THOMPSON'S CARDIAC ASSISTANT

THOMPSON'S
GARDENER'S
ASSISTANT

WATSON

1

THOMPSON'S
GARDENER'S
ASSISTANT

WATSON

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THOMPSON'S GARDENER'S ASSISTANT

NEW EDITION

CYPRIPEDIUMS:—

1, INSIGNE, VAR. 2, CHAMBERLAINIANUM. 3, EVENOR.

CYPRIPEDIUMS

No genus or race of Orchids that has been brought under cultivation has yielded so readily, and we may add, so strikingly, to its influence as *Cypripedium*. This is not only apparent in the results of hybridization, but also in the species themselves, especially in those that have been longest under the cultivator's care. The most obvious effects of cultural influence have been the development of more robust foliage of a brighter colour; the normally one-flowered scape occasionally becomes two-flowered; the flowers are often larger and modified in colour (Veitch). Generally they are easily cultivated, they flower freely and may readily be induced to mature seeds from which plants can be raised. The species, with few exceptions, readily intercross, and consequently an enormous number of hybrids have been raised artificially. Two of the three represented in the plate are true species, the third, *EVENOR*, is a garden hybrid. Recently the genus has been divided by botanists into four, viz.:—*Cypripedium*, *Phragmopedilum*, *Paphiopedilum*, and *Selenipedium*.

THE GARDENER'S ASSISTANT

A PRACTICAL AND SCIENTIFIC EXPOSITION OF THE
ART OF GARDENING IN ALL ITS BRANCHES

BY

ROBERT THOMPSON

OF THE ROYAL HORTICULTURAL SOCIETY'S GARDENS, CHISWICK

NEW EDITION

REVISED AND ENTIRELY REMODELLED UNDER THE DIRECTION
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ILLUSTRATED BY NUMEROUS ENGRAVINGS IN THE TEXT,
AND A SERIES OF PLATES IN COLOUR, AND OF PLATES IN BLACK-AND-WHITE

Volume I

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PREFACE

The original edition of *The Gardener's Assistant* was issued in 1859, under the editorship of the late Mr. Robert Thompson, Superintendent of the Royal Horticultural Society's Gardens at Chiswick, an eminent authority on all matters appertaining to English horticulture. He was assisted by Mr. William Paul, Mr. Cock, Mr. Salter, and Mr. Glendenning, who contributed chapters on the subjects of which they were leading practical exponents. The work was at once welcomed as "*the soundest and best guide to practical gardening that has been published in our times*", "*the best book on general practical horticulture in the English language*", &c.

In 1877, and again in 1884, the work was revised and enlarged by Mr. Thomas Moore, F.L.S., Curator of the Chelsea Botanic Gardens, assisted by numerous specialists, including Messrs. W. B. Hemsley, J. C. Niven, F. W. Burbidge, T. Baines, R. Dean, and J. Douglas. The new issue was received with even greater favour than the previous one. Mr. William Tillery, Gardener to His Grace the Duke of Portland, Welbeck, one of the cleverest of English gardeners, wrote concerning it: "I consider this new edition of Thompson's *Gardener's Assistant* the most complete work on horticulture and floriculture that has ever been published. Every gardener should have a copy of it, both for its practical and scientific interest, and as a guide to all the duties of the profession." *The Athenæum* described it as "*A veritable encyclopædia to which all may turn who wish to have the best and soundest information on the practice of gardening*".

A new edition being again called for, its preparation was commenced under the joint general editorship of Mr. Edward W. Badger and Mr. Archibald F. Barron, but owing to failing health they were compelled to relinquish the task, not, however, before some progress had been made with the work of revision. The duties of general editor were then intrusted to me, and, thanks to the hearty co-operation of numerous specialists, as well as to the sympathetic help and encouragement afforded by the publishers, the work has been completed. The book has been remodelled, revised, and enlarged to such an extent that it is now practically a new work, in which every department of the garden is dealt with in a thoroughly comprehensive manner to meet the requirements of present-day horticulture.

An important feature of this new edition is the illustrations, which in many instances are far more helpful than any words could be. Many of them were specially drawn or photographed for this edition, and I am indebted to numerous friends for

the supply of material for the artists to work from. The horticultural press has also been most helpful in this respect.

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For all chapters and sections that are not initialled I am solely responsible; also for the nomenclature of the plants, which is, of course, that in use at Kew. I may add that the exceptional advantages afforded by my having access to the great collections of plants and books in the Royal Gardens made my task lighter than it would otherwise have been.

W. WATSON.

Kew, *May*, 1902.

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TEA-ROSES

The merits of the many beautiful Roses which are known as tea-scented owing to their peculiar odour, are not yet fully recognized in gardens. They are supposed to be too tender to be grown in the open air, developing their full beauty only under glass; but with few exceptions they will bear as much cold as most Roses, provided they are afforded protection from nipping wind and frost in early spring, when they are apt to suffer through starting too early into growth. Breeders have done more within the last ten years to improve this class than any other, and there are now hundreds of varieties, many of which are as large and beautiful in form and colouring as the three represented in the plate herewith. Of the 6000 cut blooms of Roses shown at the last exhibition at the Crystal Palace, half were Tea-Roses. They have the valuable quality of flowering freely and continuously from June to November, and even later. They are best on their own roots or budded on seedling Brier. When grafted or budded on the Manetti they are least satisfactory.

TEA ROSES —

1, COMTESSE DE NADAILLAC. 2, THE BRIDE. 3, MADAME CUSIN.

CATTLEYAS

Cattleyas take first rank among garden Orchids, and they owe this position to their usually large and richly-coloured flowers, not one of the many species and varieties known being unattractive. By far the handsomest of them are all those which constitute the *Labiata* section, of which that shown in the plate is a type. In this section there are varieties with pure white, rose-tinted, purple, or nankeen-yellow flowers, the lip in every case being blotched or veined with some more pronounced colour. They vary in their season of flowering, the true *Labiata*, often called *Vera*, flowering in autumn. The variety *Mossia*, forms of which have flowers eight inches across, beautifully coloured, blooms in May or June. The species have been intercrossed freely by breeders, and there are now many beautiful hybrids which, judged by their commercial value, are greatly superior to their parents. There are also many hybrids between Cattleyas and the closely-related *Laelias*.

SWIFTIA LANCEATA

CANNAS

The beautiful race of Cannas that we now possess was originated by M. Crozy, a French nurseryman, who, by crossing two species, obtained a new "break" of comparatively dwarf habit and with large flowers. Other breeders, especially Herr Pfitzer and Herr Ernst, German nurserymen, have continued the work of improvement by cross-breeding and selection, with the result that a large number of beautiful varieties are now available for the garden, both under glass and in the open air in summer. In the warmer parts of this country Cannas are used as bedding plants; they are lifted in October and stored in a dry frost-proof place until March, when they are started in a little warmth with Dahlias, &c., and planted outside in June. They flower continuously from July onwards. Grown in pots under glass they form handsome pictures of large green or bronzed leaves and spikes of flowers, whose colours vary from rose to crimson, cream yellow to orange, or variegated, as in that shown in the plate.

IRIS KÖNIGIN CHARLOTTE

HIMALAYAN HOUSE AT KEW
(A Wing of the Great Winter Garden)

PLANT-HOUSE RANGES

THE GARDENER'S ASSISTANT

INTRODUCTORY

CALENDAR OF OPERATIONS IN THE FLOWER-GARDEN

It is necessary to observe, that no calendrical directions can be made to justify the expectation that they can be strictly followed in all cases. The climate of the locality, the season, soil, and other circumstances, may render deviation expedient or absolutely necessary. It will be found, however, that in preparing the following Calendar most of the circumstances that lead to exceptions have been noticed, and suitable directions given accordingly. It is obviously impossible to provide for every contingency; but any intelligent person will easily adopt such modifications as his particular case may require. On the whole, it is presumed that the following Calendar will be generally applicable throughout the United Kingdom. It may be said that over this extent the climate is exceedingly variable, and therefore no one Calendar can be applicable; but within certain limits of elevation the difference between the temperatures of any two places is much less than frequently occurs between the temperatures of two different seasons at the same place. For example, if we take March—the principal spring month for seed-sowing—we find that over nearly ten degrees of latitude, extending from Paris to Wick, in Caithness, the mean temperature of that month differs very little on the average of a number of years, as will be seen by the following table:—

	Latitude.	Mean Temperature of March.
Paris,	48° 50'	43·79
Rouen,	49 26	41·12
Brussels,	50 51	42·78
Chiswick, London,	51 29	42·23
Boston, Lincolnshire,	52 48	41·67
Dublin,	53 21	42·46
Liverpool,	53 25	44·44
Edinburgh,	55 58	40·53
Dundee,	56 27	42·20
Aberdeen,	57 9	42·80
Elgin, Morayshire,	57 38	40·53
Wick, Caithnessshire,	58 29	41·94

From the above it appears that the mean temperature of March is nearly the same at London, Dublin, Dundee, and Aberdeen, although the last-named of these places is nearly 400 miles north of the first. At Elgin, the month of March is just as warm as it is at Edinburgh; and at Wick, furthest north of the towns noted, the mean temperature at that period of the year is higher than at Edinburgh. It will also be seen that at all the above places the difference of temperature in March is not such as to materially affect the CALENDAR OF OPERATIONS. In fact its scope may include all those widely-distant places.

But in different seasons, at the same place, a greater variation than that arising from latitude frequently occurs, in consequence of which considerable modifications of usually applicable directions have to be made. The mean temperature of the month to which we have referred varies as much as ten degrees in different years; and operations such as sowing and planting, which in ordinary seasons would be properly done in the first week of March, may not be at all practicable, in consequence of frost and snow, till the very end of the month.

The adaptation of a Calendar, therefore, is more affected by the variations of the seasons than by any circumstance connected with localities fit for gardens throughout the extent of Britain. If, then, a Calendar is carefully made for one place, it may be considered suitable for this country in general. By gardeners in the south, as well as in the north, calendrical directions must be understood with the proviso—*weather and state of the soil permitting*. If these are favourable the earliest practicable opportunity should be taken to carry out the operations indicated.

JANUARY.

PLANT-HOUSES.

Orchid Houses.—All through this month it will be very necessary to pay special attention to orchids, as there are some species which do not thrive under artificial heat if it be too liberally supplied; while at the same time some of those from the hotter regions of the earth would suffer in a low moist temperature if allowed to remain under those conditions for any protracted period. *Odontoglossums* of the *erispum* type should be kept in a temperature of from 45° at night to 50° or 60° in the day, according to the weather. Air should be admitted on all favourable occasions, and the plants should be sprinkled with a syringe every day that the weather permits. If possible, the house should be washed and thoroughly cleaned inside, so as to get rid of all insect and other pests that may have crept inside from the cold. Constant supervision must be exercised to prevent snails from destroying the flower-spikes, which they soon find out if any are showing.—Those of the *vexillarium* type ought to be kept in a temperature a few degrees higher; also *O. Harryanum*, *O. citrosum*, *O. Roezlii*, and others. If the weather in this month be very severe, so that much fire-heat is necessary to keep the temperature to the requisite degree, a close search must be made for thrips. A little sulphur put down the sheaths will be sufficient to keep them in check. Some of the different sections of *Dendrobiums* will now be in flower, and they should be kept free from damp or the flowers will become spotted. Those of the *nobile* division, as, for example, *Ainsworthii*, *aureum*, and *moniliforme*, may have a temperature of from 50° to 55° Fahr. when in flower, and, while at rest, from 45° to 50°, according to the weather. Plants belonging to the *bigibbum* section should be kept in a temperature which should not fall below 60°; neither ought such as *Farmeri* to be subjected to a lower temperature. *Cattleyas* generally will now be at rest, and they should have a temperature of from 55° to 60°, with a rather dry atmosphere. Those who grow a mixed collection of orchids in one house will find the *Zygopetalums* very useful at this period of the year. These thrive best in an intermediate temperature. Most of the *Calanthes* will by this time have finished flowering, and should therefore be put to rest in a warm dry place, which should not be allowed to fall below 55°. As many of the *Oncidiums* will be throwing

up their flower-spikes, they will require careful watching to prevent slugs from eating them.

Hothouse.—During the present month work in this department is not abnormally severe. Special care, however, must be taken to keep the houses at the proper temperature, for as the inmates of these structures have their native habitats in warm countries, they will not remain in health if subjected to cold. Where much house decoration is required it will be requisite to propagate plants for the purpose, and to bring them forward, so that they may take the place of those which become unhealthy through standing too long in dwelling-rooms.

Caladium bulbs may be divided where there is sufficient heat at command to cause them to commence growth quickly. The little *Argyrites* and *Le Nain Rouge* are two useful kinds for this purpose. Small palms should be potted on, so that they may be well rooted before being removed. *Kentias*, *Cocos*, *Arecas*, and *Geonomas* are the most easily adapted to this use. Such plants as *Gymnostachyum*, *Acalyphas*, *Pandanus*, *Panicum*, *Asparagus plumosus*, *Cyperus*, *Crotons*, and the like, are all useful in a small state, and may be propagated where sufficient heat is available. Many of the plants in this department will soon be starting into growth, and will therefore require re-potting. Material for this, such as peat loam, leaf-mould, sand, cocoa-nut fibre, manure, and moss, should be got ready, and, if possible, put into a warm place, so that it may be of the same temperature as that in which the plants are growing. Have all pots and drainage material washed previous to using them, as cleanliness is of great importance in plant-cultivation.

Intermediate House.—This will now be occupied with the preparation of cut flowers and plants for the conservatory, for where a supply of these has to be kept up it is imperative that they should be subjected to a lower degree of heat than that of the forcing house before they are removed to cooler structures. *Bouvardias*, *Heliotropes*, and many other plants of a similar nature will grow in such places. *Imantophyllums*, *Amaryllis*, and *Epiphyllums*, together with many other plants of a like nature, will succeed well in a temperature of about 55° Fahr., in addition to those which have been brought from warmer houses to be hardened a little before removal to a lower temperature.

Forcing House.—Where a constant demand for flowering plants exists many things will have to be brought forward in heat. Among these may be mentioned *Azalea mollis*, *A. indica*, *A. pontica*,

and the various Ghent varieties. These, with *Spiræas*, including *Spiræa astilboides*, *S. japonica*, *S. confusa*, and *S. Thunbergii*, Lilacs, Philadelphus, Deutzias, Rhododendrons, and Roses, should be potted up, and introduced in batches as they are required. Tuberoses will also have arrived by this time, and a batch of them ought to be started in small pots, potting them on into those of larger size as soon as they show their flower-spikes. Batches of *Lilium Harrisii*, Hyacinths, Tulips, Lily of the Valley, Polygonatum, Narcissus, Gladiolus (The Bride), and other bulbs ought also to be brought forward in gentle heat, and removed, just as the flowers begin to expand, into a cooler and more airy structure. This is done in order that their flowers may be of greater substance, and therefore better able to endure the lower temperature to which they will be subjected.

Greenhouse and Conservatory.—In cold, frosty weather much care must be exercised to keep the occupants of these places in good health, particularly if they include, as is usually the case, a varied collection of plants. Cape Heaths do not thrive under much artificial heat, while some of the soft-wooded plants, such as Pelargoniums, ought not to be in a lower temperature than 45° Fahr. Where these plants have to occupy the same houses as those derived from Australia they should be placed at the warmest end of the building, in such positions that they may be placed near the glass. Watering must be done cautiously, especially if the thermometer should show a lower degree than that mentioned. Heaths, and other hard-wooded plants of similar habit, should have all the air possible when the weather is propitious, for a close atmosphere conduces to the formation of mildew.

The conservatory must be kept free from all dead or decaying foliage or flowers, and no more water should be used than is necessary to keep the plants in a state of health, for the less moisture there is in the house the better and fresher will the flowers keep. Superfluous moisture may be expelled by keeping up a sufficient heat. It is always best to ventilate in the early part of the day, closing the lights early, so as to aid in maintaining the temperature during the night.

PITS AND FRAMES.

Under this heading must be included both hot and cold pits, wooden frames, and boxes for placing in hot-beds. The former are most useful for protecting plants which are required for

the flower-garden during summer. The gentle heat generated by the hot-water pipes will be sufficient to keep the frost away from such plants as Pelargoniums, Ageratums, Lobelias, and other half-hardy kinds required for the aforesaid purpose. They are also well adapted for propagating most of such plants. Unheated pits are serviceable for growing Violets, and for wintering many plants which are too sensitive to cold to withstand the rigour of an English winter, as, for example, Cinerarias, Calceolarias, Stocks, and similar plants. Frames are also exceedingly useful, as they may be moved from place to place and put over beds of various plants, either to bring them forward, or as a protection from cold. They are also much in demand during spring for "hardening off" numerous plants before their exposure to the open air. Cuttings of Chrysanthemums may be inserted in them, and if there be no room in the heated pits, pots of Sweet Peas may be forwarded in them for planting out later on.

FLOWER-GARDEN AND PLEASURE GROUND.

If the weather be frosty wheel manure on to all vacant ground, to be dug in as soon as conditions are favourable. Clear up any weeds and other rubbish which may have accumulated during boisterous weather. When atmospheric conditions permit, prune and nail deciduous climbers and other shrubs. Push forward any ground work that can be done before tasks of a more urgent character reveal themselves. Should there be very severe frost it may be necessary to protect some of the more tender plants, such as *Magnolia grandiflora*, Euonymus, Tea Roses, Escallonias, Ceanothus, &c. Nothing is more suited to this end than bracken. Ground around the roots of plants covered with decaying leaves will be hindered from becoming frozen. Occasionally deciduous trees and shrubs may be planted, and many hardy plants may be divided and replanted.

FEBRUARY.

PLANT-HOUSES.

Orchid Houses.—Many *Odontoglossums* of the crispum type will now be showing their flower-spikes, and these should be carefully inspected every day for slugs and snails, which are particularly fond of them. If the past month has been severe, rendering much fire-heat necessary, thrips will most probably have

made their appearance. Should any be visible, dip the plants occasionally in soft-soap and water. *O. citrosmum* will also have commenced growth, and should be repotted where necessary, before the roots are far advanced. Some of the winter-flowering section of Cattleyas and Lælias will also be starting, and will therefore need attention. Any which require repotting or surfacing should be attended to. *C. labiata* and *C. Dowiana* will be the first to require care. Good fibrous peat and clean crocks only should be used. Any Dendrobiums which have finished their flowering period and are starting afresh should also be potted or put into fresh baskets as need arises. *Vanda Amesiana*, *V. cærulea*, and various other orchids which require repotting, should be attended to on the first available opportunity.

Towards the end of the month, when the days lengthen and the sun has more power, it may be found advisable and necessary to put up the blinds, for many plants suffer more from sudden bursts of sunshine than if they were exposed to it continually. Blinds will also prevent the necessity of damping down too frequently, which, at this season of the year, owing to extremely low outside temperature at night, is apt to cause drip through the condensation of the moisture on the roof-glass.

Hothouse.—Numerous plants in these structures will be starting into growth, therefore potting will be general. If the necessary materials were prepared last month, as then advised, the work may be taken in hand at the expiration of the first fortnight. All pots and drainage appliances should be perfectly clean. Most stove-plants succeed in a mixture of loam, leaf-mould, peat, and sand. There are, however, a few which need a special soil, as, for example, *Ixoras*, *Dipladenias*, *Phryniums*, &c., which thrive best in sandy peat. Particular care is needed in potting. Such plants as have thick fleshy roots should not have the soil made too firm, while those of a more fibrous nature take hold much better if it be pressed down hard.

Gloxinias, Caladiums, and other bulbs, which have been lying dormant through the winter, should now be induced to commence growth. The former succeed best in sandy peat to which a little loam has been added. The latter require a rich, light, rough soil, so that their roots may ramify freely. The temperature should be increased to 65° at night in mild weather, and from 70° to 75° in the daytime.

Intermediate House.—Gardenias, and other plants of a similar nature that require a

temperature of from 55° to 60° and are now coming into flower, should be exposed to the light as much as possible. Weak manure-water should be given to those whose roots fill the pots, to assist them in swelling their buds. Many of the Java section of Rhododendrons should be potted before growth and root-action have made much progress. Most of the palms find the temperature of the intermediate house congenial, and those should be potted which require it. They all succeed well in a compost of light rich loam, peat, and leaf-soil. They should be potted rather firmly, as many of them make a quantity of fibrous roots. Begonias of the tuberous-rooted kinds should be started into a renewal of growth.

Forcing House.—Continue to introduce plants, to bring forward as recommended for last month. In addition to these, cuttings of various other plants may be rooted in this structure. Among these may be included Perpetual Carnations for winter flowering, Heliotropes, Bouvardias, Harrison's Musk, and various stove-plants. Many kinds of plants may now be raised from seed.

Greenhouses and Conservatory.—This month is usually one of the most pleasant of the whole year in this department, as there are so many spring flowers that have been brought forward in heat, which will now be in bloom. Much care, however, will be needed to keep the flowers fresh, as probably the weather may be very changeable.

Cinerarias, Cyclamens, Primulas, and other flowers of their class should now be had in abundance; while the numerous bulbs that have been brought forward all tend to make the conservatory gay. Any climbers that need pruning should receive attention without delay, as the sap will soon be active.

The propagation of various soft-wooded plants for summer flowering should be taken in hand. These include such as Petunias, Heliotropes, Pelargoniums, and Fuchsias. Fancy Pelargoniums intended for early flowering should be removed to their final quarters. Many hard-wooded plants, particularly those that bloomed in the autumn or early winter, will now be starting into growth, and these should be repotted. Such climbers as Lapagerias, Tecomas, Rhynchospermums, &c., that need top-dressing or their border extending, should be looked to. Heaths and many New Holland plants will be revealing their flower-buds. If these require retarding for any special purpose, this should be done before the buds get too far advanced. For this

purpose they should be kept in the coolest end of the house, and air admitted on all favourable occasions.

PITS AND FRAMES.

With warmer weather and an increase in the latent store of heat, many plants will be starting into new life. Where *Polyanthus*, *Auriculas*, *Stocks*, *Border Carnations*, *Aquilegias*, *Hydrangeas*, *Marguerites*, and such-like plants have been wintered in these contrivances, they should be looked over, and all dead leaves removed. Air should be ungrudgingly admitted on all propitious occasions. The sun being bright and the weather mild, the lights may be removed altogether for an hour or two in the middle of the day. Make another sowing of *Sweet-peas* and other half-hardy annuals, such as *Sweet Sultan*, *Gaillardias*, and *Perpetual Stocks* for cutting. *Violets* will need plenty of ventilation when the weather is fine. They must, however, be well covered at night to protect them in case of frost.

FLOWER-GARDEN AND PLEASURE-GROUND.

When the weather permits, push forward with all digging and the planting of deciduous shrubs, as such work should be brought to a conclusion by the end of the month. Where any new turf has to be laid, it should be done without delay; walks should be regravelled if necessary. Sweep and roll lawns to give them a tidy appearance. Look over the flower-beds, and if any of the spring bedding plants, such as *Daisies*, *Polyanthus*, *Myosotis*, *Silene*, &c., have been lifted by frost, press their roots in again. All dead leaves should be removed. Look well after mice where *Crocuses* are growing, as they are often very troublesome just as the flower-buds are appearing. Should any pruning remain undone, finish it as soon as possible, as the sap will very shortly commence to flow.

MARCH.

PLANT-HOUSES.

Orchid Houses.—Of all the trying periods of the year March is one of the worst with which a gardener has to contend. Often there are cold winds blowing from the north-east, which lower the temperature of the houses, so necessitating the consumption of a large quantity of fuel in order to maintain the requisite degree of warmth. While these remain, frequent damp-

ing down must be done, or otherwise the young growths will soon be covered with yellow fly and thrips.

Oncidiums of the autumn and winter flowering section, such as *O. Lanceanum*, *O. ampliatum*, *O. majus*, and *O. pulvinatum*, will now require potting. After this is done, they should be placed in a temperature of 60° at night, and from 70° to 75° during the daytime. Such varieties as *O. incurvum*, *O. ornithorhynchum*, *O. tigrinum*, *O. Marshallianum*, *O. crispum*, and *O. sarcodes*, should be grown with the *Odontoglossums*. Some of the *Cattleyas*, notably *C. Adundie*, *C. superba*, and *C. Schilleriana*, will now need potting. Use clean pots and crocks, for these plants dislike sour soil. The remarks applied to *Laelias* last month, hold good during the present one. All that have commenced new growth should either be top-dressed or placed in new baskets if they require it. *Dendrobiums* will be gay during March. Those which have finished blooming should be attended to, and any that need potting should have this taken in hand before growth has advanced too far, as the process retards it. Many of the plants in the intermediate house will now need removal to fresh pots. *Maxillarias*, *Lycastes*, and *Cypripediums* that are starting into growth will also require more root-room. *Calanthes* that have been at rest will be resuming active life again. When the new growths are about an inch long, they should be potted. The compost used should consist of rich turfy loam and dried cow-dung. The base of the old bulb should be just covered with the soil, and a small stick used to support each till it has become firmly established in its new quarters. No water will be needed for some time except for damping over the surface with the syringe. They should have a temperature of 65° at night, and of 75° to 80° by day. Repot *Odontoglossums* that are just renewing their growth. Be careful to keep these plants shaded from the sun, and use plenty of water, both at the roots, over the stages, and amongst the pots.

