

INDIAN GARDENING

A MANUAL OF

FRUITS, AND VEGETABLES,
SOILS AND

AND

GARDENING OPERATIONS

OF EVERY KIND IN

BENGAL, THE UPPER PROVINCES, & THE HILL STATIONS OF INDIA

BY

LIEUTENANT FRED. POGSON

Corresponding Member of the Agri-Horticultural Society of India

VOL. I

THE FLOWER AND FRUIT GARDEN



1872

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P R E F A C E.

THE want of a Practical Manual on Horticulture, suited to the climate and soils of the Himalayas, the Punjab, North-Western Provinces, Bengal, and other parts of India, being much felt, we undertook the task of preparing the present work for the press.

We have divided it into two volumes—the first being devoted to FLOWERS and FRUITS, and the second to VEGETABLES; and we have done our best to supply the fullest and most practical information on the subjects treated.

The difference between our work and others already in print, consists in the rejection of all unnecessary matter. The object we had in view was to write a HANDBOOK ON INDIAN GARDENING, and not a Botanical Encyclopædia, which description of work, however valuable it may be for purposes of reference, is of little use to ladies and gentlemen who desire to cultivate the fairest of Flowers, and to grow the choicest of Fruits and Vegetables, without worrying themselves about the scientific names and descriptions of plants, leaves, petals, barks, and roots.

The reader will observe that under "Flowers" we have given full instructions for cultivating the newest, most beautiful and popular varieties; and whilst we have devoted some space to the cultivation of the Rose, Violet, Pansy, Carnation, and other forms of floral loveliness, we have taken no notice of the *Ranunculus aconitifolius*, and others as plain and unpoetic; nor yet of the future tormentor, of the exciseman—the *Saltpetre Plant*—the introduction of which we purpose accomplishing in order to supply vegetable saltpetre to the Kitchen Gardener and Agriculturist for use as manure.

Under "Fruits" we have rejected all Indian ones which we considered were not worth the trouble of cultivation; and have brought to special notice all English Fruits which will thrive in our hills, and some, when acclimatized, in the plains.

We have devoted very considerable care and attention to the Kitchen Garden, which, under our instructions, may be made to produce the numerous choice and Prize Esculents brought to notice, not forgetting the gourmand's favourite Flower—the Cauliflower—of which he may now have nine superior kinds to choose from; and we trust the most insatiable of Indian cooks will be satisfied with a single Onion when it weighs over three pounds.

We have to offer our acknowledgments to Mr. James Carter, of London, the Royal Seedsman, for an immense amount of floricultural information derived from his "Instructions to Professional Gardeners;" and also to Professors Liebig, Johnston, and Stephens; and, finally, to the Revd. Mr. Firminger, whose comprehensive Botanical Volume has supplied us with valuable and very interesting information.

We now make our bow to the critic, and trust we shall be so fortunate as to secure his approbation, and succeed in making him a convert to our views on the subject of the value of Saltpetre as a saline manure, and the immense injury done to Agriculture by placing this natural manure under the excise.

INDIAN GARDENING.

INTRODUCTORY.

HORTICULTURE was man's first avocation, as proved by the following extract from Genesis ii., 8, 18, 22 :—

8. And the Lord God planted a garden eastward in Eden; and there He put the man whom He had formed.

18. And the Lord said, it is not good that the man should be alone; I will make him a help meet for him.

22. And the rib, which the Lord God had taken from man, made He a woman, and brought her unto the man.

The ancestor of the human race found the loveliest garden, which had been called into existence for his benefit, instruction, admiration, and amusement, a beautiful solitude. His Omniscient Creator and Friend had compassion on him, and brought before his wondering gaze the indescribably lovely, most beautiful, and fascinating being, who was to be his companion for life; and at whose advent Solitude ceased to be, and the Garden of the Lord became a Paradise.

The earliest notice of man's history appears in the text quoted, and shows that he was an horticulturist, acquiring

experience and knowledge under divine instruction; whilst his lovely and idolized wife made Eden ring with her musical and joyous laugh, as she gathered flowers and twined them into wreath and garland to decorate herself, and the natural bower wherein she sought refuge from the mild midday sun, and ate the choice fruit brought to her by the object of her heart's adoration—her husband, lord, and sovereign—Adam.

This most agreeable way of enjoying life, and acquiring wisdom without toil, ceased after a while: and when man transgressed and was expelled from Eden, he became an agriculturist, doomed to eat bread in the sweat of his brow, in place of some perfect, nutritious fruit, which had answered this purpose in Eden; the fair companion of his life being punished with the lighter labour of spinning into thread the wool of the sacred cotton tree, whose scarlet flowers and snow-white down had no doubt, in happier days, excited her curiosity and admiration.

The practice of Agriculture without suitable implements being as impracticable as the production of a continuous length of thread without a distaff, these must have been supplied. The Spade, Weeding-hook, and Sickle were given to the man; the Distaff and Working or Crochet-hook to the woman. Thus beneficently provided with the instruments of labour, the bread of the future was brought within man's grasp,—the spade to dig and delve with, whilst the weeding-hook removed the unsown thistles which sprang up in the field, and the sickle helped to cut down the thorns, as well as the stalks of wheat when ready for the harvest; the distaff and crochet-hook were destined to replace with textile fabric the *skin* raiment of the despondent pair, for whose convenience blood was first shed on the earth; and

Adam, instructed how to slay and flay an animal for sacrifice, was duly presented with the sacrificial knife, subsequently used by his righteous son Abel, the first of martyrs.

Having shown that the care and culture of plants was an honorable occupation and amusement for man, we shall now progress with our work, and commence it by giving ample instructions for forming, laying out, and stocking a Flower Garden.

In India, the flower garden, and the *mallee** or Hindoo gardener, are inseparable; and if a good one is secured, a great deal of unnecessary labour, disappointment, and vexation are avoided. Therefore, it is better to pay an extra rupee or two and secure a good one who is up to his work, than to save the money and to endure the worry of watching a dolt, who will some fine day cut down or disfigure a handsome bush or tree to obtain its fruit or flowers, just to avoid the trouble of using a crook. I have seen this actually take place, the idiot considering himself very harshly treated at being censured for his stupidity, and the mischief he had accomplished.

All the implements needed by the Floriculturist may be obtained, of the newest and best description, from Messrs. T. E. Thomson & Co., of Calcutta, who will also be able to import and supply English-made weeding-hooks. This most useful tool is of no use to the *mallee*; though it will enable his master or mistress to pull up and remove weeds at pleasure; thus securing gentle exercise conducive to health without descending to toil, which is injurious to the European constitution in the plains of India.

*The word *mallee* means a Hindoo who is by birth and caste a gardener; and Mahomedans following the craft are also called *mallees*.

SOILS.

The soil of a flower garden, and that needed for filling flower-pots, should be of the best and richest description. It is one of the popular fallacies of the day to imagine that one measure of earth (taken from any convenient spot), mixed with two measures of black stuff (the *kalee mittee** of the *mallees*) from the nearest and oldest cowdung heap, constitutes the best of artificial soils for flower culture. But there never was a greater mistake, inasmuch as flowers require not a superabundance of *humus* or *humic acid* in the soil, but an ample supply of saline and mineral matters, which are essentially necessary for their successful growth, and for the due development and colouring of their flower buds and petals. The brightness of their colours is due to the oxides of iron, and to various combinations of sulphur with the alkalies and alkaline earths. The production of rich scent or perfume is intimately connected with the presence and action of sulphur. Hence it follows, that if these substances are deficient, or scantily represented, the petals will be imperfect, the colouring poor and defective, whilst the fragrant odour will be of the most subdued kind. A scentless Violet, or a Rose with scarcely any perfume, is nothing rare or uncommon in India; and yet both defects may be removed, if the proper substances be added to the soil.

I must refer the reader, for full instructions and exhaustive explanations on these subjects, to Pogson's "Handbook of Agriculture" (Part I.), and to Professor Johnston's "Catechism of Agricultural Chemistry and Geology." This eminently practical work cannot be too highly recom-

* *Kalee mittee* means black earth or mould.

mended or eulogised. He who has studied it with care, will always be able to benefit himself, and to instruct others in the noble art of Agriculture, with which Floriculture is closely allied. In fact it may very properly be called the poetry of Agriculture.

In India, the soil required for the culture of English and exotic flowers must be made by art, the best natural soil procurable being selected as the base to be operated on, and improved or exalted by agricultural science.

In the plains of India, the soil which produces the best crops of sugarcane is the soil best fitted for flowers. In the hills, the rich black soil of the Pine, Oak, and Rhododendron forests will answer the same purpose. It is not the six inches of surface leaf mould that is required, but the first twelve inches of soil underlying the leaf mould. In Simla this description of soil is easily obtained. The north-western face of Mount Jacko, from "Oakwood House" and up to "Violet Hill," is overlaid with this soil. All who visit the summit of Mount Jacko cannot fail to be struck by its appearance: and as nearly similar soil exists in all other Indian hill stations, (when not built on naked rock,) the Simla visitor will have little difficulty in finding it in the hills of the Bombay and Madras Presidencies. The black cotton soil of the Deccan, Bundelcund, and certain parts of Rohileund and Oude, is also well fitted for flower culture.

To obtain a supply of the soil needed, the *mallee* should receive orders to visit the sugarcane fields in the vicinity, and to select the field which produces the most luxuriant crop as the one from which soil is to be secured.

His master should ride out and inspect the field; and, if satisfied, a bargain should be concluded with its *zemindar*,

or proprietor, for removing a certain number of cart-loads of soil,—the excavation to be made just beyond the limits of the field, or within its boundaries. The best and most economical form will be that of a blind well, the depth of which will correspond with the depth of sugarcane soil; the excavation to cease as soon as a change of strata indicates a change of the soil. The good soil may extend to a depth of from 10 to 12 feet, and it may change at the third foot of depth. The *mallee* must be instructed accordingly; and if, in spite of these instructions, he brings home the changed soil, he should be fined for his negligence. These men are perfectly well acquainted with the distinguishing features of sugarcane soil, and as there is no mistaking it, no ill-considered leniency should be shown to the offender.

When the soil is carted home, have it carefully broken down with mallets; let it dry, and gradually pulverize it. By adopting this plan, the soil absorbs oxygen, nitrogen, and carbonic acid gas from the atmosphere, and becomes chemically fitted for inducing and producing catalytic chemical action. The soil so prepared should be placed under shelter, and its conversion into an artificial flower soil should at once be undertaken.

—It is not generally known that the great and wealthy perfumers of France are owners of large flower farms, on which the best descriptions of scented flowers are constantly grown. The natural soil of the flower farms of Grasse, in the lovely Cannes Valley (France), is probably the richest soil extant in Europe. Its analysis is given on next page, and is as far as possible to be considered as a formula for the manufacture of garden and flower-pot soil.

*Analysis of Cannes Valley, Deccan Cotton, and a most fertile
English soil.*

COMPONENTS.	CANNES VALLEY SOIL.	DECCAN COTTON SOIL.	FERTILE ENGLISH SOIL.
Silica and sand. ...	860.00	482.00	648.00
Alumina ...	30.70	203.00	57.00
Silicate of alumina ...	13.00	...	{ Carbonic acid. 40.00
Silicate of magnesia ...	8.50	...	
Organic matters ...	22.30	*43.00	97.00
Carbonate of magnesia ...	7.00	102.00	8.50
Carbonate of lime ...	6.80	160.00	59.00
Sulphate of lime ...	5.80	...	2.00
Phosphate of lime and magnesia ...	5.70	...	4.50
Potash salts ...	4.80	...	2.00
Soda salts ...	6.70	...	6.00
Carbonate of iron or oxides ...	10.50	10.00	61.00
Carbonate of copper ...	1.70	...	
Manganese* and iodine ...	0.00	...	*1.00
Loss during analysis ...	16.60	...	14.00
Total ...	1,000.00	1,000.00	1,000.00

* This includes the water present. In the first the water has been expelled by drying.

A comparison of the figures will show how deficient the Indian soil is in almost all vital matters, and it teaches us the extent to which the alkaline earths may be used in improving poor or inferior cotton soils. The *kunkur*, which burns into lime, is totally different from that which will not yield it. This latter is of no use as a mineral manure; but the former, reduced to powder without being subjected to calcination, is a most valuable manure. When calcined lime is applied to the soil, in the state of the slaked powder, it rapidly absorbs carbonic acid gas, and resumes its original status of carbonate of lime, in which condition it becomes fit for plant food. Hence *kunkur* dust has the same value as very old bazar *chunam*, which is quite unfit for making mortar. Therefore, when *kunkur* of the proper quality is available, its superiority and cheapness will cause it to be preferred to ordinary *chunam*, which is always more or less adulterated with useless substances. When caustic, or unslaked lime powder, is applied to sour land, overrun with roots of rank weeds and vegetation, it first kills them by its causticity, and then sweetens the soil, by neutralizing the acids present; this done, it gradually passes into the state of carbonate of lime, and becomes fit for plants. The sulphate of lime is a compound of sulphuric acid and lime. Hence, if a solution of sulphate of soda be applied to *chunam* in powder, a chemical change takes place, and we obtain carbonate of soda and sulphate of lime. If a solution of common salt be used, we obtain muriate of lime and carbonate of soda. If a solution of saltpetre be employed, we obtain the nitrate of lime and carbonate of potash. If we operate on bone ashes with soda and potash, we secure their phosphates. Thus, by soaking bone ashes in saltpetre water, the potash is taken

up by the phosphoric acid present therein, and the lime combines with the nitric acid, forming nitrate of lime. This, when dried, will combine with potash derived from decaying plants and vegetation, and *re-form* the nitrate of potash. We cannot use a solution of the muriate of ammonia (*sal-ammoniac*) with lime, because gaseous ammonia is formed and at once dissipated. But if we soak brick dust or charcoal dust in this solution, and then fix the ammonia by a second application made by dissolving sulphate of iron in water, we obtain the sulphate of ammonia and the muriate of iron. The charcoal and brick dust remain unaltered and inactive till a certain quantity of moisture has been absorbed; and when this takes place, the water is decomposed, and compounds of carbon and hydrogen are formed, and taken up by the roots of growing plants. In like manner all soluble substances undergo decomposition and re-composition, and are taken up by the plant. Thus, if a sufficient supply of potash and lime be present, these will appear in the grain or seed of the plant in the form of phosphates, the iron being the agent which produces chemical activity. But if there is potash, and little or a mere trace of lime, the plant will take up silica in its stead, and the seed or grain will be hard and flinty. The production of flinty wheat and maize is due to this solution, and precipitation of silica or flint.

The constitution of flowers being very delicate, as compared with food-producing plants, the absence of any particular substance necessary for its perfect development will at once be indicated by the want of colour, imperfect form of petals, and the non-production of seed capable of germination. These are generally called blind seeds, whilst the others are true seeds.

This explanation has been given to show why saline substances, or their solutions, are not directly applied to the pulverized soil, and why growing flower plants would suffer by their direct application.

The preparation of artificial soil has now to be explained. Let the operator consider that the numbers given in the first column represent *seers* in weight. He may then order the *mallee* to weigh out as follows, viz. :—

1st.—For the three first constituents he should weigh out 900 seers of the pulverized sugarcane soil.

2nd.—Reduce 20 seers of *sael khurree* (soapstone)—if 40 seers of calcined *magnesian limestone* lime are not procurable—to powder, run it through a fine wire sieve, and mix this with the soil. This operation will supply the *magnesia* needed.

3rd.—Sift, and add 40 seers of bazar lime or *chunar* to the above in its dry state.

4th.—Prepare 20 seers of bone ash, and place them in a tub; add thereto five seers of saltpetre, and water sufficient to dissolve it completely. Let it soak all night, and next morning add thereto 20 seers of *soorkhee*, or brick dust, pounded fine and sifted; mix well together, and then spread it over the soil mass; cover over with soil, and, when quite dry, work it well in by repeated turning over of the mass.

5th.—Take 40 seers of *soorkhee* and divide it into two equal parts, which place in separate tubs; to the first add seven seers of saltpetre and three seers of sulphate of soda (the *kharee neemuk*) of the bazar; mix well together. To the second tub add two seers of common culinary salt, finely pounded and sifted, and then three *seers* of crude carbonate of soda (the *dhoobee's sujje* of the bazars); mix well together.

In a third tub dissolve eleven *seers* of sulphate of iron (the *kussees* of the bazars) in two *mussucks* of cold water. Take a *ghurrahful* of this solution and apply it to tub No. 1, and as much to tub No. 2; mix and turn over the contents. This done, apply a second *ghurrahful* to each, and to what is left of the iron solution, add 20 *seers* of charcoal dust, which work well in. Now add sufficient cold water to all three tubs to cover their contents to the depth of one inch, and let them soak all night; next morning, weigh ten maunds of the prepared soil, in heaps of five maunds each. To the first heap add the contents of tub No. 1, and to the second the contents of tub No. 2; mix each heap and its prepared *soorkhee* well together, and, when dry, run it through a coarse sieve, say quarter inch mesh. This done, fill up the third tub with water, and divide the contents equally amongst the three tubs. Now fill up each tub with fresh droppings of the camel, sheep, or goat, or a mixture of all three, though the first and last are to be preferred, as being very much richer in nitrogenous compounds; work them in with a rake, so as not to break or mash them more than can be helped. Whilst this is being done, cause the soil mass to be evenly spread out, and over its surface apply the contents of *the three tubs*, and mix well together; now re-level the heap, and to it apply the soil and prepared *soorkhee* heap No. 1; mix and turn over, and then apply heap No. 2; mix as before, and allow to dry under cover. After two or three days, run the prepared soil through a coarse half or one-third inch mesh sieve, and reduce all hard droppings to powder, so that the prepared mass may be a uniform coarse powder or pulvurent artificial soil, in which state it is to be kept ready for instant use.

It will be seen that this artificial soil contains every component present in the two fertile soils, and is somewhat richer in potash salts, which play a most important part in the economy of flowering plants.

The Chinese, who are very superior gardeners, manure the plant, and not the soil. There is much sound sense and economy in the plan. If the plant food is kept within a radius of from 9 to 12 inches, the roots and rootlets will be most adequately supplied with food; whereas, when it is thinly scattered over a large extent of soil, the roots have to go far in search of it, and may, and very often do, come across injurious substances which act fatally on them.

LIQUID MANURE.

In order to make *liquid manure*, which is often required for use in the flower garden, the following process should be adopted, viz.:—In a clean half-cask place 20lb weight of sheep or goat's droppings; and over them pour a large kettle of boiling water; stir occasionally until cool, when the mass should be reduced to a paste by the *mallee*. Next, 20 gallons of cold water are to be poured in, and the mixture well stirred together. It must now be allowed to stand and settle all night, so that the *clear liquid manure* may be ready for use next morning. One pint of it is to be poured about the stem of the plant, thus manuring the surface roots and rootlets. This manure is a leaf-producer, and should be used when the foliage is scanty. The dregs should be utilized in the kitchen garden. The utmost care should be taken that the *mallee* does not fill his watering-pot with this manure, preparatory to applying it, through its rose, to Geraniums and other plants in full flower. We have seen this done, and caution the florist accordingly.

In India nearly all families keep up a farm-yard or *moorgeekhana*, and as the manure obtained from fowls, ducks, geese, and pigeons is very rich in mineral matters and nitrogen, it should be carefully collected and kept under cover. Its ammonia may be fixed by sprinkling sulphate of iron water over the heap, and then strewing some sifted slaked lime over it. The droppings of rabbits, and the litter removed from their hutches, is also a very rich manure. All or any of these may be used, *when fresh*, in the manufacture of liquid manure; but when dry they are better adapted for *composts*. All these manures owe their value to the percentage of *phosphate of lime* present therein. The bones of the ox contain $57\frac{1}{3}$ per cent.; and those of the sheep 80 per cent., of the *phosphate of lime*. The faithful dog crunches down and swallows the bone flung to him by his master. The solvents present in his stomach reduce the bone to a liquid state, the nutritious matters are retained, the mineral part is voided, and being a natural *super-phosphate of lime*, it may be dissolved in water and used as the artificial phosphate. If an artificial *guano* be desired, the dog and the duck between them will afford a constant and gratuitous supply of the best quality. This guano is purer and richer than that obtained from the Kooria-Mooria Islands, Patagonia, and other places; yet the British farmer and market gardener will pay large sums to purchase the one, and not take the trouble to preserve and use the other. We have shown that with a little management, and suitable orders given to the *sweeper*, an ample supply of the most valuable manures may be always secured free of cost. It should be remembered that the aqueous solution of sulphate of iron immediately deodorises these substances, which may be kept in a semi-fluid state till

required for use. Their dilution with the proper quantity of water is the work of a few minutes, and if this vital fluid is abundant, the liquid manure should be freely used in the kitchen garden and orchard. If, however, there is an over-supply, the best way to economise it is to sprinkle it over dry pulverised earth, repeating this operation till the stock is exhausted. This enriched earth, when dry, should be stored under cover in a pit, and if not required by the owner, will always command a good price. These powerful manures will be free of grubs, and the larvæ of beetles, flies, and creeping things innumerable, whose birth-place is the reeking dunghill, from which they emerge only to devour and destroy the choicest of flowers and vegetables at their leisure, will, and pleasure. Before leaving this subject, we would wish to point out that the dung of stall-fed oxen and cows differs very considerably from that of the half-starved animal met with in Indian villages. The richness of cow's milk depends on the quality of the food consumed, and the manure corresponds. Hence it follows, that the cow fed upon Indian Corn, large Millet, Barley, Potatoes, Beans, Marigold, Wurzel, Cattle Cabbage, &c., will yield far richer milk and manure than one fed on grass and Carrots with a *seer* or two of *gram*. The farm-yard manure of England and India are about as different in quality as the *bazar* cream cheese and that of Cheshire.

LAYING OUT A FLOWER GARDEN.

The artificial soil being ready, the formation or laying out of the Flower Garden may now be considered.

The best plan is to make a map of the ground on paper, marked off to scale. On this lay out any of the selected

geometrical figures which will be found in the frontispiece of this work. Then, between them lay out walks, which should never be less than five feet wide, nor more than seven feet. All blanks or spaces intervening between the walks and geometrical flower-beds should be planted with *Doob* Grass, or, in the hills, with Clover or any favorite English grass, or a mixture of them. To make the figures distinctly visible, small flat tiles, made to a guage of six inches by three inches, should be procured and fixed in the natural soil, according to the outline of the bed.

If this is to be sown broadcast with flowers, the natural soil, to the depth of six inches, (and for large flowers, to nine inches,) must be carefully removed, and its place filled up with as much prepared garden soil. Plot by plot each bed will have to be similarly treated, until the entire flower garden has been laid out according to the plan on paper.

