardy shrubs, the foliage of many of which was extremely ornamental. In one of the groups, however, a class of Gesneraceous plants, not yet generally grown, were exhibited and attracted much attention. These were the *Streptocarpi* which Messrs. Veitch have been hybridising for the past year or two. The strong-growing South African species, *S. Dunnii*, a single leaf of which is three to four feet long, and the sturdy, erect

scapes bearing an enormous number of brick-red flowers, has been crossed with the smaller and more convenient kinds, such as *floribunda*, *parviflora*, &c., with the result that many beautiful forms have been raised. The first two of these hybrids were raised at Kew in 1887, and were duly named *Watsoni* and *Kewensis*—the former name commemorating Mr. Watson, the Assistant Curator, for his labours. The woodcut (fig. 68) gives a

Fig. 68.—Hybrid Streptocarpus.

correct idea of the graceful habit and the number of beautiful flowers produced by these new hybrid Streptocarpuses, which possess the additional advantage of being easily grown in a cool house.

Messrs. B. S. Williams & Son, Upper Holloway, contributed a grand collection of flowering plants, the chief attractions being the Azaleas, Cliveas, and Anthuriums, which were well set off by Palms, Dracænas, Crotons, &c.

Fruit.

Fruit was plentifully shown, and it was evident that many visitors took the greatest notice of the exhibits.

From J. E. Campbell, Esq., Uttoxeter (gardener, Mr. J. Hollingworth), came dishes of Black Hamburgh and Foster's Seedling Grapes.

Mr. J. R. Featherby, Gillingham, Kent, also sent Black Hamburghs and some Tomatos.

From the Duke of Northumberland, Syon House (gardener, Mr. Geo. Wythes), came some remarkably fine Brown Turkey Figs, President Strawberries, and Melons.

E. Pettet, Esq., Oatlands Park, Weybridge (gardener, Mr. J. W. Reed), sent a collection of Grapes, Melons, and Oranges.

Messrs. T. Rivers & Son, Sawbridgeworth, staged a remarkable collection of fruit trees in pots, and these were the objects of much attention during the show. Peaches, Plums, Oranges, Nectarines, and Cherries all vied with each other in scenting the atmosphere with their fragrant flowers, and gladdening the eye with their magnificent and luscious fruit.

Messrs. Jas. Veitch & Sons, Chelsea, also contributed an extraordinary collection of 86 dishes of Apples, the sight of which in May was very remarkable. Standard trees of the St. John's Fig were also exhibited.

Mr. J. McIndoe, Guisborough, sent some very fine dishes of Peaches, including Grosse Mignonne and Crimson Galande, and also Nectarine Lord Napier.

Messrs. F. Burton & Son, Bexley, sent a box of Alexander Peaches.

Major Shuttleworth, Old Warden (gardener, Mr. G. R. Allis), contributed some fine Melons.

From Lord Foley, Ruxley Lodge (gardener, Mr. J. Miller), came a few large-ribbed and well-netted fruits of Melon Ruxley Lodge Favourite.

Messrs. W. & E. Wells, Hounslow (gardener, Mr. G. Thomson), sent fruiting Strawberries in pots.

Mr. G. Munro, Covent Garden, exhibited some fruit grown in the Channel Islands, including baskets of Black Hamburgh and Muscat Grapes, and Melons. Besides these there were some excellent Peas, Beans, and Potatos.

Messrs. Alford & Millar exhibited Mildura Raisins from the Irrigation Colonies, Victoria, "from vines planted one year and nine months, and one year old when planted."

Messrs. Gaymer & Son, Attleboro', exhibited some samples

of Norfolk cider. Mr. M. Smout, Hastings, displayed marine decorations made from seaweed, shells, &c.

Horticultural Sundries.

Under this heading Messrs. W. S. Iles & Co., Camberwell, exhibited plain and ornamental pottery, red and brown rustic ware, garden and flower-box tiles; Mr. G. W. Riley, Herne Hill, rustic summer-houses, garden-seats, &c.; Messrs. Clark & Co., Great St. Helens, E.C., the Vermorel knapsack pump; Mr. W. Colchester, Ipswich, guano; Mr. G. Fry, Lewisham, his patent garden-pots; Mr. J. George, Putney, specimens of manures, &c.; Messrs. Green & Nephew, Queen Victoria Street, flower-glasses, &c.; Messrs. E. Newton & Co., Hitchin, specimens of patent glazing; Messrs. Seymour, Sidney & Co., Glasgow, Fern pottery, fruit preservers, and African grass for floral decorations. Syringes, sprayers, &c., were sent by the Stott Fertiliser and Insecticide Co.; Messrs. Toope & Son, Stepney, a model greenhouse fitted with a patent fog annihilator; Messrs. Wallers & Co., Leytonstone, Orchid baskets, cylinders, rafts, &c.; and Messrs. Wood & Son, Wood Green, samples of peat, loam, &c.

New or rare plants examined by the various committees are noticed below, as are also the prizes awarded to particularly fine groups of plants.

FLORAL COMMITTEE.

INNER TEMPLE GARDENS.

May 28, 1891.

W. Marshall, Esq., in the Chair, and sixteen members present.

Awards Recommended:—

First Class Certificate.

To Eremurus himalaicus (votes, unanimous), from Mr. John J. Smyth, Rathcoursey, Ballinacurra, Ireland. A hardy border perennial, bearing fine spikes of fragrant white flowers.

To Cocos Pynærti (votes, 6 for), from Messrs. F. Sander & Co., St. Albans. A charming little Palm, in the way of C. Weddelliana.

To Dracæna australis variegata (votes, 7 for), from Messrs. J. Laing & Sons, Forest Hill. An elegant variegated form of D. australis.

Award of Merit.

To Clematis Snow-white Jackmani (votes, unanimous), from Messrs. R. Smith & Co., Worcester. As its name implies, a pure white variety of Jackmani.

To Begonia (single) Mrs. R. Dean (votes, unanimous), from Messrs. J. Laing & Sons. Light centre with broad Picotee edge of rosy carmine.

To Begonia (double) Lady Addington (votes, unanimous), from Messrs. H. Cannell & Sons, Swanley. Buff-salmon-rose, very fine.

To Begonia (single) William Marshall (votes, unanimous), from Messrs. H. Cannell & Sons. Rich deep golden orange.

To Caladium B. S. Williams (votes, 4 for, 2 against), from Messrs. J. Laing & Sons. Leaves large, veined with red on a white ground.

To Rose (H.P.) Crimson Queen (votes, unanimous), from Messrs. William Paul & Son, Waltham Cross. A grand flower, crimson.

To Rose (H.P.) Souvenir du Rosieriste Gounod (votes, 7 for, 1 against), from Messrs. W. Paul & Son. A fine dark scarlet.

To Rose (H.P.) Spencer (votes, 7 for), from Messrs. William Paul & Son. Soft pink flowers of good substance and shape.

To Rhododendron Rosalie Seidel (votes, unanimous), from Messrs. James Veitch & Sons, Chelsea. A beautiful hardy variety, bearing a profusion of pure white flowers.

To Streptocarpus, New Hybrids (votes, unanimous), from Messrs. J. Veitch & Sons. A beautiful strain, in rich variety, of these charming flowers.

To Lilac (double) Madame Lemoine (votes, unanimous), from Mons. V. Lemoine, Nancy, France. A fine large-flowered white.

To Lilac (double) Michel Buchner (votes, unanimous), from Mons. V. Lemoine. Very fine silvery lilac.

To Rose (polyantha) Clothilde Soupert (votes, unanimous), from Messrs. Paul & Son, Cheshunt. A beautiful pink, promising for pot and garden culture.

To Azalea alba odorata plena (votes, 6 for), from Messrs. Paul & Son. A fine double white, sweet-scented form.

To Pæonia arborea Mrs. Wm. Kelway (votes, 6 for), from Messrs. Kelway & Son, Langport. Flowers large and handsome, pure white.

To Pelargonium (decorative) Royal Ascot (votes, unanimous),

from Mr. C. Turner, Slough. Brilliant scarlet, with a white centre and dark blotches.

To Asplenium lanceolatum microdon (votes, 6 for), from Messrs. W. & J. Birkenhead, Sale, Manchester. Of compact and neat habit, distinct.

To Athyrium f. f. Girdlestonei cristatum (votes, 5 for), from Messrs. W. & J. Birkenhead. Slender crested fronds.

To Polystichum angulare pulcherrimum (votes, 4 for), from Messrs. W. & J. Birkenhead. A distinct and beautiful variety.

To Polystichum angulare divisilobum decorum (votes, 5 for), from Messrs. W. & J. Birkenhead. Very elegant.

ORCHID COMMITTEE.

Harry J. Veitch, Esq., in the Chair, and nine members present.

Awards Recommended:—

First Class Certificate.

To Cattleya hybrida Lowryana (votes, 6 for, 4 against), from Messrs. F. Sander & Co. Parentage unknown. In form the flowers are near those of C. intermedia—sepals and petals white, front lobe of lip purple-crimson.

To Cattleya hybrida Prince of Wales (votes, unanimous), from Messrs. F. Sander & Co., St. Albans. This is the result of a cross between the light form of C. calummata × and C. Wagneri. The sepals and petals are white, and the lip is tinged with rose.

To Grammatophyllum Measuresianum (votes, 5 for, 3 against), from Messrs. F. Sander & Co. The plant had several spikes, each about four feet high, and carrying numerous greenish white flowers, heavily blotched with brownish purple.

To Masdevallia hybrida Mundyana (votes, unanimous), from Messrs. Sander & Co. This is the result of crossing M. ignea aurantiaca with M. Veitchii. The flowers, which are of an orange hue, are very handsome.

To Aërides Savageanum (votes, unanimous), from Sir Trevor Lawrence, Bart., M.P., Burford Lodge, Dorking (grower, Mr. White); Baron Schröder, The Dell, Egham (gardener, Mr. H. Ballantine); and Messrs. F. Sander & Co. This is a new species, with brilliant crimson-purple flowers, smaller but somewhat similar to those of A. quinquevulnerum.

To Oncidium loxense (votes, unanimous), from J. Ingram, Esq., Elstead House, Godalming (gardener, Mr. Bond). This is

a very old species which has been lost sight of for years. It belongs to the macranthum section, but reminds one of having the sepals and petals of Odontoglossum Harryanum and the lip of Oncidium tigrinum. The sepals and petals are yellowish green, the former transversely barred with deep shiny brown, the latter longitudinally lined with the same colour. The lip is deep yellow, with several bristle-like teeth forming the crest.

Award of Merit.

To Cypripedium hybridum Euryale (votes, unanimous), from Messrs. F. Sander & Co. This is the result of a cross between C. Lawrenceanum and C. superbiens.

To Cypripedium Stonei magnificum (votes, unanimous), from Messrs. Heath & Son, Cheltenham. A magnificent form of the typical C. Stonei.

To Dendrobium Parishii albens (votes, unanimous), from Messrs. H. Low & Co., Clapton. A nearly pure white variety of the type.

To Lælia elegans Statteriana (votes, unanimous), from T. Statter, Esq., Standhall, Whitefield, Manchester (gardener, Mr. Johnson). The sepals and petals are white, and the labellum, which is almost as broad as that of L. purpurata, is a glowing crimson.

To Masdevallia Harryana luteo-oculata (votes, unanimous), from Sir Trevor Lawrence, Bart., M.P., Burford Lodge, Dorking (grower, Mr. White). This is a magnificent new scarlet variety, with a distinct yellow eye and perianth tube.

To Odontoglossum excellens Sanderæ (votes, unanimous), from Messrs. F. Sander & Co. This is a very fine form with large flowers heavily spotted with rich crimson.

To Odontoglossum crispum Amesianum (fig. 69), (votes, unanimous), from Messrs. F. Sander & Co. This is a very fine crimson-blotched variety in the way of O. c. apiatum.

Other Exhibits.

Messrs. F. Sander & Co. submitted for the inspection of the Committee, Cattleya Parthenia, Bleu; a fine dark form of C. Mossiæ; Lælia purpurata brilliantissima and L. p. Germinyana, both fine dark forms; Cypripedium barbato-superbiens ×, and various good forms of Odontoglossums under provisional names.

R. B. White, Esq., Arddarroch, Garelochhead, N.B., sent a fine spotted Odontoglossum crispum and a pretty light variety of Cattleya Mendelii.

Messrs. Heath & Son, Cheltenham, exhibited their hybrid Masdevallia Heathii ×.

Sir Trevor Lawrence, Bart., M.P., staged Cypripedium Fraserii × (C. hirsutissimum × C. barbatum).

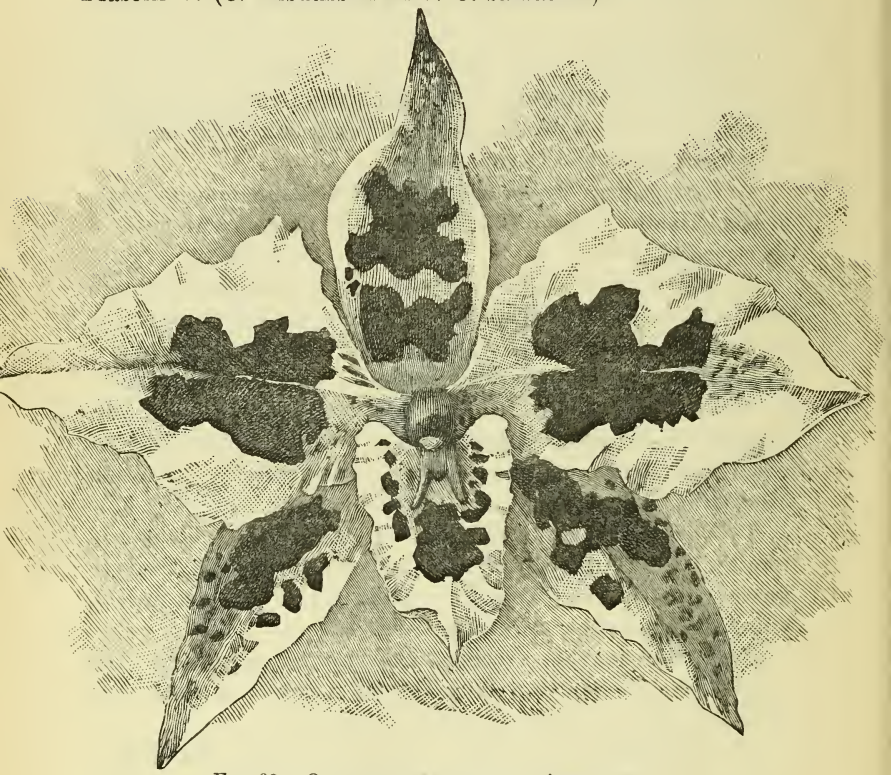

Fig. 69.—Odontoglossum crispum Amesianum.
(From the *Journal of Horticulture.*)

J. T. Bennett-Poë, Esq., Riverstone, Nenagh, sent a spike of Odontoglossum Pescatorei, Poë's var.; a purple-spotted form previously certificated.

FRUIT COMMITTEE.

P. Crowley, Esq., F.L.S., in the Chair.

Messrs. J. Veitch & Sons, Chelsea, sent Apple North End Pippin, which the Committee expressed a desire to see again.

Messrs. T. Burton and Son, Bexley Heath, sent some fine examples of Peach Alexandra from a pot tree.

Mr. Foster, Berkhampstead, sent good fruits of Tomatos.

Special Awards.

The special awards made at the Temple Show were as follows :

Silver Cup.

To Sir T. Lawrence, Bart., M.P., for a group of Orchids.

To Baron Schröder for a group of Orchids.

To Messrs. W. and J. Birkenhead for a group of Ferns.

To Messrs. H. Cannell & Sons for a group of Begonias.

To Messrs. J. Carter & Co. for miscellaneous groups of Plants.

To Messrs. W. Cutbush & Son for a group of Foliage and Flowering Plants.

To Messrs. Kelway & Son for Hardy Herbaceous Plants and cut Flowers.

To Messrs. J. Laing & Sons for a group of Begonias.

To Mr. G. Munro for a collection of Fruit.

To Messrs. Paul & Son for a group of Roses, &c.

To Messrs. W. Paul & Son for a group of Roses, &c.

To Messrs. T. Rivers & Son for a collection of Fruit.

To Messrs. F. Sander & Co. for a group of Orchids.

To Messrs. J. Veitch & Sons for a group of Hardy Shrubs and Plants.

To Messrs. B. S. Williams & Son for a group of Foliage and Flowering Plants.

Silver Gilt Flora Medal.

To the Duke of Marlborough for a group of Orchids.

To Messrs. de Rothschild for a group of Vanda teres.

To Leopold de Rothschild, Esq., for a group of Carnations.

To Sir C. Pigott, Bart., for a group of Calceolarias.

To Messrs. Barr & Son for groups of Hardy Herbaceous Plants and cut Flowers.

To Messrs. J. Cypher & Son for a group of Orchids.

To Messrs. H. Low & Co. for a group of New Holland Plants.

To Mr. W. Rumsey for a group of Roses.

To Messrs. J. Veitch & Sons for Hardy cut Flowers, strain of Hybrid Streptocarpi and Gloxinias.

Silver Flora Medal.

To T. B. Haywood, Esq., for a group of Orchids.

To A. H. Smee, Esq., for a group of Orchids.

To Mrs. Arbuthnot for a group of Orchids.

To Mr. W. Iceton for groups of Palms and Foliage Plants.

To Messrs. J. James & Son for a group of Calceolarias.

To Messrs. J. Laing & Sons for a miscellaneous group of Plants and Caladiums.

To Mr. H. B. May for groups of Ferns and Foliage Plants.

To Messrs. Paul & Son for a group of Hardy Herbaceous Plants.

To Mr. C. Turner for groups of Pelargoniums, Azaleas, and Roses.

To Messrs. J. Veitch & Sons for a collection of Fruit.

To Messrs. B. S. Williams & Son for a group of Orchids.