Keep a little air on, from both top and bottom ventilators, whenever the weather will permit the practice. The temperature at night should be from 45° to 50°, and by day from 50° to 60°, according to the weather.

Hothouse.—The present is a busy month in this department, as many plants will need repotting, cuttings must be put in, and seeds sown. Such plants as *Crotons*, *Dracenas*, *Allamandas*, *Alocasias*, *Marantas*, and stove-plants in general will need fresh pots. Since so many

plants are required for general house decoration, they must be provided of various sizes. To attain this end a variety of cuttings should be rooted. Among these we may mention *Andropogon schænanthus*. Aralias of numerous kinds should be grafted, Ardisias raised from seed, *Curculigo* by division, *Cissus discolor* from cuttings, *Eranthemums* by cuttings, *Cyperus* by taking off the heads with two inches of stem, and inserting them up to the pennates in a mixture of peat and sand, *Epiphyllums* by grafting, *Goldfussia anisophylla*, *Pandanus*, *Panicum*, *Pellionia*, *Phrynium*, *Pilea*, *Reidia*, &c., from cuttings; and *Rivinas*, *Torenia*s, *Smilax*, and the various forms of *Asparagus* from cuttings. These must all have attention, in order that a regular supply of such plants may be had as required. Pot up *Caladium* bulbs and increase their number by dividing them into as many pieces as there are eyes.

Intermediate House.—Divide and pot all such plants as *Aspidistras*, *Clivias*, *Farfugiums*, *Hedychiums*, *Myrsiphyllum asparagoides*, *Phormiums*, *Ophiopogons*, *Rhapis flabelliformis*, and *Curculigo recurvata*. If this be done this month, nice well-established plants may be had for use in the autumn. Sow seed of *Aralia Sieboldii*, *Grevillea*, and other plants, and propagate by means of cuttings *Libonias*, *Eupatoriums*, *Begonias*, *Linums*, and similar plants for winter flowering. Many of the Ferns will also require repotting, and any seedlings should be pricked out into pans as they get large enough to handle.

Forcing House.—Continue to introduce plants required to be brought into bloom, but as the days get longer they will come into flower with far less artificial warmth than in the previous months. It will therefore be no longer necessary to place so many in heat at one time. Cuttings of such plants as *Aloysia* and *Coronilla* should now be rooted. The former will be found very serviceable, if planted out, for cutting in the autumn.

Greenhouse and Conservatory.—Hard-wooded plants will require constant attention during this month. The bright gleams of sunshine and the parching winds have each to be contended with. The former causes the temperature to rise suddenly, while the latter prevents the admission of air to regulate it. Azaleas that have been forced, and have finished blooming, should have the old flowers picked off, and if the plants require repotting, this should be done before growth has too far advanced. If there is no lime in the soil, some good turfy loam may be mixed with the peat, but where lime is

present, this should be discarded, nothing being used but sharp sand to mix with the peat.

Camellias whose flowering period is over should be repotted. We do not advocate placing them in heat to forward their growth, except for the purpose of causing them to flower earlier, as more robust shoots are developed in a cooler atmosphere.

The conservatory will now have a gay appearance, with the various kinds of flowers that have been forced; and as a number of these will be tender, the house should be shaded to protect them from the direct rays of the bright sunshine. More water should also be used to keep the house cool. Sudden changes in temperature must be avoided by keeping the ventilators in use when possible.

PITS AND FRAMES.

These will now be filled to their utmost capacity, as many plants which have been occupying the houses will be transferred to them towards the end of the month. They will also be useful in retarding Tulips, Hyacinths, Freesias, and such-like, and for the protection of the early-flowering *Gladiolus*. Florists' flowers, too, will still need their shelter. Violet cuttings may be rooted in them.

FLOWER-GARDEN AND PLEASURE GROUND.

Any leaves which have been blown about by the wind should be cleared away. Edge grass-walks, sweep and roll lawns, and make all tidy. When the weather is favourable finish digging shrubbery borders, and prune any evergreens that may require it. In warm localities many half-hardy plants that have occupied cold frames during the winter may be planted out towards the end of the month, as may also Carnations, Pentstemons, and various other plants. Rearrange herbaceous borders, and divide plants where necessary.

Helianthus, *Chrysanthemums*, *Heleniums*, *Pyrethrums*, and other autumn-flowering plants, should have due attention paid to their requirements.

Spring bedding plants will soon be gay, especially those planted early in the autumn. Many of the *Violas*, *Silenes*, *Polyanthuses*, *Myosotis*, *Arabis*, and others that bloom early, will be in flower.

Keep the beds under inspection and remove all decayed leaves. In dry weather stir the surface of the soil with a hoe, to destroy any little weeds which may be making their appearance. Put sticks to Tulips and Hyacinths, to

prevent them being broken off by high winds, and pay particular attention to catching mice, which are often very obnoxious, and do much harm to Crocuses and Snowdrops. Towards the latter end of the month plant out Sweet-peas and other annuals which have been raised in pots. Protect them with evergreen boughs if the weather should make it necessary.

APRIL.

PLANT-HOUSES.

Orchid Houses.—This is a busy month with all gardeners, as so many plants require attending to. In this department there is much necessary work, caused by the rapid growth and development of plants under the fostering influence of increased sunshine and longer days. *Cœlogynes* will have finished their flowering period, and therefore will either need potting or fresh surfacing. Those of the *cristata* type do best in baskets suspended from the roof. Many of the *Cypripediums* and *Dendrobiums* will also need repotting as they start into fresh growth; as will likewise *Epidendrums*, *Masdevallias*, *Phaius*, *Sobralias*, &c. The two last-named require rather large pots, and should be grown in a mixture of turfy loam, peat, leaf-soil, and sand. The pots should be well drained, as, during the growing season, these plants consume abundant supplies of water. The former does well in the hothouse or any place where it can have bottom heat. Shade, however, is necessary, or the leaves may scald. *Vanda teres* will now be showing flower and should be shaded from the sun. Any of the other species that need potting should be looked to, as, if left to themselves, they are apt to become leggy. Attend to *Cattleyas*, and repot or surface any which are commencing growth. As the weather becomes milder there should be a free circulation of air, but cold draughts must be carefully avoided. The *Odontoglossum* house will not need fire-heat, unless an occasional frosty night should make an exception. Keep the stages, paths, and pots well moistened by damping down two or three times daily. The plants may also be syringed both morning and evening. If the sphagnum is growing well, it may be taken as a sign that the plants are receiving the right treatment. The *Dendrobium* house requires to be kept at a temperature of 70° at night during mild weather, but may be allowed to fall 5° or 10° if the season is cold, as too

much fire-heat is harmful, and encourages insect pests. The plants in active growth may be watered from above with a rose. Shade from the direct rays of the sun, but raise the blinds as soon as the sun is off them, in order that its rays may keep up the temperature of the house.

Hothouse.—The greater part of the potting in this department will have been finished, except in the case of young plants that have been propagated from cuttings or seed. Do not on any account allow these to become either pot-bound or overcrowded in the seed-pans, for if either of these contingencies arise, the plants will become stunted in their growth or spindly while young.

All seedlings should be kept as near the glass as possible, and those newly placed in small pots should be kept close and shaded from the sun.

Pot up *Achimenes*, *Gesneras*, and *Gloxinias*, and start them into growth. Continue to propagate such plants as *Euphorbia jacquiniæflora*, *Ixoras*, *Begonias*, *Æschynanthus*, *Acalyphas*, *Dracænas*, *Coccocypselum discolor*, *Pandanus*, *Gardenias*, and *Thyrsacanthus rutilans*, as many of them will be useful either in producing a supply of flowers or furnishing plants for house decoration. Shade will be needed whenever the sun is bright, and this will prevent the necessity of too much watering. Keep the syringe well at work amongst the foliage, in order to destroy all insect pests. The temperature should vary from 65° at night to 85° by day under sun-heat.

Intermediate House.—*Rhododendrons* of the *Javanicum* type will now need special care. They must be potted firmly in peat, and afterwards carefully watered. *Streptocarpus* will now be in bloom, and if seed is needed, the flowers must be kept dry. Pot on seedlings as they get large enough. Many palms will also need looking after, as thrips are nearly certain to make an appearance. Air should be admitted liberally on all favourable occasions. The temperature should range from 55° at night to 65° or 70° by day.

Forcing House.—Sow seeds of *Ricinus*, *Tobacco*, *Solanums*, and other plants of ornamental foliage, to produce, early in the month, plants for use in sub-tropical gardens later on in the year. If these are grown on in a brisk heat till the middle of next month, and then gradually hardened, they will become large plants by the time it will be advisable to plant them out. It will not be necessary to introduce any more hardy shrubs to be forced into flower-

ing, as so many other things will now be coming into bloom naturally. Many cuttings, nevertheless, will need to be put in for the purpose of furnishing the flower-garden during summer, and no better place can be found for them than the forcing house.

Greenhouse and Conservatory.—The latter will now be gay with the various plants that have been pushed forward into early flower, and a great number of hard-wooded New Holland plants which have their natural period of efflorescence at this time of the year. There are several Acacias, Chorizemas, Clematis, Aphelaxis, Pimeleas, Leschenaultias, Hydrangeas, Roses, &c. These, together with bulbous and herbaceous plants, will make a fine display. Care must be taken, however, not to overcrowd, as is much too often the tendency when there is such a tempting array of flowering plants. Propagate such things as Francoas, Pleromas, and *Rochea falcata*. Sow Mignonette, *Rhodanthe Manglesii*, and other hardy and half-hardy annuals, to give a supply of cut flowers and decorative plants. Tuberous Begonias should also be potted for flowering later on. The pretty little *Crassula jasminoides* and other species should be rooted, so that good plants may be had for another season. Fanciful Pelargoniums will be in active growth, and as the pots get filled with roots, they should be supplied with weak manure-water, to assist them in sending up strong trusses of flowers. Fuchsias that were started last month will now need repotting. Cuttings may also be rooted, to give good plants for autumn flowering.

PITS AND FRAMES.

Propagate Dahlias, Cannas, Zonal and other Pelargoniums, for flowering in winter, Heliotropes, and other bedding plants. Pot off Carnations that were rooted in heat last month. Harden bedding Pelargoniums and other plants of a like nature. Sow seeds of Asters, Stocks, Balsams, Chinese Primulas, ornamental grasses, &c. Plant out herbaceous Calceolarias, Pansies, Hollyhocks, Pentstemons, Gladiolus, &c., towards the middle of the month, or, in warm sheltered situations, at the beginning of it. By so doing more room in the frames will be available for less hardy subjects.

FLOWER-GARDEN AND PLEASURE GROUND.

Evergreen shrubs, such as Hollies, Rhododendrons, Kalmias, and Andromedas, should be planted in showery weather. Tidy up all herbaceous borders, and do everything in the

way of transplanting, &c., not already done without delay. Grass will now be growing well on the lawns, and will need cutting. It should be swept first, then rolled, after which the machine may be run over it. Edge and clear up gravel walks, and give immediate attention to any re-gravelling which may be necessary. Look over and prune Roses at the beginning of the month, and replace with others all which have succumbed to the winter frosts. Spring bedding should be looking very bright at this season, as most of the plants will be in flower. Keep the edges of the beds trimmed, and clear off all decayed leaves or other rubbish that may have been blown on by the winds.

MAY.

PLANT-HOUSES.

Orchid Houses.—Many plants will now have reached their full development with regard to size, and when such have got firmly established in the new material in which they were potted plenty of water should be afforded them. Sobralias should be potted before growth is far advanced. These plants succeed best in a light, rich compost, in which their thick, fleshy roots can more easily push their way and ramble at will in search of nutriment. *Odontoglossum Inseayi*, *O. I. leopardinum*, and other varieties of this section should also be potted and grown in the Mexican or intermediate house. Other occupants of this structure will also need attention. Zygopetalums, which should have a place in all gardens on account of the fragrance of their flowers, should now be potted. They thrive most conspicuously in a mixture of good fibrous loam, cow-dung, crocks, and a little peat. They must be very carefully drained, as they are moisture-loving plants. Phalaenopsis that require fresh pots, baskets, pans, or blocks, should be accommodated therewith. This lovely tribe is not so difficult of management as some people suppose if they receive proper attention. They should be kept shaded from the sun, have a uniform temperature, with a humid atmosphere. Many Cattleyas will be in flower during this month, and these, if possible, should have a rather more airy atmosphere than the others to prevent their flowers from spotting. When flowering is over look to their roots, and if any require potting this should be done. More moisture should afterwards be allowed them. Odontoglossums of the crispum type will be

expanding their flowers. Shade for these will be a very essential requirement, and plenty of water must be kept about the paths and stages. The top and bottom ventilators should also be opened when the weather is warm so that the house may be kept as cool as possible. Dendrobiums of the densiflorum type, that is, all those with persistent foliage, will be going out of flower. As soon as the flowers are faded the plants should be potted in order that their roots may be as little injured as possible. After this operation they should be subjected to a temperature of 70° by night and from 80° to 90° by day, according to the weather. Syringe the plants over the foliage twice daily during warm weather, and shade should be afforded at all times when the sun is bright.

Hothouse.—Most of the plants that were potted in March will by this time have got well rooted, so that liquid manure may be given where it is intended to keep them growing. Plants of Allamandas, Stephanotis, Dipladenias, &c., will produce more flowers if liberally treated thus. Many of the fine-foliaged plants and palms will also be benefited by applications of some description of stimulant. With increased heat various insects will become troublesome. It will therefore be necessary to prevent their ravages. Syringe or dip the plants frequently with some insecticide. Start plants of Poinsettia, and when the young shoots are forward enough they should be taken off and rooted in close, moist heat. *Euphorbia jacquiniæflora* may also be propagated now. The temperature at night should be about 70° Fahr., with an increase of 10° to 20° by day under sun-heat. Shade in bright weather, but draw up the blinds early, and close the house so as to maintain a good night temperature without the assistance of much fire-heat.

Intermediate House.—Pot on Bouvardias as they require it, and towards the end of the month, when they are well rooted, remove them to a cooler structure where they may get more air. Gardenias will be flowering freely, and when new growth is made cuttings should be taken off and rooted to give young plants.

Many Ferns will now be resuming active growth. Shade should be afforded these, or the young fronds may get scalded. Pot up any which require it, and keep remainder well watered.

Forcing House.—It will not be found necessary this month to push forward any hardy shrubs for decorating the conservatory, as plenty of flowers will be in bloom under the natural

influence of the sunshine. There is, however, a number of useful plants that may be caused to flower which would not otherwise do so till a much later period of the year if not forced. Take, for example, Tuberoses, *Lilium Harrisii*, and some other choice flowers. It will therefore be necessary, if a quantity of flowers are required for cutting, to bring them forward artificially.

Greenhouse and Conservatory.—Hardwooded plants of various kinds will now be in bloom, and when their flowers are over the plants should be cut back to induce them to make a clean growth for another season. The potting of plants of this kind should be attended to, especially Azaleas, Pimeleas, Cassias, Heaths, &c. The soil must be pressed down firmly, as otherwise the roots will not take hold of it. The plants must be well syringed to keep down insects. The conservatory should be kept shaded, and air admitted night and day, in order that the flowers may last as long as possible. Any plants, as, for example, Pelargoniums, that are subject to the attacks of aphides, should be cleansed thoroughly before their introduction to the conservatory, as at this time of the year these pests increase very rapidly.

PITS AND FRAMES.

Violets that were rooted in these should be planted out in the open ground early in the month, and their places reoccupied with bedding plants. Perpetual Carnations, which were rooted early in the season, will now require to be potted, and various plants from the greenhouse may be placed in the pits, &c., as space becomes vacant. Begonias of the tuberous-rooted section will need potting, and no more suitable place can be found for them than in these structures. Towards the end of the month Chrysanthemums will require to be put into their flowering-pots and removed to the open. See that these pots are properly drained, for without this precaution they may become waterlogged. Various kinds of herbaceous plants which were propagated from cuttings put in during the autumn should now be transferred to the open. This will give space for other occupants of a more tender nature, such as Balsams, Celosias, Solanums, Ricinus, &c.

FLOWER-GARDEN AND PLEASURE GROUND.

The present is a busy time with gardeners as many summer-flowering plants may now be placed in their permanent quarters. In warm and sheltered situations Calceolarias, Verbenas,

Stocks, Asters, and similar plants may be put out in the early part of the month. These may be followed by Pelargoniums, Petunias, Fuchsias, and Begonias. Annuals may also be sown to procure a succession to those sown early last month. Sow also Perpetual Stocks for autumn flowering. Stake and tie any plants which require it, taking care not to leave the ties too tight. Grass usually grows very fast during this month, but it should be kept well under at any cost. Walks and beds should be edged, and nothing omitted which tends to give them a tidy and neat appearance. Should the weather prove dry it will be necessary to water all newly-planted shrubs and plants. When this has to be done give a generous soaking, not a mere dribbling over the surface. Keep the hoe at work among seedling plants to check weeds, which at this time of the year grow at a great rate.

JUNE.

PLANT-HOUSES.

Orchid Houses.—The sun will now have great power, therefore it will be necessary to pay much attention to shading. Neglect of this precaution is productive of more harm than any other omission. If plants that have been kept in shade happen to be exposed to sunshine during the hottest part of the day, they are certain to suffer in consequence. *Verb. sup.* Calanthes will now be growing rapidly, and should have an ample provision of water, both at the roots and over the foliage. Dendrobiums also will be in active growth, and will therefore need plenty of moisture. A number of the "cool" *Oncidiums* will require potting or top-dressing during the month, to give them fresh vigour. Brassias will generally be out of flower, and they should likewise be attended to, as regards potting, &c., before new roots are formed.

As *Cypripediums* of different varieties are mostly now out of bloom, they should be potted as growth commences.

A great number of *Cattleyas* will have finished flowering; there are, however, some which bloom during the present month. As they go out of flower and start to make roots, the supply of moisture should be increased. It is a mistake to allow the flowers to remain on the plants too long, as they have a tendency to exhaust them. One of the chief points in the successful cultivation of these plants is the keeping them in a uniform temperature, with plenty of light, but

shaded from the direct rays of the sun. Air should be freely admitted, but cold draughts must be avoided. Look well after all kinds of insects and other vermin, such as snails, for they are very troublesome.

Hothouse.—Pay close and unremitting attention to the inmates of this department, for insects of all kinds thrive wonderfully under the genial heat there afforded. Sponge, syringe, or dip any that show signs of these obnoxious creatures.

Many of the summer-flowering plants will now be in full bloom, as, for example, *Dipladenias*, *Ixoras*, *Allamandas*, *Clerodendrons*, &c., and all such should receive every necessary care, and not be allowed to deteriorate for want of moisture. Many fine foliage plants will also be making active growth, and these should be liberally treated. Pot up a batch of *Caladiums* for late use. Bulbs started in this month will make a fine show till late in the season. Pot on young plants as they require it, taking care to allow none to suffer through becoming pot-bound.

Such plants as *Torenia*s, *Acalyphas*, *Ardisias*, Winter-flowering *Begonias*, *Epiphyllums*, *Eranthemums*, *Euphorbia jacquiniæflora*, *Goldfussia*, *Justicia*, and other winter-flowering kinds should be placed in heated pits, where they may have the benefit of sunshine to ripen their wood.

Palms of all kinds will now be making active growth, and should have plenty of water, as otherwise their fronds will be imperfect. Attend to the potting of ferns before they become pot-bound, or it will be difficult to get the water through the old ball afterwards.

Intermediate House.—The first batch of *Bouvardias* should now be put into their flowering-pots, using for the purpose a light rich compost. Do not pinch them subsequently, but allow all shoots to grow up strong. *Heliotropes* for winter-flowering should now be potted up. These plants should on no account be allowed to get pot-bound, or they will not make satisfactory progress. *Tuberoses* should be potted, and if, after they have started, they are taken and plunged in a cold frame, they will give a supply of flowers through the autumn and winter months.

Pot on seedlings of *Celosias*, *Cockscombs*, *Streptocarpus*, &c., as they become large enough to handle, and shade for a time till they have got well established, then expose to the sun. *Gloxinias*, *Achimenes*, and *Gesneras* should be potted as they require it.

Greenhouse and Conservatory.—Many

climbers in these structures will now be making active growth, and as the young shoots of some are very susceptible to the attacks of slugs, a search should be made for these, late each night and early in the morning.

Lapagerias, Passifloras, Habrothamnus, Chorizemas, Kennedyas, Jasminums, *Solanum jasminoides*, *Clematis indivisa*, and some others will need a quantity of water to keep them growing. Cyclamen should be potted on into larger pots before they become pot-bound, as should also the early batch of Primulas and Cinerarias. Hard-wooded plants will, towards the end of the month, have completed their growth, and many of them may then be placed out-of-doors in a sheltered place on a bed of ashes. Pelargoniums, both show and French varieties, will now be in full bloom, and should therefore receive every attention in the way of watering. If the soil be allowed to get dry the flowers will not open properly, neither will they last so long. Plenty of air should be allowed them by night and day, unless the weather is cold.

PITS AND FRAMES.

Zonal Pelargoniums for winter flowering should be potted on as soon as the roots reach the sides of the pots. Plant out Richardias, *Solanum capsicastrum*, and other things, to be lifted in autumn for flowering in winter. Pot on Perpetual Carnations, Fuchsias, Sweet-scented Geraniums, *Aloysia citriodora*, Celsias, Begonias, &c., intended for autumn and winter decorations. Do not permit any to suffer through want of water. Chrysanthemums that have not yet been placed in their flowering-pots ought to be so treated without delay. Propagate Petunias, Marguerites, and such plants, for late use. Sow Mignonette in pots for the conservatory. Stake and tie all such plants as require it.

FLOWER-GARDEN AND PLEASURE GROUND.

Sow seeds of biennials and perennials thinly, in order that the plants may not become overcrowded. The following is a good selection:—Anemones, Wallflowers, Sweet Rockets, Polyanthus, Foxgloves, Canterbury Bells, Lunaria, Chelone, &c.

Thin out annuals as they become large enough, and finish planting bedding plants. Every operation should be performed at its proper time. When flower-beds have to be cleared of winter and spring bedding-plants, this should be done as each variety goes out of flower, and they should be replaced by those that are to occupy the beds during the summer. Sub-tropical

plants may be put out now, as the weather will be sufficiently warm for all kinds of half-hardy plants. Water liberally in the event of hot and dry weather. Herbaceous borders will need much care, as a number of plants will require staking, and others cut down, as they cease flowering, to make room for those which tend to spread.

The rose-garden will now be gay, but when the flowering season is past the beds look untidy, unless something be planted amongst them. Gladiolus started in pots may be turned out here, as they make a grand display during the autumn season. Any shrubs which have been used for forcing may be turned out. Cut down *Deutzia gracilis* to cause it to make new growth. Dahlias and other tender plants ought not to be planted out till all danger of frost is at an end, for if once cut down they will not grow satisfactorily afterwards. Keep the grass cut short, and see that neatness prevails everywhere.

JULY.

PLANT-HOUSES.

Orchid Houses.—Many Cattleyas will still be in bloom, among them being *C. Gaskelliana*, *C. Warneri*, *C. gigas*. While they are flowering it will be necessary to keep them well supplied with water, for at this warm season of the year the flowers would soon fade if they were allowed to get dry. When flowering is over, less water will be needed. At the same time they must not be allowed to dry up in the heated atmosphere. Air should be freely admitted at all times during this month, but cold draughts at night must be avoided. *Laelio purpurata* and some others of that class will need looking over, and if any require potting, this should be done. Dendrobiums in full growth must be freely supplied with water, both at the roots and overhead. They should also be kept in a high temperature. Close the house early so that the thermometer may indicate 90° to 100° F. with the sunshine. Odontoglossums should be kept as cool as possible by a free circulation of air. Plenty of moisture on roots, paths, and stages alike must be given, with shade constantly when the sun is bright. When available use rain-water for syringing, as this does not discolour the leaves. Calanthes, Phaius, and others with large leaves will need plenty of water with a high temperature to promote as free growth as possible, for unless this is made

during bright sunny weather, it is often necessary to use increased fire-heat in autumn to mature the growth. If insects of any kind make their unwelcome appearance, they should be promptly dealt with by either dipping the plants in soft-soap solution or by sponging, taking care not to injure the tender foliage.

Hothouse.—As the heat increases, considerable attention will be requisite to keep insect pests in check, as they increase and multiply exceedingly fast. Mealy-bug is one of the most obnoxious of these that the gardener has to contend with, but every effort should be made to eradicate it. Thin out and regulate shoots of *Clerodendron Balfourianum*, *Stephanotis*, and other stove climbers that they may not become overcrowded. Where plants for table decoration have to be grown to a considerable extent, a suitable selection of these should be made and put forward for the purpose. By potting them now they will become well established by autumn, so that there will be less risk on removing them to a lower temperature. Plants for this purpose should be allowed plenty of room, that they may be thoroughly developed. *Cocos Weddelliana*, *Cyperus alternifolia variegata*, *Aralia Veitchii*, *A. V. gracillima*, *Asparagus plumosus nana*, Crotons of sorts, *Dracena gracilis*, *D. rubra*, and others of like character, *Eulalia japonica*, *Caladium argyrites*, *Pandanus Veitchii*, *P. javanicus*, small plants of *Ardisia*, and other berry-bearing species. Seed of the Common Asparagus may also be sown in pots to supply greenery during the winter months.