Of course, it is understood that the artificial soil is only to be used for choice exotic flowers, whether grown in beds, or in flower-pots of suitable size. For common or *acclimatised* flowers, ordinary garden soil, enriched with the droppings named, (and prepared with sulphate of iron water, which will fix the ammonia and deodorise the manure,) should be used.

THE PLANT-HOUSE.

The construction of a *plant-house* is as essential as the laying out of the garden. There is not the slightest necessity for running up an expensive structure of glass and iron. What is wanted is a building to keep out *Indian heat*, not *Indian cold*. Therefore, a thatched shed, 16 feet broad and 40 feet long, with sides 9 feet in height, will answer all purposes. The Indian bazars are pretty well supplied

with sheets of tale (*mica*), which will answer all the purposes of the more expensive and brittle glass. Any carpenter can make up window frames of soft wood—deal or *saemul*, for instance; and if the sheet of tale used in place of a pane of glass, be 10 by 8 inches, a very substantial window may be made for a mere trifle. The sides of the plant-house should have posts at every three feet, with a groove running down the entire length of the post. This can be made by nailing down one lath as a fixture, and cutting the other into lengths working on a pivot or screw. The space between the two laths represents the thickness of the mica window frame. These, when placed in position, may be kept there by screwing down the movable lath; and by repeating this process a plant-house is secured, having a water-proof thatched roof and *mica* glazed side walls. The window frames should not exceed 32 inches by 18 inches, and each would contain six panes of *mica*. They would be very strong and light, and could be put up or taken down at discretion. Thus, after sunset, two rows of windows might be opened all round the plant-house, which would be closed next morning at 7 or 8 a.m. The first two feet of the side walls should be made of movable planking, and all the windows above six feet should be fixtures. The various entrance doors should be of glass, and all open spaces between the roof and side walls should be carefully stopped up with straw or mat padding, so that, when a *tattie* was put up and watered, the inside of the plant-house would be cool and comfortable; all unnecessary glare being kept out by heat-enduring creepers growing outside the house, or by blue or green calico curtains. In time, good grape vines could be trained to grow inside, whilst the plants or rooted vines would be flourishing outside.

It is not our intention to convert this practical handbook into a ponderous volume on Floriculture. We will show how most of the choicest flowers may be cultivated, and by making use of this knowledge, the rearing of the commoner kinds becomes a very simple affair.

To make our work as complete as possible, we give in continuation the latest floral novelties, numerous illustrations for laying out flower beds, and concise directions for constructing a small aquarium, and making and planting rock-work.

LIST OF FLORAL NOVELTIES.

- No. 2192. *CLARKIA INTEGRIPETALA* (*Tom Thumb*).—Compact and dwarfurth ; a profusion of rosy magenta.
- „ 2193. *ESCHSCHOLTZIA AURANTIACA*.—A first class novelty ; very deep orange.
- „ 2194. *MARIGOLD* (Orange, African Quilled).—Very double, with quilled petals.
- „ 2195. *PETUNIA GRANDIFLORA* (*La Superbe*).—Brilliant magenta with pure white eye. (*Note*.—Petunias grow and flower at Umballa in all May.)
- „ 2196. *WALL FLOWER* (*New Golden Tom Thumb*).—Compact ; colour fine golden orange.
- „ 2197. *NEMOPHILA ATOMARIA* (*Elegans*).—Blossoms with a white centre, ground colour dark chocolate, and a wide margin of pure white.
- „ 2198. *PHLOX DRUMMONDI* (*Cardinal*).—Colour brilliant scarlet.
- „ 2199. *PHLOX DRUMMONDI* (*Rose d'Amour*).—Colour bright rose.
- „ 2200. *PHLOX DRUMMONDI* (*General Grant*).—Colour rich bright purple ; *unapproachable*.

- No. 2201 *TROPÆOLUM LOBBIANUM* (*Coleur de Bismarck*).—
A variety, with flowers of the singular *Bismarck* brown.
- „ 2202. *SOLANUM* (*Capsicum, Prince of Wales*).—Charming decorative plant, from His Royal Highness's garden.
- „ 2203. *DELPHINIUM CONSOLIDA* (*Flore pleno candélabrum*).—Very double.
- „ 2204. NEW HYBRID TREE MIGNIONETTE.—Grows three feet high, and bears very sweet-scented flowers.
- „ 2205. *GODETIA REPTANS* (*Insignis*).

These have been introduced by Jas. Carter & Co. in 1871, and are very choice.

NEW DESIGNS FOR FLOWER BEDS,

Illustrated to show the arrangement of colour produced by popular Bedding Plants, as seen at the Crystal Palace, Battersea Park, and other places.

No. 1.

- | | | |
|------------------------------|-----|-----------------|
| 1. Geranium, Lord Palmerston | ... | <i>Crimson.</i> |
| 2. Lobelia speciosa | ... | <i>Blue.</i> |

No. 2.

- | | | |
|-------------------------------------|-----|---------------------|
| 1. Perilla-Nankinensis | ... | <i>Dark copper.</i> |
| 2. Calceolaria, Aurea floribunda | ... | <i>Yellow.</i> |
| 3. Geranium, Crystal Palace Scarlet | ... | <i>Scarlet.</i> |
| 4. Geranium, Christabel | ... | <i>Pink.</i> |

No. 3.

- | | | |
|------------------------------|-----|-----------------|
| 1. Geranium, Boule de Fou... | ... | <i>Scarlet.</i> |
| 2. Calceolaria angustifolia | ... | <i>Yellow.</i> |
| 3. Lobelia speciosa | ... | <i>Blue.</i> |

No. 4.

- | | | | |
|----|-------------------------|-----|-----------------|
| 1. | Geranium, Harry Hieover | ... | <i>Scarlet.</i> |
| 2. | Campanula carpatica | ... | <i>Blue.</i> |

No. 5.

- | | | | |
|----|--------------------|-----|-------------------|
| 1. | Petunia seedlings | ... | <i>Pink.</i> |
| 2. | Lobelia Paxtoniana | ... | <i>Pale blue.</i> |

No. 6.

- | | | | |
|----|---------------------|-----|-----------------|
| 1. | Tagetes pumila | ... | <i>Yellow.</i> |
| 2. | Geranium, Tom Thumb | ... | <i>Scarlet.</i> |
| 3. | Lobelia speciosa | ... | <i>Blue.</i> |

No. 7.

- | | | | |
|----|----------------------------------|-----|-----------------|
| 1. | Calceolaria, Gaines's Yellow | ... | <i>Yellow.</i> |
| 2. | Topæolum, Crystal Palace Scarlet | | <i>Scarlet.</i> |

No. 8.

- | | | | |
|----|--------------------------|-----|---------------------|
| 1. | Canna Warscewiczii | ... | <i>Dark copper.</i> |
| 2. | Geranium, Excellent | ... | <i>Scarlet.</i> |
| 3. | Lobelia, Queen of Whites | ... | <i>White.</i> |

No. 9.

- | | | | |
|----|--------------------------|-----|-----------------|
| 1. | Geranium, Crystal Palace | ... | <i>Scarlet.</i> |
| 2. | Tagetes pumila | ... | <i>Yellow.</i> |
| 3. | Pansy, Cliveden Blue | ... | <i>Blue.</i> |

No. 10.

- | | | | |
|----|---------------------------|-----|----------------------|
| 1. | Amaranthus melancholicus | ... | <i>Dark crimson.</i> |
| 2. | Geranium, Christine | ... | <i>Pink.</i> |
| 2. | Pyrethrum, Golden Feather | ... | <i>Gold.</i> |

No. 11.

- | | | | |
|----|-----------------------|-----|--------------------------|
| 1. | Variegated Daisies | ... | <i>Gold & green.</i> |
| 2. | Verbena, Crimson King | ... | <i>Crimson.</i> |

No. 12.

- | | | | | |
|----|----------------------|-----|-----|--------------------|
| 1. | Coleus Verschaffelti | ... | ... | Purple and yellow. |
| 2. | Cineraria maritima | ... | ... | Silvery. |

No. 13.

- | | | | | |
|----|-------------------------|-----|-----|----------|
| 1. | Centaurea plumosa | ... | ... | Silvery. |
| 2. | Pansy, Cliveden Blue | ... | ... | Blue. |
| 3. | Geranium, Harry Hieover | ... | ... | Scarlet. |

No. 14.

- | | | | | |
|----|--|-----|-----|------------------|
| 1. | Pyrethrum, Golden Feather, mixed with Verbena, Purple King | ... | ... | Gold and purple. |
| 2. | Lobelia Paxtoniana | ... | ... | Pale blue. |

No. 15.

- | | | | | |
|----|----------------------|-----|-----|--------------------|
| 1. | Perilla Nankinensis | ... | ... | Dark copper. |
| 2. | Verbena, Purple King | ... | ... | Purple. |
| 3. | Coleus Verschaffelti | ... | ... | Purple and yellow. |
| 4. | Gnaphalium lunatum | ... | ... | Silvery. |

No. 16.

- | | | | | |
|----|--------------------------|-----|-----|-----------------|
| 1. | Amaranthus melancholicus | ... | ... | Dark crimson. |
| 2. | Geranium, Cloth of Gold | ... | ... | Gold and green. |
| 3. | Geranium, Harry Hieover | ... | ... | Orange scarlet. |
| 4. | Verbena, Purple | ... | ... | Purple. |

No. 17.

- | | | | | |
|----|------------------------|-----|-----|--------------------|
| 1. | Coleus Verschaffelti | ... | ... | Purple and yellow. |
| 2. | Centaurea candidissima | ... | ... | Silvery. |

No. 18.

- | | | | | |
|----|-------------------------------|-----|-----|-----------------|
| 1. | Geranium, Scarlet | ... | ... | <i>Scarlet.</i> |
| 2. | Calceolaria, Aurea floribunda | ... | ... | <i>Yellow.</i> |
| 3. | Viola cornuta | ... | ... | <i>Mauve.</i> |

No. 19.

- | | | | | |
|----|----------------------|-----|-----|-----------------|
| 1. | Verbena, Purple King | ... | ... | <i>Purple.</i> |
| 2. | Eleonor, Geranium | ... | ... | <i>Scarlet.</i> |
| 3. | Cerastium tomentosum | ... | ... | <i>Silver.</i> |

No. 20.

- | | | | | |
|----|---------------------------|-----|-----|--------------------|
| 1. | Verbena, Crimson | ... | ... | <i>Crimson.</i> |
| 2. | Coleus nigricans | ... | ... | <i>Dark brown.</i> |
| 3. | Lobelia speciosa | ... | ... | <i>Blue.</i> |
| 4. | Pyrethrum, Golden Feather | ... | ... | <i>Gold.</i> |

No. 21.

- | | | | | |
|----|---------------------------|-----|-----|-----------------|
| 1. | Verbena, Crimson | ... | ... | <i>Crimson.</i> |
| 2. | Lobelia speciosa | ... | ... | <i>Blue.</i> |
| 3. | Pyrethrum, Golden Feather | ... | ... | <i>Gold.</i> |

No. 22.

- | | | | | |
|----|----------------------|-----|-----|--------------------------------|
| 1. | Purple King Verbena | ... | ... | <i>Purple.</i> |
| 2. | Coleus Verschaffelti | ... | ... | <i>Purple and
crimson.</i> |

No. 23.

- | | | | | |
|----|------------------------|-----|-----|----------------------------|
| 1. | Geranium, Golden Chain | ... | ... | <i>Gold and
green.</i> |
| 2. | Geranium, Cybister | ... | ... | <i>Crimson.</i> |

No. 24.

- | | | | | |
|----|-------------------------|-----|-----|---------------|
| 1. | Geranium, Helen Lindsay | ... | ... | <i>Pink.</i> |
| 2. | Ageratum Mexicanum | ... | ... | <i>Mauve.</i> |

No. 25.

- | | | | | |
|----|--------------------------|-----|-----|-----------------|
| 1. | Brown Calceolaria | ... | ... | <i>Brown.</i> |
| 2. | Verbena, King of Bedders | ... | ... | <i>Crimson.</i> |
| 3. | Pansy, Cliveden Yellow | ... | ... | <i>Yellow.</i> |

No. 26.

- | | | | | |
|----|----------------------|-----|-----|---------------------------|
| 1. | Coleus Verschaffelti | ... | ... | <i>Purple and yellow.</i> |
| 2. | Cineraria maritima | ... | ... | <i>Silvery white.</i> |
| 3. | Pansy, Cliveden Blue | ... | ... | <i>Blue.</i> |

ROCK-WORK AND AQUARIUM.

A flower garden may be much improved by introducing a piece of artificial rock-work and a small pond, because, in connection with these, certain highly interesting plants may be reared, or kept, which would not answer in a plain earthy soil or surface. In order to increase the effect, the pond should be at the base of the rock-work, and, if possible, receive from it the trickling of water which has been conveyed to the summit in pipes. The rock-work should possess a natural appearance, with rugged sides, and perhaps be ten or twelve feet high. Rocks of the same kind and colour should be placed together; if intermixed, they seldom wear a natural appearance. Rock plants of every description should be profusely stuck around, and in a twelvemonth the whole scene will exhibit an impress of antiquity far beyond anticipation. Among the plants suitable for growing from the crevices of the rocks, may be mentioned various ferns and mosses, and also the *Valeriana dicecia montana*, *Trifolium alpestre*, *Thymus vulgaris*, *Epilobium alpinum*, *Campanula cervicaria*, *Alyssum calycinum*, and *Viola banatica*. The plants suitable for the marshy borders of the pond are the *Acorus litorella*, *Lychnis flos-cuculi*, *Saxifraga irrigata*, *Epilobium angustifolium*, *Primula farinosa*, and many others. All English aquatic plants will grow in the hills, and an appropriate selection of such plants may be ordered from any London nurseryman.

FLORICULTURAL MONTHLY CALENDAR.

JANUARY.—Little can be done in the flower garden except the weather be open and dry ;—but advantage ought to be taken of favorable intervals to render the plots and borders neat ; to protect, by coarse screenings of leaf-mould, Fuchsias, China Roses, and other choice shrubs—for though they may not perish by frost, the mulch tends to enrich the soil when forked in. Propagate, by division of roots, Daisies and Thrift ; protect the beds of Hyacinths, Anemones, Ranunculuses, and Tulips, by a covering of coarse litter. Top-dress Auriculas, using a compost of light loam and two years old cow-dung, mixed with a twelfth each of sea or river sand, and rotten wood. Plant all the bulbous roots that are still out of the ground. In heat, sow Mignonette, annual Stock, Pentstemon, Diffusus, Gentianoides, and other half-hardy annual and perennial plants, using the propagation-pot, by which means the entire number of seedlings (allowing for previous thinning out) can be transferred, with roots undisturbed, to the pots or borders. Commence sowing in the last week, seeds of Gloxinia and Gesneria ; these, if obtained from impregnated plants, may yield new and striking varieties. Sow also (broken up, and mixed with sand) the berries of *Psidium Cattleianum* ; this plant is one of the choicest evergreens.

FEBRUARY.—Attend to the foregoing general directions ; fork and clean the flower borders. Plant Anemones, Gladiolus, perennial herbaceous roots, and transfer others, dividing the crowns to multiply the species. For examples of this division of roots, select the Primrose (single and double) and the Polyanthus. Transplant the rooted

layers of Carnations; also the divided roots of *Campanula*, *Lobelia*, *Lychnis*, *Mullpink*, and *Dianthus sinensis*. Sow in mild heat any annual flower seeds, and of *Auricula* and *Mimula* in boxes or pans. We include the beautiful *Primula sinensis*.

MARCH.—Sow annuals, including Balsam seed, collected from the best double flowers. Plant box-edgings, using much pit sand; also evergreen shrubs of every description. Transplant autumn-sown annuals into pots, and protect them till fresh rooted under glass; as *Clarkia* of every kind, *Calliopsis cœnothera*, *Lindleyana*, *Mignonette*, *Schizanthus*, *Pinratus*, and *Porrigens*. Sow in the last week, in the open ground, and at the same time a pot of each in heat or at least under glass stocks, *Foxglove*, *China Aster*, *Clarkia*, *Dahlia*, *Campanula*, *Larkspur*, *Pentstemon*, *Amaranthus*, *Tobacco*, and all the hardy annuals. Take cuttings of *Hydrangea* from the tops of the shoots. These, if the buds be full, sometimes will produce a fine flower-head, and the effect is striking: soil, pure heath-mould, or leaf-mould and sand.

APRIL.—Plant *Dahlia* roots in richly-manured loam, *Hollyhocks*, *Carnations*, biennials, and perennials. At this season every herbaceous plant is almost certain to succeed. *Campanulas* (the tall pyramidal) raised by cuttings of the roots in autumn, may now be transferred to pots of loam and leaf-mould; and as the plants grow, they are to be constantly shifted till they come into pots, wherein they will bloom profusely. If placed in the borders, they will require no peculiar treatment. Sow in a pot the seeds of this variety of *Campanula*; seedlings frequently produce the finest plants; they require profuse watering: also the seeds of the *Pansy* or *Heartsease*, to procure varieties. Propagate by cuttings, as directed for *Geraniums*, or by single eyes, the

Erythrina, Crysta Galli, and Laurifolia; in propagation-pots, using the same soil, all the Salvias, Verbenas, Rockets, double Wallflowers, and every species of Fuchsia that has produced young wood. Try every plant by cuttings placed in ounce phials, three parts filled with rain-water. Bud China, Noisette, and Moss Roses on Dog-rose stocks. Divide the roots of Dahlias, either retaining one single tuber with a sprouting eye, or twist out very cautiously a single shoot, so as to detach its base and the latent bud it contains, planting it in the smallest pot of sand and leaf-mould; a gentle hot-bed will facilitate the protrusion of roots.

MAY.—This is the season to stock the flower garden with those plants which have been prepared during autumn, winter, and spring; and therefore transfer from the propagation-pots, annuals raised in them, by lifting the whole mass and depositing it in a spot prepared in the border: thus trouble and loss of time are obviated. Sow a few annual seeds in the open ground for succession. Plant the parterres with groups of Fuchsias, Calceolaria, Petunia, Neapolitan Violet, and Verbena; and at the latter end form masses of the scarlet and variegated Gerania, and many less prized but beautiful fancy varieties, such as Diomede, Conspicuum, Succulentum speciosum, Moore's Victory, Dennis's Rival, &c., &c. Propagate by cuttings the China Roses of every kind; plant them two joints deep in a shady situation; also Calceolarias of the shrubby kind, Peruvian Heliotrope, &c.; by division of the roots, Neapolitan Violet, placing them in beds of manured loam twelve inches apart; the Heartsease of the best varieties, in shady situations: the soil, rich loam and leaf-mould. These favorite prize flowers require a frequent renewal of soil; they dwindle if retained in one site, and degenerate to the condition of the poor weak flowers of former years.

Propagate by slips, *Lychnis*, double *Rocket*, and *Wallflower*; thin out the superabundant shoots of *Asters*, *Antirrhinums*, *Pentstemons*, *Phlox*, and all luxuriant herbaceous plants.

JUNE.—Propagate as during the last month, and plant young side shoots of the best *Lobelias* in shady borders, under a hand-glass. The pipings of *Pinks*, placed in sandy earth, are to be closely covered in the same way till completely rooted. *Salpiglossis* succeeds best in the open air: the plants should now be turned out of pots and set in a dry border. *Azaleas*, *Acacia Armata*, and some such plants, are greatly improved by being turned out of pots and planted with the entire balls in an open border.

JULY.—Bud *Roses* on wild stocks. A pretty effect is produced by inserting one or two buds of the deep red *China* in the common *China Rose*. The former is strengthened in its habit, and the different tints of the two *Roses* are very pleasing. Propagate by cuttings, the *Chinese Azaleas*, half-shrubby *Calceolarias*, *Linums*, *Pelargoniums*, *Fuchsias*, *Myrtles*, and other exotic shrubs. Layer *Carnations* in sandy earth mixed with a little pulverized chalk; peg them near the incision with hooks of fern leaves. Sow *Mignonette* in small pots for winter, also annual flower seeds for bloom in September.

AUGUST.—Bud as before, but not the *China Rose*. Plant seedlings of herbaceous plants—*Cyclamens* of every kind; offset bulbs to gain strength; re-pot *Auriculas*, removing the suckers; and detach the black ends of old roots with the finger and thumb. Sow the seeds of all the annuals mentioned under that head. Use gentle heat; add any other favorites, as *Madia elegans*, *Mimulus*, the white night-flowering *Petunias*, and tall and dwarf *Larkspurs*. Sow the seed of the best *Pansies*. Take cuttings of all the fine *Pelargoniums* that are out of flower early in the month; also of *Calceolarias*, shrubby

and half-shrubby; of *Antirrhinum*, *Caryophylloides*, *Pentstemon*, *Gentianoides*, &c. These require no heat, but should be placed in a cold frame.

SEPTEMBER.—Plant the *Crocus* and some other bulbs. Transplant herbaceous perennials and Pinks to permanent beds, if perfectly rooted. Propagate by cuttings, China Roses in the open borders; and by slips, *Petunias*, *Heliotrope*, *Salvias*, *Gerania*, *Calceolaria*, &c.: they require only a hand-glass and light soil. Sow *Auricula* seeds in pans, also *Clarkia*, *Collinsia*, *Chelone*, and other annuals to be preserved in pots, all through the winter. If the *Pyramidal Campanula* be out of flower, take up one of the finest (roots blue and white), break it to pieces, and half-filling a large pot with loam, place the pieces on the earth, fill the pot with loam, and keep it, merely protected from frost all winter. Raise (*i.e.*, take up) *Geranium* and other plants now in open borders in the ground, and re-pot them in soil suitable to each. Cut back to low buds well situated, the Horse-shoe *Geranium*, and place all plants under cover, to recover from the removal; make cuttings of the best amputated shoots of *Geraniums*. Gradually diminish the watering of all housed plants.

OCTOBER.—Plant towards the end, bulbs of *Hyacinth*, *Narcissus*, and *Tulips*, the common *Jonquil* and *Daffodil*, and *Anemone* roots, &c., also shrubs of every description, though evergreens generally succeed in spring; cuttings as before, if not completed. *Hyacinths* in pots filled with a compost of light loam, sand, and vegetable earth, should be plunged to the rims in ashes or light earth, under the glass of a cold frame; and when the plants begin to grow, the pots should be raised (*i.e.*, taken up), cleaned, and placed in the warm plant-room. Take up the *Persian Cyclamen*, and

pot it in loam, sand, and leaf-mould. There is a *Geranium* which merits much attention; it is called the Scarlet Globe, and appears to be a seedling variety of *Pelargonium Zonale*. Cuttings of it strike freely in the open border early in summer; the handsomest of these, taken up in September, and carefully potted in poor loamy soil, will flower throughout October and November, if placed in the window of a south room. The flower head assumes the figure of a Guelder Rose.