Silver Banksian Medal.

To F. Wigan, Esq., for a group of Orchids.

To M. S. Cooke, Esq., for a group of Orchids.

To T. Statter, Esq., for Orchids (cut blooms).

To Right Hon. J. Chamberlain, M.P., for a group of Masdevallias.

To Mr. J. Walker for cut Roses, &c.

To Mr. M. Smout for Seaweed, Shell, Coral, &c.

To Mr. D. Baldwin for a group of Pelargoniums.

To Mr. F. Hooper for Pansies and Roses.

To Mr. Balchin for a group of Leschenaultias.

To Mr. W. Chambers for Floral Devices.

To Messrs. Dobbie & Co. for Pansies and Violas.

To Messrs. H. Low & Co. for a group of Orchids.

To Messrs. W. Paul & Son for cut Roses.

To Messrs. J. Peed & Sons for a group of Anthuriums.

To Mr. G. Phippen for Bouquets.

To Mr. G. W. Riley for Rustic Summer-houses, Seats, &c.

To Mr. T. S. Ware for a group of Pæonies.

Bronze Flora Medal.

To Major-General Berkeley for a group of Orchids.

To J. F. Campbell, Esq., for Black Hamburgh and Foster's Seedling Grapes.

To W. F. Darnell, Esq., for a group of Orchids.

To Messrs. J. Cheal & Sons for a collection of Fruit.

To Messrs. W. S. Iles & Co. for a collection of Pottery.

To Messrs. W. & E. Wells for Strawberries in pots.

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETING.

June 9, 1891.

J. Bennett-Poë, Esq., in the Chair.

Elections.

Fellows, 66.—Job Ashton, H. A. Barnard, John Barron, Rev. B. Bateman-Jones, Miss Anne Bateson, Major-Gen. E. S. Berkeley, Samuel Bindley, J. Birkenhead, W. Birkenhead, Cecil Erskine Bovill, Eustace Brickwell, W. M. Bullivant, Major Chapman, T. H. Crasp, Mrs. A. J. Crawhall, S. Cresswell, Major J. Cooke Cox, Mrs. Dawes, F. V. Dickins, A. H. Parr Ewer, G. A. Farini, W. E. B. Farnham, Mrs. Ayscoghe Floyer, Alexander Fraser, Walter Gill, F.L.S., Richard Gill, Mrs. Sophia Gladstone, Charles Gow, — Greenwood, Mrs. Howell Gwyn, Thomas Hall, Robert Hales, Henry Hawkins, jun., Arthur Head, A. James Henderson, A. G. Hubbock, Benjamin Hudson, George I'Anson, H. A. James, Miss Champion Jones, Joseph Lakin, Joseph Lawrence, Walter Lea, Miss Ella E. Ley, Thomas F. Lynch, W. Mattinson, S. Mortimer, C. T. Musson, A. Newington, M.D., Miss A. Norman, James Edward Passmore, E. D. Payne, L. G. Pike, Richard Potter, E. H. F. Reeves, H. B. Roberts, Capt. R. Slazenger, W. Stephens, Alfred Venables, Robert Walters, Dr. H. Weber, W. Wells, Rev. Edward Wensley, Mrs. Whitfield, Berkeley Wilkinson, George Woodgate.

Society Affiliated, 1.—Broughton-in-Furness Horticultural Society.

A paper on "Alpine Plants" was read by the Rev. C. Wolley Dod, M.A. (*See* p. 285.)

COUNCIL MEETING.

A Silver Flora Medal was voted to the Rev. G. H. Engleheart, M.A., for his skilful and scientific labours in the hybridization of Daffodils. (*Vide* p. lxiii.)

FLORAL COMMITTEE.

W. Marshall, Esq., in the Chair, and twenty members present.

Awards Recommended:—

Silver Gilt Flora Medal.

To Messrs. Kelway & Son, Langport, Somerset, for a very fine collection of Pæonies, Irises, Pyrethrums, and other hardy flowers.

Silver Banksian Medal.

To Messrs. William Paul & Son, Waltham Cross, for twenty boxes of Rhododendrons.

To Messrs. Collins Brothers & Gabriel, Waterloo Road, S.E., for an effective group of Pæonies grown in pots.

To Mr. T. S. Ware, Tottenham, for a bright and well-arranged group of Hardy Flowers.

To Messrs. Barr & Son, Covent Garden, for a beautiful collection of Hardy Flowers.

Bronze Banksian Medal.

To Messrs. J. Laing & Sons, Forest Hill, for a pretty group of Begonias, Palms, Ferns, &c.

First Class Certificate.

To Celmisia spectabilis (votes, unanimous), from Messrs. J. Veitch & Sons, Chelsea. A very distinct dwarf hardy Composite, native of New Zealand, where it grows at an altitude of 2,000–5,000 feet. The flower-heads are two inches across, with narrow white ray-florets and a gold centre. This is the only species at present in cultivation, although there are more than twenty others known.

Award of Merit.

To Begonia (single) Lady Lawrence (votes, 15 for), from Messrs. H. Cannell & Sons, Swanley. Flowers clear golden yellow, well shaped.

To Begonia (single) Duchess of Leinster (votes, 6 for), from Messrs. J. Laing & Sons, Forest Hill. Deep orange flowers.

To Pæony (herbaceous) paradoxa (votes, 13 for), from Messrs. Kelway & Son. Dark red flowers, Anemone centre.

To Pæony (tree) Louise Mouchelet (votes, 14 for), from Messrs. Kelway & Son. Fine form, and of great substance.

To Pyrethrum (single) James Kelway (votes, unanimous), from Messrs. Kelway & Son. Brilliant crimson flowers.

To Iris germanica "Queen of May" (votes, 10 for), from Messrs. Kelway & Son. Flowers soft rosy mauve, the falls lighter at the base, with darker veins.

To Iris germanica "Princess of Wales" (votes, 10 for), from Messrs. Kelway & Son. Flowers white, with a faint creamy tint in the centre, somewhat resembling Iris florentina.

To Carnation (tree) Selby (votes, 9 for), from Leopold de Rothschild, Esq., Ascott, Leighton Buzzard (gardener, Mr. Jennings). Clear bright yellow.

To Pink Princess Maud (votes, 11 for), from Mr. John Stacey, Farnham Royal. Large globular flowers, petals white, fringed at the edge.

To Spiræa multiflora compacta (votes, unanimous), from Messrs. Collins Brothers & Gabriel. A distinct form of S. japonica; compact in habit, with fine feathery spikes of white flowers.

Commended.

A very fine strain of Hybrid Aquilegias (votes, unanimous), from Messrs. J. Veitch & Sons.

Cultural Commendation.

To O. T. Hodges, Esq., Lachine, Chislehurst, for a pretty little group of Alpine Plants in flower.

Other Exhibits.

Lord Wimborne, Canford Manor, Wimborne (gardener, Mr. T. H. Crasp), sent a large basket of handsome Rhododendrons, and fine flowers of Gardenias and Pyrethrums.

Mr. R. Dean, Ealing, sent an interesting collection of English and Dutch Tulips; also flowers of Lathyrus Sibthorpii and L. rotundifolius.

Messrs. J. Veitch & Sons sent several fine varieties of

Hydrangea hortensis in flower; also the double purple Wistaria sinensis.

ORCHID COMMITTEE.

Harry J. Veitch, Esq., F.L.S., in the Chair, and eleven members present.

Awards Recommended:—

First Class Certificate.

To Lælia hybrida Arnoldiana (L. pu purata × Cattleya labiata, Warneri var.) (votes, unanimous), from Messrs. F. Sander & Co., St. Albans. Fine and richly coloured forms of both parents were evidently used to produce this beautiful hybrid. The leaves and pseudo-bulbs as shown were not unlike those of a tall form of Cattleya labiata. Leaves, pseudo-bulbs, and flower-sheath profusely tinged and spotted with reddish brown. The plant had a two-flowered scape equal in size to the flowers of Lælia purpurata. The sepals and petals are purplish rose, the veinings of the petals being slightly darker than the sepals. The lip is formed like that of Lælia purpurata, almost wholly rich dark purplish crimson, with velvety maroon veins. There is a white and yellow area at the base of the lip, on which are purple lines.

To Sobralia macrantha Kienastiana (votes, unanimous), from Baron Schröder (gardener, Mr. H. Ballantine). This is a very beautiful, almost pure white form of Sobralia macrantha, with a pale tinge of lemon-yellow in the throat.

To Miltonia vexillaria "Mrs. H. Ballantine" (votes, unanimous), from Messrs. F. Sander & Co. A very novel and attractive variety, with white sepals, having two bronzy-yellow lines at the base; petals white, stained in the centre with rose; lip rose, edged with white; the base white, with a yellow tinge in front and a few brown lines.

To Disa Veitchii × (votes, unanimous), from Messrs. J. Veitch & Sons. This is interesting as being the first hybrid Disa raised. Its parents are Disa racemosa and D. uniflora (syn. D. grandiflora). The plant partakes of the free growth of D. racemosa, and the tall flower-scapes bear four to eight flowers, each two inches across. The flowers are bright rose-pink, with the exception of the petals, which are yellowish, and have crimson spots.

Award of Merit.

To Cattleya Mossiæ Lawrenceæ (votes, unanimous), from Sir Trevor Lawrence, Bart., M.P. This is equal to the best form of "Wagner's White Mossiæ" (C. Wagneri), but it has a slight rose-coloured veining on the front of the labellum; the Committee therefore recorded it under the above name in order to distinguish it from C. Wagneri.

To Lælia elegans, Cullimore's var. (votes, unanimous), from Malcolm S. Cooke, Esq., Kingston Hill (gardener, Mr. Cullimore). Sepals and petals pale lilac, veined with purple; the front and side lobes of the lip deep purple, and presenting some of the features of Lælia Perrinii.

To Cattleya Mendelii, var. Morganæ (votes, unanimous), from R. B. Cater, Esq., Westfield, Bath. A marked improvement on the original form, having larger and better-shaped flowers.

Cultural Commendation.

To G. R. le Doux, Esq., Langton House, East Molesey (gardener, Mr. H. Chapman), for a finely flowered plant of Miltonia vexillaria, Le Doux var. (votes, unanimous), which had previously received an Award of Merit.

Other Exhibits.

Gurney Fowler, Esq., Glebelands, South Woodford (gardener, Mr. Davis), sent a group of Cattleya Mossiæ in several distinct varieties.

Messrs. Pitcher & Manda exhibited a small group of Orchids, consisting mainly of Cypripedium spectabile.

Messrs. de Rothschild, Gunnersbury House, Acton, showed cut spikes of a very good form of Lælia purpurata.

Messrs. J. Veitch & Sons exhibited an Odontoglossum raised by them from seeds obtained by intercrossing O. triumphans and O. Pescatorei. It resembled some of the inferior forms of O. excellens. Also Epiphronitis Veitchii ×, Thunia Veitchiana ×, and Disa racemosa.

Messrs. F. Sander & Co., St. Albans, showed Cattleya Mossiæ Reineckiana, Sander's var.

R. B. White, Esq., Arddarroch, Garelochhead, N.B. (gardener, Mr. Brown), sent Cattleya Mendelii "Enchantress." Flowers

white, with a pale yellow stain in the throat of the labellum and a slight carmine mark on its front lobe.

Messrs. Hugh Low & Co., Clapton, staged a supposed natural hybrid Cattleya, with flesh-coloured flowers spotted with crimson, and crimson front lobe to the labellum. It was stated to be known as C. intermedia punctatissima.

G. R. le Doux, Esq., Langton House, East Molesey (gardener, Mr. H. Chapman), exhibited Miltonia vexillaria albo-marginata and the curious little M. v. leucoglossa Reich. ×, which the Committee desired to see again.

Thomas Statter, Esq., Stand Hall, Whitefield, Manchester (gardener, Mr. Johnson), sent Odontoglossum luteo-purpureum; also a form of Cattleya Mossiæ, and a flower of Cypripedium Curtisii.

J. W. Field, Esq., Southsea House, Dorking, exhibited a well-flowered form of spotted Odontoglossum crispum.

FRUIT COMMITTEE.

P. Crowley, Esq., F.L.S., in the Chair, and sixteen members present.

Awards Recommended:—

Bronze Banksian Medal.

To the Marquis of Salisbury, Hatfield House, Herts (gardener, Mr. G. Norman), for fifty wonderfully fine well-coloured fruits of Strawberry Sir Charles Napier.

Award of Merit.

To Melon Wythes' Seedling (votes unanimous), from the Duke of Northumberland, Syon House, Brentford (gardener, Mr. G. Wythes). Well-flavoured, white flesh.

Cultural Commendation.

To Messrs. de Rothschild, Gunnersbury House, Acton (gardener, Mr. J. Hudson), for twelve extremely fine fruits of Nectarine Lord Napier, stated to be from a crop of twenty-four dozen gathered from a tree planted in 1878, which now occupies a space 24 feet by 12 feet.

To the Duke of Northumberland, for a dish of large Brown Turkey Figs.

To W. H. Long, Esq., M.P., Rood Ashton Park, Trowbridge

(gardener, Mr. A. Miller), for some well-filled pods of Windsor Castle Pea.

Other Exhibits.

The Right Hon. Lord Foley, Ruxley Lodge, Esher (gardener, Mr. J. Miller), sent some fine samples of Grand Admiral Cabbage and Hicks's Hardy Green Cos Lettuce; also three fruits of Melon Ruxley Lodge Favourite, and a dish of Peaches.

Lord Suffield, Gunton Park, Norwich (gardener, Mr. W. Allan), sent fruits of four seedling Strawberries. Two of the varieties (Nos. 3 and 4) were considered to promise well, and the Committee desired to have them sent to Chiswick for trial.

The Earl of Rosebery, Mentmore, Leighton Buzzard (gardener, Mr. J. Smith), sent several dishes of fine Strawberries, viz.: Noble, Auguste Nicaise, Keen's Seedling, Sir Joseph Paxton, and Vicomtesse Héricart de Thury.

Messrs. J. Veitch & Sons, Chelsea, sent, by request of previous meeting, fruits of Apple North End Pippin, which was considered by the Committee to be identical with Gooseberry Pippin.

SCIENTIFIC COMMITTEE.

D. Morris, Esq., F.L.S., in the Chair, and eight members present.

Vine Branch Grown in Darkness.—With reference to the specimen exhibited at a previous meeting, Mr. Rivers contributed the following additional information, accompanied by sketches:—"The situation is absolutely dark; first, there is a covering of slates overlapping each other, above which is a bed of tan 6 inches deep; the front wall and the back is of brick; the temperature must be very high, as the hot-water pipes pass through the place, that of the house being seldom below 70° Fahr. The house was cleared of Grapes and plants by the middle of July, and the heat taken off. It was then undisturbed until March, when the slates and beds were cleared preparatory to a new crop. The branch was then discovered, its length being about 12 feet. It had, therefore, been about nine months without heat; during part of the time a severe frost had lasted. The leaves and bunch of Grapes were of the colour of a well-blanched Lettuce. It is impossible to say how long the branch was forming. I did not see any seeds in the fruit."

A discussion arose as to the degree of perfection to which flowers can attain when grown in total darkness. Mr. McLachlan, for example, found a Hyacinth, which by accident could not emerge from the ground, to be rose-coloured. Mr. Smee on a former occasion exhibited a dark purple Hyacinth which had developed underground beneath a slate. Many other instances are known. The Committee expressed a wish to receive descriptions of any cases of plants developing in darkness which correspondents may be able to furnish.

Excrescences on Willows.—Mr. Blandford had examined sections of the specimens brought to the last meeting. The woody tissue was very dense, and indicated no clear evidence of insect origin. He suggested that there might have been an old gall, and that the hypertrophy of the tissues continued after the escape of the insect, possibly a cryptocampus or sawfly. The wood was referred to Professor H. Marshall Ward for an examination of the tissues.

Staves perforated.—Mr. Blandford observed that the insect officially reported by the India Office as taken from the barrels, and supposed to be the wood-borer, as mentioned at the last meeting, proved to be incorrect. The staves are really perforated by *Xyleborus perforans*, an insect well known since 1855, and detected as perforating Sugar-canes in St. Vincent in 1867. He proposed making further investigations. Mr. McLachlan remarked that the original home of this insect was Central and South America, that it was exported to Madeira, and thence to India. Mr. Morris observed that the distribution also agreed with exportation of the Sugar-cane.

Injuries to the Cocoa Tree (*Theobroma cacao*).—Mr. Morris remarked upon the presence of *Styrastina depressa* infesting Cocoa-trees in Grenada, that it was not a native of the West Indies, but introduced from South America. At the Jamaica Exhibition, Cocoa from Surinam, together with insects injurious to it, were shown. Hence it was undoubtedly introduced into the West Indies along with the Cocoa.

Kæmpferia, Tuberous Roots of.—Professor Church had examined the tuberous roots exhibited at a previous meeting by Mr. Morris, which are used as food in Trinidad and Dominica. He found that they contained very little starch, but a relatively large amount of gummy matter, which possessed a strong left-

handed rotation, being apparently, therefore, of the lævulose group. He remarked that it rapidly absorbed iodine, which became quite colourless, so that it was difficult to detect the starch unless a considerable quantity of iodine was present. These roots, therefore, would seem to have a composition closely resembling the tubers of Stachys tuberifera.

Papaver pilosum (*?*).—Rev. C. Wolley Dod exhibited a Poppy with orange-coloured flowers, about which some doubt was raised as to its identity. It was referred to Kew.

Apple Twigs injured.—Mr. Lee, of Clevedon, sent a number of twigs "ringed" in places. Generally the ringing had taken place at the buds. It was suggested to have been done by bullfinches rather than sparrows, as Mr. Lee intimated. It was observed by Mr. Blandford that hymenopterous insects not unfrequently produce a like result when collecting materials for their nests, as, *e.g.*, hornets on Ash-trees. It was suggested that the trees should be searched for the presence of insects at the time when the injury was done.