Intermediate House.—Celosias, Cockscombs, Toreneas, and various other free-flowering plants of similar nature that are grown for the object of furnishing the conservatory, should be potted on as they require it, and fresh seed should be sown to provide plants to take the place of those which have finished flowering. Gloxinia plants in flower should be kept well shaded from the sun, and any varieties that it is thought desirable to increase should have some of the best leaves removed for this purpose. If these leaves have the main ribs cut through with a sharp knife, and are then pegged on the surface of pans filled with a mixture of finely-sifted peat and sand, afterwards being plunged into a moderate hot-bed, they will soon form corms. These, by the end of the season, will have grown large enough to make strong plants the following year.

Achimenes and Gesneras should be staked as growth proceeds to prevent them bending down.

Greenhouse and Conservatory.—Most of the hard-wooded plants will by this time have completed their growth, and may be stood in shaded situations out of doors, where they will thrive far better during the next three months than under the heat of a glass structure. Their places may be occupied by some of the more tender flowering plants, or for growing on Fuchsias, Balsams, *Campanula pyramidalis*, tuberous-rooted Begonias, and similar things for decorating the conservatory, as it will be necessary to make frequent changes in the latter structure at this time of the year, if it is to be kept tidy, for, owing to the heat, flowers soon fade, and on that account necessitate constant removals.

PITS AND FRAMES.

This is a good time to layer Perpetual Carnations for winter flowering. If the pots can be plunged to their rims in an old hot-bed, and plenty of room allowed between them, so that the shoots can be brought down and pegged into the soil, they will soon take root. When layered they should be well watered, and afterwards covered with the lights and shaded from the sun. Plants rooted from cuttings in early spring will need potting on, and either standing on a bed of ashes in the open, or in a cold frame, where they can be protected in case of heavy rain.

Mignonette for winter flowering should now be sown. If the weather be hot and dry, shade till the seedlings appear above the soil. Zonal Pelargoniums for winter flowering should also be put into their permanent pots, and afterwards stood on a bed of ashes in the full sunlight. Heliotropes, Bouvardias, Primulas, and Cinerarias will need attention, as the plants become sufficiently large to be shifted, for if they are permitted to get pot-bound, they seldom make much further progress. Cuttings of *Hydrangea hortensis*, Otaksa, and Thomas Hogg, should be inserted in cold frames to supply plants which will flower early in spring. Pot on Eupatorium, *Linum trigynum*, and other plants of similar habit for winter blooming. Sow seed of Cyclamen and Calceolaria where early plants are required.

FLOWER-GARDEN AND PLEASURE GROUND.

Make another sowing of Sweet-peas at the commencement of the month to give a late supply of bloom, also sow seed of Brompton, East Lothian, and other Stocks, various herbaceous plants, such as Aquilegias, Delphiniums,

Polyanthus, Antirrhinums, Violas, *Campanula pyramidalis*, &c. Cuttings of double Wall-flowers, Pinks, &c., should also be inserted now. Lift Anemones, Narcissus, and other roots and bulbs as their foliage dies down. Many plants in this department will now be revealing their flower-spikes, and will therefore need staking and tying to prevent them being blown about. Commence budding Roses towards the close of the month. It is not advisable to begin too soon, however, in forward districts, as the buds often start into growth, and on that account are sometimes killed if severe weather follows. Cuttings of the half-ripened wood will root freely at this time of the year if inserted under hand-lights, or in cold frames behind a north wall, where there is but little sun. Flower-beds will now require constant attention, for if the weather is dry, frequent and copious waterings will be necessary. Peg down and pinch any plants growing out of character; remove all dead flower-stalks to preserve a tidy appearance. Some of the stronger-growing plants, as Hollyhocks, Dahlias, Helianthus, &c., would be greatly benefited by being watered with liquid manure. Most of the sub-tropical plants will be making rapid progress, and will therefore require looking to. Run the hoe through the beds and amongst the plants to keep down weeds. Mow lawns and edge walks; trim and tie creepers as growth proceeds, in order to prevent them being broken off by high winds.

AUGUST.

PLANT-HOUSES.

Orchid Houses.—A number of the plants in these houses will now be in active growth, and for this reason must be kept warm. Among these may be mentioned those of the *Phalænopsis* family, which require a warm, even temperature. *Dendrobiums* will still demand plenty of heat and moisture. The house may be damped down with manure-water, using the same for the evaporating troughs. Keep a sharp look-out for thrips, which are very destructive to the young foliage. If any of the weevils are found cut away the parts affected at once and burn them, as nothing does more harm to *Dendrobes* than these minute creatures. *Odontoglossums* of the crispum section will generally have gone out of flower, and some will be starting to develop new growth. Any that require potting should be attended to before new roots are formed, as

it is a great mistake to injure them by the process of transplanting to larger pots while in active growth. See that all pots and crocks used are quite clean. After potting shade the house a little more in bright weather, and keep the atmosphere closer for a short time, till the roots get active. *Odontoglossum vexillarium*, *O. Phalænopsis*, and some others of the same class, need a warmer temperature; from 60° to 65° at night suiting them admirably during this month. Keep up plenty of humidity in the atmosphere by constant damping down, and keep a sharp watch for red thrips, which finds its way into the young sheaths. *Epidendrum vitellinum majus* and some others will be improved by potting now. They should be grown with the cool *Odontoglossums*. *Lycastes* and *Maxillarias* will have completed their growth, so that they will need less water. The remarks that were given last month still apply to *Cattleyas*. When the nights are cold less air should be admitted, and a little fire-heat should be applied to cause a circulation of air.

Hothouse.—*Poinsettias*, *Euphorbia jacquiniæflora*, *Amasonia punicea*, and other winter-blooming plants, should be exposed to the sunlight for the purpose of ripening their shoots. This is a good time for potting *Anthuriums* in order that they may be well established before their flowering season comes round. *Begonias* of the section flowering in winter should also be potted on, and kept near the glass, to encourage a sturdy habit. As *Caladiums* finish their growth give less water, but do not dry them off too rapidly.

Where any palms need to be potted, perform the work during the current month so that they may become well rooted before the winter approaches. Ferns should also receive attention; particularly a batch of *Adiantums* for winter decorations should be potted into pots of a size larger, and seedlings should be pricked out into pans or pots for spring use. Take cuttings of *Coleus* and other plants of a tender nature, and root them in gentle heat so that they may grow bushy.

Greenhouse and Conservatory.—When the foliage of hard-wooded plants has grown firm, and before they are taken indoors, is a good time to look over them and rid them of insect pests. They may for this end be laid down on their sides, and washed with the garden engine or syringe, taking care to cleanse the under sides of the leaves. If they have two or three similar dressings they will be freed from insect plagues. Cuttings of show and fancy *Pelargoniums* that

were put in last month will be ready for potting. When doing this choose a light, rich soil; do not over-pot, and use plenty of drainage material. Afterwards stand the plants in a cold frame or on the greenhouse shelf. Fuchsias may also be rooted now to give a supply of young plants for early display. *Rochea falcata* will now be in flower. When the flowers are over take off all young growths for cuttings, and insert them in a light, sandy soil; then put them on a dry shelf till rooted. Cactuses will have completed their growth, and therefore will need less moisture. These plants thrive with abundance of air and a dry atmosphere. There will still be a sufficiency of plants in flower for decorating the conservatory, as, for example, *Lilium lancifolium*, *Hyacinthus candicans*, Gladioli, Hydrangeas, Balsams, and many other plants of like character raised from seed; as these finish flowering fresh specimens should be introduced to keep up a gay appearance. As the nights get longer there will be more moisture in the atmosphere, therefore it will be necessary to guard against the damping off of flowers. To avoid this ventilate freely on all favourable occasions, and do not water in the evening in damp weather. Much mischief is often done among flowers by keeping the air too humid. A cool, dry, airy place, shaded from the sun, is most suitable for nearly all occupants of the Conservatory while in bloom.

PITS AND FRAMES.

These structures will now be in great demand for the propagation of plants for bedding purposes. If *Pelargonium* cuttings are put in early there is not so much risk of their damping off in winter as when they are left till next month before the cuttings are taken. The young plants become well rooted, and consequently can absorb more moisture. Frames will also be required towards the end of the month for the protection of the more tender plants and bulbs, such as Freesias, Belladonna Lilies, Nerines, Tuberoses, and Vallota. As all these plants, excepting the first-named, flower in the autumn and winter, it will be requisite to cover them with lights in wet weather. Early Roman Hyacinths, Polyanthus Narcissus, and the earliest kind of Tulips should be potted and covered with ashes. If they can be plunged in a frame it will be so much the better, as they can then be had in bloom very early without forcing. Viola and other cuttings of herbaceous plants should be inserted so that roots may be formed before winter. Attend to previous remarks

about Hydrangeas, Marguerites, Primulas and Cinerarias, Calceolarias, &c.

FLOWER-GARDEN AND PLEASURE GROUND.

Outdoor work during this month is very heavy, so many plants requiring attention. Layer border Carnations at the beginning of the month. Transplant all seedlings of herbaceous plants that were sown last month. Cuttings of Pentstemons, Antirrhinums, and some of the Phloxes may also be taken. About the middle of the month sow annuals for spring bedding, such as *Saponaria calabrica*, *Limnanthes Douglassi*, Virginian Stocks, *Lasthenia californica*, *Nemophila insignis*, *Alyssum saxatile*, *Silene pendula*, Myosotis, &c. Cuttings of choice alpine should now be inserted, as they will then make strong plants by next spring.

Violets for flowering in frames during winter should have liberal waterings with liquid manure to induce them to make plump crowns. Gather lavender and everlasting flowers where they are required for indoor use. Pay attention to staking and tying all herbaceous and other tall-growing plants. Lawns will now need constant attention, for the grass will grow apace; walks must be edged, and the weeds kept down. Flower-beds should have all the dead flowers removed. There is far more pleasure to be derived from a small place well kept than from a large one in a neglected state. Look to drains, and see that they are clear, or heavy thunderstorms may do considerable damage if the water is unable to get away. Shorten the shoots of Laurels, Hollies, and other evergreen shrubs that have grown too large for their position. Hoe and rake borders to keep weeds in abeyance.

SEPTEMBER.

PLANT-HOUSES.

Orchid Houses.—Many of the Dendrobiums will now have reached maturity, therefore they will not need so much water, but will want more air in proportion to ripen their bulbs. If plants of *D. nobile*, *D. crassinode*, *D. Wardianum*, *D. heterocarpum*, and *D. Pierardi* be removed to a cooler house when growth is thoroughly ripened, they will flower much more profusely than if left in the house where others are still in active growth. *D. chrysanthum* will now be in flower. As soon as the flowering period is past, repotting or surface-dressing should be

done, as growth commences immediately afterwards. Towards the end of the month shading may be dispensed with, as the sun has not sufficient power so late in the year to do harm. Some of the early spring-flowering *Cypripediums* should be looked over, and if any need potting this should be done before the days get too short or the temperature cold. If the plants are robust, a mixture of good turfy loam and cow-dung may be used, if the former can be obtained from ground containing a small percentage only of lime. For the more delicate kinds use peat, covering the surface of the pots with living Sphagnum. Most of the *Vandas* belonging to the tricolor section may now be potted with safety. These plants are apt to become leggy if left alone too long, therefore their stems should be shortened and the roots brought nearer to the pots. This class only requires something to steady their stems; so that if clean crocks and charcoal are used, covering the surface with a little peat and Sphagnum, it will be sufficient. The plants will need but little water at the roots, as the necessary syringing will keep them well supplied with moisture. They should be kept under a temperature of from 65° to 70° at night for the present, with a corresponding rise in the daytime, according to the weather. *Lælia anceps*, *L. albida*, and *L. autumnalis* will now be showing their flower-spikes, and should be kept still in a moist state. Most of the *Cattleyas* will by this time have finished growth, so that watering must be done carefully. *Cælogyne cristata*, *Sobralia macrantha*, *Cymbidium Lowianum*, and some others will still need good supplies of water, and if a little liquid manure could be added to assist them to finish their growth, this would be very beneficial. As all plants mature their growth they should be gradually hardened off, so that they may be the better able to withstand the winter. There are, however, many species still in active growth which will need particular care.

Hothouse.—Many winter-flowering subjects in these structures will now need special attention, in order to induce them to produce their blooms at the time required. *Centropogon Lucianus*, *Eranthemum Andersonii*, *Ruellia macrantha*, *Plumbago coccinea*, *Poinsettias*, and the winter-flowering *Gesneras* should be exposed to the sun as much as possible, so that their shoots may reach their full development. *Caladiums* should be thoroughly dried off, and when all leaves have fallen the pots may be stored away under the stage, but do not remove them into a lower temperature than 60°. *Gloxinias* may

be removed to a house in which the heat does not fall below 50°. If allowed to remain in the warm stove the bulbs will shrivel, or will, if moisture is afforded, recommence growing. *Ixoras*, *Crotons*, *Dracenas*, and other plants should be kept free from insects. *Gardenias* and *Eucharis* for winter-flowering should have liberal treatment, with plenty of heat, the temperature being maintained at 70° by night, with a rise of 10° in the daytime. Towards the end of the month all shading may be abandoned, unless it be in the case of newly-potted seedlings or other plants having but little root.

Greenhouse and Conservatory.—A goodly quantity of *Mignonette* should be sown during this month—one lot at the commencement, and another towards the latter end. *Chrysanthemums* will demand special care, including disbudding and protection from frost. Water must be given abundantly, if the weather be hot and dry, as sometimes is the case, in the early part of the month. This sometimes occurs, however, in conjunction with frosty nights, when it will be found necessary in low damp places to house them early. The first batch of *Zonal Pelargoniums* plunged in ashes should be housed, as should also the earliest set of *Perpetual Carnations* and *Bouvardias*. Advantage should be taken of the present opportunity, before many of the hard-wooded plants are taken in, to prune and tie all climbers, such as *Passifloras*, *Jasminum grandiflorum*, *Clianthus*, *Tecomas*, *Stauntonias*, and *Clematisses*. These should have their shoots thinned out and cut away, and after the glass has been washed most of the hard-wooded species may be housed. *Teas* and other climbing *Roses* may also be pruned, and the border should be top-dressed with rich loam and decayed manure.

PITS AND FRAMES.

Pot off *Malmaison* and other winter-flowering *Carnations* that were layered, as advised, last month. Take up *Solanum capsicastrum*, *Callas*, *Bouvardias*, and other winter-flowering plants and pot them afterwards, standing them on a bed of ashes in cold frames, shaded from the sun. *Cinerarias* will also benefit by being shifted into larger pots before they become pot-bound. See that they are shaded from the bright sun, and ventilate freely. Push forward the propagation of all plants required for bedding, as *Heliotropes*, *Coleus*, *Alternanthera*, *Iresine*, *Ageratums*, &c. A good quantity of the scented varieties of *Pelargoniums* should also be put in, as they are very suitable for cutting.

Violets for winter flowering must be put into their permanent positions not later than the middle of the month. This will ensure their getting firmly established while there remains sufficient heat in the soil to induce the formation of young roots. Herbaceous Calceolarias sown last month will now be large enough for pricking out. The sooner this is done the better, to prevent the plants from damping. Tuberoses which have been reared in pits or frames in the summer should be taken into the greenhouse as their flower-spikes appear. Cyclamen should be potted on for a succession, and towards the end of the month another sowing may be made.

FLOWER-GARDEN AND PLEASURE GROUND.

Proceed with the propagation of hardy border plants such as *Iberis*, *Helianthemums*, *Lithospermums*, *Dianthus*, *Phloxes*, &c., by taking the young side-growths and inserting them in sandy soil in a cold frame. Where not already done take cuttings of *Violas* for spring flowering, also *Pentstemons*, *Antirrhinums*, &c., for the sooner these are rooted the more surely will they withstand the winter.

Pay attention to tying and staking plants in the herbaceous border that still keep in bloom or have not yet flowered, as the strong winds generally prevalent are apt to break them down. Bulbs of all kinds may be planted when the ground is vacant, but as most beds will still be occupied this may be deferred till next month. Grass on lawns usually grows luxuriantly this month, weeds accumulate rapidly, and leaves are also troublesome; but for the sake of appearances all must be so attended to that the garden may be kept neat and orderly, and thus give rise to a sense of pleasure.

OCTOBER.

PLANT-HOUSES.

Orchid Houses. — As the sun is on the wane, and the outside temperature becomes daily cooler, greater care must be exercised in supplying water to most of the inmates of these houses. A great number of *Cattleyas* will be at rest, and those which have not yet completed their growth will not, owing to the reduced temperature, require so much water as those growing during the height of summer. All *Dendrobes* which have made their year's

growth should have a drier temperature, but such kinds as *densiflorum*, *Farmeri*, *thrysiflorum*, *Hilli*, and others with persistent foliage should not be subjected to a lower temperature than 50° to 55° Fahr.; while such as *Wardianum*, *Findlayanum*, *nobile*, *Ainsworthii*, and other members of that section may be wintered in a house whose atmosphere sometimes falls as low as 45° Fahr. There are not many *Orchids* in flower in October, but *Dendrobium Phalaenopsis*, *D. P. Schroederianum*, and a few more will be developing their flower-spikes, and will require special attention. *Vanda Amesiana*, *Oncidium tigrinum*, and some few others will still be in bloom. *Zygopetalums* should be examined for thrips, which are very fond of the flower-buds that will shortly be expanding. *Calanthes* must be watered sparingly, and the air of the house in which they are growing should be kept rather dry. The present is a favourable opportunity for giving the *Orchid* houses a thorough wash down before winter, as many of the *Dendrobes* and other species are dormant in cooler houses. Remove all shingle, gravel, shell, or whatever the stages may be covered with, and wash it in boiling water. This process will destroy any insects which may be lurking in it, and also remove any soil which may have been washed out from the pots.

The temperature of the East Indian houses may be reduced to 65° at night, with a proportionate reduction in the daytime. That of the intermediate house should be 60°, and the cool house 50° to 55°, according to the weather. With this reduction of heat there should be a corresponding diminution in the amount of moisture.

Hothouse. — Cuttings of *Croton* and other hard-wooded, fine-foliaged plants may still be propagated where a good deal of heat is available. Those rooted now will make nice plants for early spring use. Towards the end of the month cut back *Allamandas* to within three or four eyes of the preceding year's growth. We do not recommend drying off, but rather the reverse. Various other stove climbers and deciduous plants should now be gradually ripened off, so that they may have a rest for the following two months. *Hothouse* plants in flower are not numerous. There are, however, a few with brightly-coloured flowers which will be expanding their blooms, including *Poinsettias*, *Plumbagos*, and *Lasiandras*. These should be afforded a little more heat, and fully exposed to sunlight. As the days decline the heat of these houses should be gradually lessened to 65° by night,

places they grow freely, the colour of the blossoms becoming more intense, and the plants remaining a longer time in flower. They display their beauty either in the fronts of large shrubberies and plantations or on the sides of a carriage-approach to a mansion, and when distant effect is required, no plant so

admirably answers that end, as their size and the brilliancy of their colours render them visible at a greater distance than any other flowers. They are also most imposing in large beds. *Narcissus* may be planted with good effect amongst them to give early flowers in spring, and *Gladiolus* also do well amongst

Fig. 589.—Tree Pæony.

them to give bloom in the late summer months; as centre plants in small beds they make grand objects also. They are invaluable for cut-bloom, and if gathered in a young state, when only a few petals show, they keep for a week in water. The plants are perfectly hardy, and it is difficult to kill them; they withstand any amount of cold or heat, and no vermin, insect, slug, blight, or mildew attacks them; they grow in any soil, but they well repay for deep trenching of the land and manuring highly, and watering in dry weather. Mr. William Kelway, about twenty-five years since, got together all the known species, and hybridized them with great success, raising scores of new kinds, both double- and single-flowered, some of them being scented with Violet or Rose-like perfumes. The leaves are useful in autumn for decoration. The young shoots in spring are coloured rich reddish-brown, changing as they mature to bright green, again assuming rose-red or purple-brown tints in autumn.

VOL. I.

The best double varieties of the herbaceous section are:—

Admiral Dewey, Cyclops, Dr. Bonavia, Duchess of Somerset, Duke of Devonshire, Ella Christine Kelway, Emperor of Russia, Galtee More, Geraldine, Glory of Somerset, Lady Bramwell, Lady Carrington, Langport Queen, Limosel, Lord Beresford, Maria Kelway, Mrs. Chamberlain, Mrs. Gwyn Lewis, Peter the Great, Prince Henry of Battenberg, Prince of Wales, Waterloo.

The best single varieties are:—

Alton Locke, Calliphon, Cherry Ripe, Countess of Warwick, Diadem, Dorothy, Duchess of Sutherland, Emily, Hesperus, Lady Wimborne, Meteor, Millais, Mrs. J. Gundry, Queen of May, Sirdar, Stanley, The Czar, Tinted Venus, Viscount Cross.

[W. H. K.]

Pelargoniums.—The origin of the garden races of *Pelargoniums* (including what are popularly known as *Geraniums*) appears to be largely due to accident rather than design. The four sections, viz. Show, Fancy, Zonal, and Ivy-leaved, each containing large numbers of varieties, are the result of cultivation and

selection extending over a period of at least a century, and new varieties are added yearly by Messrs. Cannell of Swanley, Lemoine of Nancy, Bruant of Poitiers, and others. About 700 varieties were awarded certificates by the Royal Horticultural Society in the period between 1860 and 1890.

Much information concerning the early sorts can be obtained from Andrews' *Monograph of the Genus Geranium* (1805), which contains beautifully-drawn coloured figures of the principal species and varieties then in cultivation. The accidental crossing of one sort with another evidently occurred in Andrews' time, who says: "The introduction of the African species within the last twenty years from the Cape of Good Hope, whose prolific character seems to know no bounds in the production of endless seminal varieties, which, Proteus-like, appear in ever-varying forms, and for which numerous variations we are indebted to the industrious bee, which conveys the pollen from one plant to another". Sweet's *Geraniaceæ*, a work of five vols., published 1820-30, containing 500 coloured portraits of Pelargoniums, nearly all of garden origin, gives much information as to their early history in the garden. About 170 species are known. They are nearly all natives of South Africa. Except in botanical collections they are not recognized garden plants.

The four races or sections of Pelargonium are quite distinct from each other, and except in one instance they have refused to interbreed, the exception being the Zonal and Ivy-leaved sections, an accidental cross between the two having been secured by M. Lemoine about twenty-five years ago.

ZONAL PELARGONIUMS.

This section includes the bedding or scarlet Geranium, Bicolor, Tricolor, and Gold Geraniums, and the highly-developed Zonal proper, usually grown for the greenhouse and conservatory in winter. They are all supposed to be descendants from *P. zonale* and *P. inquinans*.

Cultivation.—Cuttings of these may be struck at any season of the year. If, however, good pot-grown plants are desired, cuttings put in in February are to be preferred, as they start into growth immediately, and form dwarf stocky plants by May, when it will be safe to keep them in a frame to be grown on for flowering from October on through the winter. When their flowers are about over, the plants should be rested in a cool house for a few weeks, keep-

ing them dry. This drying process tends greatly to sweeten the soil. The following February or March these plants should be cut back, this process providing the needful stock of cuttings for the spring strike. When they have broken into fresh growth, they should be

Fig. 590.—Zonal Pelargoniums

reotted, reducing the balls sufficiently for them to go back into the same size of pot. Later in the season, as summer advances, these older plants will require another shift. When well established, they will prove useful to follow the Show and Fancy sections in the conservatory. Full exposure to light and air is a *sine qua non* in Pelargonium culture; without this the stocky habit so much desired cannot be had.

The stock for late or winter flowering should be stopped up to the end of August, whilst at no time previous to this should any flowers be allowed to develop. When coming into flower, they need a slight warmth, say 45° to 50° as the minimum, with a free circulation of air to keep down any symptoms of damp. These winter-flowering plants require careful watering, not nearly so much being needed as for the plants that flower earlier in the year. Weak doses of artificial manure, alternately with farmyard liquid given weekly, will assist the plants.

As a variation, a stock of these Zonals will, if grown as standards, serve a distinctly good purpose for grouping with other plants of dwarfer growth. It will probably take two seasons to obtain a stem of say 3 feet in height with a little head as a start. These in another season or two will have formed good heads. The balls of standards ought to be slightly re-

Fig. 591.—A good example of a pot-grown Zonal Pelargonium in November.

duced every spring, otherwise they will get into too large pots.

The soil for Zonals should be of turfy loam and leaf-mould. If, however, the latter fails, use a little peat instead, with silver sand in any case as an addition.

Double Zonals for Pots.

- Emile de Girardin.* Rosy-pink.
F. V. Raspail. Crimson-scarlet, good habit.
F. V. Raspail—Improved, flowers and trusses larger than type.
Gloire de France. Salmon and white.
King of Denmark. Rosy-salmon.
Le Cygne. White, good truss, large full flower.
Madame Lemoine. Clear-pink.
Turtle's Surprise. Crimson.
White Abbey. White, dwarf, spreading habit.