NOVEMBER.—Bulbs—plant all, employing much sand about and above the bulbs. Protect *Fuchsias*, if frost threatens. Screened leaves form the best substance to be placed as mulch. Dahlias should be taken up in airy and dry weather; when quite dry and clean, preserve the tubers in well-dried sand.

DECEMBER.—Protect beds of Tulips, Hyacinths, and other choice bulbs or roots, with a layer of sawdust mixed with sand or with ashes. Sawdust alone has been found the most effectual protector to the roots of potted plants in frames, the pots being plunged in it to the brim. If dry weather permit, lightly fork the surface of plots and borders; but at any rate, if it be frosty, scatter some light manures around the stems of shrubs and the more tender plants; it will tend to enrich the ground at the first spring regulation. Secure *Begonias* and other plants which die, by placing the pots in a dry room or outhouse, which can be kept closed so as to exclude the cold winds.

These instructions, by allowing for the difference in the seasons (as previously explained) in the various hill stations, will be applicable to all three presidencies. In the plains still greater allowances will have to be made; and as many summer flowers will grow and blossom in the plains at the

same time as they do in the hills (Simla), experimental culture will be necessary. Thus in all May we have had white *Petunias* (self-sown) in full flower. The Sunflower, sown in March, flowers in all June; and the *Heliotrope* seems to thrive in the hottest weather, if regularly watered. Almost all the *Jesamines* are hot weather flowers; and the *Rosa Sempervirens* bids to keep on flowering till the hot season is over. We have a self-sown *Mignonette* which will flower ere long; and, reasoning from analogy, many other summer flowers would do the same, if taken up and potted before the hot winds set in.

In the Calendar above given, the use of sawdust and of a hot-bed has been indicated. We give below instructions for making the latter; and as a substitute for the former, we recommend the use of rice husk, which may be obtained all over India for a trifle; whilst sawdust is a rarity.

HOW TO FORM A HOT-BED.

The manure obtained from the stable should be well shaken out and thrown into a heap to ferment; watch carefully that it is not too dry, or taking too great a heat—becoming what is technically termed “burned,” when it changes its natural colour, and to a great extent loses its value, both as a fermenting material and as a manure. To prevent overheating, the heap should be shaken and turned over two or three times. Leaves should be collected in abundance during the winter and packed in some convenient place, and well trodden down, so as to retard fermentation, leaving them in a fresh state for use, when wanted in spring. If cowdung is to be used, then less trouble is necessary in preparation, it being of a cooler nature; less leaves are also required, say

to the proportion of one-third. This makes an excellent and lasting bed. Mr. Carter observes :—"Materials being thus ready, and the season for their use at hand, take the measurement of the frame to be employed, allowing 18 inches additional all round when marking the base on the ground ; then commence the bed by using dung and leaves in equal proportion. Supposing horse-dung to be used, raise the bed from 4 to 5 feet in the front and from 5 to 6 feet in the back while building, beating it hard and regular all over with the back of a fork, finishing with a layer of six or eight inches of leaves, which are less liable to take a strong heat than dung. The bed being thus formed, place the frame on it, shutting the light close down. As soon as the heat is fairly up, and the thermometer, when hanging on the frame, showing at night from 60°F. to 70°F., preparations may be made to sow the bed."

It should be remembered that plants grown under frames require heat, light, moisture, and air. The health of the entire plant is intimately connected with the health of its leaves, and without healthy leaves there cannot be healthy roots or produce. Heat without light is comparatively useless ; but heat with light ensures success. In like manner, the necessity for air and moisture cannot be overrated. Warm, moist air causes plants to grow and thrive, whilst warm, dry air deprives them of their contained moisture, and accomplishes their destruction.

Having now brought the amateur flower gardener to the door of his conservatory, it is time to show him how to stock his possessions with the choicest of flowers, to grow which pots of suitable sizes will be needed, as also stands. The treatment of window plants, and the watering and potting of plants, will also have to be considered. We begin with

POTS AND STANDS.

As all in-door plants must be grown in *pots*, the sizes of which will be frequently alluded to, we give some condensed and useful information on the subject; and as most Indian potters (or *koomhars*) can manufacture pots to order, any simple and elegant design may be secured at a moderate outlay. We may here observe, that in India all oval or vase-shaped vessels are by the natives compared to *butter-pots* as made fifty years ago. The celebrated linguist, Dr. Gilchrist, wanted a pair of clay vases for the decoration of his gate pillars. The learned doctor exhausted himself, as well as his stock of Arabic, Persian, Sanscrit, and Hindee words, in the vain attempt to make an Indian potter understand what he required to be made and burnt. A young officer, who was present, offered his services, and as he could just speak the language, the doctor's surprise at the *griff's* presumption may be imagined. However, being a very kind and courteous gentleman, he accepted the offer with thanks.

The following dialogue ensued, viz.:—

Griff to *potter-log*.—"You soor, mukhun-dan janta?"

Potter.—"Han, sahib."

"Then, d—n you, *burra walla bunao do. juldee.*"

The man said, "*Ub sumjha,*" made his *salam*, and in due time the doctor got his vases.

The reader, when ordering flower-pots, should explain whether the shape is to be common or classical. The words "*itna burra phool-ka gumla*" (*Anglice*, "flower-pot of the measure given," i.e. height and diameter) will secure him pots of the dimensions wanted. If the vase or urn shape be desired, the words "*phool-ka gumla mukhun-dan kae namoonae pur bunao*" (*Anglice*, "make the flower-pots after the pattern of the butter-pot") will secure the article wanted.

Any improvements may be shown in a sketch, and if a pattern vase be available, its outline will be correctly imitated, though decorations in relief may be bungled over.

To proceed: the variety of flower-pots may be called endless; some are intended to afford better drainage than the common sort; others, by being double—that is, a pot within a pot, and the space between filled with water—to afford a more equable supply of moisture; and many whose main object is display and ornament. The professional English gardener does not speak of flower-pots as being large, middling, small, or very small, but distinguishes them by numbers: thus, the smallest ones are called *thimbles*; the next *sixties*, which are $3\frac{1}{2}$ inches deep and have a like diameter at top; *forty-eights* are $4\frac{1}{2}$ inches deep and $4\frac{1}{2}$ inches wide at top; *thirty-twos* are $5\frac{1}{2}$ inches deep and $5\frac{1}{2}$ inches wide at top; *twenty-fours* are $6\frac{1}{2}$ inches deep and $6\frac{1}{2}$ inches wide at top; *sixteens* are 8 inches deep and $7\frac{1}{2}$ inches wide at top; *twelves* are $8\frac{1}{2}$ inches deep and $8\frac{1}{2}$ inches wide at top; *eights* are 9 inches deep and 9 inches wide at top; *sixes* are 10 inches deep and 10 inches wide at top; *fours* are 11 inches deep and 11 inches wide at top; *twos* are 12 inches deep and 12 inches wide at top,—all *inside* measure. It should be remembered, however, that these dimensions vary more or less in the formation of what are called *flats* and *uprights*: the former are of greater diameter than depth, and the latter of greater depth than diameter; but all are made to contain nearly the same quantity of soil.

Flower *stands* are commonly made of wood or cast-iron (almost any iron pattern may be supplied to order from the Nahun Iron Foundry, some thirty-six miles distant from Umballa), and the latter are also easily procured from all hardwaremen. A very cheap and pretty one may be constructed of

a wooden upright, with suspension arms of stout wire. Wooden ones, with plain shelving of circular or semi-circular or quadrangular form, make very handsome stands for recesses and corners; those on single uprights, with branches for the support of the pots, are usually constructed of iron wire, or cast-iron, bronzed or painted, and are best adapted for central situations in drawing-rooms. With a sufficient supply of zinc and steel wire at hand, open wire-work baskets can be easily made, and after being suspended, any plant in flower may be placed therein.

THE TREATMENT OF WINDOW PLANTS.

Almost all houses in the hills have one or more rooms provided with windows, in which a few choice flowers may be grown.

The construction of a bay window outside of a glazed door is a very simple affair, which not only adds greatly to the comfort of the room, but supplies a small conservatory, within which sanitary plants or any others may grow undisturbed. By adopting a few simple rules, the cultivation of window plants in pots may be very successfully carried on. These are as follow :—

“*First.*—It is highly necessary that at the onset the plants be young and healthy. Diseased and debilitated plants should be carefully rejected, and tried elsewhere.

“*Second.*—The selected plants should be properly potted; that is, to say, good soil should be used,—something that will supply the plant with the necessary food for its sustenance. There should be ample drainage: pieces of broken flower-pots are used for the purpose, and the plants should, as a rule, be firmly potted, that is, the soil should be firmly pressed about the roots.

"*Third.*—The plants should never be allowed to get dry, and, on the other hand, the soil should not be drenched too heavily. It is always better that the water given to the plant be allowed to pass freely from the bottom of the pots; and thus, to keep water standing in the saucers occupied by the plants is generally a bad practice, as it will often so sodden the roots that they will rot, and the plant must become unhealthy, if it does not die outright.

"*Fourth.*—Air must circulate freely amongst the plants, if they are to be made healthy and to thrive well; therefore, sash windows are always best for flowers, as a supply of air invariably finds its way in from without, even when the sashes are closed. Plenty of light is as indispensable as plenty of air; and the undue crowding of the plants should be altogether avoided. Window gardeners are often what may be termed 'greedy' in this respect; they so crowd their windows that the inevitable result is, the plants are all badly done, whereas a few could be managed with the best possible results. The cultivator of window plants is always open to one annoyance—that of the presence on the plants of a small green insect, generally denominated the 'green fly.' When this appears, some soap and water should be applied, either by the use of a soft brush or by the hand, carefully washing off the fly in the act."—(*Carter's "Gardener."*)

WATERING POTTED PLANTS.

In India most people issue an order to the *mallee*, or his assistant, to water all plants growing in pots twice a day, and some give orders to put such potted plants out in the

rain for a few hours. We have seen a *mallee* take advantage of this order, and leave them out for days and nights together. The result of the operation was, the utter destruction of all the most valuable flowers, amongst them some fifty pots of the finest Geraniums, that had been obtained at very high cost. Unless their destruction be desired, on no account should this plan be repeated. On the subject under notice, Mr. Carter observes: "In the operation of watering potted plants, persons not practically familiar with plant culture are apt to make serious mistakes. Cultivators find by experience that an excess of water at the roots is very injurious to almost all plants, and hence it is usual to direct that great caution be used in the application of water, especially in the winter. The result is, that frequently the opposite extreme is fallen into, to the great injury of the plants. From the moment that the soil becomes so far dried that the fibres of the roots cannot absorb moisture from it, the plant begins to suffer. Some plants can bear this loss of water with more impunity than others; some again—and the *Erica* family among the rest—are in this way soon destroyed. The object of watering should be to prevent this stage of dryness being reached, at least during the time the plant is growing; and at all times in the case of those of very rigid structure; at the same time that excess which would sodden the soil and gorge the plant is also to be avoided. Within these limits the most inexperienced persons may follow sound directions for the application of water with safety; but when even water is given to pot plants, enough should be employed to wet the soil thoroughly, and the difference between plants that require more or less water should be made by watering more or less frequently, and not by giving greater or lesser quantities at one time."

If the amateur florist will purchase one or more empty beer barrels, we would recommend their being filled with water, which done, eight ounces (or four *chittacks*) of sifted slaked lime (*chunam*) should be added to each hogshead filled with water. Such water will act as a manure on all plants, and if one ounce of *sulphate of iron* be added to the above, the colors of the flowers will be fully developed, the reds and crimsons will be of the richest hue, the yellows bright and clear, and the blues and lavenders will be perfect. The explanation of this phenomena belongs to the domains of chemistry. The water so prepared should be used throughout the flowering season: the lime and iron support the growth of the plant, and enable its roots and rootlets to take up other plant food, which is rendered soluble by their presence.

In addition to this, the *lime* possesses the property of neutralising injurious salts, if present in the water. Thus, *sulphate of soda*, which is more or less present in brackish water, is deprived of a portion of its acid and rendered mild; and if common salt be present, its composition is altered. It is a very remarkable fact that iron, in suitable solution, acts on the juices of plants in the same manner that it does on human or other blood. If the florist were to use an aqueous solution of all the elements of plant food, and leave out the iron, the roots would refuse to take them up, and the plant would die, though placed in the midst of plenty. The solution of sulphate of iron is as beneficial to plants as its *ammonia citrate* is to the pale and sickly child. It should be remembered that the most valuable medicines in the Pharmacopœia are of vegetable origin. *Leaves, flowers, roots, and barks* supply us with invaluable remedies, the quality of which depends on the nature of the soil. If iron is freely

present, they are strong; if its percentage be small, they are poor in form and low in quality: examples—Indian Tobacco and Bengal Opium.

ON POTTING PLANTS.

There are many plants that require to be replaced in fresh soil after they have done flowering. The successful cultivation of Geraniums of all kinds depends on their being first carefully pruned, and then re-potted in good rich garden soil. When taking them out, a ball of earth should remain about the stem and main root, but the old soil should be carefully removed or shaken off from the thin long roots and rootlets. In re-potting, one man (*mallee*) should hold the plant over the centre of the pot, so that the roots may hang freely downwards without touching its bottom; the other (assistant) should gradually pour in dry pulverized soil, so that the roots may be covered with soil just as they hang from the ball of old earth. The pot, when filled, is to have the new soil pressed down—first gently, and then with more force; after which it should be watered, and set aside—the process being repeated with the next and all succeeding pots. The cuttings should be put down in boxes filled with fresh soil, and be watered daily.

In his instructions to professional gardeners Mr. Carter states as follows, viz. :—“In potting plants that require any cutting or pruning, the two operations should not be performed at the same time. Generally, it is best to prune first, and to allow the plant to make fresh growth before the potting is performed. Deciduous plants should never be re-potted till they have burst into leaf. Fuchsias, for instance, which have

been dried off in winter, should in no case be shaken out of their old soil till they have expanded a few leaves, and all pruning required in their case should be done before the roots are disturbed. Evergreen plants, such as Camelias, Oranges, and Myrtles, have a particular season at which the roots elongate or increase with more rapidity than is usual at other stages of their growth, and under ordinary circumstances that season is immediately (*after*) they have made their growth in branches and leaves, and it is the most desirable time to shift such as require it into larger pots and more nourishing soil, just as the roots are extending and ready to lay hold of fresh soil.

“Shifting a plant into a larger pot often becomes necessary when pruning is not called for. When it is desired to increase the size of a plant, it should be shifted into a larger pot as soon as the roots have circled themselves among and around the soil in their present pot to an extent that renders it safe to perform the operation without danger of the ball falling to pieces. Generally speaking, a sure criterion as to when a plant requires more pot room and nourishment is, when the roots make their appearance through the bottom of the pot. It is however much preferable, at the near approach of winter, to leave plants a little cramped at the roots than to shift them on at such a season. Under such circumstances the operation should be deferred till early spring. Azaleas and Camelias should not be shifted till after their blooming season is past and they have made fresh growth, and the exact season for potting such plants must of course be determined by the time at which they are forced to, or retarded from, making their growth.

“Pots should always be scrupulously clean and quite dry when used. If they have been previously used, they should

always be washed before putting another plant into them; every particle of mould or slimy matter which adheres to them and clogs up the pores should be removed, both outside and inside. When a plant is potted into a pot the inside of which is covered with particles of earth, the mischievous consequence, to say nothing of others, is, that in turning a plant out of it the ball is sure to be broken, and of course the roots also injured."

THE FLOWER GARDEN.

ANNUALS.

ALL flowers which ripen their seed within the year of sowing, are called Annuals ; the others, which live on from year to year and ripen seed accordingly, are called Perennials.

Some annuals are called hardy, and others half-hardy. The hardy kinds will grow and blossom in open borders, without artificial heat or protection ; those which are more tender will also grow in the open air, but are improved by being brought forward under hand-glasses. Of the delicate class of annuals, which must be constantly kept under glass frames, it is not our purpose to speak. The greater number of annuals may be sown at the end of March or beginning of April. The soil should be fine, and have a warm exposure, and, on being sown, cover the seeds with only about half an inch of mould : Peas and Lupins should be an inch below the surface. If the weather be dry, irrigate with pure soft water occasionally. Take care that the seed you sow is fresh and good : the way to test its quality is to throw it into a glass of water ; if it be worthless, it will swim ; if good, it will sink to the bottom.

Among the vast number of annuals that offer themselves to the choice of the gardener, the following—each having varieties as to colour—may be mentioned as taking the lead in the half-hardy kinds :—African Marigold, French Marigold, China Aster, Marvel of Peru, Chrysanthemum, Sweet Sultan, Indian Pink, Love-apple, Gourds, Bottle Gourd, Convolvulus,

Yellow Balsam or Touch-me-not, - Amaranthus, Ten-week Gilliflower, White Ten-week Stock, Cannacorus, and Chinese Hollyhock.

Hardy kinds :—Adonis-flower, Candy-Tuft, Larkspur, Lupins, Sunflower, Lavatera, Poppy, Convolvulus Major, Nasturtium, Tangier Pea, Sweet Pea, Winged Pea, Lobel's Catch-fly, Dwarf Lychins, Venus's Looking-glass, Virginian Stock, Heartsease, Snapdragon, Mignonette, Xeranthemum, Purple Jacobæa Clarkias.

If annuals are required on a more extended scale, the best plan is to leave the selection to a respectable nurseryman. Such a person will at least present a copious list to make your choice from, and mention the size or height to which the plants will respectively grow. Mr. Loudon, in his "Encyclopædia of Gardening," quotes a list by Mr. Swindon, a Brentford nurseryman, consisting of nearly ninety hardy annuals, distinguished in ranges according to heights. From this we make the following extract, for the sake of simplicity leaving out the Latin names :—

"First Range—from 8 to 12 or 14 inches high.

"Cape Marigold; purple and white. Large Caterpillar; yellow, and singular pod. Venus's Looking-glass; light purple. Ram's Horns; yellow: the pod is its beauty. Round Snails; yellow, and singular pod. Dwarf variegated Lychnis; crimson and white. Heartsease; purple and yellow. Half-moons or Moon-trefoil; white, and singular pod. Blue Meadow Lychnis, sky blue. Dwarf Virginian Stock; purple. Small Hedgehogs; yellow, and singular pod. Woodroof; light blue. Red Hawkweed; pale red. Large Hedgehogs; yellow, and singular pod.

"Second Range—from 12 to 18 or 20 inches high.

"Oak of Jerusalem; yellowish, with fragrant smell. Small White Candy-Tuft; clear white. Long-horned Devil-in-a-bush; yellow, and singular pod. Convolvulus Minor; bright blue, with yellow eye. Large Purple Candy-Tuft; light purple. White Lobel's Catchfly; reddish white. Annual Snapdragon; purple and yellow. Scarlet or Wing Peas; dark and light red. Large White Candy-Tuft; clear white. Striped Convolvulus Minor; blue and white. Red Lobel's Catchfly; bright red. Dwarf Nasturtium; deep orange. Broad Spanish Nigella, with brown seed; deep blue. ~~Pale~~ Flat Adonis; dark red.

"Third Range—from 20 to 24 or 28 inches high.

"Spanish Nigella, with black seed; light blue. Spanish Hawkweed; pale yellow, and purple eye. Blue Moldavian Balm; deep blue, and fine scent. Annual Rest-harrow; pale red. Double Roman Nigella; white, mixed with blue. Small running Nasturtium; dark orange. Nettle Marjoram; yellowish; no smell but to the over-curious. Rocket Larkspur; pink and white. Sweet-scented Lupins; bright yellow. White Moldavian Balm; fair white, and fragrant smell. Dutch Lupins; fine blue. Annual Hare's Ear; pale yellow. Purple Jacobæa; purplish-red, and yellow eye. Dutch Ranunculus-marigold; sulphur colour. Red-topped Clary; pale red, and pink leaves.

"Fourth Range—from 2 to 2½ or 3 feet high.

"Belvidere; yellowish—a handsome plant. Small variegated Corn-peppy; various red and white, &c. Double upright Larkspur; blue, blush, &c. Cyames Minor; blue, crimson, &c. Thorn-apple; white, and singular pod. Prince's Feather; dark crimson. Crown Larkspur; pale pink,

spotted, &c. Honey Scabious; pale blue, and globular pod. Portugal Lychins; pale red. Small Blue Lupins; bright blue. Love-lies-a-bleeding; light red. Ranunculus-marigold; deep orange. Honeywort; dark purple. Strawberry Spinach; bright red fruit.

" Fifth Range—from 3 to 4 feet high.

" Venetian small-flowered Mallow; purplish-white. Double Crimson Jagged-leaf Poppy; dark crimson. Tall narrow leaf Wall Flower; bright yellow. Arach; deep crimson. Double-striped Carnation Poppy; red and white. Blue Sweet Trefoil; lead colour. Red Lavatera; light changeable red. Branching Larkspur; blue and white, &c. Tall White Lupins; clear white. Double Black Carnation Poppy; rose colour. Small Peruvian Nasturtium; dark orange. Lord Anson's Peas; fine blue. White Lavatera; snow-white. Dwarf Double and Quilled Yellow Sunflower; deep yellow. Bladder Tretnia; pale sulphur, and purple eye.

" Sixth Range—from 5 to 7 or 10 feet high.

" Tall Double Yellow Sunflower, with black seed; deep yellow. Painted Daddy's Sweet-scented Peas; pale red and white. Arach; sulphur-coloured. Purple Sweet-scented Peas; dark and light purple. Tall Indian Persicaria; bright crimson. Painted Lady's Crown Peas; black and white. Convolvulus Major; fine purple. White Crown Peas; clear white. Large Indian Nasturtium; dark and light orange. Tall Double Brimstone Sunflower; sulphur-coloured. White Sweet-scented Peas; clear white. Plain Tangier Peas; fine crimson. Tall Oriental Mallow; purple. Painted Lady's Tangier Peas; pale red and white. Scarlet Beans; curled leaf. Upright Mallow; white tinged with purple."

Whether tender or hardy, all annuals should be carefully trimmed, and kept from straggling; some will require thinning. Preserve the strongest blossoms for seed; and remove withered and imperfect blooms, to add vigour to those which remain.