Hippeastrum diseased.—Mr. Morris exhibited bulbs with leaves covered with red spots and blotches. They were received from Mr. J. Douglas, of Ilford. The bulbs were reddish coloured, and the leaves died off prematurely. It was thought to be due to *Saccharomyces glutinis* (described and figured in the *Gardeners' Chronicle*, 1886, p. 396). It was referred to Prof. H. M. Ward for further examination and report.

GENERAL MEETING.

JUNE 23, 1891.

Sir J. T. D. LLEWELYN, Bart., in the Chair.

ELECTIONS.

Fellows, 20.—N. Blandford, Charles Edward Brotherton, George Brumell, Frank Callender, T. S. Carlyon, J.P., Alfred Clifton, George Cole, Edward Davis, James Flexman Walter Gardiner, E. Goodyear, Percy Hall, John Idiens, Mrs. Arthur Killik, Miss H. Locke-King, James Packham, Anthony Roozen, Richard Reynolds, F.I.C., Henry Southall, C. J. Van Tubergen.

A lecture on "Tea Roses" was delivered by Mr. T. W. Girdlestone, M.A. (*see* p. 299).

FLORAL COMMITTEE.

W. Marshall, Esq., in the Chair, and seventeen members present.

Award Recommended:—

Silver Gilt Flora Medal.

To Messrs. Kelway & Son, Langport, Somerset, for an extensive collection of Pæonies, Pyrethrums, Delphiniums, &c.

Silver Gilt Banksian Medal.

To Messrs. Paul & Son, Cheshunt, for a miscellaneous group of Hardy Plants, Single Roses, &c.

Silver Banksian Medal.

To Lord Wimborne, Canford Manor, Wimborne, Dorset (gardener, Mr. T. H. Crasp), for a well-flowered group of Souvenir de la Malmaison Carnations.

To Messrs. Barr & Son, Covent Garden, for a fine collection of Hardy Flowers.

To Messrs. B. S. Williams & Son, Upper Holloway, for an interesting group of Sarracenias.

Bronze Banksian Medal.

To Mr. S. Barlow, Stakehill House, Castleton, Manchester, for a most interesting collection of Florist's Tulips (cut blooms).

To Lord Penzance, Eashing Park, Godalming (gardener, Mr. G. Baskett), for a very interesting collection of Sweet Briar Hybrids, containing varieties of great promise.

To Messrs. H. Cannell & Sons, Swanley, for some magnificent specimens of Verbascum olympicum.

First Class Certificate.

To Iris Gatesii (votes, unanimous), from Mr. C. G. Van Tubergen, Zwanenburg, Haarlem, Holland, and Messrs. James Veitch & Sons, Chelsea. Flowers of large size, dull greyish colour; the standard petals finely streaked, and the falls freely spotted with brown.

To Weigela hortensis nivea (votes, 10 for), from Messrs. J. Veitch & Sons. Flowers pure white, freely produced.

To Indigofera Gerardiana alba (votes, 5 for, 2 against), from

Messrs. J. Veitch & Sons. Long slender racemes of white flowers.

Award of Merit.

To Carnation Lord Rendlesham (votes, 6 for, 4 against), from Mr. J. Mill, Campsey Ashe, Wickham Market. Orange-coloured flowers, somewhat resembling Mrs. Reynolds Hole.

To Iris variegata "Robert Burns" (votes, 5 for, 2 against), from Messrs. Barr & Son, Covent Garden. Standard petals rich golden yellow, falls maroon, veined with white.

To Begonia (double) Mme. la Baronne de St. Didier (votes, unanimous), from Messrs. H. Cannell & Sons, Swanley. Clear delicate yellow, of good shape.

To Clove Carnation Iver White (votes, unanimous), from Mr. C. Turner, Slough. Snow-white flowers of good form.

To Gloxinia Monarch (votes, unanimous), from Messrs. J. Veitch & Sons. Rich crimson, of fine form.

To Gloxinia Electra (votes, unanimous), from Messrs. J. Veitch & Sons. Bluish purple, margined with white-blue.

To Canna Jules Chretien (votes, unanimous), from Messrs. Paul & Son. Very large rich scarlet flowers.

To Canna Antoine Chantin (votes, 10 for), from Messrs. Paul & Son. Rich golden yellow.

To Campanula abietina (votes, 7 for, 1 against), from Messrs. Paul & Son. Flowers soft purple, very freely produced.

To Pyrethrum (double) Moonbeam (votes, unanimous), from Messrs. Kelway & Son. Large creamy-white flowers.

Other Exhibits.

From the Royal Gardens, Kew, was sent a choice selection of plants, consisting of Orchids in flower, and Primula imperialis, P. Poissoni, Exacum macranthum, Crinum purpurascens, &c.

Messrs. Paul & Son sent some promising varieties of Climbing Roses of the Dijon family, which the Committee desired to see again.

Mr. S. Mortimer, Farnham, Surrey, sent a group of Celosias and Coleuses.

Mr. R. Dean, Ealing, sent flowers of seedling Border Pinks also Lathyrus tingitanus, which the Committee desired to see in larger form on a future occasion.

Prizes.

Prizes were awarded for a collection of Herbaceous Pæonies, grown in the open; not more than three blooms of a sort. Open to amateurs. *First Prize*, Silver Challenge Cup, to Rev. W. Wilks, Shirley Vicarage, Croydon. *Second Prize*, £1, to Lord Wimborne, Canford Manor, Wimborne, Dorset.

ORCHID COMMITTEE.

Harry J. Veitch, Esq., F.L.S., in the Chair, and seven members present.

Awards Recommended:—

Silver Banksian Medal.

To Messrs. B. S. Williams & Son, Upper Holloway, N., for a group of Cypripediums, Cattleyas, Anguloas, Thunias, &c., and good varieties of Oncidium macranthum.

First Class Certificate.

To Odontoglossum crispum guttatum, Burford variety (votes, unanimous), from Sir Trevor Lawrence, Bart., M.P. (grower, Mr. W. White). A very fine and heavily blotched variety.

To Lælia Gottoiana × (votes, unanimous), from E. Gotto, Esq., J.P., The Logs, Hampstead Heath (gardener, Mr. T. Banks). A remarkably fine supposed natural hybrid of L. grandis, with which it was imported. The flowers were of the uniform rosy lilac, with darker lines on the lip, as seen in L. Boothiana, but in shape similar to Lælia purpurata.

To Lælia grandis, Tring Park variety (votes, unanimous), from the Right Hon. Lord Rothschild, Tring Park, Tring (gardener, Mr. E. Hill). This is the showiest form of true Lælia grandis which has yet appeared. Its flowers are larger than in the type, but the chief peculiarity is its broad, flat petals, which do not reflex as in the ordinary form.

To Dendrobium Phalænopsis Statterianum (votes, unanimous), from Messrs. B. S. Williams & Son, Upper Holloway. This is the dark, smaller-flowered form which is now much commoner than that originally imported.

Award of Merit.

To Lacæna bicolor (votes, unanimous), from Messrs. F.

Sander & Co., St. Albans. A very old, but still very rare and handsome Orchid, with the habit of the larger Acinetas.

To Odontoglossum luteo-purpureum illustre (votes, unanimous), from Messrs. F. Sander & Co., St. Albans. This is a finely marked form with much of the appearance of O. Hallii.

To Thunia Bensoniæ Winniana, from Charles Winn, Esq., The Uplands, Selly Hill, Birmingham. An improvement in every respect on the type. Flowers rosy purple.

Botanical Certificate.

To Cycnoches chlorochilon (votes, unanimous), from Sir Trevor Lawrence, Bart., M.P. (grower, Mr. W. White). A noble example of the Swan Orchid, with two spikes, each bearing six flowers of a peculiar greenish-yellow colour.

Other Exhibits.

Sir Trevor Lawrence, Bart., M.P., exhibited Odontoglossum crispum "Purple Emperor," a variety with flowers of a charming rosy-purple tint; also O. cuspidatum platyglossum, and a grand plant of Masdevallia Davisii.

J. T. Gabriel, Esq., Palace Road, Streatham Hill, sent a fine form of Cypripedium Curtisii.

Messrs. James Veitch & Sons, Chelsea, exhibited the new hybrid Cypripedium Astræa (C. Spicerianum ♂ × C. philippinense ♀), which the Committee desired to see again. Also the beautiful Disa Veitchii × (D. racemosa × D. grandiflora) and Thunia Veitchiana ×.

E. Gotto, Esq., The Logs, Hampstead Heath (gardener, Mr. T. Banks), staged two good forms of Lælia grandis, and a Lælia purpurata with white flowers having two purple marks, one on each side of the lip.

Messrs. Seeger & Tropp, Lordship Lane, East Dulwich, exhibited several Orchids of botanical interest.

Messrs. F. Sander & Co. sent two curious Catasetums of the C. barbatum section, Epipendrum Randii, Odontoglossum Mulus, Phajus Humblotii, &c.

FRUIT COMMITTEE.

PHILIP CROWLEY, Esq., F.L.S., in the Chair, and fifteen members present.

Awards Recommended:—

Cultural Commendation.

To Lord Wimborne, Canford Manor, Wimborne, Dorset (gardener, Mr. T. H. Crasp), for very fine examples of Peaches and Nectarines.

To Messrs. J. Cheal & Sons, Crawley, for good fruits of Strawberry Noble, sent to show its better quality when grown on heavy soil.

To the Duke of Northumberland, Albury Park, Guildford (gardener, Mr. W. C. Leach), for well-filled pods of Pea Duke of Albany.

Other Exhibits.

Mr. J. Collis, market gardener, Bollo Lane, Acton, sent Strawberry Collis's Seedling, a promising variety, which the Committee desired to see again.

Mr. J. Watkins, Pomona Farm, Withington, Hereford, sent fruits of Apples Striped Beefing and Duke of Devonshire. The latter was considered of very good flavour for the season.

R. Burrell, Esq., Westley Hall, Bury St. Edmunds (gardener, Mr. A. Bishop), sent a seedling white-fleshed Melon, which was over-ripe. The Committee desired to see it again.

Messrs. de Rothschild, Gunnersbury House, Acton (gardener, Mr. J. Hudson), sent a seedling Melon of promise, but not ripe. Requested to be seen again.

C. H. Hooper, Esq., sent an interesting collection of French instruments used in fruit-tree cultivation.

Mr. S. Mortimer, Farnham, Surrey, sent a seedling Cucumber, a cross between Express and Lockie's Perfection, of good form and appearance.

SCIENTIFIC COMMITTEE.

D. MORRIS, Esq., M.A., F.L.S., in the Chair, and seven members present.

Excrescences on Willows.—With reference to the specimens exhibited at the last meeting by Mr. Blandford, and referred to

Professor H. Marshall Ward for an examination of the tissues, it was reported that there was no evidence of any fungoid growth, and Mr. McLachlan added that there was also none of insects having ever been present. Hence the true cause of the hypertrophy could not be ascertained.

Papaver pilosum (*?*).—This plant having been referred to Kew, was ascertained by Mr. Baker to be Papaver rupifragum var. atlanticum, and is figured in the *Bot. Mag.*, t. 7107. It is a native of Morocco, P. rupifragum being a native of Andalusia. Mr. Wilks observed upon the fact that there are a great number of Poppies now in cultivation which require a careful systematic treatment with regard to the correction of names.

Iris Petals variegated.—Mr. McLachlan exhibited three petals, half white and half purple, which appeared on a single plant of Iris florentina. The question was raised whether the plant was a white variety of Iris germanica reverted. It was referred to Kew for further consideration.

Scotch Fir and Larch attacked by Chermes.—Mr. R. Maher, of Yattendon Court, Newbury, forwarded specimen branches of these trees infested with species of chermes. The only remedy is the free use of paraffin spray. At Kew, Mr. Morris observed, they were obliged to cut down some Pine-trees growing in the midst of others, as from their height and crowded condition the spray could not be used effectually, and the only alternative was to destroy the infected trees.

Ash Wood diseased.—Mr. Maher also sent specimens of branches having the common cankerous-like hollow places on them. They were from an old tree 18 inches in diameter at a foot from the ground. The trunk and all the branches presented a similar appearance. They were referred to Professor H. Marshall Ward for further investigation. Mr. McLachlan observed that the Weevil *Hylesinus Fraxini*, or else the larva of a moth, *Myelois pinguis*, which feeds beneath the bark, might possibly have been the primary cause of the injury.

Cycnoches chlorochilon (Klotzsch).—Mr. Rolfe exhibited what was apparently the male flower of this well-known Orchid, the column being very slender and the pollen normally developed. In addition he showed another form, believed to be hitherto unrecorded, having a larger flower with a short stout column, and supposed to be the female flower of the same species.

These two flowers appeared upon separate individuals imported from Caracas as C. chlorochilon. They flowered in the collection of M. A. Houjean de Lehaie, Membre de la Chambre des Représentants, Hyon (Mons), Belgium. The special interest attached to the specimens was the great similarity between the two sexes, a character also observed in C. Loddigesi, while in C. ventricosum, C. pentadactylon, and C. Rossianum the male and female flowers are very dissimilar. C. Egertonianum, the male of C. ventricosum, is a familiar example.

Elm with Coloured Wood.—A branching specimen in full leaf was exhibited by Mr. Morris. It was received many years ago at Kew from Van Houtte, under the name of Ulmus sp. libero-rubro. This is believed to be only a form of the Scotch or Wych Elm, Ulmus montana. The peculiarity possessed by the specimen consisted in its having the wood immediately beneath the bark of a bright pink colour, which easily distinguishes it from the type. The exact nature of the colouring substance in this instance did not appear to have been investigated.

TEA-ROSE SHOW.

June 23.

In connection with the Society's usual show of new and rare plants, flowers, fruit, and vegetables, the National Rose Society held its great show of Tea Roses in the Drill Hall. After the severity of the preceding winter, the beautiful display of Roses came as a great surprise, almost everyone being under the impression that the season would be very backward. Despite the fact that the exhibition was confined to Teas and Noisettes, cut in some cases from under glass, the show proved to be a good one, and the general display was bright and interesting.

In Class A, for twenty-four single trusses, not less than twelve varieties, Mr. A. H. Gray, Beaulieu, Newbridge Hill, Bath, well merited the first prize for his remarkable collection. Among the varieties exhibited were Madame Cusin, Niphetos (very fine), Comtesse de Nadaillac, Maréchal Niel, Souvenir d'Elise Vardon, Catherine Mermet (two charming blooms), The Bride, Alba Rosea, Reine du Portugal, Comtesse Panisse, Caroline Kuster, and Souvenir d'un Ami. Mr. T. B. Haywood,

Woodhatch Lodge, Reigate, was second with smaller, but fresh and well-finished blooms.

In Class B there were three stands of twelve, not less than six varieties, and here the Rev. A. Foster-Melliar, Sproughton Rectory, Ipswich, won somewhat easily. The winning twelve were as follows:—Rubens (one a beautiful bloom), Marie Van Houtte, Madame Bravy, Madame Hoste (two charming blooms), Souvenir de S. A. Prince, Anna Ollivier, Hon. Edith Gifford, and Perle des Jardins. The Rev. J. H. Pemberton, Havering, Romford, was second, his best blooms being Souvenir d'un Ami, Belle de Bordeaux, Gloire de Dijon, Madame Welch, Jules Finger, Bouquet d'Or, and Rubens. Mr. R. L. Knight, Bobbing Place, Sittingbourne, was third.

Mr. T. W. Girdlestone, Sunningdale, Berks, won against four competitors with six blooms in Class C, having a magnificent Comtesse de Nadaillac, which was selected as the best bloom in the show, and well deserved that honour; Climbing Devoniensis, Maréchal Niel, Souvenir d'Elise Vardon, Catherine Mermet, and Caroline Kuster.

The Rev. Alan Cheales, Brockham Vicarage, Surrey, was second in the same class, with Cleopatra and Marie Van Houtte as his best flowers; Mr. E. Mawley, Rosebank, Berkhampstead, was placed third, and Dr. Ashurst, Farningham, fourth.

In Class D, Mr. Gray had the best six of any one variety, that exhibited being Maréchal Niel. Mr. Cheales and Mr. Girdlestone were second and third respectively with the same variety.

Mr. Gray also won with six trebles in Class E. The varieties were Catherine Mermet, Souvenir d'Elise Vardon, Comtesse de Nadaillac, Madame Cusin, Maréchal Niel, and Souvenir de Thérèse Levet.

In the open class (G) for twenty-four flowers there were three very good stands, the well-known seedling-Briar-budded blooms of Mr. G. Prince, of Oxford, securing the first prize with Niphetos, Madame de Watteville, The Bride, Catherine Mermet, Souvenir de S. A. Prince, Souvenir d'un Ami, Souvenir d'Elise Vardon, Comtesse de Nadaillac, Amabilis, Anna Ollivier, La Boule d'Or, Hon. Edith Gifford, Maréchal Niel, Innocente Pirola, Princess of Wales, C. Koch, Jean Ducher, Ernest Metz,

Caroline Kuster, Princess Beatrice, Madame Cusin, Mlle. M. Arnaud, Devoniensis, and Amazone.

Mr. B. R. Cant, Colchester, was second, and Mr. G. Mount, Canterbury, third.

In Class H, Mr. Prince won again with twelve trebles, the varieties being Souvenir de S. A. Prince, Princess of Wales, Souvenir d'Elise Vardon, Catherine Mermet, The Bride, Jean Ducher, Souvenir d'un Ami, Anna Ollivier, Caroline Kuster, Hon. Edith Gifford, Comtesse de Nadaillac, and Innocente Pirola. Mr. B. R. Cant came second with a collection in which Souvenir d'Elise Vardon was conspicuous; and Mr. G. W. Piper, Uckfield, was third with small but delightfully fresh and well-coloured blooms of Jean Ducher, Anna Ollivier, Catherine Mermet, Josephine Malton, Marie Van Houtte, Rubens, &c.