Single Zonals for Pots.

- Amy Amphlett.* White.
Charles Maison. Scarlet, fine, very large trusses.
Duchess of Portland. Rosy-pink.
Gertrude Pearson. Pink.
H. Cannell, Junr. Crimson, white eye, flowers large and full.
H. H. Crichton. Crimson, white eye.
Ian Maclaren. Salmon.
International. White.

- Inverness.* Salmon.
John Milton. Scarlet, white eye, large and full, free.
Kate Farmer. Salmon.
Katherine Moreton. Salmon.
Lady Chesterfield. Deep-salmon.
Lady Churehill. Salmon, fine form.
Lady Reed. White, and salmon centre.
Lord Tredegar. Dark-crimson.
Madame Jules Chretien. Scarlet, light centre.
Mademoiselle Trine. Soft rose-magenta, large trusses.
Mr. H. J. Jones. Purple.
Mrs. D. Saunders. Pink, shaded.
Mrs. E. Rawson. Orange-scarlet, very free; large trusses.
Mrs. Gordon. Dark-crimson.
Mrs. Gordon Lindsay. Salmon.
Mrs. Pole Routh. Shaded salmon.
Mrs. Robertson. Pink.
Norah. Soft blush, extra fine.
Opal. Shaded salmon.
Phœna. Crimson, shaded.
Queen of the Belgians. White.
Royal Purple. Purple, good habit, splendid trusses.
Rudyard Kipling. Purple.
Sir H. Irving. Rose-magenta, large, free; dwarf habit.
Snowdrop. White.
T. Hayes. Bright-crimson.
Titania. Crimson, with white eye.
W. Bealby. Rosy-scarlet.
Golden Tricolor.—Achievement, E. R. Benyon, Lady Cullum, Louisa Smith, Masterpiece, Mr. H. Cox, Mrs. Pollock, Mrs. Turner, Prince of Wales, Queen Victoria, Sophia Dumaesque, Victoria Regina.
Silver Tricolor.—Charming Bride, Dolly Varden, Imperatrice Eugenie, Lass of Gowrie, Mrs. John Clutton, Mrs. Laing, Mrs. T. A. Dickson, Prince Silverwings, Princess Beatrice, Proteus.
Gold and Bronze.—Black Douglas, Bronze Queen, Emperor of Brazil, Golden Harry Hieover, Her Majesty, Imperatrice Eugenie, Lulu, Mrs. Harrison Weir, Mrs. Lewis Lloyd, Prince Arthur, The Dragon, The Shah.
Silver Variegated.—Bright Star, Flower of Spring, May Queen, Mrs. Kingsbury, Princess Alexandra, Waltham Bride.
Yellow-leaved.—Cloth of Gold, Crystal Palace Gem, Golden Fleece.

SHOW AND FANCY PELARGONIUMS.

The large-flowered or Show varieties (fig. 592) are the progeny of *P. cucullatum* and *P. grandiflorum*; the parentage of the Fancy varieties appears to be unknown. Although not so popular as formerly, they still have many admirers, large specimens being not unfrequently seen at provincial flower-shows. Mr. Turner of Slough is one of the principal growers of this section, plants 5 feet in diameter bearing 150 trusses of flowers being produced by him in about four years from cuttings.

Culture and Propagation.—Cuttings formed of well-ripened stocky growths from below the flowering wood; if inserted early in July in

sandy soil in a frame or on a shelf in a greenhouse, should be well rooted and fit for potting into 3-inch pots by the first week in September. They should be kept in a greenhouse, as near the roof-glass as possible, for the winter. Early in the spring they will be fit to place in 5- and 6-inch pots for flowering. As soon as root-action

Fig. 592.—Show Pelargoniums.

is again active, they should be stopped to form dwarf compact plants, once only if to flower in May, twice if not required until June or July. These plants will be better than older ones to grow on for the next season. After they have flowered, they should be stood in a sunny position in the open until the cuttings have been taken, then lay the plants on their sides to ripen. Early in August these plants should be cut back severely and near to the first stopping, and placed in a frame, giving no water except a daily syringe, until the plants have broken into fresh growth. They should then be repotted, reducing the balls sufficiently to get them into a size smaller pot. In spring they will require shifting into 6- or 8-inch pots, stopping being again attended to as advised. Those plants that are wanted in flower in March or April

should not be stopped during the winter, unless the growth is well advanced.

Forcing, for early flowers, should be done in a warm, light house, the plants being hardened off previous to the flowers opening. When in bloom they should be kept in a well-ventilated structure, or the flowers will soon fade. Liquid manure may be given when the plants are well established in their last shift. It is always safer in the winter to keep the plants fairly dry at the roots until quite active growth is in progress. The compost recommended by Mr. Turner is good yellow loam, well-rotted stable manure, bone-meal, coarse sand, and charcoal. For ordinary purposes, two parts of loam to one part of leaf-soil answers very well.

LIST OF VARIETIES.

Show.

- Achievement.* Orange-scarlet, upper petals maroon, white centre.
- Blue Beard.* Light-purple.
- Claribel.* Pure-white.
- Conspirator.* Rosy-salmon and maroon, light margin.
- Curtius.* Dark-crimson.
- Duke of Norfolk.* Crimson-scarlet.
- Eclipse.* Dark-rose.
- Emperor.* Light-pink.
- Example.* Deep-crimson.
- Excellent.* Light-crimson.
- Favourite.* Red and maroon.
- Heirloom.* Rich-rose.
- Indian Yellow.* Orange-salmon.
- International.* Bright-rose.
- Joe.* Rosy-purple.
- Mabel.* Dark-maroon above, clear narrow margin, rich.
- Magnate.* Fine dark.
- Maid of Honour.* Pink.
- Marguerite.* White and crimson.
- Martial.* Rich crimson-maroon above, bright margin.
- Miss Louisa Coombs.* Light-rose.
- Mrs. Coombs.* White and carmine.
- Orient.* Rose, shaded orange.
- Prelate.* Deep-purple.
- Prince Leopold.* Bright-scarlet.
- Prince of Orange.* Bright-scarlet.
- Princess Maud.* Bright-rose.
- Princess of Orange.* Deep-scarlet.
- Purpurea.* Rich-purple.
- Resolute.* Deep-rose.
- Royal Albert.* Rose.
- Royal Ascot.* Orange-scarlet.
- Sappho.* Cherry-rose, dwarf.
- Sister of Mercy.* Crimson-maroon.
- Souvenir.* Rosy-purple.
- Statesman.* Pale-rose.

Decorative.

- Alice.* Light spotted.
- Beauty of Oxtou.* White and crimson.
- Black Diamond.* Lilac-purple.
- Buffalo Bill.* Lilac, blotched carmine, extra large.
- Captain Raikes.* Crimson, edged white, dark blotch, double.

Comtesse de Choiseul. White.
Dr. Masters. Dark-maroon.
Duchess of Edinburgh. White, spotted.
Duchess of York. White and carmine.
Edward Perkins. Crimson-scarlet.
Emperor of Russia. Purple and maroon, banded white.
Empress of India. Rosy-scarlet.
Gold Mine. Orange-scarlet.
Kingston Beauty. White, spotted.
Lady Isabel. Lilac, free, large trusses.
La Ville de Cuen. Cerise.
Madame M. Knecht. White.
Madame Thibaut. Rich-rose, eye and margin white, fringed.
Magpie. White and purple spots.
Marie Malet. Carmine.
Master Richard. Deep-crimson.
Mr. Coombs. Pure-white.
Prince Henry. Crimson.
Purity. White.
Queen Victoria. Rich-vermilion, pale at margin, semi-double.
Radiant. Scarlet-crimson.
Rosetta. Rosy-purple.
Rosy Morn. Rosy-pink.
Spotted Beauty. Rose, dark ruby-red spots.
St. Blaise. Deep-crimson.

Fancy.

Ambassadress. Soft lilac-rose.
Delicatum. White and light rose.
Dorothy. White with carmine, margin prettily fringed.
East Lynne. Crimson-purple.
Ellen Beck. Soft carmine.
Fanny Gair. Rosy-lake.
Iona. Lilac-rose.
Lady Curzon. White and purple.
Lucy. Crimson and violet.
Medina. Dark, white eye.
Miss E. Little. Rosy-purple.
Mrs. Douglas. Rose and purple.
Mrs. Hart. Crimson-purple.
Princess Teck. White, carmine spots.
Queen of the Hellenes. White, rosy spots.
Roi des Fantaisies. Rosy-crimson.
Sir Hugo. Rich-crimson, dwarf.
Sybil. Rosy-crimson and white.
The Shah. Deep crimson-purple.
Thomas Ring. Carmine and white.

IVY-LEAVED PELARGONIUMS.

These are descendants from *P. pellatum* and *P. hederæfolium*. The wonderfully improved varieties recently raised are said to have had their origin in a chance cross between an Ivy-leaved variety and a Zonal variety, which was obtained in a garden in Nice by M. Jean Sisley. Since then others have made the same cross, and we have now a large number of beautiful varieties which are of the greatest value in the garden and greenhouse.

Cultivation.—As regards propagation and soil these require the same treatment as the Zonal section. A stock of these should be raised from cuttings every year, but instead of pruning them back for the next season it will be found better to grow them on, as they do not bear pruning nearly so well as the Zonals. Being of a semi-climbing or procumbent habit, they

Fig 593.—Ivy-leaved Pelargonium in Hanging Basket.

are excellent for training on screens or trellises, or as bushes with several sticks as supports. For covering walls or training up pillars in greenhouses or conservatories they are admirable, being of rapid growth. For hanging baskets or large vases, too, they are most effective (fig. 593).

LIST OF VARIETIES.

Anna Pfitzer. Salmon-rose.
Beauty of Castle Hill. Rose.
Edith Owen. Magenta.
Flambeau. Scarlet.
Galilee. Soft-pink.
Gloire de Lorraine. Light-magenta.
Jubilee. Reddish-crimson.

L'Elegante. White-edged foliage, flowers single.
Liberty. Light-magenta.
Madame Emilée Gallé. Pale-lilac.
Marguerite Jacquot. Rosy-pink.
Mrs. Cannell. Soft pale-lilac.
Mrs. Hawley. Bright deep-rose.
Old White. Single, for baskets.
Prince of Wales. Cerise.
Ryecroft Surprise. Salmon-pink.
Souvenir de Charles Turner. Deep-rose.
W. F. Dreer. Magenta-red.

SCENTED-LEAVED PELARGONIUMS.

These are mostly species or varieties modified more or less by cultivation. They are worth growing for the fragrance of their leaves alone, but many of them are also pretty flowering plants.

Culture.—Generally these require the same conditions and treatment as the Zonal and Ivy-leaved sections. They may be pruned as in the case of the Shows and Fancies, or grown on from year to year until they are too large. When large plants are grown, they are useful at all seasons, and as the shoots are at times cut for use in vases, it is not a difficult matter to keep them within bounds in combination with occasional staking and tying. Some of them are not by any means the easiest plants to manage—some being delicate growers, whilst others are vigorous for a time, and then go off suddenly. Firm potting keeps the plants sturdy, and is conducive to good health. The best time to repot any that require it is in the early spring, whether the balls be reduced or not. Immediately after repotting, close treatment for a short time will encourage vigorous root-action; the cool house is then the better place for them. Large shifts should be avoided; indeed plants which have not been repotted for three or four years will continue in good health if cared for as advised in winter. Active growth takes place in June, when an occasional watering with sulphate of ammonia, a table-spoonful in a three-gallon can of water, will benefit them. Three doses during the season will be ample. The best position for them is in the open air, in full sunshine, from the end of May until the end of September. The foliage of the highly fragrant varieties is excellent for use as *pot-pourri* when well dried.

LIST OF VARIETIES.

Strong Growers.—Capitatum (rose-scented), * Purple or Rollison's and * Scarlet Unique, quercifolium (true oak-leaf), radula (balsam-scented), tomentosum (peppermint-scented), viscosissimum, vars. Pheasant's-foot and Fair Helen.

Medium Growers.—* Ardens (scarlet flowers), Attar of

Roses (scent indicated), filicifolium odoratum (Fern-leaf), fragrans (Nutmeg-scented), graveolens, var. * Pretty Polly (Almond-scented), Lady Plymouth (variegated), Mrs. Douglas (dark-zoned), * quercifolium minor (small Oak-leaf), * Shottesham Pet (Filbert-scented).

Small Growers.—Citriodora, * Countess of Devon (a miniature "Fancy"), crispum (Lemon-scented), denticulatum major, Lady Mary (small foliage), * Prince of Orange (free-flowering), Prince of Orange (variegated), radula, var. * Little Gem (very compact).

* Denotes varieties useful also as flowering-plants. The best sorts for cutting purposes are capitatum, radula, Attar of Roses, fragrans, Lady Plymouth, crispum, and Little Gem.

[J. H.]

Pentstemon (fig. 594).—Few hardy plants have been so much improved during the last twenty years as the Pentstemon. By crossing

Fig. 594.—Pentstemon.

and selecting from *P. Hartwegii*, *P. gentianoides*, *P. Cobaea*, and others, florists have obtained a race of hardy border plants, remarkably floriferous, large-flowered, and very varied in colour.

Cultivation.—Garden Pentstemons succeed well in any good soil, but a deep and rather moist sandy loam is best. If occasionally dressed with manure and leaf-soil, they produce enormous spikes of beautiful flowers throughout summer and autumn. They can be grown in masses in beds, in groups in the herbaceous

border, or in the flower-garden to form a centre to large beds, or mingled with some other suitable plant.

Cuttings formed of barren shoots will strike at almost any time of the year, the best time being August or September; the softer the wood, the more readily do the cuttings root. Leafy shoots 4 inches long should be taken, cut just below a joint, and inserted in light sandy soil, well drained, and in pots or pans in a cold frame. Or they can be put in a warm border and covered with a hand-glass, shading them from the sun. Plants that have remained out all the summer will often live through the winter in the open border, especially if some ashes are placed about the roots by way of affording protection in severe weather.

Seeds saved from a good strain generally yield a large percentage of equally good varieties. They should be sown in shallow boxes of good light soil in February or March in a gentle bottom-heat, where they soon germinate. When the seedlings are large enough to handle, they should be pricked off into other boxes and kept in heat for a time, hardening them off before planting them in prepared beds in May or June. Plant them about a foot apart each way in good soil, and in dry weather occasional watering at the roots will keep them growing. If extra strong plants are required by May, seed should be sown in August, and the plants grown in a frame through the winter.

SELECT NAMED VARIETIES.

- Adonis*. White, suffused with lilac.
- Alfred Richet*. Bright-vermilion, white throat.
- Archibald Colquhoun*. Crimson and white, veined purple.
- Argou*. Bluish-purple, white throat.
- Berlio*. Violet-purple, white throat.
- Bridesmaid*. Large, pure-white.
- Charles Street*. Pale-lilac, veined crimson.
- Compacta*. Scarlet, purple, and white.
- Conspicua*. Violet-purple and white.
- David Wood*. White shaded purple.
- Eclipse*. Purplish-crimson, blotched chocolate.
- Floribunda*. Blood-red, white throat.
- George Ulrich*. Scarlet, white throat.
- Henry Lister*. Rosy-purple and white, marked crimson.
- Jean Mace*. Scarlet, white throat.
- Le Niagara*. Creamy-white.
- Mont Blanc*. Pure-white.
- Mrs. Bosanquet*. Purplish-crimson.
- Serenade*. White shaded lilac.
- Surcouf*. Carmine-lake, with chocolate markings.
- Tissandier*. Rosy-carmine and white, spotted crimson.
- Victor Hugo*. Dark-lilac, white throat, spotted purple.
- William Fowler*. Rosy-lilac, white throat.
- William Lumley*. Bright-red, pencilled chocolate.
- W. M. Baillie*. Bright-scarlet, white throat.

Phlox (fig. 595).—The popular perennial border Phloxes are said to be the outcome of a cross between *P. paniculata* (*decussata*) and *P. maculata*, the former with tall, erect unbranched stems, ovate-lanceolate leaves, and large terminal panicles of lilac, purple, or white flowers;

Fig. 595.—Phlox.

the latter with shorter stems, spotted with purple, the panicle of flowers narrower, the flowers fragrant, purple or white. Their progeny are popularly known as forms of *P. decussata*. Many named sorts have been raised, chiefly by M. Lemoine, Mr. Kelway, and Mr. John Forbes, and new ones are added annually. They vary in height from 1 foot to 3 or 4 feet, and there is considerable range of variation in the colours of the flowers, and also in the shape of the leaves.

Although these plants are not particular as to soil, they pay for good cultivation. They are too often left to struggle for existence with coarse herbaceous plants and shrubs, and even then they make a good display from July until the frost stops them. But to have them in perfection they should be grown in beds by themselves, a few large beds in a sunny position

on a lawn being a suitable place; if planted in a mixed border they should be set in sufficiently large groups to be effective, and their root-space should be kept free from the encroachments of their neighbours. The soil for them should be well trenched, and if manure is needed it should be mixed with the lower spit. A mulch of short, well-rotted dung or leaf-soil should be given every year in May. The plants are unfortunately subject in some soils to a fungus disease which attacks the stems at the surface of the soil. A good dressing of lime is recommended as a preventive. It is also advisable to discard those sorts which are worst affected by this disease. The plants should be lifted, trimmed, and replanted if possible in new soil about every three years.

Propagation.—It is easy to multiply these plants by means of cuttings taken from the base of cut-down plants. They should be placed in a cutting frame in slight heat and kept close as for cuttings of *Chrysanthemums*. When rooted they should be planted in a nursery bed for a year, where they will grow into nice stocky plants, ready for the lawn-bed or border, in March or April. They can also be raised from seeds sown in a little warmth in March. The seedlings should be grown on in a nursery-bed until strong enough to plant in borders, &c. Of course seedlings cannot be relied upon as regards colour. The stems are very brittle and easily broken by gusts of wind; they should therefore be staked early. In dry weather they require a daily watering. If the stools show a tendency to over-production of stems in spring, the superfluous ones should be taken off and used, if required, as cuttings. In planting the beds, a distance of about 18 inches between each plant is desirable, and this may prove too close for sorts that grow with great vigour. No plants are better adapted for filling large beds which have been devoted to summer bedding-plants, such as *Geraniums*, *Calceolarias*, &c. There are hundreds of named sorts; the following is a good selection:—

White.—* *Albatre*, *Amazon*, *Bayardère*, * *Berenice*, * *Eden*, * *Fille d'Eve*, * *La Neige*, *Lawrence*, *Niphetos*, * *Purity*, *Sylphide*, *The Queen*.

White with red eye.—*Captain Jackson*, *Countess of Aberdeen*, *Countess of Minto*, * *Espoir*, *Longchamps*, *Princess of Wales*.

Pink.—*Alhambra*, *Baccante*, * *Belvedere*, *Eclairer*, *Gilbert*, *Hamlet*, *Marquise de Breteuil*, *Molière*, *Mozart*, *Mrs. Gladstone*, *Parthenon*, *Regulus*.

Red.—*Angus M'Leod*, *Claude Gillie*, *Coquelicot*, *Etna*, *James Grieve*, *L'Eclair*, *Montagnard*, * *Pandore*, *Roi des Roses*, *Sesostris*, *Surprise*, *Tom Welsh*.

Purple or blue.—*Acropole*, *Balzac*, *Bayard*, *Chateaubriand*, *Duguesclin*, *Iris*, *Lamartine*, *Ledru Rollin*, *Le Mahdi*, *Le P. Hacquart*, *Montrose*, *Suffrage*.

Variegated.—*Alcesti*, *Atlante*, *Crepuscule*, *E. Danzavilliers*, *Papillon*, * *Tunisie*.

* These are less than 2 feet high.

Phyllocactus.—A very showy genus of hothouse plants, well deserving more care and attention than they usually receive. They are chiefly of hybrid origin, the largest and best

Fig. 596.—*Phyllocactus crenatus*.

varieties being mainly descendants from *P. crenatus* (fig. 596), *P. grandis*, and *P. latifrons*. The rich-coloured *Cereus speciosissimus* is also responsible for some of the most brilliant tints. They have flattened, notched stems, no true leaves, and the flowers are produced from the notches on the upper portion of the last-matured growths. For soil, a light, yellow, fibrous loam, a fourth part of leaf-mould and a sprinkling of brick and mortar rubble and coarse white sand form a suitable mixture. They do not thrive if over-potted, and, like all plants of the Cactus order, they require a season of rest in a dry atmosphere, and also to be kept dry at the roots, scarcely needing water at all for three months in winter. Propagation by seed, obtained, if possible, from cross-fertilized flowers, may result

in new and improved varieties. Cuttings of the stems root freely in the spring if placed in a warm moist house in sandy soil. There is little danger of losing them except by their damping off at the base, through over-watering. They soon fill the pots with roots, when they should be repotted into 4-inch pots in May or June; they will not require to be repotted again until the following March, when they may be put into 7-inch pots. They should always stand in a sunny position, quite unshaded, in a warm airy house. They usually assume a bushy habit, but if they show a tendency to legginess the tops of the growths should be removed. It is a good plan to turn them out-of-doors after mid-summer, in a position well exposed to the sun. Let them have moderate supplies of water. They should be removed into a warm greenhouse before the cold nights. Well-established plants should be started into growth early in the year in order that they may make their growth before midsummer, to be turned out again about that time for the ripening process. This alternation of growth and of rest produces in a few years handsome flowering plants.

Within recent years excellent work has been done in the raising of new and greatly improved varieties by French, English, and American growers.

The best of the species are:—

P. Ackermanni. Stems broad; flowers rich scarlet. Mexico.

P. erenatus. Stems very broad; flowers creamy-white and orange, fragrant. Honduras.

P. grandis. Large flat stems; flowers white, fragrant. Honduras.

P. Hookerii. Stems long; flowers with long slender tube, white, fragrant. Brazil.

LIST OF GARDEN VARIETIES.

Adonis. Large, rose-pink; a good grower, free.

Agatha. Pink-shaded salmon.

Alice Wilson. Orange-scarlet.

Brilliant. Vivid scarlet.

Cooperii. Creamy-white, a large, elegant flower.

Delicatus. Pink-shaded salmon.

Ensign. Deep-scarlet.

Exquisite. Charming bright-rose.

Favourite. Pale-rose.

Gilbert Watson. Large white.

Hecla. Light crimson-scarlet.

Homer. Red, violet centre.

Isabel Watson. Flat-stemmed, otherwise like J. T. Peacock.

Jessica. Light soft-pink.

J. T. Peacock. Rich magenta-shaded violet, large.

Niobe. Deep-scarlet, purplish centre.

Olivette. Rose-carmine.

Orion. Orange-red, shaded with violet-purple.

Plato. Brilliant scarlet.

Refulgence. Dark glossy scarlet.

Romeo. Light-red, pale-purple edge, distinct.

Saizy Watson. Salmon-pink.

Sirius. Bright rose-pink.

Sunset. Fine rich deep-shaded crimson.

Vesta. Large white.

Poinsettia (*Euphorbia pulcherrima*) (fig. 597).—This fine autumn- and winter-flowering plant is a native of Mexico. The red variety stands unrivalled for the brilliant colouring of its scarlet

Fig. 597.—Poinsettia.

bracts, which, when well grown, will attain a length of 9 or 10 inches, lasting long on the plant. The flowers are yellow, but inconspicuous. There is a white-bracted sort (*alba*) that is often grown as a companion to the above, but is not nearly so effective, although forming a nice contrast. The double variety (*plenissima*) has the cymose inflorescence branched, and bearing, within the outer bracts, tufts of smaller but equally high-coloured bracts, which mature in succession, and much extend the flowering season. As a winter plant for a warm conservatory, the Poinsettia has few equals. It can be brought into bloom at different times, giving a succession for eight or ten weeks. The flower-like heads of leafy bracts last long when cut, if kept in water.

Propagation.—The Poinsettia increases readily from cuttings in spring, taken off with a heel when the shoots are about 4 inches long, inserted in sand, and placed in a brisk heat; when rooted, put them singly in 3- or 4-inch pots, in good turfy loam to which is added one-sixth of leaf-mould with a little sand; they should be kept in a temperature of 68° or 70° at night, with a rise of 10° by day. The plant has an almost uncontrollable habit of running up with a single straight shoot without any disposition to branch. Young plants are grown on without stopping, but to prevent their getting up too high they should be kept all through the growing season with their heads almost touching the roof, and allowed sufficient air when the weather is fine; give enough water, and as soon as the pots get filled with roots move them into others 6 or 8 inches in diameter, using soil similar to that for the last potting, and treat as before, syringing them freely overhead in the afternoons. Towards the beginning of August, when they have made plenty of roots, they may be gradually inured to more air, and either removed to a house without fire-heat, where they can have air night and day whilst the weather is warm, or stood out-of-doors under a south wall in the full sun for a month; but before there is any approach to cold nights they must be taken inside and kept in a temperature of 50° during the night. Some of them may be put into a warm house in October, where they will come into flower, the remainder being brought into heat later on for succession. In a temperature of 55° the flowers last longer than if kept where it is hotter.