BIENNIALS.

The difference between biennials and perennials is in many instances very ill defined.

A biennial is said to be a plant which, when sown, does not bloom till the following spring, and dies out in the course of autumn. This is true as respects some biennials, but it is equally certain that many will survive and bloom year after year, the same as perennials. For instance, Carnations are called biennials, although it is notorious that these plants will grow and multiply by roots in the same spot, year after year, with only ordinary culture. Another circumstance requires notice: no treatise on gardening that we have seen sufficiently recognises the power which biennials and other plants possess, of continuing themselves by dropping their own seeds on the spot where they grow, by which means, in point of fact, many biennials, and annuals also, possess much of the virtue of perennials. In all treatises far too much stress is placed on the necessity of artificial propagation. In most instances, biennial and perennial flowering plants simply die off, from the top to the bottom of the stem, at the beginning of winter, and the roots remain dormant in the ground till revived by the warmth of the ensuing spring. Except, therefore, as respects thinning and propagating by a division of roots, and transplanting occasionally for the sake of change of soil, the unprofessional gardener has little

or nothing to do in the way of multiplying the number of his plants, or artificially keeping up the species during winter. Of course, we here refer to gardening operations in the British islands, where the winters are generally so temperate that every kind of root is safe in the ground excepting certain bulbs and those of a tuberous nature, such as Potatoes, Dandelions, Ranunculuses, &c., which the frost would reach and destroy.

Among biennial plants suitable for ordinary flower gardens are included the following, each having several varieties:—Canterbury Bells, Carnations, French Honeysuckle, Globe Thistle, Hollyhocks, Scabious, Sweet William, Rose Campion, Wall Flowers, *Lavatera Arborea*, Purple *Digitatis*, and Stock Gilliflowers.

It is not our intention to write a bulky volume on Floriculture, but to place the reader in possession of as much condensed information as possible, which, if turned to account, will enable the amateur cultivator of flowers to raise and produce some of the choicest kinds; and as these may be grown in boxes and flower-pots under shelter, a constant supply of flowers may be secured, without subjecting the grower to the evils attendant on solar exposure.

Mr. Carter, seedsman, of London, in his instructions to professional gardeners, observes as follows, viz.:—“Almost every one who is at all fond of flowers has invariably a particular fondness for one kind, and so the *Auricula*, *Carnation*, *Hollyhock*, &c., have each their quota of admirers. Indeed, few can look at their almost perfect shape, fine colouring, and circular forms without being in love with them either in a more or less degree.”

Mr. Carter then recommends certain flowers for cultivation, and as his instructions are very lucid, I shall quote

them as far as is necessary ; and before proceeding further, I would wish to mention that these instructions should be carefully followed in all hill stations, any changes necessary being introduced when the culture of the flowers named is undertaken at a corresponding season in the plains. If the florist has a glazed plant-house, which can be kept cool by using a *tattie*, the flowers may be cultivated in pots all through the summer and rains.

FLOWERS.

THE CARNATION AND PICOTEE.

The Carnation is propagated by layers and by seeds. The former process is done during the month of August, and by November the plants have rooted and are ready to be potted off. They are invariably potted into large 48-sized pots, a pair of plants in each pot. It is somewhat curious, but it is the invariable custom to quote the price of Carnations, Picotees, and Pinks at so much per pair. The Picotee is not so large or so robust in growth as the Carnation, though its treatment is similar. The soil for Carnations should be of the proportion of one barrow of well-decayed manure to four barrows of good turfy loam; and that for Picotees, an equal quantity of manure to the barrows of loam. The soil, as will be seen, will be richer for Picotees than Carnations, as the latter flower has a tendency to run in colour. In November, mix the soil in a dry state, and fully expose it to the action of the air. During winter, remove the frosted surface at every opportunity, and place it in a heap by itself until the whole be frosted. Keep it dry from snow and heavy rains, and turn it about often until required for use. Some growers pot off the rooted layers in the autumn, placing them singly, or in pairs, in pots, according to their size; others do not pot till March, when they are placed in their blooming-pots at once.

In the former case they are shifted from the small into the blooming about the same time. The strongest should be bloomed in pots about 11 inches in diameter, placing three

or four plants in a pot; weaker plants should be grown in 8-inch pots, two or three plants in a pot. If not done in the autumn, begin potting the first week in March, using from two to three inches of broken crocks and clinkers as drainage. Chop the soil well, sifting only a portion (for about three inches) of soil at the top, using the coarse portions of the siftings as a thin layer over the crocks to assist drainage. *Pot very firm indeed.* After potting, expose the plants fully to the weather, placing the pots on two parallel slips of wood, so as to ensure good drainage and prevent the ingress of worms. Water moderately after potting.

We are anxious to impress on the minds of our readers that Carnations and Picotees are thoroughly hardy plants, and will bear any amount of frost under proper treatment, by which we mean being kept dry in a dry frame, well aired, and moderately watered in sunny open weather: in short, as a general rule, during winter keep dry and air well. We have known several thousands of pairs of plants wintered in dry frames without any extra covering whatever, the soil frozen hard for weeks, and this was rewarded with luxuriant health and vigour. With many the Carnation is treated too tenderly, by keeping them in close frames, watering too freely, and covering too much. It is also a great fault to pot off in large pots for watering: no pots larger than small 48-size or large 30-size should be used for a pair of strong layers in which to winter them.

A good selection of Carnations will be found in the following:—

Scarlet Bizarres.

ADMIRAL CURZON (Easom).	LORD RANCLIFFE (Halliday).
CAPTAIN THOMPSON (Puxley).	SPLendid (Martin).
FANNY GARDENER (Atterton).	WILLIAM PITT (Puxley).

Pink and Purple Flakes.

FALCONBRIDGE (May).
 MASTERPIECE (Schofield).
 SARAH PAYNE (Ward).
 SHAKESPEARE (Puxley).

Purple Flakes.

DR. FOSTER (Foster).
 EARL STAINFORD (Elliott).
 EXCELLENT (Hooper).
 FLORENCE NIGHTINGALE (Schofield).
 PREMIER (Millwood).
 SQUIRE MAGNELL (Brabbin).

Crimson Bizarres.

GRAND MASTER (Schofield).
 HOPE (Puxley).
 INDISPENSABLE (Puxley).

LORD MILTON (Ely).
 MONARCH (Puxley).
 SPLENDID (Hardman).

Scarlet Flakes.

CHRISTOPHER SLY (May).
 CORONATION (Puxley).
 CRADLEY PET (Wallis).
 SIR HENRY HAVELOCK (Puxley).

Rose Flakes.

ALONZO (May).
 FLORA'S GARLAND (Brooks).
 KING JOHN (May).
 POOR TOM (May).
 PRINCESS ROYAL (Puxley).
 SAMUEL MORETON (Addis).

Of Picotees, the following are some of the finest and most distinct kinds:—

Red-edged.

CHARLES TURNER (Kirtland).
 ELIZA (Taylor).
 LAVINIA (May).
 MISS PUXLEY (Keynes).
 MR. DODWELL (Turner).
 PRIVATEER (Turner).

Purple-edged.

BRIDESMAID (Mimonite).
 COUNTESS (Fellowes).
 FAVOURITE (Norman).

LADY ELCHO (Turner).
 MRS. SUMMERS (Simmonite).
 PRINCESS OF WALES (Kirtland).

Rose and Scarlet-edged.

COUNTESS HOWE (Marris).
 ELISE (Kirtland).
 MAID OF CLIFTON (Taylor).
 PRINCESS ALICE (Kirtland).
 REV. H. MATTHEWS (Kirtland).
 ROSY CIRCLE (Payne).

The yellow-ground Picotees are a very special class, and, as a rule, have delicate constitutions. There are some twenty named varieties, and any good dealer would recommend a suitable selection to an intending grower.

Where is there a plant, during the autumn, winter, and early spring months, so gay and beautiful as this popular favourite?

THE FUCHSIA.

A well-grown Fuchsia is a beautiful object; indeed, it is in every respect a charming plant for greenhouse decoration, whether grown as standards, or in that most natural of all forms—a bushy pyramid shape. The peculiarly graceful habit of the branches, with the abundance of pendant flowers of various hues of colour, combine to make them prime favourites with all lovers of these graceful and picturesque outlines with which nature abounds. It does not require a great stretch of the memory to recall the best kinds of sixteen years ago, when Carolina was thought to be a splendid thing among the dark kinds, and Venus Victrix or Dr. Jephson was the best white; but Fuchsias, like the times, are now altered, and the wonderful flowers that are now produced, especially from the double kinds, are not more remarkable than is the improvement that has taken place in the growth and habit of the plant itself, adapting it more especially for exhibition and decoration than formerly—an absolute necessity in these days of flower shows, when Fuchsias, especially in the provinces, invariably take the best places, and enjoy the greatest attention.

The amateur who would wish to turn his attention to the cultivation of this beautiful flower, would probably first ask advice as to the sorts most suitable for his purpose, especially where he wishes to become an exhibitor. The

sorts that are here named are not mere selections from a nurseryman's catalogue, but are all kinds which have been grown, and can be confidently recommended. The dark single kinds first claim precedence, and of these, that will not fail to give satisfaction, are—

LA FAVORITA.	SENATOR.
GIPSY GIRL.	PRINCE IMPERIAL.
LORD ELCHO.	SOUVENIR DE CORNELISSEN.

Of dark doubles—

UNIVERSAL.	PÉRCY.
RIFLEMAN.	AMY HOSTE.

Single whites are well represented in—

SCHILLER.	HUGH MILLER.
ROSE OF DENMARK.	GUIDING STAR.
LADY HEYTESBURY.	FAIREST OF THE FAIR.
ROSE OF CASTILLE.	MAID OF KENT.

Of red kinds, with single white corollas—

CONSPICUA.	MARIE CORNELISSEN.
MARCHIONESS OF BATH.	

And with double white corollas—

VAINQUEUR DE PUEBLA.	EMPEROR OF THE FUCHSIAS.
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If more than this list were required, they might be added to *ad infinitum*; but it is as well to be aware of the fact that many of the finest blooms are produced by plants whose habit renders them quite unfit for exhibition purposes.

Assuming, however, that the amateur proposes to raise his plants from cuttings, he must be careful to select strong robust tops, in the month of September, from shoots that are nearly free from bloom; these may be put into pots with a compost of leaf mould and sand, and placed in a cold frame,

or the shelf of a greenhouse, for the winter. Should he have been fortunate enough to strike them, he will find that by the beginning of March it will be necessary to pot them off into large 60-sized pots, still using the same compost. If the cuttings have thrown more than one shoot, leave only the strongest, and pinch out the rest; and if, for the next month, the young plants can have a gentle heat, so much the better. As they reach eight or nine inches in height, give them the support of small sticks, and tie loosely; when from ten to twelve inches in height, it will be necessary to pinch out the top of the plant, so as to induce the production of side shoots, that the exterior surface of the plants may become well furnished with shoots after every fresh pair of leaves. From the point where the leading shoot was stopped, another should be allowed to spring, in order to continue the upright growth, and to furnish another nine or ten inches of laterals; after which stop again as before. By this time the plants having been gradually exposed and hardened, and the weather being warm, they may now have a final shift into their blooming-pots; and if they have had a shift into thirty-twos a month previous, so much the better.

The best sizes for blooming in will be sixteens, twelves, and eights, according to the size of the plants, the compost consisting of one-half chopped loam, the other half of leaf mould and rotten dung with a little sand run through a coarse sieve; the leavings can be used for drainage. Pot carefully, press the soil in firmly round the ball, then put a neat permanent stake, five feet long, to the plant, and tie loosely, so as to admit of the stem swelling freely. Now, select a sheltered and warm situation out of doors, put down slates or boards, and stand your plants upon them; and here they may remain for a month. During this time the pinching must

be carefully attended to, especially the stopping of the leader; and if flower buds should appear in the latter, pinch back to the joint next below. By the middle of June—the sun being now somewhat strong—the plants must be plunged in tan, leaf mould, or ashes, in a sheltered spot, to protect them from rough winds; and the plants should be turned round now and then to prevent them being drawn all on one side. A liberal supply of water must be given, and as the Fuchsia is a gross feeder, also give liquid manure twice a week, as the blooming period approaches: this will greatly assist the plants.

Presuming that they are to be exhibited at the end of August or beginning of September, all pinching should be discontinued about five weeks previously; and if, a fortnight before the show, they can be transferred to a shady situation, so much the better, as the plants will retain their blooms for a longer period, and a cool temperature will materially assist in developing their flowering qualities. When the period of the exhibition arrives, select the number of plants you purpose competing with—first, for good and symmetrical growth; second, abundance of flower; and third, for variety, various shades of colour being preferable. See that they are securely tied, shorten back your stakes if they are too tall, top over the soil with a little fresh mould, and having marked your pots and labelled the plants, you have but to go in and win.

After blooming is over, cut back your plants lightly, and stow them away in a safe place for the winter; when they begin to break in the spring, take out two inches of the old soil, top-dress with some fresh, give them all the light and air possible, and then you will lay the foundation of some glorious plants for early blooming.

THE PANSY

Was always a very favourite flower of the old school of florists, but it is not so much grown as it used, and as it really deserves to be. The Pansy is thoroughly hardy, but in northern and cold localities it needs wintering in cold frames, though there is no real necessity for covering the frames, as the frost never hurts a Pansy when in a dry state. As a general rule, it is safest to winter all kinds of florists' flowers in frames where it can be done, especially in damp localities. Supposing the plants have been wintered in frames, either planted out on a raised prepared bed or in pots, they can be planted out of doors to bloom in March or April, in a soil composed of decomposed turf sods, matured leaf soil, and a small amount of rotten manure; if all have been burned during the frosty weather, so much the better. Some kinds of Pansies require to be grown poorer than others, in order to get them into good condition for the exhibition table; but this is the exception, not the rule, of Pansy growing. Much manure is objectionable, where good leaf soil can be had; manure is not wanted at planting time. Guano, in a dry state, should not be applied; but it is safe to use it in a liquid form—say about an ounce to three gallons of water—and then to water round the plants, and not on them. It is most essential to the Pansy that it should be protected from an excess of moisture; and when the weather is very dry, of course watering can be had recourse to. The most destructive results to the Pansy will sometimes arise from heavy rain followed immediately by very hot weather. Protection from strong sunshine should be afforded to the plants, not only to benefit the flowers but the plants as well; they dislike excessive heat, and strong healthy-looking plants will succumb to its influence in a few hours. Some frame-work should be formed

to protect the bed, over which canvas can be stretched, but not to reach at the sides less than eighteen inches from the beds. This allows a free circulation of air, and admits plenty of light: it will not do to shade too heavily, or drawing will be the result. Top-dress or surface the beds with a light rich soil occasionally during the summer, to encourage the rooting of the side shoots. The plants can remain in the beds till November, when they should be lifted, pulled to pieces as all the young shoots will be found to have taken root, and planted in the cold frame for wintering.

To have Pansies in bloom in September and October, cuttings should be taken from the plants in April and May, or young pieces slipped off with roots and placed under a hand-glass, or in a cold close frame with a north aspect; these will soon be well-rooted plants, and, if planted out in June and July, will then produce fine blooms for the autumn shows.

The fancy kinds are very handsome and showy, as they comprise many shades of colour which the old varieties do not possess, and a great many of them are boldly and distinctly blotched.

They are generally very robust growing, and should be planted wide apart, and, being vigorous growers, are invaluable for border decoration. Any good garden soil suits them: avoid manure, and in forming a bed use decayed sods and leaf soil. They, too, should be wintered in frames, and, when required for exhibition, be planted out on beds in spring, as recommended for the English kinds.

Seed of either kind can be sown in August in pans, and when the plants are strong enough, planted out into prepared beds, about four inches apart, to bloom. These seedlings grow strong, and make capital border flowers. Any good flowers should be marked for propagation. In moist and cold localities,

it will be best to winter the seedlings in frames, and plant out in March; or sow the seed in February, and plant out in April. In saving seed, select only the finest and most distinct flowers.

As some of our readers may be induced, from the above remarks, to give the Pansy more attention in the future, we append a list of some of the best kinds of both the English and fancy sections suitable for exhibition:—

Self Yellow Flowers.

CHERUB (Hooper): yellow, with solid dark blotch.

INIMITABLE (Dean): fine primrose, dark blotch.

VESTA (Downie): primrose, large dark blotch.

YELLOW QUEEN (Downie): deep yellow, fine blotch.

Self White Flowers.

HIGHLAND MARY (Dickson): white, regular blotch.

MISS RAMSAY (Ramsay): pure white, fine.

PURITY: pure white, fine blotch.

QUEEN OF WHITE (White): fine white, solid dark blotch.

Self Dark Flowers.

DAVID SYME (Dean): beautifully shaded da

DUX (Downie): very rich dark, fine.

ECLAT (Downie): dark-shaded maroon.

MASTERPIECE (Downie): rich dark-shaded blue.

Yellow Ground Flowers.

ALEXANDER WHARNOUD (Downie): rich yellow, bright bronzy-purple belting.

CHANCELLOR: yellow, bronzy-purple margin.

FRANCIS LOW (Downie): deep gold-belted light maroon.

GEORGE WILSON (Downie): rich golden yellow, bronzy-purple belting, fine.

J. B. DOWNIE : bright yellow, bronzy belting.

MR. DOWNIE (Downie) : deep gold-belted with bronzy-purple.

PRINCE OF WALES (White) : clear yellow ground, dark purple belting.

WILLIAM AUSTIN (Downie) : bright golden yellow, fine form.

White Ground Flowers.

ALICE DOWNIE (Downie) : light cream ground, belted with dark purple.

ATTRACTION (Dickson) : cream white, broad purple belting.

LADY LUCY DUNDAS (Downie) : clear white, with deep purplish-maroon belting.

MISS E. COCHRANE (White) : white, deep purple belting.

MISS M. CARNEGIE (Downie) : pure white, rich purple belting.

MR. LAIRD (Downie) : white amply belted, with bright maroon.

PRINCESS OF WALES (Downie) : pure white, belted with rich maroon.

VILLAGE MAID (Dickson) : white, fine purple belt.

Fancy Flowers.

BLACK PRINCE : glossy black; top petals margined with white.

EARL OF ROSSLYN : pale crimson, large dark blotch.

HUGH W. ADAIR : top petals ruby crimson; side and lower petals dull orange yellow, dark blotch.

FAIRY QUEEN : pale white belting, shaded with blue.

MR. R. DEAN : white, slightly shaded with pink, very large black blotch.

MR. J. SCOTT : white, belted with light carmine.

MR. H. NORTHCOTE : creamy white, belted with purplish violet, fine.

MISS J. KAY : light mauve, laced with purple, pretty and distinct.

MIRIAM NIVEN : light rosy carmine, dark blotch.

PRINCE LOUIS OF HESSE : rich gold, beautifully marked with carmine.

*PRINCESS ALICE : creamy white, fine blotch.

WILLIAM MOFFATT : bright claret, extra fine.

THE HERBACEOUS CALCEOLARIA.

The Calceolaria has become one of the most highly developed of the florist's flowers of the present day, though it is at the same time one too rarely seen at our plant exhibitions. Grown as large specimen plants, they may be truly denominated "glorious," covered with their numberless bright self-coloured and spotted blossoms; for it is in their gorgeous masses of colour in specimen plants that the beauty of the Calceolaria may be said to culminate. A writer in a recent number of the *Gardeners' Chronicle* gives an account of the appearance of the specimen house of Calceolarias at Isleworth under the cultivation of Mr. James, whose strain has come to be regarded as the very finest of the present day. The account states :—"The specimen house gives masses of the most striking colours allied to the best developed and most finished flowers. There were twelve particular specimen plants occupying the front of a fine airy lean-to-house, built especially for these Calceolarias. The plants were two years old, and averaged $2\frac{1}{2}$ feet in diameter, with a height of some 24 inches. Perfect masses of bloom literally covered each plant; one was particularly striking, the flowers being of a rich shining velvety crimson. The short stiff wiry foliage of the shrubby

section is almost entirely reproduced in this fine strain ; and being so stiff in growth, only a little tying of the exterior shoots is necessary to keep them in their places, and so to form a shapely outline to the plants."

Such plants as these can be produced if only due attention be given to their cultivation ; there is no secrecy about the method, but it can only be successfully followed by those having the time and space at their disposal. They are two-year old plants, grown on liberally, and flowered in pots some ten or twelve inches in diameter. Liberal feeding by liquid manure has no part in the process, as some suppose—as Mr. James administers liquid manure but twice in a season. A cool airy house, plenty of room, and close attention, will do wonders for the *Calceolaria*. Seed sowing is the best and safest means of propagating the *Calceolaria*. It should be sown in a pan about the middle of July, using light soil. Sow the seed as regularly as possible on the surface, cover it slightly with very fine soil, give a gentle watering through a fine rose pot, place the pan in a shady part of the greenhouse, and cover it with a piece of glass. Never allow the surface soil to become dust dry, as germination will be retarded, if not prevented. As soon as the young plants will bear handling, prick them out singly, about two inches apart, in boxes. Place the boxes in a cool shady situation, carefully water, and when the plants get crowded, take out every other one and place them in another box about four inches apart.

By November the plants will be nice and strong, and fit for wintering. A good place is a dry pit or a shelf of a greenhouse ; all they will want of water will be enough to keep the plants from flagging, and all decayed leaves should be removed ; and if the green fly settles on the plants, fumigate

them. There is no better method of wintering Calceolarias than in boxes, as here recommended. About the middle of January, prepare a compost for potting off the plants, by taking one-half loam, one-fourth thoroughly rotten manure, and one-fourth leaf mould, adding a little sand and finely powdered charcoal to keep it open. This mixture should be turned several times previous to using it. Early in February pot the plants into their blooming-pots, using some from seven to nine inches in diameter. Remove from the boxes with good balls, and, when potted, give a thorough watering through a fine rose pot, and place on an airy shelf in the greenhouse—or a cold pit will answer just as well—where they can enjoy plenty of light and air, and no more fire heat than is necessary to exclude frost. For the next few weeks they will require attention as to airing and watering, never allowing them to be too much crowded or affected with green fly. By the beginning of May most of the plants will be showing their flower stems, and they will soon produce an abundance of gaudy flowers to repay the grower for the care and attention bestowed upon them.