Mr. A. H. Gray followed up previous successes by a highly creditable victory with twelve large and perfectly fresh Maréchal Neils in Class K, in which Mr. Frank Cant, Braiswick, Colchester, and Mr. R. L. Knight were second and third respectively. Mr. Gray also won with twelve blooms of any Tea or Noisette in Class L, having a superb stand of Souvenir d'Elise Vardon, so that he may be said to have been the hero of the day. In this class Mr. Prince was second with a splendid box of his beautiful Tea Souvenir de S. A. Prince, Mr. B. R. Cant third with a good stand of Souvenir d'Elise Vardon, and Mr. Mount fourth with Anna Ollivier, small but fresh. The best basket was shown by Mr. G. Mount.

One of the most interesting features in the exhibition was a stand of seedling Sweet Briar hybrids raised by the Right Hon. Lord Penzance. Some of these were remarkably pleasing both in form and colour, and their delicious scent attracted universal attention. The Sweet Briar crossed with Alfred Colomb, H.P., yielded a charming rosy-crimson single flower, marked P. 91, but the spicy Briar fragrance was wanting in the foliage. In the case of Lady Penzance the perfume of the leaves was retained in conjunction with small single flowers of a rosy-salmon hue, distinct in colour and most charming in character. The result of a cross between the Sweet Briar and Pau Ricaut, H.C. (D. 44), had bright pink flowers. The hybrid between Sweet Briar and William Jepe (D. 59) had large pale rose flowers, which showed an inclination to doubling. Souvenir

d'Auguste Riviere produced a deep rose-purple variety (R. 55), and Rosa lucida with the Sweet Briar brought out white flowers tinged at the tips with pale rose (O. 63). Lord Penzance also exhibited the fine old Rose Fortune's Yellow from a N.E. wall, and the old double yellow Rosa sulphurea. The trusses of the former were remarkably beautiful and greatly admired. Messrs. Paul & Son, Cheshunt, had a box of Rosa rugosa varieties, and such species as De Meaux, pomifera, Sweet Briar, Janet's Pride (a charming variety), rubrifolia, Domeril, Boccard, White Burgundy, Copper Austrian, and several of the Scotch Roses.

ROYAL HORTICULTURAL SOCIETY'S DINNER.

The same evening the Society held a dinner in the Whitehall Rooms of the Hôtel Métropole, the President (Sir Trevor Lawrence, Bart., M.P.) taking the chair. Among the guests were the Greek Minister, the Earl of Rosse, Lord Justice Fry, Baron Schröder, Sir James Paget, Sir Joseph Lister, Sir Henry Thompson, Mr. Sheriff Farmer, Mr. Brymer, M.P., Dr. Farquharson, M.P., General Donnelly, C.B., Mr. Norman Lockyer, F.R.S., Sir J. T. D. Llewelyn, Mr. Martin R. Smith, Mr. W. T. Thiselton Dyer, F.R.S., C.M.G., Professor Michael Foster (Secretary of the Royal Society), Dr. Stewart (President of the Linnean Society), Dr. Hogg, Mr. T. B. Haywood, Mr. Philip Crowley, F.L.S., &c. The toast of the "Ministers of Foreign Countries" was coupled with the name of the Greek Minister. Sir James Paget proposed the "Royal Horticultural Society," which Sir Trevor Lawrence acknowledged. Professor Foster proposed "Botanical Science," coupled with the names of Lord Justice Fry and Dr. Stewart. Another toast was the "Treasurer and Benchers of the Inner Temple," and Sir Joseph Lister responded for the visitors.

EXHIBITION OF HARDY SUMMER PERENNIALS AND SMALL FRUITS AT CHISWICK,*

JULY 7 AND 8, 1891.

FLORAL COMMITTEE.

W. MARSHALL, Esq., in the Chair, and sixteen members present.

Awards Recommended :--

Silver Gilt Flora Medal.

To Messrs. J. Laing & Sons, Forest Hill, for a large and rich collection of Hardy Flowers.

To Messrs. Paul & Son, Cheshunt, for a very fine collection of choice Hardy Flowers.

Silver Flora Medal.

To Mr. T. S. Ware, Tottenham, for a smaller but very beautiful collection of Hardy Flowers.

To Messrs. J. Veitch & Sons, Chelsea, for a choice collection of Hardy Flowers, containing many good varieties of Delphiniums, &c.

To Messrs. Kelway & Son, Langport, for a fine collection of Delphiniums, Gaillardias, Irises, &c.

Silver Banksian Medal.

To Messrs. Barr & Son, Covent Garden, for a beautiful miscellaneous collection of Hardy Flowers.

Award of Merit.

To Pæony Mme. Emile Galle (votes, 4 for), from Messrs. Paul & Son. Pale blush, of good substance.

To Veronica anomala (votes, 6 for), from Messrs. Paul & Son. A white-flowered dwarf hardy shrub.

To Prunella Webbiana (votes, unanimous), from Messrs. Paul & Son. Showy spikes of flowers, of a rosy-violet shade.

To Delphinium Robert Adair (votes, unanimous), from Messrs. Kelway & Son. A large bright blue single-flowered variety.

To Centaurea cyanus nana compacta (votes, 6 for), from Mr. H. Herbst, Richmond. Miniature Corn-flowers of a deep blue shade; plant of very dwarf growth.

To Mimulus cupreus "Prince Bismarck" (votes, 7 for), from

* For papers read at the Conference *see* page 309.

Messrs. J. Laing & Sons. Flowers rich crimson, freely produced; an exceedingly dwarf variety.

To Godetia White Pearl (votes, unanimous), from Messrs James Carter & Co., High Holborn. Pure white flowers; plant about 18 inches in height.

To Begonia (double) Miss Faulkner (votes, unanimous), from Messrs. H. Cannell & Sons. Rich yellow, flowers of fine form.

To Rose (single) Reine Blanche (votes, 7 for), from Mr. B. Ladhams, Southampton. Blush white, free flowering.

To Escallonia exoniensis (votes, unanimous), from Messrs. J. Veitch & Sons. A hybrid variety; flowers of a pale blush colour, very freely produced.

To Pink The Rector (votes, unanimous), from Mr. C. Turner Slough. Ground colour pure white, with margin of a rosy shade; a beautiful variety.

Botanical Certificate.

To Lilium maritimum (votes, unanimous), from Mr. T. S. Ware. Bell-shaped flowers of a dull red colour.

Commended.

Strain of Gaillardias, from Messrs. Kelway & Son. Flowers large and finely coloured.

Other Exhibits.

From the Royal Gardens, Kew, was sent a very interesting collection of hardy flowers, conspicuous being Chrysogonum virginianum, rich yellow; Perezia multiflora, pale blue; Cosmos bipinnatus, Layia heterotricha, and varieties of the Alpine Dianthus.

Mr. W. C. Leach, Albury Park Gardens, Guildford, sent bunches of Alstrœmerias.

Mr. Anthony Waterer, Woking, sent trusses of late kinds of Hardy Azaleas.

Mr. R. Dean, Ealing, sent a useful selection of Border Pinks.

Messrs. J. Veitch & Sons sent Gerbera Jamesoni, a handsome Composite from the Transvaal, with heads of flowers over 3 inches across. The ray-florets are orange-red above, pale yellow beneath. (*Botanical Magazine*, t. 7087.) The Committee desired to see it again.

Mr. T. Laxton, Bedford, sent several promising white Border Pinks.

Prizes.

Prizes were awarded in the following classes :—

Class 1.—Eighteen bunches of Hardy Perennials (distinct). Amateurs. *First Prize*, Silver Gilt Flora Medal and £2, to O. T. Hodges, Esq., Lachine, Chislehurst. *Second Prize*, £1. 10*s*., to Mr. G. H. Sage, Ham House, Richmond.

Class 2.—Twelve bunches of Hardy Perennials (distinct). Amateurs. *First Prize*, Silver Flora Medal and £1. 10*s*., to W. Marshall, Esq., Auchinraith, Bexley (gardener, Mr. Pratt). *Second Prize*, £1, to E. M. Nelson, Esq., Hanger Hill House, Ealing (gardener, Mr. E. Chadwick).

Class 3.—Eight bunches of Hardy Perennials (distinct). Amateurs. *First Prize*, Bronze Flora Medal and £1, to Miss R. Debenham, St. Peter's, St. Albans.

Class 14.—Six varieties of Gaillardias. Amateurs. *First Prize* (presented by Messrs. Kelway), Kelway Silver Medal, to Lord Wimborne, Canford Manor, Dorset (gardener, Mr. T. H. Crasp).

ORCHID COMMITTEE.

Messrs. Pitcher & Manda, Hextable, Swanley, Kent, exhibited Cypripedium Browni × ; a cross between C. longifolium var. and C. leucorrhodum, the flowers very closely resembling those of the last-named variety.

Messrs. Seeger & Tropp, Lordship Lane, East Dulwich, staged several very distinct forms of Cattleya labiata Gaskelliana ; also C. Mossiæ formosa, a very brightly coloured variety, Lælia xanthina, with an imperfectly developed spike, and a plant of a Grammatophyllum, near to G. multiflorum, named G. Seegerianum. It came from the Molucca Islands.

Mr. Prewett, Hammersmith, sent Aërides maculosum, Prewett's variety. A well-grown plant with a stout, branched, ascending inflorescence, the flowers closely resembling those of Aërides maculosum Schröderi.

F. Wigan, Esq., Clare Lawn, East Sheen (gardener, Mr. Young), exhibited a plant of Angræcum caudatum in flower, also a specimen of Odontoglossum cordatum ; and Mr. C. Harris, The Gardens, Victoria House, Dukinfield, Cheshire, sent cut flowers of several varieties of Cattleya Mossiæ.

FRUIT COMMITTEE.

PHILIP CROWLEY, Esq., F.L.S., in the Chair, and ten members present.

Awards Recommended:—

Silver Banksian Medal.

To J. A. Rolls, Esq., The Hendre, Monmouth (gardener, Mr. T. Coomber), for eight remarkably well grown examples of Queen Pines.

Bronze Banksian Medal.

To Mr. J. Watkins, Withington, Hereford, for examples of well-kept and highly coloured Apples.

First Class Certificate.

To Banana Lady's Finger (votes, unanimous), from Mr. J. Fitt, Panshanger, Hertford. Well-flavoured fruits; short, with very thin skin, and remarkably sweet and good.

Other Exhibits.

Mr. G. F. Pontin, Stanley Vineries, Wokingham, sent several fine Melons—Golden Triumph, 7 lbs., Conqueror, 10 lbs., Sutton's Triumph, 7½ lbs., and Golden Perfection, 8 lbs. in weight.

Mr. J. Collis, Bollo Lane, Chiswick, sent a seedling Strawberry, No. 1, which the Committee desired to have tried in the Society's Gardens.

Mr. J. Fitt sent good examples of Strawberry Premier.

Mr. R. Gilbert, Burghley Gardens, Stamford, sent a promising seedling Strawberry named Chief Secretary, greatly resembling Sir J. Paxton. The Committee desired to have it tried in the Society's Gardens.

The Duke of Northumberland, Albury Park, Guildford (gardener, Mr. W. C. Leach), sent very fine fruits of Strawberries Noble and Sir J. Paxton.

Messrs. Paul & Son, Cheshunt, sent examples of Strawberry Marie Nicaise. A very handsome variety.

Mr. J. W. Church, The Vineyards, Braconash, sent a bunch of Alicante Grapes which had been kept since 1890.

Messrs. James Carter & Co., High Holborn, sent specimens of Cabbage Lettuce Holborn Favourite.

Mr. R. Daws, High Road, Chiswick, sent examples of a

seedling Rhubarb, which the Committee desired to have tried in the Society's Gardens.

Prizes.

Prizes were awarded in the following classes:—

Class 4.—Six dishes of Strawberries (distinct), not less than thirty fruits to a dish. Amateurs. *First Prize*, Silver Banksian Medal and £1. 10*s*., to Mr. G. H. Sage, Ham House, Richmond. *Second Prize*, £1, to Mr. W. Palmer, Thames Ditton, Surrey.

Class 5.—Four dishes of Strawberries (distinct), not less than thirty fruits to a dish. Amateurs. *First Prize*, Bronze Banksian Medal and £1, to E. M. Nelson, Esq., Hanger Hill House, Ealing (gardener, Mr. E. Chadwick).

Class 6.—One dish of Strawberries, not less than thirty fruits to a dish. Amateurs. *First Prize*, 10*s*., to E. M. Nelson, Esq.

Class 9.—Two dishes of ripe Gooseberries (distinct), not less than thirty berries to a dish. Amateurs. *First Prize*, withheld. *Second Prize*, 7*s*. 6*d*., to Mr. W. Palmer.

Class 10.—Six dishes of Green Gooseberries (distinct), not less than thirty berries to a dish. Amateurs. *First Prize*, 15*s*., to Mr. W. Palmer. *Second Prize*, 10*s*., to the Rev. L. R. Flood, Merrow, Guildford (gardener, Mr. J. Gilbert).

Class 13.—Three dishes of Peas, Sharpe's Sir F. A. Milbank, Queen, and Triumph. *First Prize*, £2. 2*s*. (presented by Messrs. Sharpe & Co.), to E. M. Nelson, Esq.

Chiswick Trials, July 7, 1891.

FLORAL COMMITTEE.

W. Marshall, Esq., in the Chair, and sixteen members present.

Awards Recommended :—

Highly Commended (× × ×).

To Pink Hettie Dean, from Mr. R. Dean, Ealing.
To Pink Charmer, from Mr. R. Dean, Ealing.
To Pink Mrs. Dark, from Mr. R. Dean, Ealing.
To Pink Modesty, from Mr. Charles Turner, Slough.
To Pink Beauty of Bath, from Mr. Hooper, Bath.
To Pink Her Majesty, from Mr. Hooper, Bath.

FRUIT AND VEGETABLE COMMITTEE.

PHILIP CROWLEY, Esq., F.L.S., in the Chair, and ten members present.

Awards Recommended :—

Highly Commended (× × ×).

To Pea Ameer, from Messrs. Harrison & Sons, Leicester.

To Pea Sutton's Empress of India, from Messrs. Sutton & Sons, Reading.

CHISWICK TRIALS, JULY 14, 1891.

FRUIT AND VEGETABLE COMMITTEE.

W. WARREN, Esq., in the Chair, and seven members present.

Awards Recommended :—

First Class Certificate.

To Potato Early Laxton, from Mr. T. Laxton, Bedford.

Highly Commended (× × ×).

To Pea Chelsonian, from Messrs. James Veitch & Sons, Chelsea.

To Pea Duke of Albany, from Messrs. James Veitch & Sons.

To Pea Telephone, from Messrs. James Veitch & Sons.

To Pea Critic, from Mr. H. Eckford, Wem, Salop.

To Pea Essential, from Mr. H. Eckford, Wem, Salop.

To Pea Epicure, from Mr. H. Eckford, Wem, Salop.

To Pea The Echo, from Mr. H. Eckford, Wem, Salop.

To Pea Alderman, from Mr. T. Laxton, Bedford.

To Pea The Marquis, from Mr. T. Laxton, Bedford.

To Pea Extra Dwarf Daisy, from Messrs. James Carter & Co., Holborn.

Commended (× ×).

To Pea Optimum, from Mr. T. Laxton.

To Pea Sutton's Early Marrowfat, from Messrs. Sutton & Sons.

GENERAL MEETING.

July 21, 1891.

Philip Crowley, Esq., F.L.S., in the Chair.

Elections.

Fellows, 23.—John P. Barber, Joseph Watts Church, Percy N. Cobbett, J. Gurney Fowler, T. R. Jones, F. George Lloyd, Matthew Low, M.P., C. J. Lucas, Lady Lyttelton, Frank Marshall, M.A., Mrs. McCreagh Thornhill, Captain Nash, R.A., Herbert Pearson, W. Pennyfeather, R. Pullar, G. D. R. Rust, Mrs. Rutter, Jas. Simmons, J. H. Simpkins, E. Unwin, George Whitley, Mrs. Geo. Whitley, Mrs. Wynne-Corrie.

Associates, 2.—George Duncan, A. Mayne.

Societies Affiliated, 2.—Alvaston Horticultural Society, Matlock Bath Horticultural Society.

A paper on "Early Peaches and Nectarines" was read by Mr. T. Francis Rivers. (*See* p. 363.)

FLORAL COMMITTEE.

W. Marshall, Esq., in the Chair, and seventeen members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Paul & Son, Cheshunt, for a beautiful collection of Cut Roses, Lilies, and other Hardy Plants.

To Messrs. James Veitch & Sons, Chelsea, for a very interesting collection of Hardy Ornamental Trees and Shrubs.

Silver Banksian Medal.

To Messrs. Laing & Mather, Kelso, N.B., for a beautiful collection of the different types of Souvenir de la Malmaison Carnations.

To Mr. W. Rumsey, Waltham Cross, for a fine display of Cut Roses.

To Messrs. Kelway & Son, Langport, for a fine group of Delphiniums and Gaillardias.

To Messrs. J. Laing & Sons, Forest Hill, for a collection of Hardy Flowers.

To Mr. T. S. Ware, Tottenham, for a very fine collection of Lilies, embracing all the more noteworthy varieties.

To Mr. W. Stacey, Dunmow, for a well-grown collection of Verbenas.

Bronze Banksian Medal.

To Messrs. James Veitch & Sons, for an extensive collection of Carnations and Picotees, grown out of doors at Chelsea.

First Class Certificate.

To Allamanda Williamsii (votes, 11 for), from Messrs. B. S. Williams & Son, Upper Holloway. Flowers bright golden yellow, of moderate size, and very freely produced.

Award of Merit.

To Pteris serrulata pendula (votes, unanimous), from G. Standford, Esq., Horsham (gardener, Mr. F. Lane). A most graceful and distinct variety.

To Rudbeckia californica (votes, 7 for), from Messrs. Paul & Son. Bright golden ray-florets, which are long and drooping.