Where plants are wanted dwarf, say from 8 to 12 inches high, and in 6-inch pots, about the beginning of September, cut the shoots half-way through, 6 or 7 inches from the top, and leave them in this state upon the plants for ten days until the cut portion has become callused over; then completely sever them and place in 3-inch pots in a mixture of half sand and loam in a close frame, where they will root in about three weeks, after which give air gradually, and ultimately, as soon as they evince ability to bear it, fully expose them; move into 6-inch pots in soil as before advised, and keep them as near the glass as possible. If they show a disposition to get taller than desired, again half-sever them at a similar distance below the tops, and after they are callused as before, take them off and root them.

When the flowering is over, put the plants

in any out-of-the-way place where a temperature of 55° can be kept up, and here let them remain until May, when they should be cut down and placed in a temperature of 60°. They will here soon push into growth, when cuttings, as required, can be taken off, and the old plants destroyed or grown on if wanted. Where it is desired, they can be grown in succeeding years to a large size by giving them more root-room, cutting them well back each season before starting into growth, and removing the exhausted soil, which the spare nature of the roots allows to be readily shaken away.

Primrose and Polyanthus (*Primula vulgaris*).

—One of the prettiest of native plants, whether wild in a wood or copse or hedge-row, or cultivated in the garden. It is most effective when planted in the wild garden in imitation of its position in nature, and it may be used as an edging to a flower border in partially shaded positions. Under cultivation it has varied considerably, perhaps the most remarkable of all the varieties thus obtained being the blue-flowered seedlings raised by Mr. G. F. Wilson. A very large-flowered form of the type has lately been raised and distributed under the name of Evelyn Arkwright (fig. 598). There are also purple, crimson, rose, and white sorts, some of them double-flowered. They reproduce themselves fairly true from seeds, which should be sown early in spring in boxes or pans in a cold frame, pricking the seedlings out on a moist shaded border as soon as they are large enough to handle. If to be used for filling beds for spring effect they should be grown on in rich, moist soil in a shaded position in a nursery or kitchen-garden bed until October, when they may be lifted and planted in the flower-beds, watering them in freely if the weather be at all dry. Here they may remain till May, when they will require fresh quarters for the summer. They should be lifted and broken up if an increase of stock is required; indeed single offsets make the best plants by the following spring; they may be planted in a bed as advised for young seedlings. Very choice varieties can only be kept by this annual division, and they do not always produce offsets freely.

Although there is a well-marked difference between the true Primrose and the Cowslip (*P. veris*) they are really essentially very closely related, and consequently they are supposed to have crossed in a wild state. "The cultivated

varieties, either natural or hybrid, which are generally referred to these two species are numerous. The Polyanthus, *P. variabilis*, is intermediate in character, but its origin is not known with certainty. However, as some of the forms approach the Cowslip, and some the

charming of hardy spring-flowering plants, but it receives comparatively small appreciation from the gardeners of the present period. Where Daffodils or Tulips are favourites, there also should Polyanthuses find admirers. They are easily cultivated, they flower freely, and the colours of their flowers are pleasing. A bed of selected sorts, such as may be seen at Hampton Court in June, is a delightful floral picture. The laced varieties are particularly rich in colours, velvety crimson, edged or laced with gold, &c. There are numerous named varieties, but for all except exhibition purposes a packet of seeds from a reliable grower will afford plenty of variety and quality. Their cultivation is conducted on the same lines as those detailed above for the Primrose.

Fig. 598.—Primrose—Evelyn Arkwright. (3.)

stalked variety of the Primrose, there seems to be little doubt that it is a fertile hybrid between these two species, if indeed they are entitled to that rank. The colouring is endless in its variations, though limited to various shades and combinations of purple, red, and yellow. There is a curious variety called the Hose-in-hose, remarkable for the calyx being an almost exact counterpart of the corolla. Another race of cultivated varieties belongs to the Primrose, agreeing with that in having the flower-umbels sessile. The flowers are larger, however, in the so-called typical form, and hence it has received the name *grandiflora*. The varieties in cultivation are more or less double, and range from nearly pure white, yellow, and lilac, to deep crimson" (W. B. Hemsley).

The Polyanthus is certainly one of the most

Primula sinensis (fig. 599).—This plant, as its name implies, is a native of China, and has been introduced now some sixty years; but it is within the last twenty that the greatest advance has been made in raising improved varieties, both double and single. For bouquet-making, the double white kinds are most useful, being available nearly all the year round. The single forms are most serviceable in the conservatory and greenhouse during the winter and spring months.

It is usual to raise fresh plants every year, destroying the old ones as soon as they have flowered or have ripened seeds, except in the case of any that may appear to possess some superior quality. The first sowing should be made early in March. The seeds require care in sowing or they will fail to germinate, or not come up well; in all stages, from the seed-pan up to maturity, Primulas cannot bear any approach to stagnant moisture in the soil. The soil for seeds should consist of three parts good sifted loam, one part sand, and one well-rotted leaf-mould, the latter sifted, and the whole mixed together; fill the pans to within an inch of the rim, make moderately firm, and press the surface smooth; give a gentle watering to settle the soil, and then sow the seeds evenly, lightly covering them with fine soil. The pans can then be placed in a cold frame and covered with a pane of glass, shading with paper. Little water will be required until the seedlings are visible, when a little ventilation is necessary, and as they gain strength more air should be admitted, care being taken to shade from bright sunshine. When large enough they should be pricked off into pans,

an inch apart, and returned to the frame, keeping them close and shaded until established, when they may receive cooler treatment. Their next shift should be singly into 3-inch pots, keeping them close for a few days. Shift again into 5-inch pots, taking care to develop, by means of light and ventilation, a stiff, robust habit of growth. They delight in a moderately open and rather rich compost, consisting of six parts of turfy loam and one part

Fig. 599.—*Primula sinensis*.

each of well-decomposed cow-manure, leaf-soil, and silver sand. The pots need efficient drainage, so that water may pass away freely from the roots, the soil made rather firm, and deep potting is to be preferred. After May the plants will do well in a cold frame. Water them freely during the summer, but in autumn and winter give just enough to maintain a moderate moisture in the soil. An airy position a short distance from the roof-glass suits them during winter, with a temperature not below 45 to 50 degrees.

The Chinese *Primula* is exceptionally well cultivated in the neighbourhood of Birmingham, very large specimens 2 feet or more in diameter, with large massive foliage and very fine flowers, being annually exhibited in November in the town-hall there. The Birmingham strain is quite distinct. The treatment of the plants is as follows:—

The seeds are sown as soon after ripening as possible. The young plants are pricked off

when ready, and potted into small pots when large enough. They are wintered in these pots, on shelves very close to the glass. At the turn of the year, when the plants show signs of fresh growth, they are shifted into 5-inch pots, and kept close to the glass in a genial, warm, greenhouse temperature. In June they are put into cold frames, kept close to the glass, shaded during the brightest part of day, plenty of air being judiciously given early in the day, reduced or closed altogether according to weather before the sun has left the glass. The final shift into 8-inch pots is given soon after the plants are removed into cold frames. They are allowed plenty of room during the whole growing season. Weak cow-manure water, with soot, is beneficial when the plants are well-rooted. A sharp look-out is kept for green-fly. About the middle of September the plants are moved into a cool, airy greenhouse to flower, and from November onwards many of them become perfect pyramids of bloom from purest white to deep crimson, lasting for several months in beauty. Some of the favourite sorts are:—

Duke of York, Emperor, Eynsford White, Her Majesty, Kentish Purple, Marquis of Lorne, Meteor, Mont Blanc, Princess May, Swanley Giant, White Lady, White Perfection.

Several fine double and semi-double varieties have been produced from seed; the former are increased by means of cuttings; the latter come fairly true from seed.

The old double white is largely propagated by means of cuttings planted in pots of light sandy soil in a moderate heat. Another plan, that of layering, is, as soon as the old plants have gone out of bloom fine cocoa-nut fibre is piled up among the shoots, which soon root into it; they are then taken off and potted. Some growers partly sever the shoots with a knife, in the belief that it induces a quicker root-development. [R. D.]

Pyrethrum (fig. 600).—*Pyrethrum roseum* has been so greatly improved by the florist that the fine double-flowered kinds may be said to fill such places in May, June, and July as the Aster and Chrysanthemum fill in autumn. During the last thirty years or so Mr. Wm. Kelway and others have produced numerous varieties, both single and double, by continuous cross-breeding and selection.

They thrive under ordinary conditions, responding readily to liberal treatment, and are useful either for beds or to form masses in

borders. They are propagated by division after the plants have done flowering, and also from cuttings made of the side-shoots formed at the end of the summer. These should be set in a cold frame, or under a hand-glass in a shady border. When rooted they can be planted out either in the autumn or early spring.

The double-flowered varieties do not seed easily, and the seedlings are generally inferior. The single varieties are better in this respect.

Fig. 600.—Pyrethrum.

The seed should be sown in pans in early spring and placed in a cold frame or on a shelf in a cool greenhouse, covering them with a pane of glass, and shading until they germinate.

SELECTION OF SORTS.

Double-flowered.—Alfred, Aphrodite, Duchess of Teck, Empress Queen, Ernest, Evelyn, Figaro, King Oscar, Lady Kildare, Lenoard Kelway, Lord Rosebery, Milton, Pericles, Primrose, Princess Beatrice.

Single-flowered.—Alice, Apollyon, Dorothy Kelway, F. M. Peacock, James Kelway, J. G. Clarke, Lord Roberts, Macbeth, Mary Anderson, Millicent, Pascal, Princess Irene, Princess Marie, Princess of Wales, Ruth.

Rhododendron (Hardy).—Undoubtedly the finest and best of hardy evergreens, no other genus combining so much variety of colour, so much beauty of both flower and foliage, with vigour and hardiness.

The garden Rhododendrons, as distinct from the species from which they are derived, are quite a modern acquisition. The most important of the parent species—*R. catawbiense*, *R. arboreum*, and *R. caucasicum*—have been introduced within the last hundred years. *R. ponticum*, which has also played a part in the production of the garden race, was introduced in 1763, but does not appear to have been used for hybridizing until long afterwards. Although other crosses, accidental or otherwise, had been previously obtained, the first results which may be said to have begun the evolution of the garden Rhododendrons, as we know them to-day, were obtained between 1826 and 1835. About this period the Himalayan, *R. arboreum*, introduced in 1820, flowered for the first time under cultivation. It is easy to imagine the effect of its glorious crimson trusses on people who had only seen before the comparatively ineffectual and indeterminate hues of the European and American species then in gardens. At any rate, the desire was generally felt to get some of its vivid colour into the open air (for it is, itself, only hardy in very few parts of the United Kingdom), and it was used by several hybridists between the dates mentioned. Thus were obtained *altaclerense* (*arboreum* × species unrecorded), *Nobleanum* (*arboreum* × *caucasicum*), *Russellianum* (*arboreum* × *catawbiense*), *Smithii* (*arboreum* × *ponticum*). These first hybrids, raised from *R. arboreum*, naturally retained some of its tenderness, as well as its propensity to break into flower early in the year. But a beginning had been made, and by repeated crossing and selection a hardy, later-flowering race was gradually evolved, which still retained much of the vivid colour of the Himalayan species. In fact, all that is red or crimson in the flowers of the garden race of Rhododendrons has its origin in the "blood" of *R. arboreum*. In the varieties that are most free from any purple tinge, such as Michael Waterer and Doncaster, even the foliage still bears a strong impress of that species. During the years that followed the first crosses with *R. arboreum*, several hybridists took in hand their improvement; but the most noteworthy, both as regards the length of time over which their work has extended and the results obtained, were the Waterers of Knap Hill and Bagshot. Their labours may, indeed, be said to have largely given to the great bulk of the garden Rhododendrons of the present day their chief distinctive features.

Whilst the great majority of the varieties

owe their origin in a varying degree to the four species above-mentioned, successful attempts have been made in more recent years to introduce the "blood" of other species into the open-air varieties. The results that have already been obtained by using the fragrant Chinese species, *R. Fortunei*, are full of promise. Two or three hybrids, with *R. Griffithianum*

(*Aucklandii*) as one parent, are of a singularly refined beauty, and very strikingly distinct from the old-fashioned race. *R. Thomsoni* has also been used—Ascot Brilliant is one of its progeny—but although the colour is almost equal to that of *R. arboreum*, its indifferent constitution is a drawback. A few charming varieties, hardy, but too early-flowering to be

Fig. 601.—*Rhododendron Kewense*.

of much value in the open air, have been raised by crossing *R. ciliatum* and *R. dauricum*. *R. praecox* and Early Gem are of this class. The American *R. maximum* has been used also to some small extent, but its value in this connection is likely to be greater in its native country, where the climate is not so well adapted as ours for Rhododendrons generally.

The value of Rhododendrons in gardens can scarcely be overstated. Among evergreens of similar stature and bulk they stand out because of the wonderful profusion and beauty of their flowers. Most evergreens of similar character, like the Yew, Box, Laurels, Aucuba, Holly, &c., have comparatively little to recommend them beyond their foliage. The Rhododendrons, on the other hand, are almost equal to the best deciduous shrubs in flower-

beauty, and we have only to recall such varieties as Broughtoni or Charles Noble to show how striking some of them are as mere foliage plants also. They may be grown as single specimens on lawns, either as standards or in their natural form. Massed in large beds or groups, they produce magnificent effects, especially if varieties flowering simultaneously and of colours that contrast or harmonize well are brought together. As an instance of a striking combination, we may recommend a group composed of the fiery scarlet Doncaster and the charming white Mrs. John Clutton. Such groups or beds, arranged in a more or less formal manner, are admirable for supporting broad drives and promenades, or for walks that lead up to large mansions and imposing buildings. But to see Rhododendrons at their

very best, some sheltered dell or hollow is needed where they can be planted informally on the grass, and without any particular regard to their colour or time of flowering. If a representative collection is brought together, varieties may be had in flower during April, May, and June. The latter part of May and

early June, however, is the great Rhododendron time. The variety *Nobleanum* will sometimes be in flower before Christmas, and it keeps on intermittently till April. A few specimens are worth growing, but owing to its susceptibility to frost it is not to be relied on.

The following list is representative of the

Fig. 602.—“Ghent” Azalea.

different sorts of hardy garden Rhododendrons:—

Purple and lilac.—Baron Schroeder, Caractacus, Charles Thorold, Everestianum, Fastuosum flore pleno, Melton, Purpureum grandiflorum.

Crimson and scarlet.—Charles Dickens, Doncaster, Frederic Waterer, James Bateman, James Macintosh, J. Marshall Brooks, John Walter, Martin Hope Sutton, Michael Waterer, Mrs. Milner, Sefton, The Warrior.

Rose and pink.—Lady Armstrong, Lady Eleanor Cathcart, Mrs. Charles Thorold, Mrs. John Kelk, Mrs. John Penn, Mrs. R. S. Holford.

Rose and pink with intense spot.—James Nasmyth, Lady Annette de Trafford, Marchioness of Lansdowne, Marie Stuart, Picturatum, Stella.

Rose and crimson with light centre.—Alexander Dancer, James Mason, John Spencer, Kate Waterer, Mrs. Charles Leaf, Mrs. Mendel.

White and blush.—Album elegans, Duchess of Connaught, Madame Carvalho, Minnie, Mrs. John Clutton,

Mrs. J. P. Lade, Mrs. S. Simpson, Mrs. Thomas Agnew, Pink Pearl, Sappho, Snowflake, The Queen.

Fortunei hybrids.—Duchess of York, H. M. Arderne, Luscombei, Mrs. Thiselton-Dyer.

Griffithianum hybrids.—Coombe Royal, Kewense (fig. 601), Manglesi.

Rhododendrons are not all equally well adapted for growing as standards, but the following are recommended:—

Barclayanum, Everestianum, James Mason, Kate Waterer, Lady Armstrong, Marchioness of Lansdowne, Michael Waterer, Mrs. Charles Thorold, Mrs. John Clutton, Mrs. Shuttleworth, Roseum elegans, Scipio.

Hardy Azaleas.—If the hardy Azaleas do not hold quite the same commanding position among deciduous shrubs that Rhododendrons do among evergreens, they are undoubtedly in

the very first rank. They have the same antipathy to chalky matter in contact with the roots as their evergreen allies, and are thus unsuited to gardens on a limestone formation. With those exceptions, no garden can be considered complete with the hardy Azaleas unrepresented.

The chief species from which they have been derived are of American origin, viz., *calendulacea*, *nudiflora*, *viscosa*, and *occidentalis*, hence the popular term for them of "American" Azaleas. But the European species known as *A. pontica* (*flavum*), and, in later years, the Asiatic *A. sinensis* (*mollis*), have both played a very important part. Another name that has popularly been applied to these shrubs is "Ghent" Azaleas. The first hybrids were, indeed, produced in Belgium, and many of the older varieties were extensively grown and exported thence to this country; hence, no doubt, this name. One of the first workers among Azaleas in this country was Mr. Gowen of Highclere, who crossed *A. viscosa* and *A. pontica* about the same time that he raised *R. altaclerense*, already mentioned. *A. calendulacea* and *A. viscosa* were also crossed about the same date. In recent years the most important work among these Azaleas has been done at the Knap Hill Nursery, near Woking.

In a general sense the orange and scarlet varieties have come from *A. calendulacea*; the pink, purple, and rosy shades are from *A. nudiflora*; the yellow from *A. pontica*; and the small white-flowered varieties from *A. viscosa*. In more recent times an important group originating from *A. sinensis* has come into prominence. Except that the flowers have no fragrance, these varieties are quite as charming as the others, the flowers being larger and remarkable for their exquisitely soft tints, ranging from yellow to salmon colour. They flower somewhat earlier than the others, and are thus liable to damage by spring frosts. Another group, also of recent origin, has been obtained at Knap Hill by hybridizing *A. occidentalis*—a white-flowered, very fragrant, West American species—with the older varieties. As they do not come into bloom until after the other Azaleas are almost over, they add appreciably to the length of the Azalea season. These deciduous Azaleas are amongst the most attractive of autumn-tinted shrubs, the foliage dying off in brilliant shades of red and purple.

The size and habit of these Azaleas do not render them so well adapted as the evergreen Rhododendrons for growing as single isolated

specimens on lawns, &c. They are better suited for growing in large masses or in formal beds, and thus arranged may be used in the same positions as the Rhododendrons, *i.e.* skirting walks, drives, &c. But a more admirable plan, and one which is being generally adopted, is to set apart for them a certain portion of the garden, which in May and June, when these plants flower, is most delightful.

In the early days of the hybridization and development of the Azalea, nearly every plant showing a distinguishing character, however small, was given a name. Some of these old varieties are still worth growing, but the best of them are now surpassed by the new varieties

Fig. 603.—Azalea—Duchess of Wellington.

raised at Knap Hill, and these have become so numerous that it is no longer possible to give distinctive names. As a slight guide the following named varieties may, however, be recommended:—

Ardens, *Comte de Flandre*, *Daviesi*, *Decus hortorum*, *Duchess of Wellington* (fig. 603), *Fürst Camille de Rohan*, *Gloria Mundi*, *Meteor*, *Minerva*, *Nancy Waterer*, *Ne Plus Ultra*, *Pontica grandiflora*, *Queen Victoria*, *Sulphurea*, *Triumphans*, *Viscocephala*.

Double-flowered.—*Bijou de Gendbrugge*, *Heroine*, *Louise Aimée Van Houtte*, *Narcissiflora*, *Ophirie*, *Van Houttei*.

Mollis group.—*Anthony Koster*, *Emil Liebig*, *Frans Van der Bom*, *Hugo Koster*, *Nicolas Beets*, *T. J. Siedel*.

Mollis × *Pontica*.—*Charles Rogier*, *Edison*, *Esmeralda*, *Frederic de Merode*, *General Goffinet*, *Gloire de Belgique*, *Oswald de Kerchove*, *Souvenir de Louis Van Houtte*.

Cultivation.—The general principles which are laid down in regard to the cultivation of "American plants", in an earlier part of this work apply in every respect to Rhododendrons and Azaleas. As has already been said, they will not thrive in a soil heavily impregnated

is usually an expensive undertaking. Mortar rubbish, burnt earth and ashes, sand, leaf-soil, and such like, when freely mixed with heavy soils, improve their character considerably.

Manures.—Various fertilizers have been suggested for Tomatoes, and most authorities are agreed that a too free use of animal manures is liable to promote a luxuriant, disease-inviting growth of plant, and in retentive soils especially they ought to be somewhat sparingly used.

American experts are mostly in favour of chemical manures, and exhaustive series of experiments have demonstrated the fact that it pays better to use certain mixtures at a fixed rate at planting-time than to distribute a similar quantity over a period of two or three months. Nitrate of soda and sulphate of ammonia, as previously intimated, act quickly, and if a full dressing is given at one time, a portion of it is liable to be washed away

Fig. 1115.—Tomato—Best of All.

before the plants can avail themselves of it, and this means so much waste of a valuable manure. Special mixtures for Tomatoes are to be obtained from various vendors at reasonable prices, and if these are applied according to the directions given with them no mistake will be made. Those who prefer to buy and mix their own manures are referred to the formula already given (p. 333), using the mixture at the rate of about 12 lbs. per square rod, or roughly, 6 ozs. to the square yard of ground. For the more clayey, retentive soils sulphate of ammonia may be substituted for nitrate of soda, and lighter dressings all round are desirable in the case of soils not previously cropped with Tomatoes. Where animal manures have been frequently applied rather freely, this might well be withheld for one season, and a surface-dressing of newly-slaked lime, at the rate of half a bushel to a

square rod, given by way of economy, and as a corrective of acidity.

Training.—As a rule Tomatoes produce the heaviest crops when trained up the roof near the glass; but a far greater number of plants can be found room for, and a much greater weight of fruit be had, by planting in rows across a house, and either providing each plant with a bamboo stake, or else twisting them round strings secured to pegs in the ground or to the stem of the plant and to the roof. It may here be added that the durable bamboos are the best in the long run, though they may seem a little expensive at the outset. Crowding the plants is a great mistake. When planted 12 inches to 14 inches apart, in rows 2 feet or so apart, the crops set well for a time, but eventually the plants smother and rob each other, and the fruits in consequence are light in weight and poor in quality. The

wholesale removal of the lower leaves is but a poor way out of the difficulty. After repeated trials we have come to the conclusion that a distance of not less than 3 feet should separate the rows, the plants in the rows being 12 inches apart. Given this space there will be no necessity to remove many leaves, but they usually require to be reduced to about one-half their natural size, according as they begin to press against each other. For these later crops the smooth round varieties are very suitable, those of a medium size, such as Cropper and Champion, finding most favour in the markets, while the larger varieties, of the Duke of York type, are preferred for exhibition purposes, heavy as well as handsome fruit being needed.

If the plants have been prepared as already advised, and planted before they become root-bound, progress will be rapid from the first. The soil about the roots must be made quite firm. The plants when young must not suffer for want of water. Later on they will require copious supplies, which should be given as much as possible in the mornings of bright days with a view to getting the house dry before night. A mulching of rotten straw manure saves the hose or watering-pot considerably, but it is thought to favour the spread of fungus and other diseases, that attack the underground portion of the stem and cause the collapse of the plants; still, this may be risked. It is a great mistake to delay removing the side-shoots until a knife has to be used (see Fig. 1108), better attention repaying well, as shown in Fig. 1109.

As the days lengthen, and it is possible to ventilate more freely, a good set of fruit is easily effected; but no risks should be run, and the padded stick must be used daily as long as necessary. If handsome fruit are required, on no account neglect the early removal of the central ugly flower, and if the other flowers are thinned out the rest will be stronger, and if duly fertilized will develop finer fruit. If the flowers have not been thinned, then the number of fruit must be reduced, that is, if show examples are wanted. Topping the leading growths beyond the second or third cluster of fruit may have the effect of slightly increasing their size, but, as a rule, no topping need be practised till the tops of the stakes or the roof is reached. Sometimes the plants next to the sides or fronts of houses are not topped when the glass is reached, but are allowed to extend up the roof, when they continue to fruit

heavily till later in the season, those underneath being cut out as fast as they are cleared of fruit. There should be enough heat in the hot-water pipes to maintain temperatures not lower than 55° during the night; a slight heat in the pipes during the day, accompanied by top-air, more or less according to external conditions, serves to keep the house dry and the air buoyant. Never delay opening the top ventilators till a high temperature, accompanied by a great increase in the humidity of the atmosphere, is reached, nor close early enough to bring about the same undesirable state of affairs, as this invariably leads to a rapid spread of fungus diseases, "scalding" of the fruit, and the like. The season of 1898 was one of the worst on record as far as Tomato diseases were concerned, but little or nothing was seen of them in houses where little or no fire-heat was given.

AUTUMN AND WINTER CROPS.

The demand for Tomatoes is greatest from May to September, but it is considerably on the increase during the colder months of the year. Trade growers will therefore do well to meet this demand, while private gardeners will gain credit with their employers if they also grow as many as possible for late autumn and winter consumption. There is really no good reason why they should not be far more plentiful in winter than they are.