The beautiful shrubby Calceolarias that were once the wonder of the London exhibitions, appear to have died out from some cause ; yet they are sometimes to be met with at country shows, exceedingly well done. Conjoined to an almost unrivalled freedom of flowering, and a long continuance in bloom, they possess a habit tractable to the wants of every cultivator, and rejoice in the possession of colours of many hues, from pure white to deep yellow, orange, crimson, and chocolate-brown ; in addition to all which, a tendency to develop the rich markings and parti-colours of the herbaceous varieties is no longer a question to be doubted, but is actually determined.

The shrubby *Calceolarias* can be raised from seed similarly to the herbaceous kinds ; but as they so seldom yield seed, it is rarely it can be obtained. The only alternative is to propagate by cuttings from the old plants : when they are thoroughly out of bloom, the plants are cut down, taken from the pots, and a good portion of the earth shaken from the roots ; they are then planted in a shady border having a north-west aspect, some good soil being used about the roots. In this position, and under this treatment, the plants make young wood, and this furnishes cuttings, out of which are formed the specimen plants of another season. These are taken off about October and put into 48-sized pots—a few in each—or in single pots, and placed in an exhausted cucumber frame, and kept close till struck, when some air is given, according to the state of the weather.

Immediately after Christmas the first shift is made, and the plants are then placed on a shelf and kept close to the glass. A second shift takes place at the end of February, another at the end of March, and a final shift into the 10-inch blooming-pots at the end of April. The great condition of success is to keep the plants growing, at the same time giving them the benefit of air to keep the plants robust and bushy. On no account should the plants be suffered to become pot-bound : the fullest root action should be encouraged.

The foregoing is an outline of the *modus operandi* of one of the most successful growers and exhibitors of the shrubby *Calceolaria*, as he communicated it to us. We have seen his splendid specimen plants, and can testify to the value of the cultivator's process in his own experience. The surest indication, he informed us, of the plants doing well, is furnished by the beads of moisture that will be found in the morning on the leaves.

Intending growers should endeavour to obtain the following fine kinds :—

GENERAL HAVELOCK : a fine shade of dark claret crimson, and a free-growing variety.

KING OF 'SARDINIA : dark velvet crimson.

LANDSEER : rich shaded orange crimson; the under part of the flowers yellow.

LITTLE DORRIT : a bright yellow self.

LORD DERBY : yellow, profusely covered with small reddish-brown spots—an excellent variety.

MAGENTA : a rich dark shade of crimson, dashed with a somewhat brighter glow.

PRIMROSE PERFECTION : a clear primrose self, without the trace of a spot on the flowers.

QUEEN OF OUDE : dark crimson.

REGULUS : rich brown crimson, lit up with yellow.

WARRIOR : golden ground, blotched and spotted with vivid reddish crimson.

SINENSIS FIMBRIATA.

PRIMULA (*Chinese Primrose*).—That the Chinese Primrose is regarded as among the most popular of winter and spring flowering plants is not to be wondered at, seeing how valuable it is for decorative purposes, either in the greenhouse, conservatory, or the sitting-room. A simple but sure mode of cultivating this beautiful spring flower is given in the following remarks.

The Chinese Primrose is raised from seed, and to raise plants, seed should be sown about the middle of June, using shallow well-drained pans. As seed pans are usually made without holes in the bottom for drainage, place in the pan about three-quarters of an inch of small crocks, and on these a layer of small pieces of fibry loamy turf, and fill

up to within a quarter of an inch of the rim of the pan with a compost made of fine loam, leaf mould, and silver sand, well mingled. The pans should then be watered through a fine rose, or a syringe, and about three hours afterwards the seed should be sown and pressed gently into the soil, and then covered with a thin layer of the soil, this being again gently pressed and sprinkled. The pans should then be plunged in a gentle hot-bed, or placed in a stove, or, failing these, on a warm shelf in a greenhouse; if in the latter, a small hand-glass should be placed over the pan. From the time of sowing, a square of glass, or a piece of paper, may be placed over the pans, as it prevents the soil drying rapidly, or becoming too dry. Water must be carefully given, but little will be required: a saturated soil must be guarded against.

The plants should be allowed to remain in the seed pans till they can be handled without fear of injury, and then be potted singly into small 60-sized pots, using a compost of the same character as when sowing the seed, and be then returned to the hot-bed or stove, which should be cooler than when used to raise the seed. They can also be put on a warm shelf of a greenhouse, but must be protected from draught and shaded from sun. The plants at this stage should be kept within six inches or so of the glass, giving air with great care, where they may remain till the roots reach the sides of the pots, when they may be shifted into 48-sized pots; for this shift use a soil composed of a nice yellow loam, with enough leaf mould to keep it open, and some silver sand, or the fine sand washed to the sides of a gravelled road by rain. Then remove the plants to a pit under a north or east wall, keep them close for three or four days, and, as soon as they begin to make growth, give

air freely in suitable weather, and the plants will be induced to make nice short stocky foliage. They could be allowed to open their blooms in these pits. Never starve the Chinese Primrose, but grow it generously, and it will amply repay the cultivator. There are such things as bad strains of Primulas, but there are a great many more cases of Primulas being badly grown, and therefore disappointing. Nobody can grow them in a cold damp house, where they are overshadowed by other plants, and well nigh suffocated: a warm genial temperature is the one suited to the Chinese Primrose, and then fine flowers will reward the grower. Watering is a point requiring close attention. It should be done in the morning, adapting the quantity to the requirements of the plant and the state of the atmosphere. As much as possible guard against the soil being allowed to become *soddened with wet*; if it remains so for a time, the plants are sure to become sickly and ill-conditioned, and rot will ensue.

We do not generally recommend the keeping over of plants for the second year's blooming, as we have abundantly proved, in our own experience, that seedlings are much better for a late autumn and spring bloom. Still, should it be desired to keep plants over—a plan connected with many risks, except where there is good convenience for doing so—they, when they have done blooming, should be placed in a cold frame, and have air plentifully, selecting only such plants as are worth keeping. Re-pot them in the same sized pots as those in which they flowered, shaking the old soil from the roots; the lights should be drawn on closely, and a very slight sprinkling of water given every evening, with shade from the bright sun. When the plants recover from the potting, admit air freely, and keep them well supplied with water. At night,

the lights may be drawn off, and replaced in the morning, tilting them high at back during dry hot weather and when heavy rains occur. In August, shift the plants into pots six inches in diameter, pursuing the same treatment as before. The plants will bloom freely in autumn: all bloom stems showing before September should be kept pinched off. The double forms of the Chinese Primrose have generally been regarded as somewhat difficult to cultivate, or at least requiring more than common care. Being increased by cuttings, it is important to secure a sound and well-established plant at the commencement. Such a plant, selected in spring, may be grown on in a warm and partially shaded greenhouse or pit, where a moderately moist atmosphere can be maintained; should be potted in a compost of good loam, pure leaf mould, dry sheep or goats' droppings, and silver sand in equal proportions, and having a few small pieces of charcoal intermingled. The pots must be thoroughly drained, and the plants be rather firmly potted. They may be re-potted as often as the roots form in sufficient quantities, but too large a shift should not be given. When once well established, the plants should receive abundant light and fresh air, and only require shading from strong sunshine. A dry, parching atmosphere, which stunts the growth of plants of this character, should be avoided. Water must never be applied in excess. In hot summer weather, a light but cool north aspect is best for them, and they may be freely ventilated. The plants thus grown, if in good health and vigour, will bloom profusely from October onwards through the winter months. They must, however, have a warm but not close greenhouse for their winter quarters, and be very cautiously watered at that season.

THE CINERARIA.

This flower is most useful for decorative purposes, and for the embellishment of the flower vase or bouquet. By artificial or candle light, the colours of some of the rose, crimson, and purple varieties are extremely brilliant; whilst the white flowers, margined with the preceding colours, are so beautiful as to be considered matchless.

There are two methods of obtaining young plants of Cinerarias—the one from old plants, the other from seed. In regard to the first, we will suppose the old plants, after blooming, have been cut down near to the roots, and are standing in a shaded, sheltered place, the young growth round the stem being strong and healthy. About the beginning of August, the old plants should be turned out of the pots and the soil gently removed, and the shoots taken off with the point of a knife with the young rootlets adhering—selecting them from the roots, not from the stem, as the latter too frequently emit suckers at the base. These should be planted singly, into pots three inches in diameter, in a mixture composed of leaf mould, sand, and loam, in equal parts, sifted somewhat finely. The plants should have a good watering, and be removed to a cold frame, and the pots should be imbedded in coal ashes or rotted leaves. Seed should be sown in July in heat, and the plants potted off when strong enough to bear a shift, and, as in the case of the plants from cuttings, be removed to a close frame. In either case, the plants should be kept closely covered for a few days until they have drawn root, sprinkling them overhead in the morning, drawing off the lights for an hour both in the morning and in the afternoon, if the weather should be suitable to dry the foliage of the plants and prevent mildew. When their roots have reached the sides of the pots, they

must be shifted into a larger size—say pots five inches in diameter—using soil as before, but with the addition of some good rotten cowdung. Sprinkle overhead on fine mornings, drawing the lights off on favourable occasions, and watch for the appearance of green fly or mildew. In about six weeks a further shift will be required—say into 6-inch pots—because, if once the plants get pot-bound, it throws them into flower. However small they may be, attention must be paid to pegging or tying out the foliage, so as to admit a free circulation of air, and all superfluous or bad foliage should be cut out. The next shift will be into the pots in which they are to bloom, say pots nine inches in diameter; and the time for doing this must depend upon when they are required to be in flower: for exhibition purposes, the beginning of the year is soon enough. The soil for specimen blooming plants should be two parts of good fibrous loam, one of leaf soil, and one of cowdung, with the addition of sand in sufficient quantity to make the compost freely porous. As a rule, *Cinerarias* do better in pits kept close to the glass than they do in a greenhouse; it is simply required that there be some hot-water pipes to keep out the frost or dry up the damp. In all stages of the growth of the plants, fumigate with tobacco or tobacco paper, if green fly makes its appearance; and should mildew appear on the leaves, apply flour of sulphur. When in the blooming-pots, the plants should be occasionally looked over, pegging out the foliage, and removing all superfluous growth. When the plants have spindled two or three inches, stop them at once, which will cause them to break into strong lateral growth. A little weak manure water will assist in the development of the flowers: in the case of the tipped or edged varieties, pure water should be substituted where the flowers show colour, as otherwise they have a tendency to assume

a muddy appearance. Train the lateral shoots as they grow as near to the rim of the pots as possible, as they will assuredly find their way to the centre : by careful training, and tying, very handsome plants may be formed. Shading will be requisite when the plants show colour, to prolong the bloom. After flowering, the plants may be cut down to about nine inches of stem, and placed in a shady situation, giving protection from continuous rain. These directions apply to the production of large specimens for conservatory decoration or exhibition purposes ; for continuous decoration, plants in 32-sized pots do admirably, and by forcing some, and retarding others, a continuous display can be made. Seedling plants force well, and some are certain to betray evidences of blooming earlier than others. Many of the flowers are also richly fragrant, and this adds to their value for conservatory purposes. In order to produce extra large specimens, it is necessary to put two or three plants of one variety in a pot. As seedlings make fine ornamental plants, it is necessary to select a few examples of the most esteemed kinds, bearing in mind that those chosen should be of the best possible form, clear colours, and marking, as much depends on this in producing new and first-rate varieties. As soon as the seeds are ripe, they should be sown immediately ; and as soon as large enough, be pricked off thinly into flat pots or pans, and kept close for a few days till established in the soil, and then treated as just directed.

The following varieties of Cinerarias would make a good selection of fine, varied, and distinct kinds :—

ADAM BEDE (Turner) : bright rose self.

AMAZON (Turner) : light ground, edged crimson.

BLUE BEARD (Turner) : deep blue self..

BRIDESMAID (Wiggins) : white margined, with purple.

- BRILLIANT** (Smith) : bright crimson self.
CAPTAIN SCRIBER (Jeffries) : light blue self.
ECLAT (Turner) : shaded purple self.
LADY SEYMOUR (Turner) : white edged, blue.
MIRANDA : white, with blue edge.
MISS SMITH (Turner) : white, deep edge of blue.
PERFECTION (Turner) : white, carmine edge.
QUEEN VICTORIA (Turner) : white broad margin of crimson.
REYNOLDS' HOLE (Turner) : scarlet, crimson self.
SNOWFLAKE : pure white self.
VICAR OF CAUNTON (Turner) : white ground, deep edge of rosy crimson.
-

THE HOLLYHOCK.

In India this flower is always cultivated in the open. In hill stations it comes into flower in April and May, and continues till the frost sets in. In the plains it is sown after the rains have ceased—say from 20th September to 15th October; and it then flowers in the cold season.

The soil most suitable for its growth is a very rich sandy loam, but it thrives well in any good rich garden soil. The young plants may be removed from the seed bed when six inches in length. Previous to planting, the earth should be trenched at least two feet deep, and liberally mixed with well-decomposed manure, light soil being most preferable.

In Simla this very handsome flower has been grown to great perfection, the double varieties succeeding as well as the single ones. In the plains, the want of success attending its cultivation is due to pooriness of soil, supposed to be enriched with exhausted cowdung manure. If acclimatized seeds were obtained from the hills, and sown as soon

as possible, not only would they germinate freely, but the flowers would be equal to original stock.

The following list contains a very choice selection, all of which may be supplied to order from any London seedsman, viz. :—

- ACME (Chater) : lovely peach, extra fine.
- ANNIE CHATER (Chater) : brilliant rose, dark base.
- CHARLES EQRE (Downie) : dark crimson, fine.
- EARL OF ROSSLYN (Downie) : bright glowing scarlet.
- FRED. CHATER (Chater) : pale yellow.
- GLADIATOR (Hawke) : deep reddish maroon, fine.
- HERCULES (Chater) : yellow, dark base.
- JOHN DOWNIE (Allan) : bright ruby crimson.
- LADY DACRES (Downie) : light rosy salmon.
- MRS. DOWNIE (Downie) : delicate soft salmon rose.
- MR. B. B. TODD : rosy carmine.
- MAGNET (Downie) : glowing red.
- NE PLUS ULTRA (Chater) : deep rosy lilac.
- PRINCESS (Chater) : rosy purple, fine.
- QUEEN VICTORIA (Chater) : glowing rosy carmine.
- REVD. JOSHUA DIX (Chater) : bright shining crimson.
- ROSY GEM (Downie) : delicate soft rose.
- ROYAL SCARLET (Chater) : intense crimson scarlet.
- STANSTEAD RIVAL (Downie) : rich rosy salmon.
- SERAPH (Downie) : delicate soft pinkish peach.

The following observations on exhibiting perhaps may not be out of place here, and as the best way of showing the Hollyhock is in spikes, we mention what is considered the standard of a perfect spike. In judging, the first point to notice is the individual flowers on the spike, the perfection of which consists in the petals being of thick substance, the edges smooth and even, the florets occupying the centre,

full and compact, closely arranged, rising high in the middle, and of a globular form, with a stiff guard petal extending about half an inch, or in proportion to the size of the centre ball, so that the different parts of the flower presents a uniform appearance. Second, the arrangement of the flowers on the spike should be regular, not crowded together in a confused mass, nor loosely hanging with open spaces between each flower, but so disposed that the shape of each may be distinctly seen when fully blown, the uppermost covering the top: nothing can add more to its beauty than a few small green leaves between the flowers, which give it an elegant and graceful appearance. The third point is colour; the brightest, strongest, and most distinct stand first, but it is desirable to obtain all imaginable shades.

THE VERBENA.

The common Verbena attains a height of from five to eight feet in many of the Simla gardens, and consequently most of the varieties named below would thrive equally as well if they were planted and grown in suitable soil. In the hills, the Verbena is in flower from June to October; and such would also be the case in the plains, if the plants were grown in half-casks within the plant-house. These would be placed in various parts of the garden as soon as the cold weather commences. The compost would be formed of good loam, prepared garden soil, and leaf manure, in equal proportions. Strong, healthy plants should be chosen, a preference being given to those which have been twice stopped. After potting, they should be kept in a cool place for a few days (three to five), they should then be placed in the coolest *verandah* (*the hills understood*) in the house, and the plants should be disbudded

as soon as the small buds can be removed with the thumb and finger. This disbudding will keep the plants dwarf and bushy. These will produce many trusses of bloom, and be very gay and attractive. To produce cut flowers in perfection, select healthy young plants. Too many stems are not needed, three or four main shoots will be sufficient for the purpose; train them out free of each other. If the green fly makes its appearance, repeatedly tobacco-smoke the plants when coming into flower; shade carefully in the hot weather, allowing the sun to act upon the plants a little in the morning and evening. Too much shade is injurious; and when watering the plants the utmost care should be taken that no water falls on the flowers and opening flower buds, as the former will be soiled, and the latter will produce poor flowers.

Some fine kinds for pot culture will be found in the following, viz. :—

ANNIE: white and carmine, distinctly striped.

ATTRACTION: rosy pink; white eye.

BLACK PRINCE: dark maroon; white eye.

CATO: light rose; crimson eye.

DECORATOR: a compact growing glossy crimson variety.

L'AVENIR DE BALLENT: shaded pink, with crimson centre.

LORD LEIGH: brilliant scarlet; white eye.

LORD CRAVEN: purple or plum colour.

MAGNIFICENS: shaded lavender.

ROSE IMPERIAL: rosy pink, with crimson centre.

RUBY KING: ruby rose,—a distinct and beautiful kind.

SYLPH: pale flesh, with light crimson centre.

VENUS: pure waxy white, with purple centre.

The following are among the finest exhibition kinds :—

AURICULA: deep purple; white eye.

- CHARLES TURNER : blush ; cherry centre.
 HERCULES : deep rose ; white eye.
 V. C. WARD : violet ; white eye.
 JAMES BERBECK : shaded pink, dashed with violet.
 JOHN WILSON : scarlet, dashed with violet.
 GLOWWORM : brilliant crimson ; white eye.
 MISS TURNER : pale flesh, nearly white.
 MAZEPPA : deep bright scarlet ; white eye.
 MR. TURNER : pale flesh ; large carmine centre.
 PINK PERFECTION : pink.
 PRINCESS OF WALES : rose, distinctly striped white.
 STARTLER : crimson ; white eye.
 WILLIAM DEAN : shaded flower ; white eye.
 WONDERFUL : crimson.

VARIEGATED PELARGONIUMS.

In the plains of India it is futile attempting to cultivate Pelargoniums unless a plant-house is available, and as this can always be kept cool, their culture may be carried on in pots till the cold weather sets in, when they may be safely removed to the flower garden.

In the hills all the varieties named herein may be grown to perfection. The plants should be kept in the verandah till the heavy rains are over, and they may be put out about the middle of August, or later, if the rains still continue.

The section of variegated Pelargoniums is a large one, being sub-divided into several divisions, such as variegated Zonals, both gold and silver-edged (what were formerly termed Tricolors) ; the gold and bronze section ; the golden-leaved ; and the ordinary variegated, or sorts having leaves of a green hue with white edges. They are all extremely interesting,

and some very beautiful. All are regarded as bedding plants, though it is not improbable but that only a very select few of the former will be used for the purpose; all the others are well adapted for bedding purposes.

Cuttings of variegated Pelargoniums strike well if inserted in the open border, but not later than the first week in August: if it can be done earlier, so much the better. Select a border or any suitable piece of ground fully exposed to the sun, and if the soil is light in character it will be most suitable. Let it be well dug and carefully pulverised; then spread on the surface of the bed an inch or more of a mixture of sand or road scrapings, and well-rotted leaf mould not less than two years old; this should be well mixed with the soil. Rake it smooth and level, and with a measuring rod mark the surface in lines across the border, about nine inches apart. Then, with a setting stick make holes along the lines three or four inches apart, and from two to three inches deep. Into each hole pour a small quantity of silver sand, and insert the cuttings so that the end of each will rest upon the sand. Press the soil gently against the cuttings, and when the bed is finished, water well with a fine rose to settle the soil about them. Water as required, and keep them free from weeds, and by the end of September the rooted cuttings may be raised, and potted singly into pots about four inches in diameter, in which they may remain till planting-out time commences. Single cuttings can also be inserted in a pot three inches wide, using light turfy soil; and insert the cuttings, pressing the soil firmly about it; then place them in cinder ashes in a cold frame, give them water, keep them close a week, and then they may be fully exposed to the sun, night dews, and gentle rains, but screened from heavy rains. Keep them dry during the winter; enough moisture to keep them

alive is sufficient, but the plants can be syringed on bright sunny mornings in fine weather. In giving air avoid cold draughts. To grow specimens for exhibition purposes, some of the most promising plants should be selected from the autumn-struck cuttings, or from plants which have been re-potted. These should be sifted about the middle of February into pots one size larger than those they have been wintered in, and should be grown upon a stage as near the glass as possible, and in a temperature not lower than 45° at any time. Let the plants be frequently turned round, to expose all parts alike to the influence of the solar light, and in order to get the growth properly balanced. Carefully avoid over-watering, and slightly syringe on fine days. In giving air, on no account allow the cold morning draughts to act directly on the plants. Early in May they may be shifted into 6-inch pots, and some of the strongest of them into pots about eight inches in diameter, using a somewhat rich soil, composed of turfy loam enriched with a small proportion of thoroughly rotted hot-bed manure or leaf mould. They may now be placed under cinder ashes, in a cold pit or frame kept somewhat close, and slightly shaded for a fortnight or so after having been shifted; and should then be gradually inured to full exposure to sunshine, gentle rains, &c., the sashes, however, being always in readiness, so as to protect them from violent thunder-storms or hail, as well as from heavy or prolonged rainfall. The shoots should be staked or tied down to the rim of the pots, in order to lay the foundation of a specimen plant. In the training of the plants, however, avoid using more stakes than are absolutely necessary. Large specimens of variegated Zonal Pelargoniums are grand things for decorative purposes during winter, at which season some of them put on their best and brightest garb of foliage.

The following list will give some of the best kinds in each section :—

Variegated Zonals, golden-edged.

ACHIEVEMENT (Stevens).
 ETTIE BEALE (Carter & Co.)
 LADY CRAVEN (Perkins & Son).
 LADY CULLUM (Grieve).
 L'EMPEREUR (F. & A. Smith).
 LOUISA SMITH (F. & A. Smith).
 LUCY GRIEVE (Grieve).
 PRINCE OF WALES (Carter & Co.)
 PRINCESS BEATRICE (Carter & Co.)
 SOPHIA DUMARESQUE (Grieve).
 SOPHIA CUSACK (Grieve).
 TITANIA (Carter & Co.)

Variegated Zonals, silver-edged.