To Spiræa Bumalda "Beauty of Knap Hill" (votes, 7 for), from Mr. A. Waterer, Woking. Large heads of very pretty rosy-red flowers.

To Pelargonium (Ivy-leaved) Beauty of Castle Hill (votes, unanimous), from Mr. R. Owen, Maidenhead. A fine semi-double pink-flowered variety.

To Sweet Pea Lady Penzance (votes, 8 for), from Mr. H. Eckford, Wem, Salop. Large bright rose.

To Sweet Pea Venus (votes, 6 for), from Mr. H. Eckford. Soft buff tint, very distinct.

To Sweet Pea Mrs. Eckford (votes, 10 for), from Mr. H. Eckford. Creamy yellow.

Botanical Certificate.

To Delphinium Zalil (votes, unanimous), from Messrs. Kelway & Son. A species with small yellowish flowers arranged in a short dense spike.

Other Exhibits.

H. E. Monro, Esq., Bazzleways, Milborne Port, Somerset,

sent a pink-flowered Vallota, which the Committee desired to see again next year.

Messrs. William Paul & Son, Waltham Cross, sent cut blooms of a fine new Rose, named Spenser, bright pink.

Messrs. John Laing & Sons, Forest Hill, sent several good varieties of single and double-flowered Begonias.

Mr. J. T. Gilbert, Dyke, Bourne, Lincolnshire, sent fine cut blooms of Rosa polyantha "The Engineer," certificated last year, the Committee confirming the award then made.

From the Society's Gardens was sent a varied collection of Sweet Peas.

ORCHID COMMITTEE.

Harry J. Veitch, Esq., F.L.S., in the Chair, and eleven members present.

Awards Recommended :—

Silver Flora Medal.

To His Grace the Duke of Devonshire, Chatsworth (gardener, Mr. O. Thomas), for a group of twenty plants of Disa uniflora (D. grandiflora), magnificently grown and flowered, and stated to be but a sample of about 200 plants in flower at Chatsworth at the time. The plants had from one to seven spikes each, and the individual flowers were large and of a brilliant scarlet.

To the Right Hon. the Marquis of Salisbury, K.G., Hatfield House (gardener, Mr. G. Norman), for a group of fifteen cut spikes of Saccolabium Blumei. Similar spikes from the same plants have been exhibited annually for several years from Hatfield House, and the Committee recommended the Medal for continued good culture and excellent flowering.

To Messrs. B. S. Williams & Son, Upper Holloway, for an extensive group of Orchids, comprising ten well-flowered plants of Cypripedium Morganæ ×, and various other Cypripediums; the rare Vanda concolor; many varieties of Vanda tricolor, among them being V. t. insignis, V. t. formosa, V. t. Glen var., and V. t. Dalkeith var.; also some forms of V. suavis, and Dendrobiums, Odontoglossums, &c.

Silver Banksian Medal.

To J. W. Temple, Esq., Leyswood, Groombridge, Tunbridge Wells (gardener, Mr. E. Bristow), for a group consisting chiefly of fine specimens of Cattleya Warscewiczii (gigas), well grown and profusely flowered. With them were a variety of C. Mendelii and a specimen of Trichopilia tortilis alba.

First Class Certificate.

To Cattleya Hardyana, Hamar Bass's variety (votes, unanimous), from Hamar Bass, Esq., Byrkley, Burton-on-Trent (gardener, Mr. Hamilton). This is the darkest-coloured form of C. Hardyana which has yet appeared, and the rosy crimson of its sepals and petals and the yellow at the base of the lip is brighter than in the original form.

Botanical Certificate.

To Cochlioda Noezliana (votes, unanimous), from Messrs. B. S. Williams & Son, Upper Holloway. A pretty plant of the genus formerly known as Mesospinidium, with orange-scarlet flowers.

Other Exhibits.

Messrs. Seeger & Tropp, Lordship Lane, East Dulwich, exhibited Aërides maculosum (Prewett's variety), Dendrobium leucolophotum, D. Dearei, and two plants of Zygopetalum Wendlandii.

Messrs. Pitcher & Manda, Hextable, Swanley, Kent, again sent Cypripedium Browni × (C. longifolium × C. leucorrhodum ×), which the Committee considered almost identical with C. leucorrhodum ×.

Messrs. F. Sander & Co., St. Albans, staged plants of three distinct and brightly coloured forms of Masdevallia Harryana, and two good varieties of Odontoglossum crispum.

Messrs. Paul & Son, Cheshunt, exhibited a group of seedling Disa uniflora (grandiflora) showing some variety, one of the forms being almost devoid of scarlet colour, and of a uniform nankeen-yellow.

C. E. Smith, Esq., Silvermere, Cobham, Surrey (gardener, Mr. James Quarterman), showed a good specimen of Oncidium Lanceanum.

FRUIT COMMITTEE.

P. Crowley, Esq., F.L.S., in the Chair, and eighteen members present.

Awards Recommended:—

Silver Gilt Banksian Medal.

To Messrs. James Veitch & Sons, Chelsea, for a very large and fine collection of Gooseberries, Strawberries, Currants, &c.

To Messrs. T. Rivers & Son, Sawbridgeworth, for a magnificent collection of Cherries, Peaches, Plums, and Nectarines.

Silver Banksian Medal.

To J. T. Hopwood, Esq., Ketton Hall, Stamford (gardener, Mr. W. H. Davis), for splendid examples of six varieties of Peaches, viz., Royal George, Sea Eagle, Barrington, the Nectarine Peach, Princess of Wales, and Prince of Wales.

To Messrs. James Carter & Co., High Holborn, for a very interesting collection of Peas, comprising about eighty varieties.

First Class Certificate.

To Strawberry Lord Suffield (votes, unanimous), from Lord Suffield, Gunton Park, Norwich (gardener, Mr. W. Allan). Fruit large and firm, of excellent quality and appearance.

To Strawberry Gunton Park (votes, unanimous), from Lord Suffield. Fruit of very large size, broad "cockscombed," and of good colour and quality.

Cultural Commendation.

To the Dowager Lady Freake, Fulwell Park, Twickenham (gardener, Mr. A. H. Rickwood), for fine fruits of Grosse Mignonne and Dr. Hogg Peaches.

To Lord Suffield, for magnificent fruits of Dr. Hogg Strawberry.

To F. Crisp, Esq., White House, New Southgate, N. (gardener, Mr. H. A. Page), for good Lord Napier Nectarines and excellent Cannon Hall Muscat Grapes.

Other Exhibits.

Dr. Hogg sent a fruiting branch of the Early Julyan Apple to show the character of the variety in the Weald of Sussex. There were forty-six fruits on a shoot three feet in length, most of them being highly coloured. In most districts they are pale. This is a very early and useful Apple, much grown in some of the London market-gardens.

Major Heneage, V.C., Compton Bassett, Calne, Wilts (gardener, Mr. W. A. Cook), sent six dishes of Peas.

Lord Wimborne, Canford Manor, Dorset (gardener, Mr. T. H. Crasp), sent a dish of Fig Ursule d'Avignon, and a small fruiting bush of what was described as a "new" White Currant. This was recognised as the old Cut-leaved, or Shilling's White.

Mr. Crook, Ford Abbey, Chard, sent examples of two Seedling Tomatos.

Some very large Apples were sent through the Secretary of the Wellington Horticultural Society, New Zealand. They had been packed in powdered charcoal, which much disfigured the fruit. Having been forty-two days in transit, they were all more or less decayed, and not in a condition for examination. The thanks of the Committee were recorded for the endeavour that had been made in sending the specimens to arrive in good condition.

Mr. B. Ashton, Glossop Hall, Derbyshire, and Mr. G. H. Mould, Frampton Court, Dorchester, sent Seedling Melons.

From the Society's Gardens were sent eighteen varieties of Currants.

SCIENTIFIC COMMITTEE.

Dr. Maxwell T. Masters, F.R.S., in the Chair, and four members present.

Conifers attacked by Chermes.—With reference to this subject, brought before the Committee at the last meeting, Mr. Blandford remarked on the difficulty of destroying the insects with the paraffin spray, inasmuch as it was practically useless for large trees, and could be only applied to small ones; moreover, it will not remove chermes unless it be applied with force, and in that case water alone would answer the purpose. The

only effectual method was to nip off the galls made by the chermes. From some observations of Dr. Masters, it would seem that the gall-making species does not appear to attack the Larch, but only the Spruce Fir, though other species of chermes attack various members of the Coniferæ.

Microscopical Structure of Hybrids.—Dr. McFarlane sent photographs illustrating the microscopical structures of Lapageria, Philesia, and of the hybrid between these two genera—Philageria. In all cases the anatomical details of the hybrid were intermediate in character between those of the two parents.

Primula sikkimensis attacked by Slugs.—Rev. C. Wolley Dod sent plants from which the cortical chlorophyllaceous tissue had been gnawed off by the common white slug. As a proof of the slug's partiality, he observed that stalks of P. rosea and of Dodecatheon, growing side by side with the above, were not touched. If the P. sikkimensis is barked soon after flowering it withers and develops no good seed.

Loranthus (?) from Bechuanaland.—Mr. Johnstone forwarded a specimen of what appeared to be a species of Loranthus, on which he observes: "It has a small berry, not quite round, of a colour similar to red coral, on a short stalk." It was referred to Kew for identification.

Apple and Pear Twigs barked.—Mr. G. Lee, of Clevedon, sent some more specimens, but no new light could be thrown upon the injury. A method adopted by Mr. Bunyard, who is familiar with the fact, may be mentioned. In cases where nocturnal beetles or other insects attack young trees, he lays a sheet under the tree, and by violently shaking it the insects fall upon the sheet, are easily seen, and then killed.

Strawberries attacked by Beetles (?).—Messrs. Wood & Ingram, of Huntingdon, forwarded specimens of beetles of two species, *Harpalus ruficornis* and *Terrostichus madidus*, supposed to have been the depredators. They are nocturnal, but very exceptionally vegetable feeders, hence some suspicion was felt as to their being the right insects; and the question was raised as to whether they had been actually observed eating the seeds of the Strawberries as described. If the above beetles were the real enemies, hand-picking at night is the only method of destroying them, as they are nocturnal in their habits.

Plants, &c., Exhibited.—Dr. Masters showed a specimen of Weigela sessilifolia, with small scentless and yellowish flowers, a dimerous Cypripedium, a pelorian Linaria vulgaris, and a proliferous Carnation. Mr. Henslow exhibited a white Iris with two flowers, both being dimerous instead of trimerous.

CARNATION AND PICOTEE SHOW.

July 21.

The annual exhibition of the National Carnation and Picotee Society was held in conjunction with the Royal Horticultural Society, at the Drill Hall, Westminster. Owing to the lateness of the season the number of exhibits was not so large as usual. However, a good display of flowers was obtained, and the show proved to be an interesting one.

The struggle for first place with twenty-four Carnations was contested by Mr. C. Turner, Royal Nurseries, Slough, and Mr. J. Douglas, gardener to Mrs. Whitbourn, Great Gearies, Ilford. Both contributed some excellent blooms. Mr. Turner was first with fresh, clean flowers, among which the following were noticeable: Jupiter, Dr. Foster, Hutchinson's Rose, Juno, Clementine, Mrs. Payne, Squire Potts, Jas. Taylor, Dr. Hogg, Robert Houlgrave, E. Adams, Charles Turner, Squire Trow, Saturn, E. S. Dodwell, and Teresa. Mr. Douglas's flowers were smaller, but his Thalia, Mrs. Gorton, John Keet, and Mayor of Nottingham were very good.

There were four stands of twelve, and Mr. Douglas came first with Sarah Payne, Thalia, James Douglas, William Skirving, Squire Potts, Alisemond, Wm. Wardill, Master Stanley, and four seedlings, one (No. 203) a charming purple flake. Mr. C. Phillips, Hamilton Road, Reading, was second with fresh, bright, but small blooms, James Douglas and Mayor of Nottingham being the best. Mr. H. W. Headland, The Firs, Leyton, was third with larger but somewhat badly formed flowers, and the Rev. L. R. Flood, Merrow, Guildford (gardener, Mr. Gilbert), was fourth.

Mr. F. Nutt, Rose Road, Southampton, won with six, Sarah Payne, Crista-galli, John Keet, James Douglas, Joseph Lakin, and Alisemond representing him admirably, though one or two

were hardly filled. Mr. J. J. Keen, Castle Street, Bevois Town, Southampton, was second with equally large but rather coarse flowers; Mr. T. H. Catley, Claverton Buildings, Bath, was third; Mr. G. Chaundy, William Street, Marston Road, Oxford, fourth; Mr. Rowan, Manor Street, Clapham, fifth; and Mr. Sanders, gardener to Viscountess Chewton, Bookham Lodge, Cobham, sixth.

In the scarlet bizarres Mr. J. Keen was first with single specimens of Squire Potts, Mr. Douglas second with Robert Houlgrave and third with Master Stanley, Mr. Lakin fourth with Mars, and Mr. Chaundy fifth with Admiral Curzon. In the crimson bizarres Mr. Douglas was first with a seedling and third with William Skirving, Mr. Hooper second with Squire Dodwell, Mr. Phillips fourth with Harrison Weir, and Mr. Headland fifth with J. D. Hextall.

Mr. Nutt was first with Sarah Payne, Mr. Douglas second with the same variety, Mr. Headland third with Squire Llewelyn, and Mr. Turner fourth with James Taylor, in the pink and purple bizarres.

In the purple flakes Mr. Douglas was first with his seedling before referred to (No. 203), Mr. Sanders second with James Douglas, Mr. Rowan third with the same variety, Mr. Hooper fourth with a seedling, and Mr. Turner fifth with Squire Trow.

In the scarlet flakes Mr. Douglas was first with Cannell, jun., and third with Alisemond; Mr. Keen second with Matador, Mr. Headland fourth with Henry Cannell, and Mr. Phillips fifth with Sportsman.

Mr. Lakin was first in the rose flakes with Mrs. Gibson and third with Lovely Mary, Mr. Douglas second and fifth with Thalia, and Mr. Hooper fourth with Mrs. George Cooling.

In the competition for Picotees only Mr. Turner and Mr. Douglas were able to muster a presentable twenty-four stand. They were first and second as before, Mr. Turner having the following varieties: Madeline, Favourite, Clara Penson, Miss Flowdy, Lucy, Mrs. Rudd, Mrs. Sharp, and several seedlings, the whole forming a clean and well-finished collection. Mr. Douglas's flowers were somewhat uneven in point of size, but they were in capital condition.

The best of the three stands of twelve came from the Ilford

grower, the varieties being Liddington's Favourite, Brunette, Muriel, Thomas William, Miss Flowdy, Mrs. Sharp, Clara Penson, Violet M. Douglas, Mrs. Chancellor, John Smith, and a seedling. Mr. Phillips was a fair second, his flowers, though small, being very fresh and good in colour. Mr. Headland was third.

There were five stands of six, Mr. Chaundy winning with Amelia, Annot Lyle, Winifred Esther, Mrs. Rudd, Juliette, and a seedling. Mr. Nutt was a close second, Mr. Sanders third, Mr. Catley fourth, and Mr. Flood fifth.

In the heavy red edge class for single specimens, Mr. Lakin was first and second with Isabel Lakin, Mr. Douglas third with Brunette and fourth with a seedling, and Mr. Phillips fifth with Brunette.

In the light red edge Mr. Phillips was first and fifth with Thomas William, Mr. Douglas second with Violet Douglas and third with Thomas William, and Mr. Headland fourth with Mrs. Gorton.

In the heavy purple edge Mr. Lakin was first and third with Amelia, Mr. Chaundy second and fourth with the same variety, and Mr. Douglas fifth with Muriel.

Mr. Turner was first and second in the light purple edge with Clara Penson, Mr. Douglas third with Silvia, Mr. Phillips fourth with Clara Penson, and Mr. Headland fifth with Pride of Leyton.

In the heavy rose edge Mr. Phillips was first with Mrs. Ricardo and third with Mrs. Sharp, Mr. Douglas second with the latter variety and fifth with Constance Heron, and Mr. W. Nicholls fourth with Lady Holmesdale.

In the light rose edge class Mr. Turner was first and third with Liddington's Favourite, Mr. Douglas second and fifth with a seedling, and Mr. Phillips fourth with Mrs. Ricardo.

Mr. Douglas was first and second with a seedling, Mr. Turner third and fourth with Annie Douglas, and Mr. Headland fifth with a seedling, in the yellow grounds.

Mr. Douglas had a charming box of twelve yellow grounds, all seedlings, unnamed, and Mr. Headland was second, also with seedlings. Mr. Chaundy won with six, showing Peter Barr, Stadtrath Bail, and four seedlings. Mr. Hooper, Vine Nursery, Bath, was a very good second, and Mr. Phillips third.

Among the selfs and fancies were some of the most beautiful and valued of Carnations and Picotees. In the class for twenty-four Mr. Turner secured the first place with the following: Almira, Victory, Hutchinson's Rose, Mrs. Reynolds Hole, Alice Ayres, Annie Douglas, Lord Rendlesham, Ruby, Chas. Turner, Fimbriata alba, Germania, Duchess of Fife, Robt. Houlgrave, Mrs. Maclaren, and two seedlings. Mr. F. Hooper was second with a delightful stand, but some of the flowers were undersized and others imperfectly filled. Mr. Douglas was third with a large proportion of selfs, Mr. Catley fourth, and Mr. W. H. Divers, gardener to J. T. Hopwood, Esq., Ketton Hall, Stamford, fifth.

There were eight stands of twelve, and they produced a lovely display. Mr. Rowan was first with a splendid collection. The varieties were Purple Emperor (a grand bloom), Comtesse de Paris, Mrs. Reynolds Hole, Vice-President, Edith, Rose Celestial, President, Dodwell's No. 614, Mlle. Darquille, Mrs. Du Croz, Prince of Wales, and Lady Agnes. Mr. Nutt was a good second with a very attractive stand, the blooms being large, fresh, and finely coloured. Mr. Phillips was third, Mr. Chaundy fourth, Mr. Headland fifth, and Mr. Sanders sixth.