The secret of success, if secret it may be termed, lies in realizing the fact that Tomatoes fail to produce perfect flowers late in the year; but this difficulty can be surmounted by starting the plants soon enough to flower and set the fruit before dull, sunless weather sets in, these ripening in succession throughout the winter. But for the Potato disease the simplest plan would be to grow enough plants in pots in the open, and when these were well set with fruit, or say about the middle of September, to house the whole of them. The Bouille Bôrdelaise or sulphate of copper and lime remedy is too destructive to the flowers; but a mixture of sulphate of copper and lime in a powdered state, and applied through a dredger or other distributor, would check the spread of disease without greatly injuring the flowers. For these late crops, whether they are to be wholly or only partially grown under glass, it is a mistake to start later than May for plants to be prepared in the open, or the early part of June for any to be grown wholly under glass.

A few ripe fruit may be had from these comparatively early-raised plants before they are wanted, but the bulk will ripen more slowly and keep a long time after they are ripe, whereas later-raised plants will not only produce lighter crops, but will also very probably become badly diseased before much of the fruit has ripened.

Tomato plants can be propagated from cut-

tings as well as from seed, but few nowadays adopt the former practice, seedlings proving quite as productive, or even more so, than plants raised from cuttings; they are also less liable to be affected by disease.

When pot-plants are to be prepared in the open, use the 10-inch size with one plant in each, and arrange them 14 inches apart in rows about 3 feet apart on a hard bottom,

Fig. 1116.—Tomato—Peachblow.

placing a bamboo or other stake 4 feet high to each. Give a rich top-dressing after the soil is well filled with roots, and keep well supplied with water and liquid manure. No side-shoots should be allowed to form, and the one leading growth must be secured to the stake.

Late in the summer some of the lower older leaves should be reduced to about half their size, and when the plants are carefully transferred to the house or houses, they may be stood rather more closely together than formerly; or even between or among older Tomato plants that have been cleared of their lower clusters of fruit and leaves. Those planted under glass early in July may either be treated similarly to earlier batches, planting them in rows across the house or houses, or the roofs of small houses may be covered

with them. A few plants might be allowed to spread over a roof, the extension system answering well for these late crops. Some that have already borne good crops are sometimes roughly pruned, and a number of side-shoots laid in from them in an irregular fashion. These leading growths should not be allowed in their turn to form any side-shoots, but ought to be trained thinly, or about 12 inches apart, clusters of fruit forming on them to their entire length. The greater portion of old plants from the borders or ridges should be removed; a top-dressing with some rich compost and applications of liquid manure are good for these old plants, whilst young ones put out thickly ought not to be starved.

Late Tomatoes are also grown in boxes on the back shelves of vineries, and fruited down

the roof; but these have to be cut and ripened in stronger heat before the house is set widely open, so as to give the Vines their needed rest. If the pot and other late-cropping plants trained up roofs are kept in a temperature ranging from 55° by night to 60° to 65° in the day, they will not only give a long succession of well-ripened fruit, but they will push out side-shoots freely, which, if duly thinned, will each give a cluster of fruit in the spring before it is possible to have any from plants raised in January.

Tomatoes in Pits and Frames.—Success with Tomatoes in pits or frames is not frequent. More often than not the plants become badly diseased before a profitable crop can be had from them, owing to imperfect ventilation; or if they escape disease they yet fail to set and produce good crops. Those in frames are apt to grow too rank, and the same thing happens in pits unless the roots are confined to either pots, boxes, or narrow ridges of soil. Various contrivances have also to be adopted in order to keep the haulm raised clear of the soil. Instead of attempting to grow Tomatoes under such disadvantageous conditions, it would be far better, where possible, to devote a house to their culture during the summer, and to relegate the ordinary occupants of these structures largely to the pits and frames.

Frame culture will answer if care be taken not to grow the plants too strongly, nor to unduly crowd the leading growths, and to ventilate freely on all favourable occasions. Tomatoes may be planted in pits and frames in succession to early Potatoes, with a view to giving them a good start prior to removing the lights and exposing the plants to all weathers. Two rows of plants may be disposed from the front to the back of each light in close succession to the Potatoes. They should be kept rather close and warm till growing strongly, and directly they require tall stakes, wholly remove the light and place a 4-foot stake to each plant. Plants thus started should be well ahead of those in the open air, and in most seasons would produce a heavy crop of ripe fruit before much disease was in the air.

Diseases.—The well-known Potato disease (*Phytophthora infestans*) affects Tomatoes also, open-air plants with their crops succumbing to it in a wholesale manner whenever Potatoes are badly affected. During a hot, dry summer very little is seen of this disease. In a wet season, if the plants cannot be kept dry by a temporary protection, the only other remedy

is either occasional sprayings with Bordeaux mixture, as recommended for Potatoes, or frequently dusting with "Anti-Blight" powder, a mixture of newly-slaked lime and sulphate of copper. Both remedies are apt to seriously check the growth of the plants.

Yellow Spot (*Cladosporium fulvum*) occurs principally on plants grown under glass, and in some seasons is most destructive. At the outset a few leaves only may be affected, but if neglected the disease spreads rapidly from one house to another. The under side of the leaves is attacked, patches of brown mildew-like fungus destroying the cuticle and tissues of the leaves, causing yellow spots to show on the upper side. A warm, moist, stagnant atmosphere, such as Cucumbers revel in, favours the spread of this disease; and the soft leaves of overfed plants are the first to succumb, soon being left without a healthy leaf on them, the fruit also being spoilt. Close planting, that is, crowding the plants together, favours the spread of the disease.

The best preventive measures should include an effort to grow sturdy plants, by maintaining a warm, dry, airy atmosphere. Fire-heat is essential to success, as without this it is impossible to prevent stagnation in the atmosphere in dull, damp weather. Plenty of fire-heat, coupled with careful ventilation, opening the houses in the morning and not closing them till the evening, and not then if it will give rise to a high temperature. During the summer a little top air may be left on all night. A close look-out should also be kept for any symptoms of disease, carefully removing and burning any diseased parts.

Bordeaux mixture is considered a good remedy, though applications of this have the effect of checking the plants in growth, and unless precautions are taken it also necessitates wiping every fruit before it can be used or packed, as the case may be. The following method of preparing and applying the Bordeaux mixture is from the *Journal of Horticulture*:—Sulphate of copper, 4 ozs., powdered, dissolving in a vessel by itself in 3½ gallons of water; then slake 4 ozs. of quicklime (quite fresh) in another vessel, and pour it through a hair sieve slowly into the vessel containing the copper solution, adding enough water to make 7½ gallons altogether. To make sure this will not injure the plants, drop a few drops of ferrocyanide of potassium into the Bordeaux mixture after it has been well stirred; and if it turns brown it will injure the plants, but if it remains

a clear celestial blue it is perfectly safe. It should be used as soon as it is made, not letting it stand for several hours. Cut any fruits that are ripening, and then spray the plants in every part, repeating in the course of a week or ten days. The mixture may be kept from the fruit by wrapping it in oil-skin before spraying, removing it afterwards.

A simpler and more perfect remedy consists of turning or concentrating the fire-heat on to the affected area, to the extent of making the hot-water pipes unbearably hot, running up the temperature to 110° or 120°, repeating this every second day for a week, with the result that all the disease germs will be destroyed. It should be done in the daytime. Those who have not tried this remedy may be encouraged to do so by having their attention drawn to the fact that this "yellow spot" disease is rarely troublesome in the well-heated houses in which Tomatoes are grown for an early crop.

Black Stripe (*Macrosporium Lycopersici*) is another fungus disease of a most destructive nature to which Tomatoes are subject. A good start may be made with the plants, and a crop of fruit set on them, before the disease manifests itself. Suddenly a shrinkage and discoloration of parts of the stems, in the form of black stripes, are to be seen, and if the stems are soft the upper portion of the plants collapses entirely, while if they are moderately hard a partial recovery may take place, a poor crop of malformed fruit being obtained from them. The trouble commences at the roots, and once started, nothing seems capable of checking the progress of the disease short of carefully removing and destroying affected plants and soil, and disinfecting the sites with quicklime prior to adding more soil and replanting.

Preventive measures are most imperative. The very seeds are liable to carry contagion with them, and ought to be disinfected before sowing. This may be done by coating them with flowers of sulphur, or by soaking them in a weak solution of Condry's Fluid. The soil used in the seed-pans should also be treated by the addition of enough newly-slaked lime to whiten it, or by subjecting it to strong heat, red-hot bricks placed in the centre of a small heap of soil destroying disease germs. Soil to be used in pots or for ridges should be treated in the same way. Where the plants are put out in borders, market-growers' fashion, these should also be limed. Lime obtained from chalk and newly slaked should be applied at the rate of 1 lb. per square yard, and forked in, well mixing it with the top

soil. If in spite of these precautions a few plants early show signs of disease, these ought to be quickly drawn and burnt, and lime applied to the soil they came out of, to prevent the spread of disease to adjoining plants.

Sleeping Disease (*Fusarium Lycopersici*). Plants affected by this much-to-be-dreaded disease may apparently be in good health and in a fair way to produce extra heavy crops on one day, and during the next flag badly, never again to recover. This disease also attacks the roots, and may be prevented by taking the precautions advised for Black Stripe.

Slime Fungus also attacks Tomato plants with deadly effect at times. It should be combated in the same way as recommended for the other diseases in preceding paragraphs.

Black Rot (*Macrosporium Tomato*), another fungus disease, attacks the fruit at the eye very soon after it has set, the decay spreading slowly but surely, causing black circular patches; fruit injured in this way colour prematurely, but are quite worthless. Scalded fruits are frequently thought to be affected by this disease, but the cause and effect both differ. In the case of scalded fruits there is a rapid shrinkage of tissues or pulp, the injured parts being quite soft and green for a day or two, afterwards becoming black. The remedy, however, is the same in both cases. Sufficient fire-heat must be turned on to prevent the temperature becoming low during cold nights preceding or following clear days, and also be admitted quite early in the morning to prevent any sudden rise in the temperature. When the fruit becomes very cold at night, and there is also a delay in ventilating, not opening the house or houses till long after the sun strikes on them, the heated air condenses on the cold fruit, and the rapid evaporation of this moisture, consequent upon a sudden late opening of the top ventilators, results in the disruption of the tissues or "sun scald"—hence the necessity to avoid a low temperature, and for early ventilation, followed according as the sun gains in power, by the admission of all the air possible. Keep the fruit dry, and neither Black Rot nor Scalding will be much in evidence.

Insect Pests that affect the Tomato are not particularly numerous. Remedies for Green-fly, Red Spider, and Snowy Fly will be found in the chapter devoted to Insect Pests, but the Root-gall or Eel-worm must not be thus summarily dismissed, as it is one of the worst enemies to the Tomato, and the most difficult to deal with. Plants with their roots badly affected

by this minute pest are practically failures, soon ceasing to make any further progress. The small thread-like worms pierce and deposit their eggs on cysts in the Tomato roots, causing galls or knots to form which paralyse the roots and deprive the plants of their assistance while forming crops of fruits. A more deadly species of eel-worm, known as *Tylenchus obtusus*, destroys the bark and soft tissues of the stems below the surface, flagging leaves being the first intimation of the attack. Both species are difficult to cope with. All that can be done is to keep the soil about the roots steadily moist, and to apply lime-water occasionally, or, better still, Little's Soluble Phenyle, at the rate of 1 oz. to 6 gallons of soft water. Neither lime-water nor soluble phenyle will wholly check the ravages of eel-worms, but they serve to keep the roots active long enough to save the crop.

Thorough preventive measures should be adopted the following autumn or winter, or the chances are that eel-worms will be even more destructive the following season. Where possible all the old soil should be cleared out, the beds limed, and the walls lime-washed. If the new compost prepared has been well frozen through that would clear it of eel-worms, and, failing this, add enough newly-slaked lime to whiten it. Market-growers could not well clear out their large borders and substitute new soil, and the only way out of the difficulty is to trench the ground well, mixing 2 lbs. of basic slag and 12 ozs. of kainit with every square yard of border. This ought to be done at least six weeks prior to planting Tomatoes in the ground, as these manurial insecticides when first applied in such excessive quantities are liable to be somewhat destructive to plant as well as to insect life.

Wire-worms are destructive to Tomato plants planted in newly-broken-up ground, eating their way into and up through the centre of the stems, flagging foliage being the first signs of their presence. At this stage there is no remedy, quite large plants having in many instances to be pulled up wholesale and replaced with healthy plants. Gas-lime mixed with fresh soil at the rate of 1 half-peck to 12 bushels of soil, or well-mixed with soil in borders at the rate of 1 peck to the square rod of ground, helps to clear the soil of wire-worms; but ground treated with this kind of insecticide cannot safely be cropped for at least six weeks after its application, or until the poisonous properties are got rid of. Superphosphate of lime is both distasteful to wire-worms and a good manure for Tomatoes, but it cannot be termed a really effective remedy.

Trapping is the only safe and perfect remedy, and this should commence either in advance of or simultaneously with planting. Short (2-inch) lengths of carrot, each with a label or stick thrust into it, ought to be inserted with the aid of a trowel just below the surface of the ground and 2 feet or so apart, and in these the wire-worms will assuredly collect. Every second day is often enough to raise and examine the carrots, the wire-worms being found sticking out of them. They should be destroyed, and the carrots returned to the ground.

SELECTION OF TWENTY-FOUR VARIETIES.

Best of All (fig. 1115).—Sets freely and is an immense cropper, producing heavy bunches of fruit at short intervals all over the plant. Excellent in form, of good size, solid; colour deep-scarlet.

Blenheim Orange.—A somewhat strong grower, the fruit setting freely under glass, not so freely in the open. Fruit large, round, smooth, good form, bright-yellow faintly flushed with red, solid, of fine flavour; averaging four to a cluster.

Champion.—Sturdy growing and free setting both under glass and in the open. Fruit of medium size, round, smooth, deep-scarlet; averaging five inside and nine outside to a cluster. Ripens in the open first week in August. One of the best for all purposes.

Chiswick Dessert.—Fairly robust. Fruit rather small, round, smooth, scarlet; averaging eight in a cluster; solid, of fine flavour. A heavy cropper inside, of no value outside.

Duke of York.—Strong grower, but not free in setting. Fruit large, flattish round, smooth, scarlet; averaging three to a cluster; of good form and fair flavour.

Dwarf Gem (fig. 1107).—Plant seldom exceeds 2½ feet in height; foliage large, dark, curled, the plant presenting a very striking appearance. The pale-yellow fruits are perfect in form, and borne in immense clusters.

Early Ruby.—A dwarf grower and very free setter. Fruit medium, uneven, some fruits smooth, others corrugated, particularly outside, deep-red; averaging five to a cluster. One of the best for the open air, the fruit commencing to ripen late in July.

Frogmore Selected.—A strong grower and heavy cropper. Fruit medium to large, deep, round, slightly corrugated, handsome, scarlet; averaging six to a cluster; solid, good flavour. Good both under glass and in the open.

Golden Jubilee.—Plant robust and free bearing under glass, but no good in the open. Fruit large, round, deep-yellow suffused with red, smooth, handsome; averaging five to a cluster; solid, fine flavour.

Golden Nugget.—A moderately strong grower, free setting and distinctly ornamental both under glass and in the open. Fruit small, roundish-oval, smooth, bright-yellow; averaging eight to a cluster; solid, fine flavour.

Ham Green Favourite.—Moderately strong growing and more reliable than *Chemin Rouge*, which it resembles. Fruit large, flattish-round, smooth, deep-scarlet; averaging seven to a cluster; solid, good flavour. A heavy cropper inside and outside.

Holmes' Supreme.—Of sturdy habit with rather finely-cut leaves; setting freely under glass and in the open. Fruit medium, round, smooth, bright-red; averaging nine

to a cluster; very good flavour. A heavy cropper inside and outside. Ripens outside August 4th.

Laxton's Prolific.—Moderately strong growing. Fruit large, flat, corrugated, scarlet; averaging eight to a cluster;

solid, good flavour. A very heavy cropper inside and outside, where the fruit ripens late in July.

Peachblow (fig. 1116).—Robust in constitution, sets freely, and carries an extraordinary crop. Plant distinctly

Fig 1117.—Tomato—Princess of Wales

decorative, with numerous bunches of elegant fruit having all the charm of a handsome Peach; flavour good.

Princess of Wales (fig. 1117).—Free growth. Fruit of medium size, smooth, round, bright-red in colour, and of excellent quality. A heavy cropper, and one of the best for all purposes.

Ravenscroft's Red.—Moderately strong growing and free bearing. Fruit large, round, smooth, scarlet; averaging six to a cluster; solid, good flavour. A very heavy cropper inside and outside. Ripe in the open about the middle of August.

Sunbeam (fig. 1118).—A moderately strong grower and a free bearer both under glass and in the open. Fruit medium to small, oval, smooth, handsome, bright-yellow; averaging nine to a cluster; solid, excellent flavour. A good dessert variety.

Sutton's Dessert.—A moderately strong grower and a free setter under glass, somewhat shy in the open. Fruit small, round, smooth, handsome, scarlet; averaging eight to a cluster; solid, excellent flavour.

The Comet.—Not a strong grower, but very free bearing. Fruit medium, round, smooth, of good form, deep-scarlet; averaging six to a cluster; solid, good flavour. One of the best for open-air culture, commencing to ripen first week in August.

The Cropper.—A strong grower and heavy cropper. Fruit medium, deep, round, smooth, good form, bright-scarlet; averaging five to a cluster; solid, good flavour. Ripens outside early in August, but the fruit is liable to crack.

Tit Bits.—Robust and free setting. Fruit medium, round, smooth, good form, scarlet; averaging six to a cluster; firm, of excellent flavour. Ready outside first week in August.

Vitch's Glory.—A robust grower and a free bearer both inside and outside. Fruit large, round, smooth, handsome, deep-scarlet; averaging nine to a cluster; solid, of fine

flavour. Ready outside early in August. One of the best for all purposes.

Winter Beauty (fig. 1114).—A sturdy grower and very free setter. Fruit large, round, smooth, occasionally

Fig. 1118.—Tomato—Sunbeam.

slightly ribbed, bright-scarlet; solid, excellent flavour. Good for autumn sowing; crops heavily in the open.

Young's Eclipse.—A moderately strong grower and a free bearer inside and outside. Fruit medium, round, smooth, scarlet; averaging five to a cluster; solid, of good flavour. Ripens in the open middle of August.

[W. I.]

CHAPTER XXIV.

FRUIT-PRESERVING.

ADVANTAGES—METHODS AND APPLIANCES—JAM-MAKING
—JELLY-MAKING—MARMALADE—CRYSTALLIZING
AND GLAZING—CHUTNEY—BOTTLING WHOLE FRUITS
—FRUIT EVAPORATING OR DRYING—CANNING—MIS-
CELLANEOUS METHODS—HARDY FRUITS—APPLES—
JELLY—PEARS—QUINCES—STONE-FRUITS—PLUMS—
APRICOTS—CHERRIES—PEACHES—SMALL FRUITS—
STRAWBERRIES—RASPBERRIES—BLACKBERRIES—
RED CURRANTS—BLACK CURRANTS—GOOSEBERRIES
—MISCELLANEOUS FRUITS AND METHODS.

Advantages.—One of the most important subjects connected with the cultivation and utilization of hardy fruits is that dealing with their preservation in a convenient form for use as food. Briefly summarized, the advantages of an extension of knowledge in this matter may be stated as follows:—

1st. To prolong the season during which fruit is available for use in the home or for sale.

2nd. To provide methods of utilizing the surplus produce in seasons of heavy crops.

3rd. To enable the fruit-grower to convert waste or unsaleable fruits into a useful and marketable product.

Wherever hardy fruit is grown on an extensive scale, it is essential that some provision be made for the purposes enumerated, and even when grown only to a moderate extent the matter demands some consideration. The whole subject is of great importance; in fact, the ultimate success of increased fruit-culture must depend mainly upon the attention that is paid to this department. It constitutes the key to several of the chief problems, for usually the difference between a profitable balance and absolute total loss is influenced by the care or neglect in making the most of all fruit produce, by means of the various methods of preservation.

At the present time the waste of fruit in both large and small establishments is deplorable in the extreme. A large proportion of this waste is either due to want of knowledge of methods that have proved satisfactory, or to ignoring them, under the impression that they are not adapted for general use in this country. In the "gluts" which occur periodically, especially with stone fruits, when the market prices are depressed to a point that will not cover the cost of gathering and carriage, many tons of good fruits are allowed to fall and rot on the ground. At the same time, every year enormous quantities of similar fruits, preserved in

different ways, are imported into Great Britain, and find a ready market. From one of the recent Board of Trade returns we learn that over ninety million pounds of preserved fruits and vegetables were imported in 1899, a large proportion of which consisted of products that could have been profitably prepared in this country.

As regards fruits preserved as jam or bottled whole, British manufacturers hold their position satisfactorily, and some of the larger jam firms export to the colonies and other countries. In the processes of drying or canning, and in the utilization of otherwise waste fruits, American and Continental competitors have taken the lead, and developed an enormous industry. In the United States, where the advance within recent years has been most marked, the work was practically commenced by the efforts of individual fruit-growers to provide an outlet for surplus or waste. For a considerable period the main supplies were thus produced, and necessarily resulted in a great variety of brands and styles of preparation, which were confusing and objectionable to large buyers. As soon as it was found, however, that a demand existed for good samples of dried or canned fruits, factories were established, which in some cases have now assumed wonderful proportions, and the trade passed from the fruit-grower to another class of men who were dealers or preservers simply.

Mr. F. A. Waugh, in a recent work on Fruit Harvesting, has the following remarks on this subject, which illustrate the advance in the business:—"Formerly the home manufacture of dried Apples, &c., was common in all the farming districts of the United States—at least in the north—and home-dried fruit was to some extent an article of importance in the country stores. That day has passed. Home-dried Apples and Peaches went out with home-knit socks and home-made soap. There are still families who dry their own Apples, just as there are some who still make soap and knit socks; but for the most part these have all been given up. The change has been the same in all cases, and has resulted from the same causes. It is cheaper to buy soap than to make it, and it is equally easier to buy dried fruit than to dry it one's self. It is a question of division of labour. The man, or the stock company, that makes a business of drying fruits on a large scale can do the work to greater advantage than the farmer or the farmer's wife. His product is more uniform, better in appearance, and perhaps better in quality than the

home-made article, while at the same time it can be sold at a lower price. Fruit-drying or evaporating, therefore, has been wholly taken out of the fruit-grower's hands, and has fallen under the management of specialists."

This is a proof of the advance of our transatlantic cousins; but in Britain, where so many hardy fruits flourish, we have at present much to do before the first stage is passed. It is true that in many country houses it is customary to preserve a small quantity of fruits for use during the winter, but this does not affect the supplies materially; it is part of the domestic economy which obtains in well-ordered households. But there are numbers where nothing is done in this direction, and it is rare even in fruit-growing districts to find anything like an organized attempt to deal with the matter on a business basis.

The improvement effected in the needful appliances, and the invention of numerous ingenious contrivances to facilitate the work, now afford an opportunity to many who have hitherto been deterred from attempting fruit-preserving, bottling, or drying in a systematic manner and as a direct source of profit. One difficulty has to be faced by those who commence fruit-preserving in a small way as part of their business, and that is the competition with the established firms of repute, who have controlled the trade for many years. Amongst those who have started to place their produce on the market, there has been a prevailing idea that the only way to obtain a sale was by cutting the prices as low as possible. This underselling has proved disastrous in some cases, and has led to the production of inferior samples that have occasioned considerable prejudice against the smaller manufacturer. The policy is a mistaken one; there is a far better chance of success in seeking to establish a reputation for a really first-class article, and a local trade can thus be ultimately developed into one of much wider scope.

The present head of a large and profitable fruit-preserving business began as a fruit-grower in a small way some thirty or forty years ago, and when utilizing his surplus produce he aimed at the production of the best quality of preserves. The superiority was soon discovered by the consumers, with the result that, so far from reducing prices to undersell older firms, he has been able to command rates in excess of theirs throughout the greater portion of his career.

The co-operative system has been advocated

as a means for enabling the smaller producers in a district to share in the advantages of utilizing surplus crops without incurring large individual expenses. If well organized and judiciously managed, there is no doubt that such a system might be rendered very beneficial. The cost of preparation would be proportionately reduced, and greater uniformity in quality and general appearance of the products would be ensured. But in certain localities this has not been found to work satisfactorily, and the growers have preferred to deal with their own fruit. In some cases this can be done with comparatively little preliminary expense for buildings, as, if substantial sheds or packing-houses already exist, a portion can be readily converted to the purpose of providing for the needful apparatus required in fruit-preserving. Several methods by which this can be accomplished will be indicated later in this chapter under the respective divisions, but with a moderate amount of ingenuity a fruit-grower should find little difficulty in adapting existing buildings for the work, or in devising cheap structures that could be utilized in different ways according to the season.

As previously indicated, however, there is ample room for the extension of the home production of preserved fruits, and if this could be carried out on definite lines generally, it would afford the greatest encouragement to small holders to increase their culture of fruit-trees, and would also enable landlords to assist cottagers and others in the same direction, with a better prospect of good results. From this point of view, the late Mr. W. E. Gladstone was undoubtedly considering the welfare of the people, and the best means of assisting fruit-growing as a special or additional industry, when he advocated the increased and more general production of preserved fruits.