BEAUTY OF GUESTWICK.	MRS. COLONEL WILKINSON.
EDWARD MILNER.	GLEN EYRE BEAUTY.
EXCELLENT.	LADY OF SHALLOT.
IMPERATRICE EUGENIE.	MISS BURDETT COUTTS.
MRS. JOHN CLUTTON.	PRINCESS OF WALES.

Golden-leaved, with bronze zones.

BLACK PRINCE (Carter & Co.)
 COUNTESS OF KELLIE (Downie & Co.)
 EGYPTIAN QUEEN (Carter & Co.)
 HER MAJESTY (Wills).
 MADELINE SCHILLER (Morris).
 BEAUTY OF SALTHILL.

CLEOPATRA (Carter & Co.)

EBOR.

KENTISH HERO (Downie & Co.)

REV. W. F. RADCLYFFE.

Golden-leaved section.

CRYSTAL PALACE PERFECTION. | PILLAR OF GOLD.

Green and white variegated.

ALBION CLIFFS.

CASTLE MILK.

MAY QUEEN.

MISS KINGSBURY.

MISS STEVENS.

MR. P. J. PERRY.

PRINCESS ALEXANDRA.

SNOWDROP (Goode).

Variegated ivy-leaved varieties.

L'ELEGANTE.

DUKE OF EDINBURGH.

The double-flowering varieties of the Pelargonium are a very interesting class, and can be treated similarly with the ordinary Zonal varieties. The best are—

ANDREW HENDERSON.

MADAME LEMOINE.

EMILE LEMOINE.

TRIOMPHE.

GLOIRE DE NANCY.

TRIOMPHE DE LORRAINE.

THE POLYANTHUS.

This pretty and early flower is not difficult to grow. The seeds should be fresh, and sent to India (in a cloth envelope, by letter-post) as soon after gathering as possible. They should be sown in a pan or box, which place in the shade, and cover over with a pane of glass or sheet of talc. The soil used should be light and sandy. Thus treated, the seeds will soon germinate, and all that is afterwards required is to keep the young plants from the hot sun and heavy rains. When

the seedlings are sufficiently grown, prick them out on a shady border, in a prepared bed, to which some protection can be given; and when they have grown large, they may be removed to the place selected for them in the garden. To grow the Polyanthus well, a bed should be prepared for them in the most favorable spot in the garden. A slightly raised bed in a somewhat dry and airy position is the proper place for their culture. A compost should be formed of leaf mould, sheep's droppings, and sand, say in equal parts, with which to manure the plants. They should be planted rather deep, as they throw out the roots, from which they gain their chief growth, close under the leaves. When they begin to grow early in the spring, the soil should be strained about the plants, and a top-dressing of prepared garden soil added. Keep them free from dead foliage and weeds, and a fine head of bloom will reward the grower. When the plants become large, they should be divided at the roots. The bed is to be furnished with fresh soil at least every two years. During the hot months, strew some litter over the plants to protect them from the withering effects of the sun. The Polyanthus may also be grown in pots. The selected plants should be potted in the autumn, in a compost similar to that used for the bed. The pots are to be kept in a dry, airy place. As the blooming time approaches, the dead foliage should be gathered and removed, and the watering attended to. The spikes of bloom should be staked to keep them from drooping. As soon as the flower spike begins to show itself above the foliage, some of the old soil round the plants should be taken out without disturbing the roots, and replaced by some fresh rich compost; this will help the plants greatly, and induce a fine development of flowers. When the flowering is over, and the foliage changes, the plants should be taken out of the pots and

divided at the roots, and then planted out in a cool shady border, in some good soil; and in the succeeding autumn they may be again re-potted for blooming, as before. The finest and best-marked flowers should be selected for seed, the inferior ones being removed or used for the flower vase.

THE AURICULA.

We are told by Mr. Carter, seedsman, of London, that the Auricula is a flower which is a special favourite with many growers. It is one rich in beauty, and of a deeply interesting character. Those who cultivate it do so with an enthusiasm that marks the true florist; and these flowers, as carefully tended as can well be, are at their blooming season, if at all favorable, so many triumphs of the perfection of the florist's art. There are two classes of Auriculas—the more delicate show kinds, that are divided into grey-edged, white-edged, green-edged, and self-flowers; and the hardy Alpine varieties, all of which have showy white, cream, or yellow centres margined with rich colors. The last named have been much improved of late years, and some beautiful kinds are now in cultivation.

Of the show Auriculas it has often been said, "How very beautiful, but so difficult to winter." Now, they are neither difficult to manage nor keep through the winter; on the contrary, no collection gives so little trouble. If the plants are kept dry when in a dormant state, watered freely during the growing time, grown in a proper box or frame, and always kept clean, success is tolerably certain. The Auricula, like the Carnation, is by no means a tender plant, if properly grown. A single mat will suffice for protection for the plants, if in a fitting frame, during the severest winter weather, if the frame be kept dry.

When to pot the Auricula—a process done once during the year—is a disputed question among growers. Some pot at the end of the summer, others at the end of the winter; probably the best time is at the end, not the beginning of the summer rest, when vigour begins to show itself in a renewal of growth after the heats of summer are passed. The plants, which are slow in all things, will then have time to establish themselves before winter, which, in the case of small, young, or weakly plants, is of great importance. One universal caution is—"Do not over-pot:" pots four or five inches in diameter are considered the utmost allowable size. Give good drainage as well. For soil, take loam, as rich as you like, provided it be native,—the richer in clay and fibres of grasses, the better. To this add one-half of decayed leaves, or, what comes to the same thing, well-rotted cowdung. Add sand enough to keep it open, if any is necessary; but it is not always necessary: some growers rarely add it. The drainage being arranged, let the pot be filled to about two-thirds with the compost, not in too dry a state: it should neither be dusty on the one hand nor visibly moist on the other, but in such a state that a handful taken up and squeezed will remain in a ball. Spread the roots out evenly over the mould, and fill in; very little pressure indeed,—a tap upon the potting table will be almost enough to settle the plant. Then plunge the pot in water up to its rim to thoroughly moisten the soil. Keep the plants close for a few days, and then gradually accustom to air, for no plant requires more of free air than the Auricula. A raised stage, so as to bring the plants pretty near the glass, should be in all Auricula frames; it also allows of a free circulation of air beneath the pots. The stages should face the north at all times, except from February till April; and the plants have all the air possible and the right dews,

but no rain. As winter approaches, water should gradually be withheld till they go to their winter's rest.

The early growth of the plants will manifest itself in February. At this time the frames should face the full south; and as much as possible of the old soil should be taken from the pots without disturbing the roots, and be replaced with a top-dressing of the same compost as that used for potting, or it can be made a little richer by the addition of some well-rotted manure, provided it has been exposed to the frost of the preceding season. In watering, be very careful, even with pure water, to avoid wetting the leaves. When the trusses of flower are getting forward, they must have all the air, but no wind—and, above all, no north or east wind. The plants will now want watering three times a week. Should green fly make its appearance on the pips, it should be kept under by the use of a camel's-hair pencil. As soon as the bloom is over in May, a vigorous leaf growth takes place, during which it is customary to place the plants out of doors, under a north wall or hedge, sheltering them merely from sun and violent rains. The summer sun appears to be the only thing they will not bear. They can remain here till re-potted. The Alpine varieties should be treated in a similar manner, if fine trusses of bloom are desired. They are certainly hardier than the show kinds, and they bloom more freely. Every one fond of Auriculas should grow some of the finer Alpine varieties, for they are really very beautiful when fully in bloom.

The following varieties of show Auriculas would form a fine and varied collection :—

Green-edged.

APOLLO (Beeston).

FREEDOM (Booth).

LYCURGUS (Smith).

† MAY FLOWER (Traill).

† GENERAL NEILL (Traill).

† PRINCE OF WALES (Ashton).

Grey-edged.

CONQUEROR OF EUROPE
(Waterhouse).

LADY JANE GREY (Dixon).

LANCASHIRE HERO (Cheetham).

MARY ANNE (Fletcher).

GENERAL BOLIVAR (Smith).

MISS GIDDINGS (Read).

White-edged.

FAIR MAID (Lightbody).

FAVOURITE (Taylor).

LADY SALE (Smith).

NE PLUS ULTRA (Smith).

SMILING BEAUTY (Heap).

TRUE BRITON (Hepworth).

Of self-flowers, the following:—

BLACK BIRD (Spalding).

ELIZA (Sims).

FORMOSA (Smith).

METEOR FLAG (Lightbody).

MRS. STURROK (Martin).

ROYAL PURPLE (Headly).

Of Alpine varieties, the following:—

BRILLIANT (Turner).

CONSPICUA (Miller).

DELIGHT (Turner).

KING OF CRIMSONS (Turner).

LANDSEER (Turner).

MASTERPIECE (Turner).

SPARKLER (Turner).

SOVEREIGN (Turner).

SUNBEAM (Turner).

ROSES.

The Rose has been cultivated in India, from time immemorial, for the sake of the scents derived from its petals. These are *rose-water* and *uttur*, or *otto of roses*.

The Indian amateur florist cares little for either, and prefers the beautiful Roses of Europe to those with which almost every garden in the hills or plains is more or less stocked. Exotic Roses of all descriptions may be successfully

grown in the Himalayas ; and some of the private collections at Simla show what can be done in this line. In the plains the heat is much too severe for most of these delicate flowers, though, if grown in half-casks, and kept during the hot season inside a cooled plant-house, they would no doubt thrive, and in October all might be placed in the ground, being removed in-doors on the approach of the next summer.

In the hills the exotic kinds are generally grown in flower-pots, which very often are much too small for the plant ; and the result is a sickly, stunted plant, in place of a healthy, vigorous one. The Rose requires a rich soil, and the more sulphur it contains the better. The scent of this flower is due to the presence of sulphur. The *otto of roses* and the essence of rose are valued for the sweetness of their perfume ; yet chemists tell us that the composition of sulphuretted hydrogen gas (the most offensive of stench) and *otto of roses* is almost identical. In either case the sulphur is the smell-producer ; and hence it follows that when it is not freely present in the soil, the flowers announce the fact by their want of perfume.

The sulphate of iron, and the *sulphate of lime* in aqueous solution, will at all times supply the roots of the growing Rose with the sulphur needed. The former is sold in the bazar, and the latter is made by subjecting sifted slaked lime, or *chunam*, to sulphuration. The *modus operandi* is as follows, viz. :—Obtain a large *chatty*, or earthen pot, and oil its outside well, using common bazar oil. This is done to prevent the pot from cracking when strongly heated. See that a suitable cover is supplied. Have some *seers* or pounds weight of *chunam* sifted through a fine sieve, so as to be as fine as sifted wheat flour. Obtain a pound of

sulphur (*gundhuck*) and reduce it to powder. Fill the *chatty* with sifted lime, and then weigh its contents, emptying it in the aet. For every pound of *chunam* weigh out two ounces of sulphur, and place it in a small burnt clay vessel, which wrap up in paper and place, bottom upwards, on a metal saucer or the cover of a copper cooking-pot (*degchee*). Place the above at the bottom of the *chatty*, and gradually fill up with the *chunam*. This done, put on the cover and *lute* it down with kneaded dough. Have a fire lit in a brazier (*ungaethee*), and when the charcoal is fully ignited, place the luted *chatty* on the fire, and let it heat gradually for twenty minutes; after which, put more fuel on, and increase the heat by using a pair of hand-bellows. Keep up the fire until a decided smell of burning sulphur is evident to the olfactory organs, when the blowing is to be discontinued. Allow the fire to burn out and the pot to cool. When cold, remove the cover, and run the contents through a wire sieve (an old wire dish cover answers well), when the *sulphate of lime* will be ready for use. It must be kept in a canister, or in any earthen vessel which can be closed with a cover.

This substance is easily dissolved in water, and when required for use, one ounce of it should be allowed to the gallon of water, which may be still further enriched by adding half an ounce of *sulphate of iron* thereto. One pint of this solution will be ample for each Rose bush, and it may be used every other day, or twice a week at least, during the flowering season. The *mallee* should be supplied with a tin pint measure, and be instructed to apply that quantity to each plant in the evening only. Next morning the usual quantity of water is to be used, and will carry some portion of the lime with it downwards, and so supply the underground roots. It should be remembered that *lime*, in solution

has a tendency to sink downwards; and in this manner, in the course of time, it will get beyond the reach of the longest or deepest roots. When this takes place, the plant languishes, and finally dies. Hence the necessity for applying *lime*, or its solution, to the soil, and especially to flowering plants, whether raised in pots or cultivated in the garden.

It may interest the amateur florist to know that all plants having acid or sourish leaves require *sulphuric acid* for their proper and continuous development. The Geranium has an acid leaf, and its flowers run through all the shades of red and scarlet; from which we may draw the conclusion that the colour is due to iron, and the acid to sulphur. The Rose leaf is not sour, but its bark and seed vessel is so, and somewhat astringent as well, both being indications of the presence of iron and sulphur. If we burn some Red Rose petals to ashes in a bright silver spoon, the sulphur present will discolour the silver. By this test the presence of sulphur in any organic substance is invariably indicated.

The Rose may be propagated by layers and cuttings. The varieties that bear and ripen their seed may be raised from seedlings. In the hills and plains the budding of Roses is performed with the greatest facility, and by this method the choicest kinds may be expeditiously multiplied to any extent.

The "Rose Edouard" is generally used as a stock, on account of its vigorous growth, and the bark yielding most freely to receive the bud. This operation may be performed in the hills in all May; but in the plains, July and August are considered the best months. Budding may also be tried during the month of March.

All good *mallees* understand the process, and may be taught it, if necessary. The Hindoostanee for *rose-budding*

is "*goolaub pur aunk churhanah*." Speaking of the Rose Mr. Firminger observes: "Several Roses, deservedly of high reputation in Europe, that blossom in this country, produce small and not very double flowers; frequently only semi-double, very deficient in depth of colour, and greatly wanting in richness of perfume, insomuch that they could scarcely be believed to be the Roses grown under the same name in a more congenial climate." We have shown the origin and cause of these *defects*, and in addition have pointed out how "The Queen of Flowers" should be cultivated to perfection.

Those who desire to possess a collection of the finest Roses, should procure them direct from England; and if they are intended for cultivation in the hills, the box or case containing them should be despatched from England so as to reach India in all February. The *dwarfs*—by which are meant Roses on their own roots—should be ordered in the autumn, so that the nurseryman may have ample time to make a suitable selection, and prepare the plants for their voyage to India.

In the list given below we have marked with an asterisk the varieties growing in India:—

LIST OF ROSES.

Persian Rose* (*R. centifolia*); Cabbage Rose* (Hills); Moss Rose* (Hills). - HYBRID PROVINCE GROUP:—Blanche-fleur,* Princess Clementine,* Comte Plater,* and Rose Devigne.* HYBRID BOURBON:—Charles Duval,* Paul Peras,* and Paul Ricant.* HYBRID CHINA* (Hills):—Damask Rose* (Hills); Rosa Alba* (Hills); Rosa Gallica; Rosa spinosissima; Rosa rubiginosa* or Sweet-Briar; Rosa lutea, or Austrian Briar;* Persian Yellow Rose;* Rosa sempervirens,*

or Evergreen Rose; *Rosa ternata*; * White Banksian Rose; * Yellow Banksian Rose.* *Rosa fortuniana* (flowers described as large, double, with petals loosely and irregularly arranged, of copper and fawn colour, introduced from China, but has never flowered in Calcutta) has been acclimatized in England by Messrs. Standish and Noble, who say—“*The shoots should only be thinned; to shorten them is to destroy the flowers.*” *Rosa multiflora** (Ootacamund); *Rosa gigantea** (Hills); *Rosa involucrata* (Hills); *Rosa Laurence de Montmorency*; * *Rosa Pareira's*, No. 5.* HYBRID PERPETUAL ROSES:—Grant des Batailles; * Lord Raglan; * Leonie Verger; * Marquise Boccella; * Caroline de Sansal; * General Jacqueminot; Princess Adelaide; * Enfant de Mont Carmel; * La Reine; * Pope Pius IX.; * Madame Masson; * Napoleon; * Baronne Hallez; * Mesdames Damet, * Domage, * Laffay, * LamCriciere, * Rivers, * Trudeauux; * Mrs. H. B. Stowe; * W. Jesse; * Etendard des Amateurs; * Leon des Combats; * Reine des Fleurs; * Cardinal Patrizzi; * Alexandrine Bachmeteff; * Jules Margottin; * Baronne Prevost; * Comtesse Duchatel; * Cornet; * and Souvenir de la Reine d'Angleterre; * Gloire de Rosomene; * Bartlett's Rose; * Cape Rose; * Pheolina Borbonica; * Jibbonkissen Paul's Rose; * The Queen; * Mrs. Bosanquet; * Acidalie; * Pierre de St. Cyr; * Prince Albert; * Marquis de Balbiano; * Queen of the Reds; * Sir J. Paxton; * Souvenir de Malmaison.*

The Chinese are very fond of the Rose, and the following have been introduced from China, viz.:—1. *Rosa Chinnensis*; 2. *Rosa Indica*; 3. *Rosa semperflorens*; 4. Auckland White and Red Rose; 5. Eugene Beauharnais; 6. Cramoisie Superieure; 7. Archduke Charles; 8. China Melior; 9. Duc de Berri; 10. Madame Bréon; 11. Unique; 12. Le Caméleon; 13. Fairy Queen.

The *Tea-scented Roses* of China are distinguished by their smaller growth, more delicate habit, and by the peculiar tea scent of their flowers. As plants, they may be considered the choicest, and their flowers the most lovely of all. "Those that have been introduced into India, seem to thrive more vigorously, and to blossom even more profusely and beautifully, than they do in England."—(*Firminger.*)

The Tea Rose grows well in Calcutta, and the seventeen varieties named below would, as a matter of course, flourish in a better climate:—

LIST AND DESCRIPTION OF TEA ROSES.

1st. BOOTH'S ROSE.—Colour deep blush; flowers large and exceedingly double, of delicious fragrance. 2nd. WOOD'S ROSE.—Colour as above, but the flowers have no scent. 3rd. SOUVENIR D'UN AMI.—Large rose-coloured flower, of great beauty of form. 4th. FRENCH WHITE, also called *Maid of Athens*.—Bears in great profusion prettily-formed, fawn-white, and very fragrant flowers of moderate size. 5th. GLOIRE DE DIJON.—Flowers large, very double, with orange-yellow centre; almost scentless. 6th. DEVONIENSIS, called also the *Victoria*.—Fine large double creamy white, deliciously fragrant flowers. 7th. JULIE MANSAIS, called also *Duc d'Aumale and Strombio*.—Produces small pale lemon-coloured flowers; exquisitely beautiful when only half expanded. 8th. SAFRANO, called also the *Copper Rose*.—Produces deep fawn-coloured flowers, beautiful only in the bud. 10th. PEEL'S ROSE.—A remarkably handsome Rose, with large deep salmon flowers. 11th. COMTE DE PARIS.—Bears large flesh-coloured flowers. 12th. ELISE SAUVAGE, called also *Odorata*.*—Produces large globular pendulous flowers, creamy

* This flower must have been a scented one when first introduced, otherwise the name *Odorata* would not have been given to it. The soil of Calcutta is no doubt answerable for the want of scent, which, under proper treatment, we predict, will be restored.—Ed.

white outside, and of a rich apricot yellow within, but without fragrance. 13th. *LA SYLPHIDE*.—A beautiful Rose, of moderate size, much like *Abricote* in colour. 14th. *LA BOULE D'OR*.—Flowers small, of a beautiful *golden* colour. 15th. *SOUVENIR DE DAVID*.—Flowers described as cherry coloured, very large, and double. 16th. *VICOMTESSE DE CAZES*.—Flowers orange-yellow, large, and very double. 17th. *GREEN TEA*.—A dwarf Rose; produces beautiful small globular pure white scentless flowers.

These seventeen kinds are to be met with in Calcutta, and all may be propagated from cuttings.

The following comprise all the most beautiful *Tea Roses* now in cultivation in Europe, viz.:—*White*.—*Alba Rosea*; *Climbing Devoniensis*; *Madame Bravy*; *Madame de Sertot*; *Madame Maurin*; *Madame Villermoz*; *Rubens*; *Sombreuil*; *Souvenir d'Elise Vardon*; *Triomphe de Guillot*; *Zelia Pradel*. *Blush*.—*Adam*; *Amabilis*; *Belle de Bordeaux*; *Clotilde*; *Comte de Paris*; *Madame Halphin*; *Nina*. *Fawn*.—*Archimede*; *Bougere*; *Duc de Magenta*; *Madame Damaizin*; *Madame de St. Joseph*; *Madame Pauline Labonte*; *Marquise de Foucault*; *Triomphe de Luxemburg*. *Yellow*.—*Auguste Vacher*; *Bouton d'Or*; *Comtesse de Brossard*; *Enfant de Lyon*; *Isabella Sprunt*; *Jaune d'Or*; *Jean Pernet*; *Lay's*; *L'Enfant Trouve*; *Louise de Savoie*; *Madame Falcot*; *Madame Margottin*; *Mademoiselle Adele Jougant*; *Marechal Niel*; *Moiret*; *M. Furtado*; *Narcisse*; *Niphetos*; *Reine de Portugal*. *Rose*.—*Auguste Oger*; *Comtesse Ouvaroff*; *Eugene Desgaches*; *Goubalt*; *Homer*; *Madame de Tartas*; *Madame de Vatry*; *Marechal Bugeaud*, *President*.

NO SETTE.

Under this head we have —1st. *NITIDA*.—A dwarf plant. 2nd. *BRIDESMAID*. 3rd. *LAD BULLER*.* 4th. *SIR WALTER*.

Scott.* 5th. FELLEBERG. 6th. RED NOISSETTE.* Of these, the last four, if closely pruned in October, will in February produce a great profusion of small red flowers.

NOTE.—In the hills, prune in all March to middle of April.—ED.

7th. WHITE NOISSETTE.*—Produces small faintly fragrant flowers, forming one entire mass of white blossom.

8th. CAROLINE MARNIESSE.*—Produces clusters of small pure white flowers. 9th. AIMEE BIBERT.*—A beautiful white Rose, with fine rich verdant foliage. 10th. REINE DE PROVENCE.*—A winter Rose, producing in January a profusion of large *lilac* fragrant flowers.

TEA-SCENTED NOISSETTE.