The premier Carnation was H. Cannell, a scarlet flake in Mr. J. Keen's second prize stand of twelve, and the premier Picotee was Madeline, heavy rose edge, in Mr. Turner's first prize stand of twenty-four.

Specimens in pots were best shown by Mr. J. Douglas, the second prize going to Mr. Headland.

Chiswick Trials, August 5, 1891.

FLORAL COMMITTEE.

W. Marshall, Esq., in the Chair, and fourteen members present.

Awards Recommended:—

Highly Commended (× × ×).

To Carnation White Queen, from Messrs. Fisher, Son, & Sibray, Sheffield.

To Carnation Snowdrift, from Messrs. Fisher, Son, & Sibray.

To Carnation Dante, from Mr. Hooper, Bath.

To Carnation Maggie Laurie, from Messrs. Dicksons & Co., Edinburgh.

To Carnation Guiding Star, from Mr. T. S. Ware, Tottenham.

To Carnation Rowena, from Mr. R. Dean, Ealing.

To Carnation The Moor, from Mr. R. Dean, Ealing.

To Carnation Achilles, from the Novelty Seed Company, Newton-le-Willows, Lancashire.

To Carnation Hoffgartner Schaffer, from Mr. E. Benary, Erfurt, Germany.

To Carnation Dan Godfrey, from Mr. C. Turner, Slough.

To Carnation Madame Van Houtte, from Mr. E. Benary.

To Carnation Drusilla, from Mr. J. Douglas, Ilford.

To Carnation Fancy, from Messrs. Paul & Son, Cheshunt.

To Carnation Professor Virchow, from Mr. E. Benary.

To Picotee Margaret Rueder, from Mr. E. Benary.

To Picotee Redbraes, from Mr. E. Benary.

To Picotee Romeo, from Messrs. Paul & Son.

To Picotee Mr. Rudd, from Mr. C. Turner.

To Picotee Favourite, from Mr. C. Turner.

To Picotee Mary, from Mr. C. Turner.

To Godetia Duchess of Fife, from Messrs. Daniels Bros., Norwich.

To Chrysanthemum Sipthorpii, from Mr. R. Dean, Ealing.

To Chrysanthemum multicaule aurea, from Mr. R. Dean, Ealing.

To Viola Croft House, from Messrs. Dobbie & Co., Rothesay, N.B.

To Viola The Mearns, from Messrs. Dobbie & Co.

To a strain of Pansies, from Messrs. Dobbie & Co.

To a strain of Pansies, from Mr. Hooper, Bath.

To Sweet Pea Mrs. Sankey, from Mr. H. Eckford, Wem, Salop.

To Sweet Pea Mrs. Gladstone, from Mr. H. Eckford.

To Sweet Pea Captain of the Blues, from Mr. H. Eckford.

To Sweet Pea Princess of Wales, from Mr. H. Eckford.

To Sweet Pea Isa Eckford, from Mr. H. Eckford.

To Sweet Pea Senator, from Mr. H. Eckford.

To Sweet Pea Countess of Radnor, from Mr. H. Eckford.

To Sweet Pea Monarch, from Mr. H. Eckford.

To Fuchsia Earl of Beaconsfield, from Messrs. H. Canne & Sons, Swanley.

To Fuchsia Aurora superba, from Messrs. H. Cannell & Sons.

To Fuchsia Gustave Doré, from Messrs. H. Cannell & Sons.

To Fuchsia Flocon de Neige, from Messrs. H. Cannell & Sons.

To Fuchsia Berliner Kind, from Messrs. H. Cannell & Sons.

To Fuchsia First of the Day, from Messrs. H. Cannell & Sons.

To Fuchsia Adolphe Legour, from Messrs. H. Cannell & Sons.

To Fuchsia President Grévy, from Mons. V. Lemoine, Nancy, France.

To Pentstemon La Foudre, from Mons. V. Lemoine.]

Commended (× ×).

To Carnation Rosy Morn, from Mr. J. Douglas.

To Carnation J. R. Allinson, from Mr. T. S. Ware.

To Carnation Beatrix, from Messrs. Fisher, Son, & Sibray.

To Carnation Terra Cotta, from Mr. C. Turner.

To Carnation Van Dyck, from Mr. E. Benary.

To Viola Virginalis, from Messrs. Dobbie & Co.

FRUIT AND VEGETABLE COMMITTEE.

Philip Crowley, Esq., F.L.S., in the Chair, and thirteen members present.

Awards Recommended.

Highly Commended (× × ×).

To Dwarf French Bean Mohawk, from Messrs. J. Veitch & Sons, Chelsea.

To Dwarf French Bean Smythe's Speckled Hybrid, from Messrs. J. Veitch & Sons.

To Dwarf French Bean Fulmer's Forcing, from Messrs. J. Veitch & Sons.

To Dwarf French Bean Syon House, from Messrs. J. Veitch & Sons.

To Dwarf French Bean Ne Plus Ultra, from Messrs. J. Veitch & Sons.

To Dwarf French Bean Dark Dun, from Messrs. J. Veitch & Sons.

To Dwarf French Bean Ne Plus Ultra, from Messrs. Harrison & Sons, Leicester.

To Dwarf French Bean Wax Mont d'Or, from Messrs. Vilmorin, Andrieux & Co., Paris.

To Pea Sequel, from Mr. T. Laxton, Bedford.

GENERAL MEETING.

August 11, 1891.

Mr. James Douglas in the Chair.

Elections.

Fellows, 14.—Herbert V. Collins, Miss Berta F. M. Doyne, Henry B. Evans, W. J. Grant, James Kelway, jun., Peter Adolphus Kent, Captain Kerrison, William King-Wilkinson, the Rt. Hon. the Earl of Rosse, Mrs. L. J. Rowe, J. W. Sangwell, James Scholar, Captain Trollope Mrs. Trollope.

Mr. James Hudson read a paper on "Ornamental Stove and Greenhouse Plants." (*See* p. 370.)

FLORAL COMMITTEE.

W. Marshall, Esq., in the Chair, and sixteen member present.

Awards Recommended:—

Silver Gilt Flora Medal.

To Mr. H. B. May, Upper Edmonton, for a group of Crotons, Ferns, and Bouvardias.

Silver Gilt Banksian Medal.

To Messrs. J. Veitch & Sons, Chelsea, for a beautiful group of plants suitable for table decoration.

To Mr. F. Bause, nurseryman, South Norwood, for a magnificent collection of Caladiums.

Silver Flora Medal.

To Mr. M. Rowan, Clapham, for a choice collection of Carnations and Picotees.

Silver Banksian Medal.

To the Duke of Northumberland, Syon House, Brentford (gardener, Mr. G. Wythes), for a beautiful collection of Campanulas in flower, chiefly blue and white varieties of C. pyramidalis and turbinata.

To Mr. C. Turner, Slough, for a group of Carnations, remarkably well grown.

To Messrs. Dobbie & Co., Rothesay, N.B., for a very beautiful collection of Violas, and French and African Marigolds.

Bronze Banksian Medal.

To Messrs. Paul & Son, Cheshunt, for a well-grown collection of Hardy Flowers and Roses.

To E. M. Nelson, Esq., Hanger Hill House, Ealing (gardener, Mr. Chadwick), for a collection of Gooseberries.

Award of Merit.

To Border Carnation Pride of Sevenoaks (votes, 3 for), from Mr. W. A. Searing, Oak Lodge, Sevenoaks. A fine white flower.

To Border Carnation Ketton Rose (votes, 8 for, 1 against) from Mr. W. H. Divers, Ketton Hall Gardens, Stamford. Bright rose, free flowering.

To Fancy Carnation Mrs. R. Sydenham (votes, 5 for), from Mrs. Whitbourn, Great Gearies, Ilford (gardener, Mr. J. Douglas). Pale yellow, edged with light rose.

To Caladium M. Leon Say (votes, 11 for), from Mr. F. Bause. Bright glossy red leaves, lightly spotted.

To Caladium Louis A. Van Houtte (votes, 8 for), from Mr. F. Bause. Large very dark red leaves, with a metallic gloss.

To Carnation Romulus (votes, 10 for), from Mr. C. Turner. Yellow ground, flaked with deep rose.

To Carnation King of Scarlets (votes, 9 for), from Mr. C. Turner. Brilliant scarlet.

To Carnation Victory (votes, 9 for), from Mr. C. Turner. Buff, streaked with bright red.

To Carnation Ruby (votes, 7 for, 1 against), from Mr. C. Turner. Rosy-crimson self, of fine form.

To Carnation Queen of Bedders (votes, 9 for), from Mr. C. Turner. Bright shade of red; very free flowering.

To Carnation Edith M. Wynne (votes, 6 for), from Mr. C. Turner. Yellow ground, dark red edge.

To Carnation Countess of Jersey (votes, 7 for), from Mr. C. Turner. Pale yellow, light rose edge.

To Carnation Mrs. Walford (votes, unanimous), from Mr. C. Turner. Sulphur yellow, streaked with red.

To Carnation Madeleine (votes, 8 for), from Mr. C. Turner. White, pale rose edge.

To Rose (H.P.) Charles Gater (votes, 10 for), from Messrs. Paul & Son, Cheshunt. Dark crimson; flowers of good substance, and very fragrant.

Other Exhibits.

Messrs. H. Cannell & Sons, Swanley, sent blooms of several varieties of Cactus Dahlias; also double-flowered Begonias.

Mr. A. Rawlings, Romford, sent an interesting collection of Dahlias. The Committee expressed a desire to see one named Mrs. McIntosh again.

Mr. G. Wythes, Syon House Gardens, Brentford, sent fine flowers of Cereus hexagonus.

Messrs. J. Veitch & Sons sent a collection of Carnations and Picotees.

Mr. J. Hudson, Gunnersbury House Gardens, Acton, sent several varieties of Stove Plants, in illustration of his lecture.

Messrs. Hurst & Son, Houndsditch, sent a collection of double Annual Chrysanthemum carinatum, showing a variety of tints.

Messrs. J. Peed & Sons, Norwood Road, S.E., sent a beautiful collection of Gloxinias (cut flowers), representing a good strain.

The Rev. A. Wilkin, Summerhill, Tenterden (gardener, Mr. Cheksfield), sent flowers of a seedling Decorative Dahlia, Mrs. Wilkin.

From the Society's Gardens was sent a collection of Carnations and Picotees.

Prizes.

The following prize was awarded :—

Class 1.—Twelve Stove or Greenhouse Plants, in pots not exceeding 12 inches in diameter. *First Prize*, Silver Gilt Flora Medal and £3, to E. M. Nelson, Esq., Hanger Hill House, Ealing (gardener, Mr. E. Chadwick).

ORCHID COMMITTEE.

James O'Brien, Esq., in the Chair, and eight members present.

Awards Recommended:—

First Class Certificate.

To Cypripedium macrochilum × (C. longifolium ♀ and C. [Uropedium] Lindenii ♂) (votes, unanimous), from Messrs. Jas. Veitch & Sons, the raisers. This extraordinary hybrid exhibits many curious and beautiful features, the most prominent of which is the large and strangely elongated labellum or pouch, whose enlargement is all the more singular as the pollen parent is practically without a labellum. The plant exhibited had a four-flowered scape of flowers equal in size to those of C. caudatum, but with shorter petals. The colour is similar to C. caudatum Wallisii, and the inside of the pouch is very beautifully spotted.

To Cypripedium Youngianum × var. Corningianum (C. superbiens ♀ and C. philippinense ♂) (votes, unanimous), exhibited by Messrs. Jas. Veitch & Sons under the provisional name C. Corningianum ×. This variety was much darker than the original C. Youngianum × (C. superbiens × C. Roebeleni), which had previously received an Award of Merit.

Award of Merit.

To Dendrobium Statterianum (votes, unanimous), from Thos. Statter, Esq., Stand Hall, Whitefield, near Manchester (gardener, Mr. R. Johnson). A supposed natural hybrid, probably between D. Bensoniæ and D. crystallinum. The fine plant exhibited resembled D. Bensoniæ in growth, but the flowers were like those of a fine form of D. crystallinum, and with a rich yellow

area at the base of the lip. This plant must not be confused with Dendrobium Phalænopsis, var. Statterianum. (*See* p. cxii.)

To Cattleya Gaskelliana speciosa (votes, 5 for), from Messrs. Seeger and Tropp, Lordship Lane, East Dulwich. A distinct form with white sepals and petals, and broad labellum, yellow at the base, and rich purplish-crimson edged with white on the front lobe.

Botanical Certificate.

To Odontoglossum Hennisii (Rolfe), (votes, unanimous), from Messrs. Charlesworth, Shuttleworth, & Co. This is a small species with brown and yellow flowers, nearly allied to O. crinitum.

Cultural Commendation.

To C. J. Lucas, Esq., Warnham Court, Horsham, for a fine plant of Angræcum Ellisii with twenty-one flowers (votes, unanimous).

Other Exhibits.

His Grace the Duke of Devonshire, Chatsworth (gardener, Mr. Owen Thomas), sent a group of Disa uniflora (grandiflora) similar to those exhibited at the previous meeting. All were splendidly grown; the flowers very brilliant, and one spike had eleven blooms.

Thos. Statter, Esq., Stand Hall, Whitefield, Manchester, exhibited a fine form of Bollea cœlestis, Phajus Humblotii rubescens, and cut spikes of Lælia elegans Turnerii and Cattleya velutina.

F. Wigan, Esq., Clare Lawn, East Sheen (gardener, Mr. W. H. Young), sent Lycaste tetragona and Dendrobium longicornu.

C. J. Lucas, Esq., Warnham Court, Horsham, staged Thrixspermum Berkeleyii, and a cut spike of Cœlogyne pandurata.

F. M. Burton, Esq., Highfield, Gainsborough, exhibited a Cypripedium, a supposed cross between C. barbatum and C. venustum, which, however, showed but little change from an ordinary C. barbatum.

Messrs. Jas. Veitch & Sons again sent Cypripedium Cleola (C. reticulatum × C. Schlimii albiflorum).

FRUIT COMMITTEE.

P. Crowley, Esq., F.L.S., in the Chair, and nineteen members present.

Awards Recommended:—

Silver Banksian Medal.

To Messrs. T. Burton & Son, Bexley Heath, for a fine collection of Peaches and Nectarines, the fruits of Alexandra Noblesse Peach having been gathered from a standard tree under glass, bearing fifty dozen similar fruits.

Bronze Banksian Medal.

To E. M. Nelson, Esq., Hanger Hill House, Ealing (gardener, Mr. E. Chadwick), for a large collection of Gooseberries, and very fine fruits of Rivers' Early Prolific Plum from a wall tree.

First Class Certificate.

To Cucumber Matchless (votes, unanimous), from Mr. S. Mortimer, Farnham, Surrey. The result of a cross between Express and Lockie's Perfection. Fruits uniform, smaller and smoother than Express.

Award of Merit.

To Melon Meritorious (votes, 12 for, 3 against), from Lieut.-Col. Eyre, Welford Park, Newbury (gardener, Mr. C. Ross). Fruit large, roundish, well netted; flesh scarlet, very sweet.

To Plum St. Etienne (votes, unanimous), from the Society's Gardens. An excellent small early yellow cooking variety.

Cultural Commendation.

To E. M. Nelson, Esq., for splendid examples of Humboldt Nectarines.

Other Exhibits.

Messrs. James Veitch & Sons, Chelsea, sent a fine collection of fruit, consisting of seventy-five varieties of Gooseberries, twenty-five of Apples, four of Pears, four of Cherries, two of Plums, and seven of Currants.

Mr. R. Nicholas, The Gardens, Castle Hill, South Molton, sent examples of a large and very fine seedling Cherry. It closely resembled the St. Margaret. The Committee expressed a desire for further information as to its parentage, culture, &c.

R. D. Blackmore, Esq., Teddington, sent a dish of dark-coloured Peaches from an open standard tree. Mr. Blackmore stated that he had obtained trees from America of the Amsden, Alexander, and Waterloo Peaches, and found them very similar, if not identical.

Mr. G. Wythes, Syon House Gardens, Brentford, sent three seedling Melons.

Messrs. H. Cannell & Sons, Swanley, also sent new Melons, which were over-ripe.

H. Balderson, Esq., Hemel Hempstead, sent a promising seedling Pear, resembling Ne Plus Ultra, which the Committee desired to be tried at Chiswick.

Mr. C. Leeson, Brigg, Lincoln, sent two varieties of Peas.

Mr. R. Maher, Yattendon Court Gardens, Newbury, sent a seedling Grape, named Royal Nursery. Sweetly flavoured; in appearance like a badly coloured Black Hambro'.

GENERAL MEETING.

August 25, 1891.

Dr. Hogg, F.L.S., &c., in the Chair.

Elections.

Fellows, 8.—J. E. Balfern, Mrs. Balfern, John Coventry, A. R. Knight, Mrs. Knight, Jasper Knight, Edw. Webb, Mrs. A. T. Weekes.

A paper on "The Gladiolus" was read by the Rev. H. H. D'ombrain, M.A. (*See* p. 380.)

FLORAL COMMITTEE.

W. Marshall, Esq., in the Chair, and twenty members present.

Awards Recommended:—

Silver Gilt Flora Medal.

To Messrs. Kelway & Son, Langport, Somerset, for a magnificent collection of Gladioli.

Silver Flora Medal.

To Mr. G. Phippen, Reading, for a beautiful collection of Cactus and Decorative Dahlias.

Silver Banksian Medal.

To Messrs. Keynes, Williams, & Co., Salisbury, for a fine collection of the different classes of Dahlias.

To Messrs. J. Cheal & Sons, Crawley, for good stands of Show, Bouquet, Single, and Cactus Dahlias.

To Messrs. H. Low & Co., Clapton, for fine examples of Lilium nepalense and L. Wallichianum superbum.