Methods and Appliances.—To convey an adequate idea of what can be accomplished by due care in the economic utilization of surplus fruits, it will be necessary to review the principal operations by which preservation is effected, and to refer to the appliances that facilitate the processes. The methods which demand special notice here are as follows:—1, Jam-making; 2, Jelly-making; 3, Bottling; 4, Crystallizing and Glazing; 5, Marmalade and Chutney production; 6, Evaporating or Drying; 7, Canning; 8, Cider and Perry manufacture; and 9, Non-alcoholic fruit drinks. These methods may also be classified according to the form in which the fruit is used, as:

- A Whole fruits (1-3-4).
- B Fruit pulp (1-2).
- C Sliced fruits (5-6-7).
- D Fruit juices (8-9).

Jam-making.—This constitutes the most extensively adopted method of dealing with fruits both for home use and in British factories, and many thousands of tons are produced annually to meet the general demand. It is especially adapted for all the soft fruits, such as Strawberries, Gooseberries, Black and Red Currants, together with such stone-fruits as Plums and Apricots, and it is the most satisfactory means of dealing with these fruits immediately they

and 6 inches deep will hold 20 lbs. of fruit and sugar, and with the help of such a vessel a little experience will enable anyone to produce 1 cwt. of good jam per day. This applies to any of the soft fruits which will not require more than twenty minutes or half an hour's exposure to the fire, but with stone fruits, which will need perhaps three-quarters of an hour, rather less could be prepared within the same time. A pan like that described is adapted for placing on an ordinary kitchen range, or it could be heated over an oil-stove, but the former is preferable, and where large ranges are available, two, three, or more of these pans could be heated at once, and it is quite possible without any special factory to produce a quarter

Fig. 1119.—Copper Preserving Pan, for home use.

Fig. 1120.—Double Copper Preserving Pans with water space, for home use.

of a ton of jam a day, or two to three tons in a week, which would suffice for most of the smaller fruit-growing establishments.

Where considerable quantities of fruit are converted into jam as a regular part of the business it is more convenient and eco-

are gathered. The method is essential wherever large supplies have to be utilized quickly to avoid loss, and it is equally necessary in small establishments, because, with Strawberries particularly, a large proportion of the crop is often ready for gathering at one time, being influenced by the weather conditions. As soon as the demand for the fruit in a fresh state is exceeded, there will either be a regrettable waste or jam-making must be resorted to promptly.

Whether on a large or a small scale the principle is the same, the fruit must be subjected to heat sufficiently long to sterilize it, but not long enough to alter its character or impair the flavour or colour. With the aid of a due amount of sugar employed in addition (which may vary from a weight equal to that of the fresh fruit to half as much again) such jam, carefully prepared and secured in jars with air-tight coverings over the mouths, should remain good for an indefinite time, certainly until fresh fruit is again obtainable.

On a small scale and for home use the operation is both simple and inexpensive, while at the same time it is as effectual as that carried out in a factory. A wide shallow stew-pan of copper or bell-metal is the only essential utensil, which can be had in various sizes at proportionate prices, but the smaller ones can be had for a few shillings. One of these pans 14 inches in diameter

nonical to erect a building for the purpose, which need not be of a pretentious or costly character. Larger pans are then employed, which will hold from half to a hundredweight of fruit; they are double-cased and connected by pipes with a boiler so that a constant supply of steam is maintained at a high temperature immediately under and around the fruit. The advantage of this method is that the boiling is done rapidly, and there is not the danger of burning, which has to be avoided when the preparation is done over an ordinary fire.

An idea can be formed of the routine work in a large preserving establishment where the fruit is grown, from the following particulars of an extensive factory. The fruit is gathered in the early hours of the morning, when dry, by a number of women who come from the neighbouring country, and who are glad to have the opportunity of obtaining labour in the open air. At 8 a.m. the factory work-people arrive from the surrounding villages, the total number of hands in the height of the season being about five hundred. Those from a distance are lodged on the plantations. The hour for the first delivery of fruit to arrive at the factory is 8 a.m. This may consist of Strawberries, Red or Black Currants, and Raspberries, which are picked free from the stalks on the plantations, and are ready therefore at once for the boiling-pans,

ensuring the retention of flavour and freshness in the fruit. This is continued throughout the day, the average quantity of fruit gathered being from 15 to 20 tons daily. Should the fruit come into the factory in larger quantities than can be conveniently made at once into jam, it is put down in large stone bottles and casks, perfectly air-tight, for future use, this process

Fig. 1121.—Couple of Copper Preserving Pans with Steam-jackets and Tilting-frames.

being known as “pulping”. The fruit turns out when required in a month’s time as fresh and bright as when gathered, if the work is thoroughly done and immediately the fruit is received. The sugar used in the manufacture of these jams is known in the market as White Dutch Crushed, and no other kind, or any sub-

wherever the ordinary methods are employed, *i.e.* those in which the pans are placed directly over the source of heat. To ensure this, attention must be paid to the fuel used, and in our

Fig. 1122.—Swing-tip Jam-pan (steam).

stitute such as glucose, is allowed on the premises. There are sixteen steam pans in use, each capable of turning out 1 cwt. of jam about every twenty to forty minutes, or from 20 to 40 tons of jam per day of ten hours.

The essentials to the production of the best results in fruit-boiling and jam-making are as follows. A steady, clear fire must be maintained

experience the best results have been obtained by a mixture of hard coal and coke broken small, in the proportion of two-thirds of the former to one of the latter. This we have found suitable for all the principal operations to be afterwards described. In the boiling itself much care is also required, with slight occasional gentle stirrings and the removal of the scum which forms

Fig. 1123.—Copper Jam-pan (steam).

on the surface by the aid of a wooden ladle. The stirring must not be done to excess, or the fruit is broken down unduly, an undesirable result, except where pulp alone is required. In the case of such fruits as Strawberries and Raspberries it is important to retain the form of the fruit as far as possible; but though this can be accomplished with the first-named fruits it is very difficult with the others. Whole-fruit Strawberry jam has gained for some firms a considerable reputation, and commands prices well in advance of the pulped products. Special

For all the best jams neat and clean glass jars should be used, and though this is an expensive item in the small quantities such as 1-lb. or 2-lb. vessels, it is a needful provision and helps the sale considerably. The cheaper jams and fruit-pulps that are sold in 3-lb. to 7-lb. quantities are usually placed in stone jars, and in some populous districts there is a large demand for this quality at low rates. Where glass jars are used careful filling is required to ensure a uniform appearance and to exclude air, but in all cases the latter must be ensured, or the jam will

Fig. 1124.—Glass Jars for Jams.

not keep well. The surface of the jam should be covered with a slip of specially-prepared, thin, oiled or waxed paper, and the mouth of the jars must be covered with bladder or vegetable parchment and tied down tightly and neatly. A tastefully-designed label indicating the character of the jam and the maker's name should complete the operation.

The only other questions to be considered are those relating to the storing and packing. In storing, a cool dry place should be chosen, where a fairly uniform temperature can be maintained,

sorts must, however, be used, to which reference will be made later in this chapter.

In the effort to produce a high-quality jam that will take a good place in the market it is important to turn it out bright and clear. Colour has a material effect on the selling value of fruit preserves, and a dull, muddy-looking compound has no chance side by side with a bright product which has a distinctly appetizing appearance. So well is this recognized that artificial colouring is resorted to for the purpose of improving dull-looking jams. These colouring matters are now manufactured largely, and analyses are published to show that they are free from all injurious substances, but the pure-fruit product must have the preference, and it only requires due care to ensure the desired effect. One of the chief points is absolute cleanliness in all respects, the fruit should be gathered when dry and clean, the utensils should be cleansed after every boiling, and the best sugars only should be employed. Common or imperfectly purified sugar will often spoil a large boiling of good fruit.

and where the jam is not exposed to full light. Under such circumstances well-prepared jam will keep good for a great length of time, but obviously there is no object in retaining such preserved fruit until the next season, except that an unusually heavy crop one season may be followed by a poor one the next, when good prices can be obtained. But to take full advantage of such an occurrence it is necessary to prepare the preserve very cheaply, and even then, with the cost of storing, the possible losses, and the interest on the capital, it is not a very encouraging risk. Then, too, there is always the chance that a second "glut" may follow, which would mean a heavy loss. As a general rule, if jam is prepared so that it will keep sound for at least a year, it is all that is requisite, and most traders dispose of the bulk of the produce within a few months of the end of the fresh fruit season.

In packing, straw is usually employed, but the coarse grades of wood wool are now cheap, and are preferable for all small consignments of glass jars. With well-constructed boxes or

cases some dozens of 1-lb. or 2-lb. jars can be packed as securely as could be desired, and they can be sent with safety long distances by road, rail, or sea. In the latter instance, especially if the consignment is to pass through tropical regions, it is preferable to have double cases, as then the space between the inner and outer case can be packed with non-conducting material, which will ensure much better results when the consignment is opened at the end of the journey.

Jelly-making.—This is a more tedious and expensive process than that just described, but well-made fruit-jelly commands a good price, and the method is especially valuable as applied to some kinds of fruits which do not yield a jam that is readily saleable. Its greatest utility is, however, found in the fact that it is one of the best and most profitable means of dealing with the waste from other processes, or for converting into a market product refuse fruit that would otherwise be lost altogether. Beyond this, it is desirable wherever fruit-preserving is attempted on a systematic basis, to introduce as much variety as possible; one class of goods will sell when another will not, and frequently where high quality is aimed at they help each other. Therefore jelly-making should be recognized as an essential part of the preserving department, and the attention demanded to ensure the best results should be duly provided.

The apparatus and appliances already indicated will suffice for jelly-manufacture, though some of the larger firms that make a speciality of this department employ boiling-pans of a more costly character, lined with non-corrodable metals, but these are not essential, though they undoubtedly assist in the production of a high-class article. The principal requirement is, however, the greatest care on the part of the operator, with close observation, as experience teaches many little details that cannot be set down in writing. The object is to extract the largest possible portions of those compounds present in the fruit which constitute the pectin or vegetable jelly, together with the essential flavour and colouring principles that distinguish the particular fruit under treatment. Some kinds of fruits are notably abundant in pectose or pectin, and especially remarkable in this respect is the Apple, not only the cultivated varieties, but also the common Crabs. Indeed, Apples that from a horticultural point of view are considered so inferior as to be not worthy of cultivation, can often be converted into an excellent jelly. The paring and coring refuse

from the preparation of Apples for drying is similarly productive when properly dealt with. Gooseberries, Red and Black Currants, with Plums and Quinces, are all utilizable in the same way with satisfactory results.

The first part of the work after cleaning and duly preparing the fruit so that no foreign substances be present to affect the flavour, is boiling for the extraction of the juice. In the case of jam-making the only object is to sterilize to assist in the preservation, and the operation is therefore performed as quickly as possible; but in jelly-making the boiling must be prolonged considerably. It is here that the judgment and experience of the worker are so important, for if insufficiently done the whole of the subsequent labour is thrown away. As much as two hours' boiling is needed for some fruits, such as refuse Apples, Crabs, &c., but this may be taken as a limit, and for Apples of less substance an hour to an hour and a half will suffice. For the more delicate fruits, such as Currants and Gooseberries, from half an hour to three-quarters will usually be enough to effect the desired object. In this first boiling no sugar is used, and the next part of the process is a careful straining of the prepared juice through a very fine meshed sieve or straining-bag. The subsequent clearness and brilliance will depend upon the way this straining is performed, as a very small amount of the solid substances will cause a cloudiness that detracts materially from the value of the jelly from a selling point of view.

The most critical part of the work is the second boiling, with the sugar, where the fruit-extract alone is depended upon for the formation of the jelly; an insufficient or slightly too long exposure to heat will effectually prevent the gelatinizing process. For some juices, such as Red Currant, a few minutes will suffice, while for others, such as Apples, from half an hour to an hour and a half will be needed. In every case the substance should be tested at frequent intervals by placing a little in a cold plate to see if it thickens. The quantity of sugar necessary will also vary with different fruits, from half the weight of the extract to an equal weight; or from about 5 lbs. to 10 lbs. per gallon. The principal details under this head will be given under the respective fruits later in this chapter; we are only seeking here to make the general process understood.

Immediately it is seen that the boiling has proceeded far enough, the concentrated juice should be poured into the glass jars placed in

readiness for the purpose, and if the work has been successfully performed the jelly should set in a few minutes. To avoid loss, if it is seen before the extract is poured out that it is not likely to set properly, a little of the purest gelatine may be added, and when the work is carried out on a large scale this is often adopted as a general precaution. With experience and care that course is not however essential, and the pure-fruit jelly is such a delicious substance that it is not desirable to introduce any foreign matter even though it be absolutely innocuous. Still, a considerable quantity of imitation fruit jellies is manufactured, and by means of artificial colouring and artificial flavours, a large number of which are produced chemically, a substance of very good appearance and pleasant taste can be turned out, which may command a sale in preference to the genuine extract of the fruit by reason of its price. This is regrettable, because there is an ample field for the extension of fruit-jelly production, and a little experience in the comparison of the true article with the imitation will conclusively prove the superiority of the former from a dietetic point of view.

Marmalade.—This is practically a form of jam-making, in which the whole fruit is cut into thin slices and boiled with sugar until the solid portions are thoroughly cooked, and sufficient pulp is formed to render it agreeable. Though employed so extensively in the conversion of Oranges into a confection, this process is not applicable to hardy fruits grown in this climate, with the exception of the Quince. From this a richly-flavoured and highly-coloured preserve can be made at comparatively small cost beyond the value of the fruit and the sugar employed. The supply is always limited, and the demand is fairly good at paying prices for the best quality. Where it is sought to provide a general stock of preserves for sale it is advisable to have a few boilings of Seville Oranges in addition; Lemons also are occasionally employed in the same way. The clearest and brightest products appear to the best advantage in glass jars, but some of the large firms use 1-lb. white glazed earthenware gallipots in enormous numbers, the surface either plain or fluted, and suitably labelled.

Crystallizing and Glazing.—By far the most costly and troublesome process connected with fruit-preserving, is that concerned in the production of crystallized or glazed fruits, but at the same time there is no form which commands such large prices. At certain periods of the year, especially at Christmas, the demand

is considerable, but large supplies are obtained from the Continent or America, and to compete with these the British manufacturers must be prepared to produce a first-class article and exercise the utmost taste in displaying the goods. The neat little boxes of crystallized fruits which reach our markets have the fruits carefully packed in layers separated by white paper, and, margined with delicately-stamped paper-lace, they have quite an artistic appearance. They serve as seasonable and attractive presents, and the extra care and taste bestowed upon them yield a large return in the higher price realized. It is only in this way that crystallizing can be made to pay, and that is one reason perhaps why it is seldom attempted here on a large scale. Still, so long as sugar is not excessively dear, it is a method that should be included in the operations of any producer, particularly as there is practically no limit to the time the fruit will keep, provided it is not exposed to damp or excessive heat. In consequence it is admirably adapted for exportation, as many of the American firms have realized in recent years, and it constitutes a growing portion of their business.

Almost any kind of fruit can be treated in this way, but those most usually employed are Green-gages, Apricots, Cherries, small Pears, and occasionally small Apples. The first three generally have their stones removed, while the others are cut into quarters, pared and cored. With all, the object is the same, namely, to substitute sugar-syrup for the natural moisture of the fruit, a process which can only be accomplished in a very gradual manner. The samples must be selected with great care also, as, if too ripe or not sufficiently ripe, they will not absorb the sugar freely enough to effect the desired purpose. It is customary to place the prepared fruits in clean willow baskets and dip them in boiling water until the fruit is slightly softened and a portion of the juice extracted. But though this is a safe process with regard to Apples, Pears, the firmer Plums, and Apricots, yet with the more delicate Plums, such as Green-gages, for instance, it requires to be done with the greatest caution or the fruit will be spoiled for the intended purpose, the skin being cracked or the substance softened to an undue extent. For some a few minutes will suffice, for others perhaps ten minutes or a quarter of an hour will be needed for the first soaking; but judgment must be exercised in all cases, as absolute rules cannot be laid down.

A thick syrup of fine white sugar must be

prepared, and, after the fruit has been placed in layers, in large shallow earthenware jars, poured over them slowly, so that all the spaces between the fruits may be filled. In this way the fruit is often allowed to remain a considerable time—not less than three weeks, and perhaps for a month or more. But in the meantime it will require to be frequently examined, and if indications of fermentation or mouldiness are perceived, the vessels should be placed on a stove and the temperature increased until the above tendencies are checked; this being repeated until the fruit is thoroughly saturated with the syrup. It is then removed, cleaned, and sorted.

To glaze or crystallize fruit that has been through this process, a hot syrup of the best sugar is prepared, and the fruits are dipped into it (either in sieves or baskets) until they are well covered; if to be glazed, they are dried rapidly in a cool, dry, airy place free from dust; if to be crystallized, they are dried very gradually in a warm position; should the process be not quite satisfactory the fruit may be dipped a second time.

Chutney.—Although this method is only suitable for two kinds of fruit, *i.e.* Apples and Tomatoes, it is of sufficient importance to merit a few words of reference, because it is a means that has been generally neglected, or performed in so unsatisfactory a manner as to excite a prejudice against it. The majority of Apples can be utilized in this way, and they need not be either the best fruits nor the best varieties from a garden point of view. As frequently prepared, the Apples, after being pared, cored, and sliced, are cut into small slices after the style of Marmalade, but we have found it far better to pass the Apple rings through a small mincing machine, which reduces the divisions to a uniform size, and small enough to be readily mixed with the other ingredients. What these should comprise will depend upon the taste of the producer to a great extent, but a small portion of finely-chopped Onions or Garlic, a little mustard-seed, and a pinch or two of ginger are essential, while other flavourings will suggest themselves. The whole should be thoroughly boiled for about two to three hours, and then placed in glass or earthenware jars, and tied down as with jams and jellies.

Bottling Whole Fruits.—However skilfully fruits may be preserved with the aid of sugar it cannot be done without, to some extent, sacrificing the essential flavours of the finest sorts; any system, therefore, which can effect the same

purpose without the addition of sugar will always command favour with a great number of persons. For several years the bottling of fruits has been extending as a portion of the preserving industry, and the only matter which checks its development in a much more rapid degree is the cost of the bottles. Some continental glass manufacturers are now entering into keen competition with British makers, and it is probable that prices will be reduced, as in many cases they are out of proportion to that of other cheap glass-ware in the market. It is of course requisite to have well-made bottles of clear glass, and if they could be charged and allowed for when returned in the same way that beer bottlers do, it would facilitate this important work considerably.

The method is particularly adapted for Plums, Green Gooseberries, Damsons, Cherries, and Red

Fig. 1125.—Glass Bottles for whole Fruit.

Currants, and when well-selected fruits are employed and care is exercised in filling the bottles a very attractive result is obtained. The quantities displayed in shop windows prove that the retailers find a substantial demand, and also that they appreciate the show value of such goods. But it is not only on a commercial scale that bottling is important, it is a method that can be employed by the smallest fruit-growers and in the houses of farmers or cottagers. The desirability of extending the system in this direction has been recognized by some of the horticultural societies and county councils, and either prizes or other inducements have been offered to encourage competition amongst cottagers and those in the occupation of small holdings.

The process is very simple, and is essentially the same whether provision is being made for a dozen bottles or as many thousands. If the fruit to be dealt with is gathered clean and dry from the trees, and the bottles are in a similar condition, no further preparation is required. It can be placed at once in the bottles, and all is ready for the final operation. A wide boiler must be used sufficiently deep to hold water up to the necks of the bottles, or about a foot in depth, a convenient size of bottle being from 10 to 11 inches high, with the mouth 2 inches in diameter. It is well to have a layer of canvas or some similar material at the bottom of the boiler, and this is equally useful between the bottles, as it will assist in reducing the danger of breakages.

The fruit should be placed in the bottles, the mouths of which should be left open. They are

Fig. 1126.—Lee's Patent Fruit-bottling Apparatus, showing thermometer (A) at side, and bottles placed in boiler ready for heating.

then placed in the boiler, which is filled with water to the desired height, and then it must be slowly raised to the boiling-point. As a rule, by the time the water is boiling the fruit is sufficiently cooked for keeping; it is not advisable to overdo it, or when turned out for use subsequently it will be soft and flavourless. The form of the fruit should be preserved, as if any of it splits, or the skin of Plums is broken, its appearance is spoiled and the selling value greatly diminished. A kettle of boiling water must be at hand, and as fast as the bottles are removed from the fire they should be filled with this water and immediately tied down with bladder, or corked and sealed with common sealing-wax or bottle-wax, in such a manner as to effectually prevent the admission of air; the fruit will then keep for a year or more.

Several manufacturing firms have brought out

simple, cheap appliances for bottling fruits on a small scale. One of these is a round metal boiler that will contain about a dozen bottles at a time, and is adapted for use on an ordinary stove or fire. This is sold with two dozen patent bottles at as low as 35s., the bottles themselves being fitted with metallic tops, which are secured by spring clips that are easily removed and replaced though they answer all the purposes of an air-tight cork or bladder top. In some of these apparatus a kettle is connected with the side, and steam thus takes the place of a direct application of heat from a fire. Whatever method is adopted the essential part of the business is that the boiling should not be done too rapidly, and the more gradually it is done within reason the more likely is the fruit to retain its form, colour, and flavour, so that when required for use it should as nearly as possible resemble the fresh product.

Fruit Evaporating or Drying.—As regards its economic bearing upon the fruit culture of other countries, but especially in America, Germany, and France, the process of preserving fruits by evaporating or drying is by far the most important and extensive. In Great Britain at present it has only been tried in an experimental or tentative manner, but some have already proved that it can be utilized to good purpose, and there is an increasing demand for information of a reliable character, *i.e.* that resulting from experience. The Royal Agricultural Society and the Royal Horticultural Society have endeavoured to draw attention to the matter in England, both by the institution of experiments and by the publication of reports. Individual experimenters and a few firms have also taken up the work, and evidence is now accumulating bearing upon the possibility of making the operation profitable in this country.

A few years ago Mr. D. Pidgeon contributed a report to the *Journal of the Royal Agricultural Society*, which summarized the case as regards the United States, and it is interesting to compare what he says with the conditions that prevail in Great Britain:—"Why is the British farmer so slow and his transatlantic cousin and competitor so quick in adapting himself to altered conditions of cultivation? The entry of the Great West in the character of a wheat-grower upon the agricultural stage of the world created a depression in the agriculture of the Eastern States of America, no less marked than that which followed from the same cause in England. New England no more than Old England could after that entry any longer

having been done, the ground may be forked over, a good soaking of liquid manure given, and, with the exception of keeping it free of weeds, nothing further is required till the plants come into bearing in June or July.

Artichokes may be forwarded somewhat by means of a framework and a covering of mats, and the season be prolonged in the autumn with similar aids. Every year, as the crop is gathered, the flower-stems should be cut down, as previously indicated; and the same treatment with respect to protection from frost, removing suckers, forking the ground, &c., should be pursued. After the second year, however, a quantity of well-decomposed dung or sea-weed ought to be forked in before winter. Notwithstanding the care taken in protecting the plants in winter, they are sometimes injured by frost. During extra severe winters the stock, if imperfectly protected, is frequently nearly all killed, and in this case the plan of lifting the survivors and starting them in heat with a view to obtaining a number of suckers for rooting in pots is to be commended.

Artichokes seldom continue in good bearing longer than four or five years; therefore a fresh plantation should be made every third or fourth year. As the plants in fresh plantations bear later in the season than those in old ones, some persons make a small plantation every year, with the view of prolonging the production.

If chards are required, when old plantations are to be destroyed, the plants should be cut over a little above the ground as soon as the principal part of the crop has been gathered; and when the leaves are about 2 feet high, they may be tied up and blanched like Cardoons.

In Italy, besides the head and chard, another product is obtained from the Artichoke; the stem is bent down at right angles, the leaf-stalks collected together, and the whole covered up to blanch. The result is a lump called *gobbo*, or hunchback, which is tender, and said to be very palatable when eaten raw with salt. It is used in autumn and winter as a substitute for Radishes.

Except in very warm seasons the Artichoke does not ripen its seeds in this country. If, notwithstanding this, an attempt to save seed be made, the heads should be sheltered from rain, either by gradually bending them down so as to throw off the wet, or by some other means. The seeds keep five or six years.

The varieties cultivated are:—

Globe (or Large Round-headed).—This has dull-purplish heads, with incurved scales, and is the sort most esteemed in this country.

Green (Common or French) has a conical or ovate head, with recurved scales.

Purple (Violet) has a medium-sized head, pointed scales, green tinged with purplish-red on the outside. Is earlier than the preceding sorts.

Several other varieties are described by French authors:—

Gros Camus has a large flat head, pale-green in colour, but less fleshy than some.

Large Green or *De Laon* (fig. 1147) is most esteemed and is largely cultivated in Paris.

Perpetual (fig. 1149).—Remarkable for its habit of growing and producing heads all the year round in

Fig. 1149.—Artichoke—Perpetual.

climates favourable to it. Is largely grown in the south of France. The heads are purplish.