The Roses of this group are all climbers, blooming in clusters; all the flowers are more or less of a yellow tint, and the following are amongst the finest, viz. :—America; Seline Forestier; Claudia Augustin; Cloth of Gold; Isabella Gray; Jane Hardy; Jeanne d'Arc; La Biche; Madame Massot; Mademoiselle Aristide; Ophirie; Triomphe de la Duchère; Triomphe de Rennes. These have not as yet been introduced into India, though the five named below are to be met with in the gardens of Calcutta:—1st. LAMARQUE.*—Has never flowered in Calcutta. 2nd. SOLFATERRE,* also called *Sulphurea*.—It produces large handsome pale-lemon flowers, of strong *tea fragrance*, at nearly all times of the year. 3rd. RAJAH.*—A splendid Rose, like the last. The flowers are paler and somewhat larger. 4th. JAUNE DESPREZ.—The flowers are fragrant, the colours varying between *buff* and *red*. It blossoms abundantly. 5th. CANINA BORBONICA.*—Produces large handsome pendulous very double creamy-white flowers, with Apricot centre, which are relieved most agreeably by the very peculiar and distinct yellow-green of the foliage. All these Roses may be propagated by cuttings.

MUSK ROSES.

1st. *ROSA MOSCHATA*.—Firminger says: "This is a small plant common in all parts of India; produces small flowers, with narrow, ill-formed, dirty white petals, having nothing but their peculiar musk scent to recommend them." He gives *seotee* as the Hindee or native name. There is evidently some mistake here, as the *very sweet smelling* wild Rose of the Himalayas is so called, and it certainly does not answer in any way to the description given. 2nd. *RIVER'S MUSK ROSE*.—Introduced by Firminger from England, who states that it "produced poor small valueless flowers." 3rd. *PRINCESSE DE NASSAU*.—Imported by Firminger. "It thrrove well, but did not blossom." Said to produce very fragrant flowers, their colour being *rosy-buff*.

The degeneration of these Roses shows the necessity for acclimatizing such flowers in the hills, and the cuttings so obtained would then succeed in the plains, provided a plant-house was available.

To make this portion of our Manual as complete as possible, we subjoin a list of *Hybrid Perpetual Roses*, which are either unknown or are rare in India. The Roses of this group stand in the very highest estimation for the fulness, colour, and fragrance of their flowers. The following are among the finest, and are arranged in the order of their colour, viz.:—*White*.—Coquette des Alpes; Imperatrice Eugenie; Louise Darzens; Louise Magnan; Madame Alfred de Rougemont; Madame Bellenden Ker; Madame de Canrobert; Mademoiselle Berthe Levêque; Mademoiselle Bonnaire. *Blush*.—Charles Rouillard; Comtesse de Chabrilant; Louise Peyronny; Madame Emile Boyan; Madame La Baronne de Rothschild; Madame Vidot; Mademoiselle Marguerite Dombrain; M. No nan; Sophie de la Villeboisnet.

Rose-coloured.—Charles Verdier; John Hopper; La Tour de Crouy; Madame B. Desportes; Madame Pulliat; Madame Rousset; Mademoiselle Annie Wood; Maréchal Vaillant; Marguerite de Saint Arnaud; Prince Humbert; Souvenir de Dr. Jamin; Souvenir de Ponsard. *Carminé*.—Alfred Colomb; Baron Adolphe de Rothschild; Beauty of Waltham; Duchesse de Caylus; Exposition de Brie; Jean Rosenkrantz; La Rhone; Madame Charles Verdier; Madame Furtado; Madame Victor Verdier; Marie Baumann; Maurice Bernardin; Rushton Radclyffe; Souvenir de M. Coll. *Crimson*.—Alfred de Rougemont; Alphonse Damaizin; Charles Lefebvre; Dr. Audry; Eugène Appert; Pierre Notting; Prince Camille de Rohan; Prince de Portia; Sénateur Vaisse; François Lacharme; Gloire de Santenay; Lord Clyde; Lord Macaulay; Souvenir de Comte Cavour.

The *Bourbon Roses* new to India are: *White*.—Baronne de Maynard; Emotion; Madame Angelina; Madame Gustave Bonnet; Mademoiselle Emain; Marguerite Bonnet. *Pink*.—Baron Gonella; Armosa; Catherine Guillot; Comtesse Burbantanne; Empress Eugène L'Avenir; Louise Margottin; Madame Charles Baltet; Madame Maréchal; Michel Bonnet; Modèle de Perfection. *Rose*.—Baronne Noirmont; Heroine Vaucluse; Madame de Stella. *Carminé*.—Aurore de Guide; Jules Cesar; Rev. H. Dombrain; Dr. Berthet; George Peabody.

STANDARD ROSES.

These, though rarely seen in the plains of India, are by no means uncommon in the Kussowlee and Simla Hills, where they thrive, owing more to climate than to a special knowledge of their culture. The instructions of Mr. Carter, of London, on this subject are deserving of the best

attention; and the *Standard Rose* fancier may follow them with perfect confidence.

Planting Standard Roses.—Mr. Carter observes: “Failures of Standard Roses are of no unfrequent occurrence, as they are often injudiciously planted in a bed scarcely large enough to contain their roots, in a very poor lawn, without any manure, and the turf laid close up to their stems. How, therefore, can they be expected to thrive? Where it is desirable to plant Standard Roses singly in grass lawns, a circle of turf should be removed not less than five or six feet in diameter. If the first spit of soil be moderately rich, it may be placed on one side, and the whole of the sub-soil to the depth of three feet (*be*) entirely removed, and replaced with a mixture of good rich loam, good strong stable manure, or old night-soil, and the top spit next the turf (*should be*) well mixed with them. If the top soil is rather light, a good proportion of the sub-soil, if heavy, may be added to it, in order to make the compost heavier, as Roses bedded on stocks of the Dog Rose flourish best in a moderately heavy soil. Tread the mixture in the hole, to prevent it from sinking, till nearly full; place the plant in the centre, spreading the roots and fibres (*rootlets*) in a horizontal direction; and cover them with rich garden mould. Especially avoid planting too deeply. On the top spread a layer of sub-soil, pour sand or road earth, one or two inches thick (*over it*), to prevent the turf growing more luxuriantly than the rest of the lawn. In replacing the turf, leave a circle of not less than eighteen inches, or two feet in diameter, round the stem. This should be filled, instead of sub-soil or poor sand, with a rich compost, which will be washed down to the roots by the rain. To ensure the future health and vigour of the plants, one or two

gallons of good liquid manure* should be poured on this circle two or three times every succeeding winter."

DAHLIAS.

In the hills north of Deyra, (*Mussoorie, Simla, Murree, &c.*) Dahlias of almost every colour are successfully grown in the garden, and require no care beyond manuring in spring. They commence flowering in May, and cease to flower in October. The tubers of the superior varieties should be taken up and put by for future use; the commoner kinds may be left in the soil, and will throw up fresh shoots in the following spring. The Dahlia may also be raised from seeds and cuttings; but as tubers may generally be obtained for the asking, they (tubers) are much to be preferred. In the plains the utmost care seems to be taken (*vide* Firminger's work) to convert the Dahlia into a winter flower, and the result is that "it very rarely produces those fine handsome fully double flowers which make it so conspicuous an object of beauty in the gardens of Europe."

We would recommend Dahlia tubers (one or two of each superior kind) being obtained from the hills in October and November. These should be placed in a box and be carefully covered over with sand (just as Potatoes are stored), and some straw over the sand. The cover should be nailed on, and the box buried $2\frac{1}{2}$ feet deep in some shady corner of the garden—say under a Lemon tree; the object being to keep the tubers as cool as possible; and to prevent them from sprouting till the end of March, or the first week in April, when the box should be unearthed, the cover removed, and the tubers got ready for planting in suitable sized baskets. These should be not less than 18 inches in diameter and 12 inches in depth. They should be lined with plantain leaves, and be filled up with

* For liquid manure, see p. 12.

prepared garden soil; a single tuber being planted in each. The baskets should be kept inside the plant-house all day, or from 8 a.m. to 7 p.m., and be placed outside all night, being removed as before at 8 a.m. The soil should be gently watered every evening till the sprouts appear, when they should be watered in the morning as well as in the evening. Thus treated, the plants will thrive and come into flower in all June. When the rains have steadily set in, dig holes in the garden corresponding in size and number to the baskets. Place a brick at the bottom of each hole, and fill up with soil to the level of the brick. Now place the basket (without disturbing the Dahlia) on the brick, and fill in the hole with pulverised soil, which press or stamp down. Next, make a circular trench all round the plant, at a distance of two feet from the stem—i.e. the trench will have a radius of two feet, inside measurement. It should be six inches deep and as many wide, and is to be connected with the nearest open drain, so that all surplus water may be drained off as it falls, leaving the Dahlias high and dry. As the brick used is three inches thick—this much of the basket will be above ground—the angle should be filled up with soil so as to form a slope, on which *Dock* grass may be set. The basket-work will decay in a month or so, and the tubers will grow beyond its limits. When the Dahlias are out of flower and the stalks have dried up, take up the tubers and store them, as before, for next year's use. The Dahlia does not require its nature to be changed. It cannot stand the hot winds or the sun heat of 130° F.; but when this is passed, the temperature of the rains will suit it well, and drainage being secured, its further cultivation becomes a very simple affair.

These beautiful but scented flowers may also be grown in half-casks, in which case a fresh crop of tubers will be

formed within it, and will not be full-sized. The destruction of the basket may cause the loss of some coppers; but as good tubers are secured, the grower is no loser by the transaction.

The following is a list of the newest and most beautiful varieties of the Dahlia, most of which are prize-takers, and almost unknown to India:—

New Show Dahlias.

ALEXANDER CRAMOND, shaded maroon, a most striking flower, very large, always ready: grand flower.

BLUEBEARD, a great novelty of colour, shaded crimson, a seedling from *James Backhouse*; large.

CRIMSON KING, beautiful crimson.

GOLDEN BEAUTY, a beautiful clear yellow, of the finest quality.

MARCHIONESS OF LORNE, orange ground, lightly edged with purple, chaste, and magnificent improvement in its class.

MAID OF ESSEX, pale ground, regularly tipped with purple rose: very fine flower.

MRS. AUSTIN, yellow, edged pink: beautiful flower.

QUEEN OF YORK, light blush, very large, constant: flower of great depth.

SARAH READ, light ground, edged deep pink.

WILLIAM KEYNES, very grand orange, one of the finest formed Dahlias in cultivation.

WILLIAM PRINGLE LAIRD, the finest Lilac in cultivation, chaste petal, more like a Camelia in texture: first-class.

AMY CREED, salmon colour.

ANNIE AUSTIN, amber.

ARTHUR, lilac.

BOB RIDLE, scarlet.

EARL OF LEMBROKE, claret.

FLOSSY GILL, edged pink.

GIpsy KING, mulberry.

GOLDEN ADMIRATION, buff.

HEBE, tipped lilac.

HIGH SHERIFF, black.

HON'BLE. MRS. WELLESLEY, blush.	NETTY BUCKELL, blush.
INCOMPARABLE, yellow ground, tipped claret.	OTHELLO, black brown, - centre almost black.
JOHN HARRISON, dark maroon.	PARADISE WILLIAMS, crimson.
LORD DERBY, crimson.	PURPLE GEM, purple.
LORD NAPIER, crimson purple.	TRIUMPH, light cherry on dark cochineal ground.
LOTHAIR, yellow ground, edged carmine.	VICE-PRESIDENT, orange.
MARY KEYNES, fawn ground, edged rosy-purple.	WILLIAM LUCAS, yellow ground, edged puce.

New Fancy Dahlias.

DOLLY VARDEN, clear white, splendidly striped with ribboned purple; by far the finest flower in its class.

JESSIE GILL, yellow ground, striped rose; fine flower.

MARQUIS OF LORNE, light ground, flaked with large stripes of purple; fine noble flower, requires no cutting out, splendid form.

MONARCH, the darkest flower in cultivation, with a white tip, but much inclined to be self, when it is a first-class show flower.

MRS. BENNETT, light ground, striped lilac, quite a new colour, and most desirable, large, splendid form.

MRS. GOODWIN, purple crimson, tipped white; a beautiful flower, most distinctly tipped: constant and fine.

ALICE PURCHASE, purple, tipped white.	EBOR, chocolate and black.
ATTRACTION, white and purple.	FANNY STURM, orange & white.
BESSIE WYATT, white and red.	FLORA WYATT, orange, flaked red.
CHAMELEON, lilac and scarlet.	FORMIDABLE, red and white.
CHANG, yellow and scarlet.	GRAND SULTAN, buff and red.

JAMES HUNTER, gold and lake.	MRS. WICKHAM, white and crimson.
JEANNIE DEANS, orange and purple.	OCTOROON, purple and white.
JOHN SEALEY, lilac, striped purple.	OLIVER TWIST, purple and white.
LADY DUNMORE, yellow, crimson, and white.	PERI, white and lavender.
LADY PAXTON, red, tipped white.	PROSPERO, crimson and purple.
LIGHTNING, striped.	QUEEN MAB, red and white.
LORD WARDEN, rose and white.	QUEEN OF BEAUTIES, straw and purple.
MESSANGER, aurora and buff.	SPARKLER, purple and white.
MRS. BUNN, white striped purple.	TABBY CAT, crimson, pink, and buff.

Dahlias (Lilliputian, Bouquet, or Pomponé Varieties).

Very useful for cut Blooms, decoration of Vases, &c.

- BONFIRE, golden yellow, with scarlet.
 CAMILLA, crimson, edged white.
 CUPID, ochre yellow, changing to buff.
 DIADEM, yellow, with carmine, edged white.
 DIANA, rosy lilac.
 FIREBALL, orange scarlet.
 GERMAN BOY, buff ground, edged bronze crimson.
 HEROINE, peach blossom, reflex brown-violet.
 LITTLE LOVE, rich puce, shaded rose.
 LITTLE MARY, maroon crimson.
 LILIA, rich carmine, tinted rose.
 LOUIS SPATH, peach, with silvery edge.
 MISS CONSEQUENCE, dark peach, shaded carmine, edged white.
 MOONLIGHT, snowy white.
 ORB OF GOLD, yellow, centre and edges maroon.
 OUR TIM buff, shading to peach.
 PERCY, flesh rose, with lilac reflex.
 PRINCESS LOUISE, scarlet, with golden yellow reflex.

ROYAL DOWRY, golden yellow, with copper colour reflex.

SILVERSMITH, yellow, tipped crimson.

TOM TIT, blush lilac, edged violet-purple.

Dahlias (Dwarf Bedding Varieties).

BEAUTE DES MASSIFS, scarlet,
fine.

CRIMSON DWARF, rich crimson.

DR. WEBB, rich scarlet.

GOLDEN BEDDER, fine yellow.

LITTLE WONDER, scarlet crim-
son.

PRINCE OF WALES, scarlet.

PRINCESS ALICE, purple-rose
colour, profuse blooming.

WHITE BEDDER, pure white.

ZELINDA, purple.

CREEPERS.

The south and west sides of the plant-house may be shaded from both heat and light, by training Creepers over iron netting or trellis-work ; and in like manner the sunny and hot verandahs of dwelling-houses may be similarly turned to account, if the Creepers are sown in empty three-dozen wine Cases filled with ordinary garden soil. But for the more delicate Creepers the artificial garden soil will have to be employed. These boxes should have between twenty or thirty holes, about a quarter of an inch in diameter, bored through their lowest side ; the bottom of the box should have a lath, an inch thick, nailed on at each end, so that the water percolating through the holes might run off freely, and a due circulation of air be kept up.

From the quickness of its growth, and for the beauty of its foliage and flowers, the Passion Flower (*Passiflora*) must be allowed precedence. These flowers are natives of South America and the West Indies ; hence, when any particular species does not flower in the garden, we may be certain

that the soil is to blame, and not the plant. To save disappointment, the capital letters U. P. G. S., meaning "use prepared garden soil," will appear in parentheses after the description of the plant, which *will not flower* in ordinary soil.

1. P. ALATA.—The flowers are very fragrant, with calyx and petals crimson; rays variegated^d white, purple, and crimson. (U. P. G. S.)

2. P. CÆRULEA.—Very handsome and hardy. Flowers large, with the segments of the calyx and petals pale greenish-white; styles purplish; rays of the crown purple at bottom, white in the middle, blue at the end. Most readily propagated by young suckers.

3. P. CÆRULEO RACEMOSA.—Flowers very large and handsome; colour pale lilac, prettily relieved with a pure white crown of rays. If cultivated in a half-cask, it will continue constantly in bloom, or a box will do as well. (U. P. G. S.) *Perforate the cask.*

4. P. KERMESINA.—Flowers of moderate size, of a fine carmine crimson; display themselves only where sheltered from the sun. Of it Sir J. Paxton says—"Beyond all comparison the most beautiful species in cultivation, except P. racemosa." (U. P. G. S.) This should be grown in half-casks, and they should be placed in the northern verandah.

5. P. LAURIFOLIA.—The foliage is dense and handsome, the leaves being laurel-like, rich green, and glossy, and the flowers large and fragrant, colour blue. (U. P. G. S.)

6. P. LOUDONI.—Bears brilliant crimson flowers. One of the choicest of the species. (U. P. G. S.) To be grown in half-casks.

7. P. MIDDLETONIANA.—A very handsome species, with fine red and green three-lobed leaves; bears very large exquisitely beautiful flowers; colour bright azure blue, with

rings of pure white. The flowers have a fine fragrance. (U. P. G. S.)

8. *P. PRINCEPS*.—A handsome species, bearing scarlet flowers. This should be grown in half-casks, placed in the northern verandah. (U. P. G. S.)

9. *P. QUADRANGULARIS*.—Mentioned as “a superb species, with flowers of a most superb colour.” Firminger says—“It is not uncommon in the gardens about Calcutta, where it blossoms during the rains.” In France it is grafted upon *P. cærulea*, and flowers and fruits the same season as grafted, when not above two feet high.—(*J. Paxton*). (U. P. G. S. for grafted plants).

10. *P. RACEMOSA*.—This very choice and handsome plant bears deep-red or scarlet flowers in March. It (according to Firminger) can only be propagated by grafting upon a stronger species. (U. P. G. S.) This should be grown in half-casks, and they should be placed in the northern or eastern verandah.

11. *P. SERRATIFOLIA*.—Flowers in May. They are large and very handsome; colour lavender.

12. *P. INCARNATA*.—This grew formerly in the Calcutta Botanical Gardens, but has died out—a sure sign of soil being unsuitable. It bears pink-coloured flowers. (U. P. G. S.) This should be grown in the southern verandah, in half-casks.

Of the above, Nos. 1, 3, 4, 5, 6, 7, 8, 10, 12, are choice kinds, being the pick of twenty-three named species. Almost all the red and blue-flowered plants are rare to India. Communication with England is now so rapid and regular, that any good London seedsman could supply rooted plants of the kinds named. The soil should be entirely removed from the roots, some damaged moss should be placed in an empty tin box (of the size of a common red-herring tin),

and a layer of rooted plants on the moss. They should be covered over with more wetted moss, on which more plants should be placed, the operation being repeated till the box is full, when it should be soldered down and sent to India by parcel or other post. The plants will reach in perfect preservation, and will strike soon after planting. [N.B.—The moss should be sensibly damp, *not dripping wet*.]

Almost all Creepers, be they annuals or perennials, may be grown in pots or half-casks. The soil for all superior or exotic descriptions should be prepared garden soil; and in the hills, any rich soil, to which some prepared soil should be added—say ten per cent.

They may be raised from seeds or cuttings, and creeping room must be provided. Where it is objectionable to fasten climbing plants to walls, a light trellis-work of wood, or galvanized iron wire, may be employed, being permanently fixed when the climbers are perennial, but movable where they are grown merely for summer purposes.

By being removed and kept in a dry place when the plants have done flowering, a light wooden trellis (originally of small cost) will last for several years.

The wire ones will last for a lifetime, and are to be preferred, though somewhat more costly. If *rattans* are procurable at a low rate, they should be split into four, six, and eight equal parts by the *rattan-worker* (*vulgo, chick-wallah*), the entire length being preserved. These should then be coiled down in a tub till all have been split, when an aqueous solution of sulphate of copper should be poured into the tub, the rattan slips being well covered with the cupreous solution. Weights should be used to keep them down, and after twenty-four hours' immersion these and the prepared rattans should be removed.

They have now become perfectly seasoned, and are climate-proof as well as white-ant (*termite*) proof. The sizes should be sorted; the quarter (four) canes being used for the skeleton or foundation work (*i.e.* the strongest diagonals of the diamond-shaped trellis), the sixes for the next interlacing, and the eights for the smallest parts, and for tying all the parts or structure together.

The cupreous solution is made by dissolving one pound of sulphate of copper (*bazar* name, *neela tootteeah*) in eight gallons of cold water, when it is ready for use.

As flower gardening is a favorite occupation with most ladies, we may here mention that any of the geometrical patterns taken from Beeton's "Book of the Needle" may be executed in split rattan-work, or, if this be too troublesome, any fancy pattern may be devised for the occasion; care being taken that in trellising it is necessary to remember that the lines and curves should be easy and graceful, so as to give scope to the free and rambling habits of the climbers.

In the plains, the Passion Flower, the Honeysuckle, the Creeping Jessamine, and any fragrant flowered local Creeper may be used, though the sweet-scented Passion Flowers are to be preferred. In the hills (of all three presidencies) all the *hardy* (European) species, as well as the more delicate ones, may be most successfully cultivated.

For the decoration of rock-work, or to hide an unsightly garden wall, few things are more appropriate than the real English Ivy; and as this Creeper is now quite common at the hill station of Kussowlee, cuttings may always be obtained through the kindness of friends; and these, if packed in damp moss, placed inside of a canister of suitable size (say 10 to 12 inches in length, and 3 to 4 inches in diameter), may be sent by banghy-post to any part of India.

The Ivy will not thrive in the plains, though, like other Creepers, it may be grown within the plant-house; the cask being placed outside in October, and removed back in March following. The climbers named in the list given below may be ordered out from England so as to reach India in all March, when they will be available for planting in spring.

The *hardy* species includes the small white Clematis, the Pyrus Japonica, Lathyrus chimonanthus, Cydonia, Lonicera, and the Hop. For summer purposes a selection from the following *genera* may be made, viz. :—Campanula pyramidalis, Cobæa (several species), Convolvulus speciosus, Loasia lateritia, Lophospermum (several), Manettia cordifolia, Maurandya Barclayana, Pentstemon argutus, Rhodochiton, volubile, Thunbergia (several), Tropæolum (several), Tweedia cærulea. The Campanula pyramidalis and Pentstemon argutus, though not climbers, make a handsome display when fastened to a trellis. The creeping Nasturtium, and the *Canary Creeper* (Tropæolum peregrinum) with its small but pretty canary-colored flowers, should not be forgotten; both thrive at Simla, and are much admired.