Bronze Banksian Medal.

To Messrs. H. Cannell & Sons, Swanley, for a collection of Cactus and Decorative Dahlias.

To Messrs. Wallace & Co., Colchester, for fine flowers of Lilium eximium giganteum, L. e. magnificum, and L. takesima.

To J. T. Hopwood, Esq., Ketton Hall, Stamford (gardener, Mr. W. H. Divers), for a beautiful collection of Border Carnations, Ketton Rose (certificated at the last meeting) being shown in fine condition.

To C. E. Smith, Esq., Silvermere, Cobham, Surrey (gardener, Mr. Quarterman), for a very interesting collection of Oak foliage, representing thirty-six varieties.

To Mr. S. Mortimer, Farnham, Surrey, for fine blooms of Show and Fancy Dahlias.

First Class Certificate.

To Hypericum Moserianum (votes, unanimous), from Mr. A. Waterer, Woking. Large rich yellow flowers.

To Cupressus arizonica (votes, unanimous), from Messrs. J. Veitch and Sons, Chelsea. Dull greyish-green foliage; growth slender and graceful.

Award of Merit.

To Dahlia (Show) John Walker (votes, 11 for, 2 against), from Mr. J. Walker, Thame. White, faintly suffused with lemon; large and handsome.

To Gladiolus Thalis (votes, 6 for, 3 against), from Messrs. Kelway & Son. Ivory ground, throat suffused with crimson; very large flower.

To Gladiolus Bias (votes. unanimous), from Messrs. Kelway and Son. Salmon-red, throat blotched with crimson.

To Gladiolus James O'Brien (votes, 9 for, 2 against), from Messrs. Kelway & Son. Salmon, large bold flower.

To Dahlia (Cactus) Delicata (votes, 13 for, 4 against), from Mr. T. S. Ware, Tottenham. Soft rose; flowers of fine form.

To Carnation (Border) La Neige (votes, unanimous), from Mr. T. S. Ware. White self, clove-scented.

To Carnation (Border) Mr. C. R. Humbert (votes, unanimous), from Messrs. Dicksons, Chester. A free-growing scarlet self.

To Dahlia (Cactus) Kynerith (votes, 8 for), from Messrs. Keynes, Williams, & Co. Rich red, yellow centre.

To Dahlia (Cactus) St. Catherine (votes, 10 for), from Messrs. Keynes, Williams, & Co. Bright yellow; large flower.

To Dahlia (Cactus), Baron Schröder (votes, 7 for), from Messrs. Keynes, Williams, & Co. Rich magenta.

To Dahlia (Single) Miss Glasscock (votes, 7 for, 3 against), from Messrs. J. Cheal & Sons. Soft lavender, edged with deep mauve.

To Dahlia (Cactus) Robert Cannell (votes, unanimous), from Messrs. H. Cannell & Sons. Carmine; a beautiful and striking flower.

To Dahlia (Cactus) Swanley Cactus (votes, 16 for), from Messrs. H. Cannell & Sons. Orange-red.

To Dahlia (Show) Arthur Ocock (votes, 7 for), from Mr. A. Rawlings, Romford. Crimson-scarlet, of fine form.

To Dahlia (Show) Mrs. L. Standbridge (votes, 9 for, 1 against), from Mr. A. Rawlings. Clear amber, of good shape.

To Dahlia (Show) John Rawlings (votes, 5 for, 3 against), from Mr. A. Rawlings. Pale mauve; very large, distinct.

To Dahlia (Show) Mrs. McIntosh (votes, 8 for), from Mr. A. Rawlings. Old gold; fine form.

To Dahlia (Single) T. W. Girdlestone (votes, unanimous), from Messrs. J. Cheal & Sons. White, margined with crimson.

Other Exhibits.

Messrs. James Veitch & Sons sent flowers of Java Rhododendrons; also a small Begonia with marbled foliage, which the Committee desired to see again when larger.

Messrs. J. Cheal & Sons sent a collection of Tom Thumb Dahlias in pots.

Mr. T. S. Ware, Tottenham, sent a group of Dahlias, Liliums, Carnations, and Chrysanthemums.

Mr. A. Campbell, Lord Street, Southport, sent Scolopendrium vulgare crispum Campbelli. A beautiful form.

C. B. Powell, Esq., Southborough, Tunbridge Wells, sent interesting forms of Hydrid Gladioli.

Mr. A. Swanson, Barton-on-Humber, Hull, sent twelve varieties of Border Carnations.

From the Society's Gardens were sent cut flowers of Perennial Asters and Sunflowers.

Prizes.

Prizes were awarded in the following classes :—

Class 1.—Eighteen Gladioli, Gandavensis vars. (distinct). Amateurs. *First Prize*, Silver Gilt Flora Medal and £2, to Mr. Herbert Fowler, Claremont, Taunton.

Class 2.—Twelve Gladioli, Gandavensis vars. (distinct). Amateurs. *First Prize*, Silver Flora Medal and £1. 10*s*., to Mr. Herbert Fowler.

Class 3.—Nine Gladioli, Gandavensis vars. (distinct). Amateurs. *First Prize*, Bronze Flora Medal and £1, to the Rev. H. H. D'ombrain, Westwell Vicarage, Ashford.

ORCHID COMMITTEE.

Mr. James Douglas in the Chair, and five members present.

Awards Recommended :—

Award of Merit.

To Lælio-Cattleya Behrensiana × (votes, unanimous), from Messrs. F. Sander & Co., St. Albans. A hybrid between Lælia elegans Schilleriana and Cattleya intermedia. In growth the plant much resembles Cattleya superba. The flowers are equal in size to those of Lælia elegans. Sepals and petals blush white, the front and sides of the labellum (which resembles in form that of Cattleya intermedia) bright crimson.

To Lælia elegans Blenheimensis (votes, unanimous), from

Thomas Statter, Esq., Stand Hall, Whitefield, Manchester (gardener, Mr. R. Johnson). This is a light form of L. elegans Turnerii, with the labellum more broadly developed than in the type, and of a clear rosy crimson.

To Sobralia leucoxantha (votes, unanimous), from Messrs. Seeger & Tropp, Lordship Lane, East Dulwich. The flowers, which last but a day or so, are white with the exception of the front of the labellum, which is yellow. The plant is similar in habit to S. macrantha, but the flowers are only half the size of those of that species.

Botanical Certificate.

To Zygopetalum grandiflorum (Batemannia grandiflora, *Bot. Mag.* t. 5567 ; 2nd Cent. Orchid. Plants, t. 172) (votes, unanimous), from Messrs. Charlesworth, Shuttleworth & Co., Park Road, Clapham, and Heaton, Bradford. A distinct species of similar growth to Z. crinitum, and flowers of equal size to those of that species. Sepals and petals pale green, with longitudinal lines of chocolate colour ; lip white, thick in texture, and studded with short papillæ.

Cultural Commendation.

To Mrs. Whitbourn, Great Gearies, Ilford (gardener, Mr. James Douglas), (votes, unanimous), for a spike of six flowers of Cypripedium Lowii.

Other Exhibits.

Thomas Statter, Esq., Stand Hall, Whitefield, Manchester, sent cut spikes of Lælia elegans Turnerii, L. e. T. prasiata, L. amanda, Cypripedium Morganæ ×, Odontoglossum Harryanum, and Dendrobium Dearei.

Mr. J. Prewett, Hammersmith, showed a good plant of Dendrobium Phalænopsis Statterianum.

C. J. Lucas, Esq., Warnham Court, Horsham, sent for identification a spike of Dendrobium undulatum.

Messrs. James Veitch & Sons, King's Road, Chelsea, exhibited their new Lælio-Cattleya Nysa (Cattleya Warscewiczii [gigas] ♂ × Lælia crispa ♀). Its flowers resemble those of L. exoniensis. As the plant was not strong, the Committee desired to see it again. Messrs. Veitch again also exhibited Cypripedium Cleola ×.

R. I. Measures, Esq., Cambridge Lodge, Flodden Road, Camberwell (gardener, Mr. H. Simpkins), exhibited, under provisional names, Cypripedium leucochilum, a supposed hybrid between C. Godefroyæ and C. bellatulum ; and C. tortile, imported by Mr. Osmers from the Dutch East Indies. It resembles a small form of C. philippinense, with the petals more than usually twisted. The Committee referred these to Kew.

Messrs. F. Sander & Co. showed Masdevallia Measuresiana × (M. amabilis × M. tovarensis). It had a slender scape with two small white flowers, tinged at the edge with rose.

Malcolm S. Cooke, Esq., Kingston Hill (gardener, Mr. D. Cullimore), sent a cut spike of a fine form of Cattleya velutina, and flowers of three varieties of Lælia elegans Turnerii.

F. Wigan, Esq., Clare Lawn, East Sheen (gardener, Mr. W. H. Young), exhibited Aërides suavissimum.

G. Palmer, Esq., Springfield, sent Cypripedium apiculatum, Springfield variety (C. Boxalli × C. barbatum), which differs from the original form in being of a darker tint.

FRUIT COMMITTEE.

P. Crowley, Esq., F.L.S., in the Chair, and thirteen members present.

W. Roupell, Esq., Harvey Lodge, Roupell Park, S.W., sent four varieties of early Dessert Apples, Mr. Gladstone, Irish Peach, Red Astrachan, and Devonshire Quarrenden, grown on dwarf trees in his garden within five miles of Charing Cross.

Messrs. Laxton Brothers, Bedford, sent seedling Apple Harvest Queen.

Mr. W. H. Bannister, Cote House, Westbury-on-Trym, sent well-coloured fruits of Doyenné Boussoch Pear, from a bush tree.

Messrs. T. Burton & Sons, Bexley Heath, sent four boxes of Peaches.

Seedling Melons were shown by Mr. G. Wythes, Syon House Gardens, Brentford ; Mr. A. Bishop, Bury St. Edmunds ; and Mr. Wilson, Fulham.

Sir Trevor Lawrence, Bart., M.P., Burford Lodge, Dorking,

sent fruits of Prunus Pissardi, similar, if not identical with those of the Myrobalan, or Cherry Plum.

Dr. Hogg exhibited fruiting sprays of a Plum resembling the Cherry Plum, but smaller, and glossy red in colour.

Mr. J. Foster, Horse Market, Kettering, sent examples of a fine-looking white kidney Potato, named Tit-Bits.

Messrs. Sutton & Sons, Reading, sent specimens of Bean Sutton's Tender and True—a Runner variety of the Dwarf type. The pods long and handsome, and very prolific. It was desired to be grown at Chiswick.

Mr. W. C. Leach, Albury Gardens, Guildford, sent Bean Sutton's Emperor of Germany—Scarlet Runner type. It also was desired to be grown at Chiswick.

From the Society's Gardens were sent twelve fruits of Tomato President Cleveland, each averaging 1 lb. 4 oz. in weight.

CHISWICK TRIALS, SEPTEMBER 3, 1891.

FRUIT COMMITTEE.

Dr. HOGG, F.L.S., in the Chair, and eight members present.

Awards Recommended :—

First Class Certificate.

To Bean Tender and True, from Messrs. Sutton & Sons.

Highly Commended (× × ×).

To Potato Mottled Beauty, from Mr. E. S. Wiles.

To Potato Ellington's Prolific, from Mr. Ellington.

To Potato Crawley Prizetaker, from Messrs. J. Cheal & Sons.

To Turnip the Early Milan, from Messrs. J. Veitch & Sons, Mr. E. Benary, and Messrs. Harrison & Sons.

To Turnip the Early White Strap-leaf American Stone, from Messrs. Vilmorin & Co.

To Turnip the Long White Globe Purple-top, from Messrs. Vilmorin & Co.

To Turnip the Large Green Globe, from Messrs. Vilmorin & Co.

To Turnip Early Snowball, from Messrs. J. Veitch & Sons.

To Tomato Golden Sunrise, from Messrs. J. Veitch & Sons, Messrs. Barr & Son, and Messrs. Daniels Bros.

To Tomato Italian Wonder, from Messrs. Hooper & Co.

GENERAL MEETING.

September 8, 1891.

Philip Crowley, Esq., F.L.S., in the Chair.

Elections.

Fellows, 3.—W. Alfred Netley, Mrs. Stroudley, H. W. Ward.

Society Affiliated, 1.—Twerton-on-Avon Horticultural Society.

A paper on "Hardy Water and Bog Plants" was read by Mr. George Paul. (*See* p. 385.)

FLORAL COMMITTEE.

W. Marshall, Esq., in the Chair, and nine members present.

Awards Recommended:—

Silver Flora Medal.

To E. J. Lowe, Esq., F.R.S., Shirenewton Hall, Chepstow, for a very interesting group of Scolopendriums, containing varieties which the Committee desired to see again when more fully developed.

To Mr. G. Phippen, Reading, for a group of Dahlias.

To Mr. G. Phippen, for a group of Liliums.

To Messrs. Kelway & Son, Langport, Somerset, for a beautiful display of Gladioli.

Bronze Banksian Medal.

To Messrs. J. Veitch & Sons, Chelsea, for a group of Hardy Flowering Plants, among which Hydrangea paniculata attracted special attention.

To Mr. C. G. Van Tubergen, Haarlem, Holland, for a small but interesting group of Hybrid Gladioli.

First Class Certificate.

To Athyrium f. f. plumosum Drueryii (votes, unanimous), from C. T. Druery, Esq., F.L.S., Fernholme, Forest Gate. A seedling from A. f. f. p. superbum. Fronds multipinnate, graceful and delicate.

To Scolopendrium vulgare crispum decorum (votes, unanimous), from E. J. Lowe, Esq., F.R.S. Not unlike Cowburni, with a fimbriate margin.

To Scolopendrium vulgare supralineatum Moonæ (votes, unanimous), from E. J. Lowe, Esq., F.R.S., having an internal margin on the upper side of the frond.

To Scolopendrium vulgare ramo-inæquale laudabile (votes, unanimous), from E. J. Lowe, Esq., F.R.S. Widely branching as well as crested.

To Asplenium f. f. lunulatum Nelliæ (votes, unanimous), from E. J. Lowe, Esq., F.R.S. A lunulate variety, with a large crested head composed of minute divisions.

To Aspidium angulare grandiceps tæda (votes, unanimous), from E. J. Lowe, Esq., F.R.S. An erect-growing grandiceps, with enormous tassels.

To Aspidium angulare cruciatum Nympha (votes, unanimous), from E. J. Lowe, Esq., F.R.S. A large narrow form, with ascending pinnæ.

To Aspidium aculeatum cristatum hybridum (votes, unanimous), from E. J. Lowe, Esq., F.R.S. A cruciate hybrid between A. aculeatum and A. angulare.

To Nephrodium paleaceum Willsii (votes, unanimous), from E. J. Lowe, Esq., F.R.S. A broad-fronded, large-tasselled polydactylous form.

To Osmunda regalis capitata (votes, unanimous), from E. J. Lowe, Esq., F.R.S. A grandiceps form, raised from a bulbil formed on the variety cristata.

Award of Merit.

To Athyrium f. f. revolvens (votes, unanimous), from C. T. Druery, Esq., F.L.S. Pinnæ curled under like a feather; distinct.

To Athyrium f. f. superbum densum (votes, unanimous), from C. T. Druery, Esq., F.L.S. Finely divided delicate fronds.

To Asplenium Ceterach var. multifida-cristatum (votes, unanimous), from E. J. Lowe, Esq., F.R.S. A notable variation of the species.

To Scolopendrium vulgare muricatum superbum (votes, unanimous), from E. J. Lowe, Esq., F.R.S. A large-growing very rugose capitate form.

To Scolopendrium vulgare muricatum crispum (votes, unanimous), from E. J. Lowe, Esq., F.R.S. A very fine form of the common Hart's Tongue.

To Aspidium angulare grandiceps coronale (votes, unanimous), from E. J. Lowe, Esq., F.R.S. Erect-growing, with large twisted capitate fronds.

To Aspidium angulare setosum gracile (votes, unanimous), from E. J. Lowe, Esq., F.R.S. A delicate variety with copious thorns.

To Aspidium angulare plumoso-divisilobum gracile (votes, unanimous), from E. J. Lowe, Esq., F.R.S. A plumose form with finely cut divisions.

To Aspidium aculeatum Adrastia (votes, unanimous), from E. J. Lowe, Esq., F.R.S. A distinct variety, both crested and capitate.

To Gladiolus Sir Arthur Sullivan (votes, 7 for), from Messrs. Kelway & Son. Bright orange-scarlet, slightly flaked with cerise.

To Gladiolus Sheila (votes, 7 for), from Messrs. Kelway & Son. A charming light variety.

To Gladiolus W. S. Gilbert (votes, 7 for), from Messrs. Kelway & Son. Delicate pink, flaked with carmine.

To Gladiolus George Meredith (votes, 7 for), from Messrs. Kelway & Son. Blush-sulphur throat, heavily flaked with crimson.

To Gladiolus Lady Brooke (votes, 7 for), from Messrs. Kelway & Son. Blush, with sulphur throat, and slight flakes of purplish crimson.

To Dahlia (Show) Arthur Rawlings (votes, unanimous), from W. Keith, Esq., Cornwalls, Brentwood (gardener, Mr. J. T. West). Finely formed crimson self.

To Dahlia (Show) William Powell (votes, unanimous), from W. Keith, Esq. Deep yellow.

To Dahlia (Decorative) Mrs. Keith (votes, unanimous), from W. Keith, Esq. Salmon and delicate mauve.

To Croton Golden Ring (votes, unanimous), from Mr. H. B. May, Upper Edmonton. Of the spiralis type. Beautiful golden foliage. A capital table plant.

To Dahlia (Decorative) Claxton's Harlequin (votes, 7 for), from Messrs. Paul & Son, Cheshunt. Yellow, flaked and striped with crimson. Novel.

Botanical Certificate.

To Abies (Picea) Omorika (votes, unanimous), from Messrs. J. Veitch & Sons, Chelsea. Plant 4 feet high, this season's leader being 18 inches long. Leaves deep green above, glaucous below.