Asparagus (*Asparagus officinalis*).—A hardy perennial, native of Europe and Asia. Gerrard says the manured or garden Asparagus is the same as the wild, but, like other vegetables, was made larger by cultivation; that it grows wild in Essex and in Lincolnshire, and in great plenty near Harwich. Phillips' *History of Cultivated Vegetables* says:—"It is well known how much the Asparagus is improved in size since Gerrard's time (1597), and it might be still further improved if our gardeners were to im-

port roots of this plant from the borders of the Euphrates, where it grows to an extraordinary thickness. Pliny states that Asparagus, which formerly grew wild, was in his time carefully cultivated in gardens, particularly at Ravenna, where it was grown so fair and large that three shoots would weigh a pound. It is naturalized in America, near the coast, most probably from seeds which have escaped from garden plants."

The plant consists of a cluster of fleshy roots springing from the base of the stem, where a quantity of buds are formed, from which shoots annually push, and these in their young and tender state form the edible part (fig. 1150).

Fig. 1150.—Asparagus—Giant Dutch Purple.

The shoots, which are annual, attain a height of from 3 to 6 feet and bear numerous branches, clothed with small, linear, bright-green leaves. The flowers are small, star-shaped, and white, and the fruits are pea-like berries coloured bright red. Differences of soil, climate, situation, and cultivation have resulted in several recognizable variations, and it is probable also that seedling sports have been fixed. Accordingly there are numerous named sorts, the name usually indicating the district where the variety originated. The colour of the young stems depends greatly on the nature and texture of the soil; and with regard to size we may mention that in one part of Mr. Grayson's extensive plantations on the south side of the Thames the so-called Giant variety was produced, and in another part the common sort; but when both were made to change places, the common acquired the dimensions of the Giant, whilst the latter diminished to the ordinary size.

Propagation.—Asparagus seeds may either be sown broadcast on prepared ground, and the plants thinned out, or in drills in nursery-beds, where the plants can remain for one or two years before being finally planted out. The soil for the nursery-bed should be light, rich, and sandy. The seeds should be sown in drills half an inch deep in October, or in March or April. The seedlings should be thinned when they are 2 inches high.

Soil and Situation.—A rich sandy alluvial soil, impregnated with saline matters, is naturally best adapted for the growth of Asparagus, and in such soil its cultivation is an easy matter. Soils of a different texture may be made rich enough with manure; but whilst the soil retains too great a degree of stiffness, the results of cultivation will not prove satisfactory, nor will the produce bear comparison with that from soil naturally well adapted for the growth of the plant. The large Asparagus from Argenteuil is chiefly grown on a sandy loam, and by a peculiar mode of culture, which will be presently described, and the cultivators think that on soil of this character the shoots attain a greater size than on very light sandy ground, but are produced on the latter more abundantly.

The situation for Asparagus should be open to the sun, and sheltered from strong winds.

Preparation of the Beds.—The effectual drainage of the soil should be the first consideration; for although the plant grows naturally in salt marshes, and therefore cannot be said to dislike moisture, yet moisture, to be beneficial, must be accompanied with heat. If cold rains occur in spring, after the beds are warmed by the sun and are in full cutting, growth and production will be arrested; but warm rains later in the season are, on the contrary, favourable in both respects. The plant requires warmth in the soil, and undrained soil retains the coldness of winter.

The ground should therefore be drained, trenched, or made good to the depth of 3 feet, and a large quantity of manure introduced; also, near the top, such materials as the scourings of ponds or ditches, sea-weed, decayed leaves or leaf-mould, turfy peat, charred soil, decayed hot-bed dung, all of which are excellent. Heavy crops of Asparagus are grown where the bottom is a yellow, rather heavy loam, and the top has been made light from long working and plentiful manuring. In trenching for Asparagus, the heavy subsoil is neither turned up nor mixed with the upper soil, as might be advisable for some crops; on

two handfuls of well-decomposed manure, and finally with an inch of soil, making a little hillock an inch high over each stool, and putting in a stick to mark the place of the plants, and prevent injury to the roots in hoeing.

In October the stalks are cut off at 6 inches from the surface, the surface cleaned, the ridges dug a foot deep, and the plants manured. The roots having been carefully uncovered with a hoe over a circle 8 inches in diameter, one or two handfuls of well-decayed dung are placed over every crown, and covered with about 3 inches of light soil, raising a hillock 2 inches high over each, and marking any vacant places with a small stick.

In the second year the failures are replaced in March or April, using strong one-year-old plants, and stakes 3 feet long are pushed in slantwise at an angle of 45° near each plant. The ground is hoed at the beginning of April, and as soon as the shoots are large enough they are tied to the stakes to prevent breakage by wind. In October the withered stalks are cut off 8 inches above the ground, the ridges manured and dug over, and the stakes removed. The crowns are uncovered down to the manure, the soil about them loosened by the hand, and two inches of soil put on, always forming it into a conical mound.

In the third year, about the middle of March, mounds from 6 to 8 inches high are formed over each crown, according to its strength, but the plants used to fill up blanks are only covered 4 inches deep, and are afterwards left alone. In taking the shoots for use they are removed with the fingers so as to avoid injuring the stool, an asparagus knife only being used, if at all, to remove the earth and trace out the base of the shoot. The shoots are taken when 2 inches above-ground, by passing one finger behind their base, and, by pressing the shoot aside, it is easily detached. The soil is then returned. At most only three or four shoots are taken from each stool. In April, stakes 4 feet 3 inches long are put in, and the stalks tied to them, and in October the withered stems are cut over 10 inches above the surface, and cleared entirely away, the ground cleaned, and a good dressing of manure given. In doing this the soil of the trenches is entirely cleared out to the depth of 4 inches, casting it on the ridges; it is replaced with half that depth of well-rotted dung, the withered stems are shortened, except one, which is left to show the position of the stool, and, after digging the ridges, the manure is covered with about 1½ inch of soil, at the same time

raising a mound of 3 inches high over each crown, and marking with a stick any that are weak.

In the fourth year, mounds 10 or 12 inches high are formed over each plant, but the weak stools marked in the previous autumn are only covered half that depth. In May, when the ridges are hoed, some earth is drawn into the trenches, and stakes 4 feet 9 inches high are put in. In October the stems are cut over at 14 inches above the ground, the ridges are manured and dug, the mounds in the trenches levelled, the soil in the trenches thrown out as in the previous year, some handfuls of well-decayed manure placed over the crowns, and mounds 3 inches high raised over them.

In the fifth year the mounds are raised in March to about 14 inches high. The whole of the shoots of the strong stools are taken for use, but only a few from those which are weak. The shoots are removed for about two months daily, every second day, or every third day at most, according to the temperature, and when showing about 2 inches above ground, and of a red or violet colour. The plants are staked and securely tied, and in October the stems are cut over, the soil of the mounds thrown on the ridges, the trenches manured as in the third year, the ridges dug, and the manure covered.

In the sixth year the Asparagus will be in full production; it is mounded up 14 inches high from the crown, and the autumn treatment is the same as in the fourth year.

Cutting the Stems.—In doing this a little of the soil is taken from beside the shoot with the Asparagus knife, which is then pushed down, but so as not to endanger the crown, or other shoots that may be pushing up, then turning

Fig. 1153.—Asparagus Knife.

the edge of the knife towards the shoot, the latter is cut, or rather sawed off. It is the practice near London to cut off all the shoots as they appear, up to the period when it is thought proper to leave off cutting altogether; the period for doing this depending on the climate, season, nature of the soil, and strength of the plants. Where the climate is good, or when the season is an early one, cutting must commence early; and of course, in that case, it ought not to be continued late, otherwise the plants will be weakened. When green Peas can be had, Asparagus is less required; so that, in the southern parts of the kingdom, the cutting may cease

towards the middle of June, and in the northern parts by the end of that month. If the plants are weak, they ought to be allowed to grow up as early as possible to make foliage, and consequently fresh roots, and thus to acquire more vigour for the ensuing year. It is also advisable to leave off cutting, at an early period, some of the best of the beds formed for early produce, in order that the shoots may be well matured early in autumn; and consequently that the young shoots may be prepared to push vigorously early in spring.

Duration of the Plantation.—Asparagus beds in favourable soil will continue to bear well for many years if properly managed, especially as regards cutting; but if too severely cut they will soon become unproductive, however well they may have been originally formed, or however good their treatment in other respects. By continually cutting off all the shoots throughout the season, as they appeared, the plants would be completely destroyed, just as the most obstinate weeds would ultimately be if so treated. If a strong Asparagus root were allowed to mature all the shoots it produced, these of course would return organized matter for the formation of still finer buds, and production of a proportionate quantity of fresh roots. But if all the shoots are cut off as they appear, except one, perhaps, late in the season, sap cannot be elaborated for the proper maintenance of the whole of the roots, and consequently a portion of those least in connection with the shoot which is left will perish. If the same severe process of cutting is pursued the following season, the plant is almost certain to succumb. When blanks begin to appear in beds, the latter should in future be more sparingly dealt with. There is only one case in which severe cutting is excusable, and that is when a piece of Asparagus is about to be thrown up, then market-gardeners and others cut as long as the produce pays for the trouble of cutting.

The duration of Asparagus beds mainly depends on the manner in which cutting is conducted. If carefully done, the beds may continue in good bearing for fifteen or twenty years, and even longer. It should, however, be remembered that to have fresh beds in bearing condition to supply the place of those past good yielding, four or five years must elapse from the time of sowing, and therefore it is not good practice to unduly delay the starting of new beds.

Seeds.—Some of the finest shoots which push in the early part of the season, and on the south

sides of the beds, should be allowed to run up for seed. As the stems grow up, some of the most promising may be tied to stakes to prevent breakage by the wind; but in doing this care should be taken not to crowd the branches, in order that the foliage may be exposed to the light as freely and equally as possible. With the growth of plants so reserved, that of others adjoining should not be allowed to interfere. When at maturity the largest of the red berries should be selected. After lying a week or two they may either be squeezed between the hands, and the seeds washed from the pulp, or the berries may be dried, in which case the seeds will keep the longest.

Forcing Asparagus (Figs. 1154).—This is an industry of some importance in the neighbourhood of Paris. It is also practised in a few

Fig. 1154.—View and Section of Frames for forcing Asparagus (French Method).

gardens in this country. The following account of the French method of forcing is taken from Robinson's *Parks and Gardens of Paris*:—"The forcing alone of Asparagus throughout the autumn, winter, and early spring is an industry of considerable extent. In one of the most recently-organized and active of these gardens about half an acre of glass is devoted solely to the forcing of Asparagus, and a supply is obtained from early in September to the end of April. It is forced in three ways—in houses heated with hot water; in frames in the ground and heated in the same way; and lastly, in frames covered with stable-manure. It appears to be forced with equal success in each case, though the stable-manure seems to offer the simplest means. As usual here, the frames are small, about 4 feet wide; the roots are placed directly on the manure, not flat, as they would be in the open ground, but packed as closely as possible, from 500 to 2000 plants, according to size, going under one light. A mere sprinkling of soil is placed over them. As

a result the shoots come up very thickly. The plants are strong ones, three years old; as many as five crops of roots follow each other throughout the autumn, winter, and spring in the same frame. The universal straw mat is used to cover the frames at night."

The old mode of forcing *Asparagus*, still practised to some extent, chiefly consists in digging deep trenches between beds planted for the purpose, covering the beds with the soil and with frames, filling in the trenches between the frames with stable-manure, and protecting the frames with straw mats and litter to keep in the heat. In the beginning of November the pathways between the beds of *Asparagus* are dug up about 2 feet in depth and width. The soil coming from the pathway is divided very carefully, and put about 8 inches thick upon the surface of the bed. The trench is filled up with new stable-manure, not litter, and frames placed on the bed. The manure should rise as high as the top of the frames, and the lights be entirely covered with mats and litter to prevent the accumulated heat from escaping. The sashes are put on, and no air is given; on the contrary, they are covered at night with straw mats, and also during the day in cold weather, a temperature of from 60° to 75° being considered desirable. We should, however, prefer starting with a temperature of between 50° and 60°, as is done by means of hot-water pipes in the Royal Gardens at Frogmore. The heat may be increased so as to range between 60° and 65°, or not exceeding 70°; for it is found that when *Asparagus* is forced too rapidly it is not so good as when it is brought forward gradually, with a temperature resembling that of a very fine May. Where glass is used, a good deal of sun-heat may be economized by keeping the sashes closed till the shoots appear. In the open air the finest and most tender shoots are produced in beds that have been exposed to powerful sun-heat.

In about a fortnight or three weeks the *Asparagus* begins to show itself on the surface of the bed. Many market-gardeners cover the whole of the bed inside the frame to a thickness of 3 or 4 inches with manure to force the vegetation more quickly, but in this case the manure must be removed when the *Asparagus* begins to shoot. When the shoots are about 3 inches out of the ground they may be cut. The mats must be taken off in the daytime, but the heat must be well kept up, or the roots and buds will fail to push. The beds are forced every second year only. The gathering

of the *Asparagus* may continue for about two months, but no longer, or the plantation would be injured. When the gathering is over, the frames and linings may be taken away, and the soil which has been dug up from the alleys put back again.

When the trenches are partially filled up after forcing is over, and the dung turned out, the roots strike into the decaying substances usually employed, so that when the beds are again about to be forced, these roots are destroyed in clearing out the trenches for the reception of the dung, and they are generally the most vigorous. This proceeding, in fact, deprives the plant of its most efficient feeders at the time they are most wanted. It is better to keep the trenches open, so as not to encourage the roots in that direction. In this case it would be well to cover over the trenches, in order to prevent the soil of the beds from being dried. In some instances the sides of beds intended to be forced by dung-heat have been faced with bricks in the pigeon-hole fashion, and where the expense can be afforded, this plan answers very well.

In some places it is difficult to procure dung for the purpose of forcing, and in any case it is doubtful whether heating by hot water is not cheaper in the end. The labour required for working dung linings is very considerable, and would go far towards defraying the expense of fuel. At all events the hot-water mode answers well where it has been adopted, as, for example, in the Royal Gardens at Frogmore. The beds there are 75 feet long and 7 feet wide; their sides are formed with pigeon-hole brickwork, and the spaces between the beds are 4 feet deep; but the lower half is filled with rich soil, and in the upper half there are a flow and a return pipe for hot water, connected with a boiler which heats six ranges of flow and return pipes. The cavities for the pipes are covered with Yorkshire stone, and the beds themselves with a close-fitting wooden roof. Some think 7 feet too great a width for the beds; we should recommend 6 feet; and where such substantial covering as Yorkshire stone cannot be afforded, wooden covers will answer the purpose. At Frogmore forcing is usually commenced in December, and a supply obtained in about a month. A little air and light, when the shoots begin to reach the surface, much improve their flavour and appearance. In every case avoid forcing every growth out of the crowns, as it is important that the plants should grow as strongly during the summer as those not forced. Do not wholly withdraw all the protective

material directly forcing ceases, but keep the beds littered over till all danger from severe frosts is passed. These forced beds should also be very liberally treated as regards manuring, abundant supplies of liquid manure during the growing season doing excellent service.

Forcing Removed Plants.—As yet there are few places where Asparagus in permanently planted beds is forced, the more convenient practice of lifting and forcing plants prevailing. Nor do many growers prepare a stock of plants specially for forcing, probably because this cannot well be done under two or three years. Those, however, with plenty of garden room would do well to prepare a few thousand plants for forcing, as the produce from strong young plants is usually very superior to that obtained from old plants. Ground that would grow good Potatoes would suit Asparagus. Either sow the seed thinly in drills 30 inches apart, eventually thinning out to a distance of 9 inches apart, or else plant 1-year-old roots at the same distances apart. Keep them free from weeds, mulch before dry hot weather is anticipated, and then nothing but poverty at the roots will prevent a strong growth.

In most large gardens a fresh bed is formed every spring, the oldest bed being broken up for forcing. If the beds are well prepared, and fresh sites chosen each time, this gradually brings a garden into a highly cultivated state.

The plants for forcing should be carefully lifted, enough being taken to fill a two-light or three-light frame, or the same number of lights in a pit to be forced at one time, unless a large supply is wanted at any particular date, in which case a period of from 15 to 30 days, according to the time of year, should be allowed, a close succession to be kept up by means of fresh relays of plants every fortnight or three weeks. Seeing that it is impossible to lift when the ground is frozen, severe frosts should be anticipated either by lifting a good supply of plants and storing in fine moist soil under cover or else by covering the beds with strawy manure. Asparagus forces readily in pits, bottom-heat being afforded by a gentle hot-bed of manure and leaves, and top-heat by means of hot-water pipes. It can also be forced successfully in ordinary frames on mild hot-beds. Keep the lights close, and mat over heavily till the shoots are coming up freely, when a little light and air during mild days should be admitted. Force all the growth out of the plants, and then throw them away as being no longer of any value. Divide the shoots into grades, mixed bundles

not finding favour. The smallest shoots may be used in soup-making.

Green or even blanched Asparagus may be produced in any forcing-house, in a temporary pit formed of wood, or in boxes. The latter may be made so as to rest one above the other, in order to occupy comparatively little base room. They may be 2 feet wide, 3 feet long, and 1 foot deep, with an upright 20 inches long secured inside the box in each corner. The uprights, standing 8 inches above the upper edges of the box, will serve as posts for supporting another similar box, and leave space for the growth of the shoots and for cutting. In this way four or five tiers may be placed along the back wall of a vinery or other forcing-house at work.

Insects, &c.—See chapter on this subject.

Leaf Enemies.—Garden Pebble Moth.

Balm (*Melissa officinalis*).—A hardy perennial, native of south Europe. Its young shoots are sometimes employed in salads instead of Parsley. It is also used for making a decoction known as Balm-tea.

It prefers a light warm soil, and is propagated by division early in spring. The subsequent culture is confined to keeping the ground free of weeds, and stirring it occasionally; the stems should be cut down when frost sets in; by these means the plants will remain vigorous for many years. When coming into flower some stalks should be gathered and dried for winter use.

Basil (*Ocimum basilicum*) (fig. 1155).—An annual, a foot high, native of India. The aro-

Fig. 1155.—Basil.

matic leaves are used in soups, &c., and occasionally in salad; but their strong flavour is disagreeable to some persons.

The BUSH BASIL (*O. minimum*) is smaller and rather more hardy than the first. They are both raised from seed, which should be sown in gentle heat in March, and the young plants thinned out to about 3 inches apart. Plenty of air and frequent waterings should be given in mild weather, transplanting them to the open ground in May in a warm border. The larger sort may be planted 6 or 8 inches from plant to plant, in rows a foot apart, and the smaller one 5 or 6 inches apart, in rows 9 inches asunder.

Bean (*Vicia Faba*).—A hardy annual of obscure origin, but possibly Egyptian; at any rate it is known to have been cultivated by the ancient Egyptians, and also in Europe in prehistoric times. It is now largely cultivated in most civilized countries, and is popularly known as the Broad Bean.

Soil.—The Bean has a long tapering root, extending downwards in a perpendicular direction to a considerable depth. Shallow soils are therefore not well adapted for it. That which is most suitable for the main crop is a deep, well-drained, rather strong loam; but for the first crops a light warm soil should be chosen. It has been found by analysis that the Bean contains a large amount of nitrogen; hence a soil rich in decaying animal or vegetable matter is most suitable for them.

Manures.—As Beans in garden culture are gathered young, it is obvious that manure ought to be given so as to be serviceable to the plants at an early stage of their growth. Lime, marl, gypsum, superphosphate of lime, bone-dust, wood-ashes, and burned clay will each and all prove highly beneficial to Beans on soils that have long been under cultivation and manured with organic manures. As lime and gypsum require a considerable time for solution, they should be applied in the autumn, and the other manures in spring. Although farm-yard manure may in general be the best manure for Beans, yet in cases where the ground is already rich in organic matter, its application will not be attended with such good results as would follow the use of lime, potash, magnesia, soda, &c. On the other hand, when the soil is deficient in vegetable matter, but abounds in mineral substances, the application of such will not be so beneficial as that of organic manures.

Seed Sowing.—Beans are generally sown in drills, 2½ feet apart and 3 inches deep. The seeds should be placed singly, 4 inches apart in the drills, and then covered with soil, which should be made firm. Many cultivators sow

the seeds in double drills, 6 inches apart, the rows being not less than 3 feet apart; or the seeds may be planted with a dibber.

When the plants are about 6 inches high they should be earthed up. When they have formed pods on the lower part of the stem, they should be topped; this checks the upward growth, and causes the pods to swell. This operation is likewise beneficial in relieving the plants from the destructive ravages of the *Aphis fabæ*, which infests the top part more especially. The tops when cut off should therefore be buried or burned.

Instead of placing the seeds at equal distances in a line, some plant them in patches a foot apart, and three or four seeds in each patch. In this way, by tying a strip of matting round the plants forming each patch, the stems are not so liable to be broken by the wind as they are when standing in rows, unless supported by twine stretched from end to end of the row.

To obtain an early supply, such sorts as Early Longpod or Early Dwarf Prolific should be selected, and sown on a warm border in front of a south wall or close hedge. A small sowing may be made in the end of October or beginning of November, and another in December for succession. If the winter is mild, the plants will require little or no protection; but if likely to be severe, a covering of litter or leaves, or a mixture of both, should be put between the rows to keep the ground from freezing.

Beans transplant well, and their safety through the winter may be ensured by sowing them in November or December, in rows from 4 to 6 inches asunder, in light soil and in a warm situation, where they can be easily protected by means of frames, straw-screens, mats and hoops, or similar contrivances. In protecting, care must be taken that the plants do not suffer from want of air and light. They will be fit for transplanting into a warm border on a mild day in February; or the plants could be raised singly in small pots early in February, and placed in gentle heat to germinate, hardening them off before they become root-bound, and planting them out on an early and favourable opportunity. Most cultivators defer making their first sowing until early February, and if possible a warm border is selected. The seeds should be planted in rows not more than 2 feet asunder, and fully as deep in the soil as they were before removal, afterwards drawing a little earth to the stems, and topping, as previously directed, for the main crop.

Windsor, Green Windsor, and Long Pod may

be sown in March for the principal crop, and again in April and May for succession. For a late crop, Long Pod and Dutch Long Pod should be sown in June or the beginning of July.

To obtain a very late crop, after gathering the summer produce of the Long Pod in a young state, let the soil be well watered, if dry, and in two or three days after the watering let the stems be cut down to within a few inches of the ground. Fresh shoots will soon push, and a better very late crop will be produced than if seeds had been sown late for the purpose. If a late crop is a very special object, then the plants intended to produce it should be cut down when in flower.

Steeping the Beans in water before sowing accelerates their germination, and plants from steeped seeds maintain their superiority over those from seeds not steeped, all other conditions being the same.

Gathering.—Some prefer Beans when very young, or when they have attained only one-fourth of their natural size. They should at all events be gathered before they appear black-eyed, that is, black at the hilum, or point of attachment to the pod. A portion, however, should be allowed to get older, in case they should be wanted for soups.

To save Seed.—The sorts of which seeds are intended to be saved should be sown in the end of February; and as the best seeds are those in the first-formed pods, none of these should be gathered for cooking green, although those produced afterwards near the top may be taken with advantage to those which are left below to ripen. When the leaves become withered and blackish, the stems should be pulled up, tied in small bundles, and set upright, where they will dry by exposure to the sun and air. The seeds will keep good for two years, after which time they are not to be depended on, though some will retain their germinating powers for five years or more. Seeds that have been long successively saved from plants grown in the same soil and situation are liable to degenerate. It is therefore advisable to obtain a supply occasionally from a different soil and climate.

Insects, &c.—See chapter on this subject.

Fruit and Seed Enemies.—Bean Beetles, Mice. *Leaf Enemies.*—Black Aphis, Pea and Bean Weevils, Silver Y-moth. *Root Enemies.*—Mole Cricket.

Beck's Dwarf Green Gem.—Stems 1 to 1½ foot high, branched, compact in growth; pods small, abundant, clustered, 3 inches long, containing about three small fine green Beans. A most prolific variety, later than Longpod, very desirable for small gardens.

Green Longpod.—Stems 3 to 4 feet high; pods 4 to 5 inches long, mostly erect, generally containing about four oblong Beans, which when fit for use are bright-green. Much valued for their green colour when cooked. A good bearer.

Hardy's Pedigree Windsor.—Stems 2 to 3 feet high, robust; pods 5 to 6 inches long, containing about three large flat Beans, produced abundantly and generally curved downwards like the Longpods, between which and the Broad Windsor it seems to be intermediate. An excellent sort, very productive.

Longpod.—Stems 2 to 3 feet high, of free growth, branching at the ground and producing from three to five stems; pods 7 inches long, containing from three to five medium-sized Beans of good quality. It is prolific and early.

Seville Longpod.—Stems 2 feet high, sparingly branched; pods often 7 to 9 inches, containing about six Beans of excellent quality; the pods are rather sparingly produced. One of the earliest.

Sutton's Green Giant (fig. 1156).—A green-seeded counterpart of Longpod, and one of the most remarkable and

Fig. 1156.—Bean—Sutton's Green Giant

popular Beans ever raised. Has long straight pods, and Beans excellent in flavour.

Violet.—Stems robust; pods 6 inches long, containing from three to four fair-sized oblong Beans, of a pale-red colour, dull-violet when ripe. An excellent Bean, coming into use three days later than the Longpod, but the colour of the skin is objectionable.

White Fan.—Stems 1½ foot high, robust, much branched; pods abundant, produced in erect clusters from the very surface of the ground; 3 to 4 inches long, and containing

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