To Davallia assamica (votes, 5 for, 1 against), from Messrs. H. Low & Co., Clapton. Fronds rich green. A very pretty basket-fern.

To Scolopendrium vulgare peraferens nepenthesoides (votes, unanimous), from E. J. Lowe, Esq., F.R.S. A variety with large cup-like appendages at the apex of the frond.

To Aspidium aculeatum cristatum circumlobatum (votes, unanimous), from E. J. Lowe, Esq., F.R.S. A large-headed grandiceps.

Commended.

A fine strain of Quilled German Asters, from Mr. J. Walker, Thame, Oxon.

Other Exhibits.

Some very interesting plants were sent from the Royal Gardens, Kew, noteworthy being Aristolochia grandiflora (syn. A. gigas) (*Botanical Magazine*, tt. 4368–9)—the Jamaican "Pelican-flower" or "Poison Hog-meat"; Clematis Stanleyi, flowers lilac-pink, $1\frac{1}{2}$ inches across, stamens yellow; Ixora macrothyrsa (syn. I. Duffii); Solandra grandiflora, and Mucuna atropurpurea.

Mr. W. Whiteley, Hillingdon, sent Chrysanthemum Miss Whiteley, which the Committee desired to see again.

Mr. J. Hole, Commercial Road, Teignmouth, sent Carnation

Devon Beauty. As the flowers were not in condition, the Committee requested to see the variety again next year.

Messrs. Paul & Son sent an interesting collection of Bog Plants to illustrate Mr. George Paul's lecture.

Prizes.

Prizes were awarded for a collection of British Ferns and their varieties. Amateurs. *First Prize*, Silver Challenge Cup, to E. J. Lowe, Esq., F.R.S. *Second Prize*, £2, to C. T. Druery, Esq., F.L.S.

ORCHID COMMITTEE.

Dr. Maxwell T. Masters, F.R.S., in the Chair, and six members present.

Awards Recommended:—

First Class Certificate.

To Miltonia Bluntii Lubbersiana (votes, unanimous), from Baron Schröder, The Dell, Egham (gardener, Mr. H. Ballantine). The variety Bluntii is supposed to be a natural hybrid between M. spectabilis and M. Clowesii, and this form appears to be intermediate between M. s. Moreliana and M. Clowesii. The habit of the plant approaches that of M. Clowesii, but its handsome flowers are as large as those of M. spectabilis. The sepals and petals are nearly equal in width, pale lilac, heavily barred with blotched markings of purplish lilac. The labellum is purple at the base, fading to nearly white in front, and with some purple blotches in lines on each side of the crest.

Botanical Certificate.

To Catasetum fimbriatum (votes, unanimous), male and female forms, from Messrs. Hugh Low & Co., Clapton, and W. Wright, Esq., The Grange, Denmark Hill (gardener, Mr. G. Parott). The labellum of the female flower resembles a helmet in shape.

To Mormodes buccinator aureum (votes, unanimous), from Messrs. Hugh Low & Co., Clapton. A bright yellow form of this most variable species.

To Cattleya granulosa var. Dijanceana (votes, unanimous), from Messrs. F. Sander & Co., St. Albans. This is the only discovery of the ill-fated collector Dijance, who lost his life in Brazil. The plant is very dwarf, being about one-third the size of typical C. granulosa. The flowers have green, unspotted sepals and petals; the side lobes of the lip are pure white, the middle verrucose lobe being a narrow, spathulate, rose-coloured blade. The column is yellow, tipped with purple.

Cultural Commendation.

To C. J. Lucas, Esq., Warnham Court, Horsham, for a finely flowered plant of the pure white Angræcum articulatum (votes, unanimous).

Other Exhibits.

Thos. Statter, Esq., Stand Hall, Whitefield, Manchester (gardener, Mr. R. Johnson), again exhibited Lælia elegans Blenheimensis (A.M., Sept. 8); also L. e. Stand Hall var., and L. e. atrorubens, both of the Turneri section. Odontoglossum Harryanum, Cochlioda vulcanica, and Saccolabium Blumei were also exhibited.

Messrs. F. Sander & Co. staged a small group of Orchids, among them being Cattleya crocata rosea, Lælia elegans Robinsoniana, a dwarf, richly coloured form of the Turneri section; also L. e. Turneri, L. e. T. Marlboroughensis, and Vanda cœrulea.

Drewett O. Drewett, Esq., Riding-Mill-on-Tyne (gardener, Mr. A. J. Keeling), sent flowers of Cypripedium Beatrice × (C. Lowii × C. Boxalli), and C. Eyermanianum × Drewett's var. (C. barbatum nigrum × C. Spicerianum).

Messrs. Charlesworth, Shuttleworth, & Co., of Heaton, Bradford, sent fine plants of Oncidium macranthum, some of which bore large flowers on spikes only a few inches in height. The Committee desired to see the plants again in order to test whether the desirable short flower-spikes proved constant.

Messrs. Hugh Low & Co., Clapton, exhibited a fine specimen of Vanda Kimballiana and a plant of Cattleya Gaskelliana albens; flowers white, with a crimson staining on the front of the lip.

FRUIT COMMITTEE.

P. Crowley, Esq., F.L.S., in the Chair, and twelve members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. J. Veitch & Sons, Chelsea, for a fine collection of fifty varieties of Plums, containing most of the best kinds; the most noteworthy being Kirke's, Jefferson's Plum, The Czar, Denniston's Superb, Early Transparent Gage, and Brandy Gage.

Award of Merit.

To Melon Halstead Favourite (votes, unanimous), from T. F. Burnaby-Atkins, Esq., Halstead Place, Sevenoaks (gardener, Mr. A. Gibson). Green-fleshed, well netted.

Cultural Commendation.

To P. Crowley, Esq., F.L.S., Waddon House, Croydon (gardener, Mr. W. King), for nineteen excellent fruits of Louise Bonne of Jersey Pears, grown in a 10-inch pot.

To W. Roupell, Esq., Harvey Lodge, Roupell Park, S.W. for fine examples of Apples Lord Suffield, Duchess of Oldenburg, and Bietigheimer.

Other Exhibits.

P. Crowley, Esq., F.L.S., sent splendid specimens of Jefferson Plums, showing effect of the sap (?) being checked, the fruits being from a branch on which a wire ligature had been accidentally left.

Mr. W. Whiteley, Hillingdon, Uxbridge, sent fruits of Tomato Hillingdon Favourite.

Messrs. Keynes, Williams, & Co., Salisbury, sent a seedling Plum named Mrs. Amy Kille.

Seedling Apples were shown by Messrs. G. Jackman & Son, Woking, and Mr. G. Lee, Clevedon, Somerset.

T. Philpot, Esq., Vale Road, Guernsey (gardener, Mr. Harding), sent a seedling Melon.

Messrs. J. Wrench & Sons, 39 King William Street, E.C., sent examples of Parsley, Wrench's Champion.

GENERAL MEETING.

September 22, 1891.

Dr. Maxwell T. Masters, F.R.S., in the Chair.

Elections.

Fellows, 5.—Robt. M. Ivatt, Miss Stone, Mrs. Vaughan, Walter Wadmore, Arthington Worsley.

A paper on "Insectivorous Plants," by Mr. Robert Lindsay, was read by the Secretary. (*See* p. 393.)

FLORAL COMMITTEE.

W. Marshall, Esq., in the Chair, and sixteen members present.

Awards Recommended:—

Silver Gilt Flora Medal.

To Messrs. G. Phippen, Reading, for a fine group of Cactus Dahlias, intermixed with Palms, Lilies, Ferns, &c.

Silver Flora Medal.

To Messrs. J. Cheal & Sons, Crawley, for a beautiful collection of Dahlias.

Silver Banksian Medal.

To Messrs. T. S. Ware, Tottenham, for a well-flowered group of La Neige Carnations and an excellent collection of Dahlias.

To Mr. A. Rawlings, for a collection of Dahlias, in which Show varieties were largely represented.

Bronze Banksian Medal.

To W. Keith, Esq., Cornwalls, Brentwood (gardener, Mr. J. T. West), for excellent blooms of Dahlias.

To Messrs. W. Paul & Son, Waltham Cross, for a collection of cut Roses.

To Mr. J. Walker, Thame, Oxon, for cut flowers of a good strain of German Quilled Asters.

First Class Certificate.

To Elæagnus pungens maculatus (votes, unanimous), from

Messrs. J. Veitch & Sons, Chelsea. Leaves creamy white and yellow in the centre, narrow green margins.

To Rhododendron Ceres (votes, unanimous), from Messrs. J. Veitch. A fine variety, with large clear yellow flowers.

Award of Merit.

To Dahlia (Pompon) Nellie Mackray (votes, unanimous), from Mr. T. S. Ware. Deep orange-buff; new and distinct.

To Dahlia (Pompon) Mrs. W. Besant (votes, 6 for), from Mr. T. S. Ware. White, tipped with deep purple.

To Dahlia (Fancy) Mrs. Ocock (votes, unanimous), from Mr. A. Rawlings, Romford. Yellow, tipped with purple.

To Chrysanthemum Vicomte Cliquot (votes, 7 for), from Mr. R. Owen, Maidenhead. Deep yellow, with slight flush of orange-red.

To Dahlia (Cactus) Sultana (votes, 7 for), from Mr. C. Turner, Slough. Terra-cotta, tipped with white; of good form.

To Dahlia (Cactus) Rayon d'Or (votes, unanimous), from Mr. C. Turner. White, edged with bright red.

To Dahlia (Pompon) Mars (votes, unanimous), from Mr. C. Turner. Bright scarlet.

To Dahlia (Pompon) Lorna Doone (votes, unanimous), from Mr. C. Turner. Bright crimson-purple.

To Dahlia (Pompon) Cecil (votes, unanimous), from Mr. C. Turner. Bright red, tipped with white.

To Dahlia (Fancy) Touchstone (votes, 6 for, 3 against), from Mr. C. Turner. Bronzy yellow, flaked with red.

To Dahlia (Show) Ada Rehan (votes, unanimous), from Mr. C. Turner. Soft pinkish-lilac, of good form.

To Dahlia (Cactus) Sir Roger (votes, unanimous), from Messrs. H. Cannell & Sons. Brilliant orange-scarlet; very striking.

To Dahlia (Cactus) Ernest Cannell (votes, 6 for), from Messrs. H. Cannell & Sons. Fine bright red.

To Dahlia (Cactus) Mrs. Thornton (votes, unanimous), from Messrs. H. Cannell & Sons. Soft rosy-purple, of good form.

To Dahlia (Show) Draughtsman (votes, 6 for), from Mr. G. S. P. Harris, Orpington. Crimson flushed with orange-salmon.

To Dahlia (Pompon) Little Sarah (votes, unanimous), from Mr. G. Humphries, Chippenham. Yellow, tipped with purple.

To Dahlia (Show) Mrs. Humphries (votes, unanimous), from Mr. G. Humphries. Warm pink, tipped with purple on the centre florets; good form.

Botanical Certificate.

To Cuphea Llavæ (votes, unanimous), from Messrs. Pitcher & Manda, Hextable. Petals brilliant scarlet, with a black spot at base.

Cultural Commendation.

To W. Marshall, Esq., Auchinraith, Bexley (gardener, Mr. Pratt), for a fine specimen of Nerine flexuosa, with twenty scapes of flowers.

Other Exhibits.

Mr. C. Turner sent several good stands of the Cactus, Show, Fancy, and Pompon types of Dahlias.

Messrs. H. Low & Co., Clapton, sent Lilium claptonense. The Committee desired to see it again, with information as to origin, &c.

Messrs. J. Veitch & Sons sent an interesting series of varieties of Elæagnus of a highly ornamental character, and a collection of insectivorous plants to illustrate Mr. Lindsay's lecture.

Mr. R. Owen sent a representative collection of summer-flowering Pompon and Japanese Chrysanthemums.

ORCHID COMMITTEE.

Dr. M. T. Masters, F.R.S., in the Chair, and ten members present.

Awards Recommended:—

Silver Banksian Medal.

To Messrs. F. Sander & Co., St. Albans, for a group of rare Orchids, comprising three varieties of their new Cypripedium Pollettianum × (C. calophyllum × œnanthum superbum), which, being second crosses in both parents, exhibited great variety; C. Maynardii splendens (C. purpuratum × C. Spicerianum), Lælia grandis tenebrosa, several fine varieties of Miltonia

vexillaria, including the rare M. v. superb, Cattleya Gaskelliana alba, and Vanda Hookeriana (votes, unanimous).

First Class Certificate.

To Cypripedium Antigone × (C. niveum × C. Lawrenceanum) (votes, unanimous), from Baron Schröder, The Dell, Egham (gardener, Mr. H. Ballantine). This is a fine hybrid raised by Messrs. James Veitch & Sons, of Chelsea. In colour and form it much resembles C. niveum, but in size of plant and flower it is equal to C. Lawrenceanum. The white sepals and petals have a delicate flush of rose colour, a similar tint suffusing the front of the lip.

To Cattleya intermedia alba (votes, 5 for, 4 against), exhibited by Thos. Statter, Esq., Stand Hall, Whitefield, Manchester (gardener, Mr. R. Johnson). This variety has pure white flowers, but not so large as those of the other white variety, C. i. Parthenia.

Other Exhibits.

Baron Schröder, The Dell, Egham, exhibited cut spikes of Cattleya Hardyana and C. Dowiana.

C. J. Lucas, Esq., Warnham Court, Horsham (gardener, Mr. G. Duncan), sent a plant in flower of the form of Aërides suavissimum known in gardens as A. Rohanianum; also a plant of Odontoglossum Pescatorei and cut spikes of a very handsome variety of Cattleya Schofieldiana, C. bicolor, and Vanda Sanderiana.

Thos. Statter, Esq., Stand Hall, Whitefield, Manchester (gardener, Mr. R. Johnson), showed Cattleya Loddigesii and C. L. splendens, a bright rosy-crimson form of the species, and having a bronzy-orange stain on the lip; also cut flowers of Miltonia Moreliana atrorubens.

J. C. Parr, Esq., Grappenhall Heyes, Warrington, sent a three-flowered spike of Cattleya, which the Committee decided was C. Hardyana.

Capt. Hincks, Brechinborough, Thirsk, exhibited his new hybrid Masdevallia Stella (M. Harryana ♂ × M. Estradæ ♀). The flower-spikes each bore a small lilac-coloured flower equal in size to M. amabilis.

Messrs. Pitcher & Manda, Hextable, Swanley, Kent, staged

a small group of Orchids in flower, including two plants of the pale rose Lælia Eyermani, Cypripedium intermedium ×, C. Chas. Canham ×, C. Harrisianum ×, and C. H. Rougierii × ; also Cattleya maxima and Burlingtonia fragrans.

Messrs. W. L. Lewis & Co., Chaseside, Southgate, sent a plant of a pretty variety of Masdevallia Gaskelliana, and a richly coloured form of Cypripedium Harrisianum × named "Southgate var."

Messrs. Seeger & Tropp, Lordship Lane, East Dulwich, exhibited a plant of Grammatophyllum Seegerianum, recently imported from the Molucca Islands. The plant had a four-foot spike of thirty-five flowers, greenish white, heavily barred with chocolate-brown, after the manner of those of G. multiflorum. The Committee, not being satisfied as to its distinctness from other species, referred it to Kew.

FRUIT COMMITTEE.

P. Crowley, Esq., F.L.S., in the Chair, and nineteen members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Wm. Paul & Son, Waltham Cross, for a fine collection of Apples and Pears, the most noteworthy varieties amongst the former being Duchess's Favourite, Duchess of Oldenburgh, Lord Suffield, and Emperor Alexander. Large and well-coloured examples of Souvenir du Congrès and Clapp's Favourite Pears were shown.

Other Exhibits.

Rev. R. L. Flood, Merrow, Guildford (gardener, Mr. J. Gilbert), sent good examples of Salway Peaches, eleven fruits, weighing 7 lbs. 13½ oz.

Messrs. R. Veitch & Son, Exeter, sent a new seedling Peach named Lady Walrond.

Messrs. W. Balchin & Sons, Hassocks, Sussex, sent examples of an Apple for name, which was recognised as Miller's Seedling.

Seedling Apples were shown by Mr. Rogers, Harrow-on-the

Hill, and Messrs. Laxton Bros., Bedford; the latter also sent fruits of seedling Plums.

A. H. Smee, Esq., The Grange, Carshalton (gardener, Mr. Cummins), sent examples of Apples, names unknown.

Messrs. H. Lane & Son, Great Berkhampstead, sent fruit of a Pear-shaped Apple.

Messrs. J. Veitch & Sons, Chelsea, sent fruits of Crab Apple John Downie, and Pyrus malus Elise Rathe; also free-fruiting branches of Damson Farleigh Prolific.

Rev. W. Wilks, Shirley Vicarage, Croydon, sent fruit of a new Pear named Marguerite Marillat—very large and handsome. It was not ripe.

Mr. J. Tubbs, Shrewsbury Lodge, Teddington, sent a seedling Melon, which the Committee desired to see again.

Seedling Melons were shown by Mr. G. Wythes, Syon House Gardens, and Mr. Gilman, Ingestre Gardens.

From the Society's Gardens were sent specimens of "evaporated" Plums, the fruit kindly contributed by Messrs. Rivers & Son, and dried at Chiswick. It was requested that some be cooked for the Committee to taste at their next meeting.

Mr. J. Roberts, The Gardens, Tan-y-Bwlch, South Wales, sent fruits of Passiflora edulis.

Mr. Bloxham, Great Brickhill Manor, Bletchley, sent good examples of Onion Veitch's Maincrop.

Cecil H. Hooper, Esq,, Elmleigh, Beckenham, exhibited an album containing pictures of vegetables, which he had collected in Paris; also illustrations from his own photographs of French methods of training fruit trees; and other views in and around Paris of matters of horticultural interest.