PENDULOUS PLANTS.

A great variety of plants can always be easily obtained, and as easily cultivated, in suspended positions. Of these, some require to be grown in pots, and watered, but others will send down their graceful pendants and blossoms for years without any direct application of water. There are some which can be grown without the aid of soil, a wet rag or a ball of moss being the only protection their roots seem to demand.

Pendant plants form very handsome appendages to a dwelling apartment; and no amateur florist should be without

a variety to grace the collection. The following are worthy of adoption, viz.:—*Saxifraga sarmentosa*, *Linaria cymbalaria*, *Fuchsias* (radicans and decumbens), *Russelia juncea*, *Lantans selloviana*; the epiphyllous sorts of *Cacti*, *Ferns*, *Lycopodiums*, &c.; and with a little management, the prostrate *Verbenas*, *Lobelias*, and *Mimuluses*, the trailing *Mesembryanthemums*, with *Campanula rupestris*, *Fragilis hirsuta*, and a multitude of plants which resemble them in their habits.

An airy parlour or drawing-room, with windows facing the sun, may be considered a domestic greenhouse, and these apartments, as is well known, may be furnished with flowering plants, which will bloom and thrive if certain precautions be adopted. Flowers of nearly every kind may be thus treated, and made to form an elegant ornament and means of delightful recreation in a dwelling-house. In the hills every verandah should be glazed, thus affording a snug play-room for the children and a conservatory for the plants. As glass is expensive, *talc*, or *mica*, should be used. The sheets of *mica* may be nailed on to light framework; or if wire-netting is available, they may be perforated at their edges, and be stitched on to the wire-netting with stout crochet thread or fine twine. An open verandah is out of place in the hills, and, during a snow-storm, renders the house most uncomfortable; and such is also the case during the rains.

SANITARY OR AIR-PURIFYING PLANTS.

The fact cannot be too widely made known, that certain flowering plants possess the power of decomposing the malarious and pestiferous gases. We know that all foul-smelling gases enter into combination with ammonia, and this very light gas acts as a carrier to all the heavier ones. Thus,

sulphuretted hydrogen, which is the heaviest and most deadly of the gases, is carried far and wide by ammonia, which is a compound of nitrogen and hydrogen. The leaves of plants are provided with an immense number of little mouths, on their under-surface: in aquatic plants the position is reversed [one square inch of the leaf of the common Lilac (*Syringa vulgaris*) contains no less than 120,000 of these pores or little mouths]; and if ammonia is in the air, whether it be foetid or non-foetid, the leaves will suck it up through these millions of mouths. The poisonous gas, however, is not taken up by the leaf, and being deprived of its carrier (*ammonia*), it sinks (by the force of gravity) to the ground, and is absorbed by the soil and there decomposed; which means that the sulphur and hydrogen present in the gas (*sulphuretted hydrogen*) are separated from each other, and have passed into an inert or harmless state.

Agricultural chemistry teaches us that all plants give off their surplus oxygen through these tiny mouths, and many of them possess the power of changing the oxygen absorbed from the atmosphere into ozone, which is oxygen in its original state. This ozone can be artificially made, and is found to be a most active *deodoriser* and *disinfectant*; and as the ozone evolved by the plant possesses similar properties, it becomes quite feasible to form a plant-barrier, beyond which it is utterly impossible for noxious gases to advance. Hence it follows, that if such plants be put down around a dwelling-house, or on that particular side of it whence foul smells or *miasmata* is known to come, the chemical affinity existing between foliage and *ammonia* will be called into action—the one will attract, and the other be attracted. The feeding or absorbing process then begins, and for every atom of *ammonia* taken up by each leaf-mouth, a corresponding atom

of sulphuretted hydrogen falls to the ground, from sheer inability to remain suspended in the air, or to proceed any further, when separated from the carrying agent ammonia.

The plants named at the latter portion of this section are great consumers of *ammonia*, and those marked with an asterisk evolve ozone as well as oxygen. Supplied with this practical knowledge, the prevention of febrile and foul-air diseases becomes the simplest of operations; and as the information given is supported by experience and high authority, further discussion is quite unnecessary.

It may interest the reader to know that the leaves of certain plants possess the power of converting gaseous *ammonia* into a solid substance, whilst others decompose it in some unknown manner, and eventually produce the *nitrate of potash* within the substance of the growing leaf and plant. For example, the Tobacco plant inhales *ammonia*, and converts it into *sal-ammoniac*; and the fact may be demonstrated by reducing a green Tobacco leaf to a paste in a mortar, and adding quicklime thereto, when the smell of snuff will be given off; and if a feather dipped in acetic or hydrochloric acid be held over it, dense white fumes will appear. In addition to this remarkable action, it converts the nitrogen derived from ammonia into nitric acid, and this, by combination with its contained potash, is turned into the nitrate of potash or saltpetre. The Sunflower similarly manufactures nitre; and the common Maize or Indian Corn (the *mukkee* of India) does the same. Supplied with these facts, it becomes easy to construct a barrier of plants around a dwelling-house, which will not only keep out *malaria*, but will draw off the carbonic acid and foul ammoniacal gases produced in-doors. The circulation of ozonized air is most conducive to health, and the feeling of depression, so common

in the hot weather in the plains of India, is not so much due to heat as to the reduction of oxygen and the absence of ozone. To form a plant-barrier, the ozone-producing plants should be put down nearest the house, or, say, 21 feet from it,—a distance of six feet intervening between plant and plant, where in quincunx order.

The Maize and Sunflower should be on the outside, the *Toolsee* and Heliotrope on the inner side. The latter flourishes in the sun, and requires ample growing room. People put it into flower-pots, and are then surprised at its stunted growth and appearance.

We know some gardens at Umballa in which the Heliotrope grows most luxuriantly, and is in full flower in the hottest months; and we are acquainted with flower fanciers at Simla who grow it in small pots, and wonder why it does not thrive.

In the hills, the Rose and Lemon Geranium, grown in pots, and kept during the day in the drawing-room and hall, will keep the air pure; and a pot of Mignonette placed in each room will not only scent it, but decompose effluvium as well.

The plants which feed on ammonia through the agency of their leaves are as follow, viz.:—The Sunflower, Tobacco, Dill, Borage,* Mint,* *Ocimum sanctum** (*Toolsee*), Anise-seed (*Sounph*), Myrtle,* Sage* of all kinds, Mignonette,* *Verbena** (lemon-scented), and the Heliotrope,* &c., &c.

All plants having aromatic leaves inhale oxygen, and exhale ozonized oxygen and ozone.

It is necessary that information should be supplied regarding the composition of substances from which nitrogen, nitric acid, and ammonia are produced; and the reader's attention is specially invited to the part played by gaseous ammonia as a carrier of noxious gases.

The *nitrate of potash*, or saltpetre, is a compound substance. Its constituents are 46.55 potash and 53.45 nitric acid. This *nitric acid* is a compound of oxygen and nitrogen, in the proportion of about 26 parts by weight of nitrogen to 74 of oxygen. Ammonia, however, is a compound of nitrogen and hydrogen, in the proportion of 1 equivalent of the former to 3 equivalents of the latter. Under ordinary circumstances it exists as a gas which is very soluble in water, which will absorb or take up nearly eight hundred times its volume of this gas. It (*gaseous ammonia*) is lighter than atmospheric air in the proportion of 6 to 10. Water by itself is incapable of dissolving either hydrogen or nitrogen; yet when these are united in ammonia, their nature is so changed that they become very soluble in water. We are informed by Professor Johnston that "100lb of ammonia (*fluid*) contain about 17lb of nitrogen," and also that "14lb of nitrogen and 3lb of hydrogen make 17lb of (*gaseous*) ammonia." We are also told that "ammonia is produced in decaying animal and vegetable substances, in fermenting compost or manure heaps, and in fermenting urine; and it is the principal cause of the smell perceived in hot stables."

The fœcal poisoning of the atmosphere which takes place when such foul substances are burned in the open air, or when marshy lands are reclaimed by means of sewage, is due to the poisonous gases being carried far and wide by the vast volumes of ammonia evolved from such matters.

The poisonous gases are *sulphuretted hydrogen* and *carburetted hydrogen*; the latter is evolved in ditches from decomposing vegetable matter—hence its name of *ditch gas*; and it is abundantly evolved from marshy lands, in the vicinity of which a peculiar smell generally prevails, owing to its presence.

Hence it follows that *marsh malaria* is atmospheric air charged with *carburetted* and *sulphuretted hydrogen* united with ammonia, which acts as a carrier to these and other deleterious gases, amongst which carbonic acid gas must be included.

Ammonia (after hydrogen) is the lightest of all the gaseous bodies; and, like atmospheric air, is elastic and invisible. If the reader wishes to make ammonia visible, he should dip a feather in muriatic or hydrochloric acid and hold it over the mouth of an unstoppered smelling-salts bottle, when dense white fumes will appear, showing that ammonia is escaping therefrom as an invisible gas. This visible cloud is a true neutral salt in vapour; and if this vapour was collected and condensed, the product would be the *muriate of ammonia*, or the *sal-ammoniac* of commerce. The ammonia evolved from the bottle was non-fœtid, and, as an essential oil (very considerably heavier than ammonia), was employed to scent it: the combination proves that ammonia is really a scent or smell-carrier. If, instead of the salts bottle, the feather be held over hot stable litter, the same fumes will appear; but the ammonia in this case is *fœtid*, and is made so in consequence of its carrying with it a certain quantity of foul-smelling gas.

Sal-ammoniac is present in large quantity in the droppings of the camel, goat, and sheep. One hundred pounds of this salt contain 39lb of ammonia united to 61lb of acid.

The explanations given show the value of plants as consumers of ammonia; and as its presence greatly enhances the value of all manures, charcoal dust should be employed for the purpose of condensing it. One cubic inch of charcoal will take up 90 cubic inches of gaseous ammonia; and if we pulverize and add it to a compost, the imprisoned ammonia becomes available as plant food procurable in the soil.

PERENNIAL BULBS.

The Tulip, Hyacinth, Narcissus, Iris, Lily, Snowdrop, Jonquil, Crocus, and many others are included in this class, and as they grow to great perfection in the Himalayas, their culture may be entered on without any fear of disappointment. It is necessary, however, that the instructions given further on should be followed; an allowance being made for the difference in the seasons—Simla being fully six weeks ahead of England, and having a bracing, dry, cold climate, in place of an uncertain, damp, and foggy one at the periods indicated.

THE TULIP.

The Tulip is the pride of the garden, or at least stands pre-eminent in general estimation. Like most other bulbs, it is a native of the Levant, and was brought to its perfection in Holland, where Tulip-fancying was at one period a mania, and the bulb is still a large article of trade. The finest Tulip gardens are at Haarlem, which has a warm and saline climate, with a soil light and rich. Round the roots and over the beds sand is freely scattered, so that the Tulips seem as if growing from a sandy beach. In planting in this country (England), follow the same practice. Before planting, take off the brown outer rind. Plant in October or early in November, so that the plant will blossom in April. In forming a bed of Tulips, the bulbs should be set at a distance of seven inches apart, ~~in~~ in straight rows, taking care to mix the different colours. To raise from seed, to improve the varieties by crossing, are works of time, and not to be thought of in ordinary circumstances.

The following is Hogg's criterion of a fine variegated late Tulip :—"The stem should be strong, elastic, and erect, and about thirty inches above the surface of the bed. The flower should be large and composed of six petals; these should proceed a little horizontally at first, and then turn upwards, forming almost a perfect cup, with a round bottom rather widest at the top. The three exterior petals should be rather larger than the three interior ones, and broader at their base; all the petals should have perfectly entire edges, free from notch or serrature; the top of each should be broad and well rounded; the ground colour of the flower at the bottom of the cup should be clear white or yellow; and the various rich-coloured stripes, which are the principal ornament of the fine Tulip, should be regular, bold, and distinct on the margin, and terminate in fine broken points, elegantly feathered or pencilled. The centre of each leaf or petal should contain one or more bold blotches or stripes, intermixed with small portions of the original or breeder colour, abruptly broken into many irregular obtuse points. Some florists are of opinion that the central stripes or blotches do not contribute to the beauty and elegance of the Tulip unless confined to a narrow stripe exactly down the centre, and that they should be perfectly free from any remains of the original or breeder colour. It is certain that such appear very beautiful and delicate, especially when they have a regular narrow feathering at the edge; but the greatest connoisseurs in this flower unanimously agree that it denotes superior merit when the Tulip abounds with rich colouring, distributed in a distinct and regular manner throughout the flower, except in the bottom of the cup, which should be a clear bright white or yellow, free from stain or tinge, in order to constitute a perfect flower."

Tulip bulbs are preserved as follows, viz. :—If the bulbs are to be sent to a distance, twist each separately into a piece of paper; in this state, and kept dry, they will remain dormant, yet fresh and ready for planting, for several years.

THE HYACINTH.

The Hyacinth has a tapering bulb, shoots up long green leaves, and in the centre is a stalk on which the bloom in the form of bells grows all round, causing it to droop or bend. There are several varieties differing in colour, as blue, red, and white; but the blue is the most common. The Hyacinth is a favourite of the Dutch, by whom it has, like the Tulip, been brought to great perfection. The best kinds have double flowers with brilliant colours. A sandy soil and saline atmosphere, with a warm exposure, are favourable in developing these properties. In the British Islands, they will endure the winter in the ground, and are among the earliest blossoming plants of spring. In Holland, the bulbs are lifted and carefully stored during winter.

THE NARCISSUS.

Of the Narcissus there are many varieties, which include Daffodils, White Narcissus, Jonquils, and Polyanthus Narcissi. The chief difference is in colour and size of petals. Most have a lightish-yellow flower, with a deeper yellow cup. A fine Narcissus has tall and firm leaves, and from the centre springs the round tube-like stalk, on the top of which is the bright-yellow bloom, with petals spreading out like rays from a star. Some send up two flower-stalks, and the criterion of excellence is massiveness and distinctness of colour in the corolla. Of the Polyanthus species there are at least a

hundred sorts—sulphur-coloured, single and double, white, &c. Like Hyacinths, the bulbs may remain in the ground during winter.

THE IRIS.

Of the Iris there are various sorts, some low and others tall, but all of them beautiful from the delicacy of colour. The Persian Iris is low, with delicate blue and violet blossoms. Chalcedonian is taller, and distinguished by the great size and magnificence of its flower, which is purple-blue striped with white; the English is a still greater height, and has flowers double the size of the former. None requires much sun.

THE LILY.

The Lily is a plant equally tall with the larger Iris. There are many species, with different colours—white, orange, and carmine. The orange, speckled with dark dots, is the more common. This plant will grow and bloom with little sun, or under the shade of trees. The effect of the orange blossoms is pleasing among green plants, which require to be set off by a contrast.

THE CROCUS.

The Crocus and the Snowdrop are two small bulbous plants, so well known for their hardy growth that little need be said of them. Crocuses are very various in colour—blue, yellow, white, and so forth; and the principal thing in planting is to dispose these colours in a pleasing variety. When the bloom withers, remove it, but do not cut away the numerous small green leaves. Crocuses, like other bulbs, require occasional transplanting. This may be done in October.

TUBE ROSE.

The Tube Rose (*Polianthes tuberosa*) grows in the plains, and flowers well; but for size, vigour of growth, perfection of flowers, and richness of perfume, it can barely be compared to that raised in the hills. It sends up stems from five to seven feet in height, and these bear hyacinth-like clusters of pure white flowers, which diffuse an exquisite fragrance for a wide distance around. The double-flowering variety bears lovely clusters of flowers. Both may be propagated from seed and bulbs. If grown in suitable sized pots, rich garden soil should be used, and the manures prescribed for Roses should be freely applied as the flowering season approaches. When the bulbs are planted in the garden, a hole, nine inches deep and twelve in diameter, should be excavated, and filled up with the soil named; place two or three bulbs in the centre; water and manure as before. It is said that under some conditions of the atmosphere the flowers of this Lily have been seen to emit electric sparks.

It may interest some of our lady readers to know that if a stoneware jar be gradually filled with sessamun oil (Hindee, *til-ka-tael*) and Tube Rose flowers, the oil will take up their perfume, and when they are removed, the resulting richly-scented oil may be used for scenting any bland hair-oil, such as that of the olive, *sessamum*, palm, &c. The fresh or dried petals of Roses, if so treated, will also yield up their perfume to the oil. The hair-oil so prepared is of the very best description, and may be dyed crimson by adding 60 grains of pulverised *ul'net root* (Hindee name, *ruttun jote*) to a wine quart filled with oil. When sufficiently coloured, strain through aannel and preserve for use. Rowland's Macassar oil is *ti* oil, highly

scented, dyed red, and mixed with a small quantity of the grass root oil manufactured in the Island of Macassar. This grass-oil has a disagreeable smoky smell; but as its application causes human hair to grow very luxuriantly, this is not objected to: certainly it is much to be preferred to the *fresh* or *stale* pat* of butter of the Abyssinian Exquisite. As the island belongs to England, (lat. $5^{\circ} 9'$ S., long. $119^{\circ} 36'$ E.,) there would be no difficulty in obtaining one or more *wardian cases* of this really valuable grass, which in time might be made to grow in most gardens in the plains of India.

GLORIOSA.

GLORIOSA-SUPERBA.—This climbing plant grows wild in the Pinjore Valley and elsewhere in India. It is propagated both by seeds and planting its tuberous roots. It bears during the rains curiously formed flowers, the petals being long, narrow, inverted, and twisted; one-half deep crimson, and one-half primrose color, on first opening, but afterwards becoming altogether crimson. "The flowers borne in profusion, and mingled together in both these conditions, have a most beautiful effect."—(*Firminger.*)

We conclude this portion of our work by recommending the cultivation of the following choice bulbs, supplied by Carter, of London, viz.:—*Cyclamen persicum*, *Dielytra spectabilis*, *Gladiolus brenchleyensis*, *Scilla Siberica*, *Lilium speciosum*, and Double Daffodils.

* Mansfield Parkyns in his "Travels" states, "that a pat of butter, stale, —when fresh is not procurable,—is placed on the fuzed head of the Exquisite, and allowed to melt away gradually."

ORCHIDS.

The cultivation of Orchids demands the construction and aid of an Orchid-room or house. In a climate like that of England, a suitable glazed building, capable of being warmed or cooled at pleasure, is called the "Orchid-house." In a climate like that of Calcutta, almost all Indian Orchids, and most of the exotic ones, are grown with more or less success in *grass conservatories*, which means a structure of bamboo frame-work, the latticed portion of which (*i.e.*, the roof and side walls) is covered over with matting and long thatching grass, so arranged as to allow the solar light to pass through in a subdued degree.

The natives of India are great consumers of the green leaves of the Betel Pepper Vine (*Chavica betle*), sold under the name of *pawn*, which is also the name of the plant. The *pawnbaree* means a closed and shaded mat, grass, and bamboo structure within which the Betel Pepper Vine is grown, and as any *grammee* (or native bamboo splitter and thatcher) will run one up of the dimensions ordered, no further explanation is needed.

In the Himalayas, where the temperature in the open air varies, according to the season, from 32°F. in winter to 120°F. in summer, the Orchid grower has to use a glazed verandah during the hot and wet months, and places his entire collection of potted plants in-doors till the frosts are over. If warm sunny weather sets in, after a thaw the plants are put out in the sun, being taken in before 4 p.m.

As nearly all permanent residents pass their winter in the hills (Simla), we would recommend the instructions given by Mr. Carter to professional gardeners to be followed, as far as necessary.

When warmth in a plant-room is desired in the winter months, a large kettle filled with hot water should be placed in a brazier (*ungaethee*) well charged with fuel, and allowed to come to the boil, when the kettle cover should be removed, and the water allowed to evaporate as steam. Of course if the supply of water and charcoal be kept up, (and the doors kept locked,) the atmosphere within will be warm and moist; and with a little practice any desired degree of temperature may be maintained.

In a properly constructed closed brazier, 2.5 of charcoal will suffice for ten hours. Hence, if the fire be lit at 4 p.m., and fresh fuel and water be added at between 9 or 10 p.m., the plant-room will be kept warm all through the coldest part of the evening, night, and early morning, and the fire will have to be continued all day if the temperature outside is too cold. Care should be taken to place the brazier on a bed of well-beaten clay, one yard square and nine inches deep, so as to prevent the plank floor from heating and igniting. The bed and brazier should be placed in the centre of the room, all the plants (Geraniums included) being ranged on their stands round it in a neat and regular manner. The carbonic acid gas may be disposed of by placing some pans filled with *chunam* in the room.

In the hot and dry months the Orchids will need a mild, moist atmosphere, and this may be easily secured by teaching the servants how to use an *atmospheric odorator*, cold water being substituted for scent. By this simple means an ample supply of moisture may be kept up in any closed room in which plants are kept.

Orchids and several other plants require their leaves to be washed and kept clean and free of dust. To do this in a most simple and effectual manner, use a pair of small

hand-bellows to blow away the dust, and after that blow aqueous vapour upon them through an odorator.

Those who can afford it may purchase a vapourizer; but as blowing vapour is very good exercise for the lungs, and gives the plants the benefit of the exhaled carbonic acid gas, it should be preferred.

The Indian Orchids require somewhat of an Assam climate—warm and moist, but sheltered from the sun.

The others seem to require a mild, moist atmosphere, with sunlight, and regulated ventilation. The Orchid fancier will very soon hit off the best method to be followed; and as this plant requires a regulated temperature, a thermometer within the plant-room is indispensable.

The care bestowed on Orchid cultivation in England is very considerable, and as each month has its separate instructions, we give them in detail, only leaving out parts which are inapplicable to India.

MANAGEMENT OF THE ORCHID-HOUSE, FROM JANUARY TO DECEMBER.

(On Mr. Carter's system.)

JANUARY.—“As many of these (Orchids) will now be starting into growth, the temperature and the humidity of the atmosphere may be slightly increased, but not too rapidly, as many of the plants are still dormant, and must not be hastily excited; when growth commences, see to the necessary shifting and surfacing, as may be necessary, using the composts in a very rough state, with the addition of lumps of charcoal and sandstone. Rotten wood, taken from the centre of decayed boles of trees, is also useful for raised pots and boxes; but it should be soaked in boiling water, and then dried, before using, to prevent the spores of fungi vegetating.

FEBRUARY.—“ The principal care here will be to avoid all unnecessary excitement; a temperature ranging from 65°F. by day to 50°F. at night will be most suitable. Plants which are making growth, as advised last month, must have the best situations, where their wants can be duly attended to. Water them when they require it, and, if possible, keep the atmosphere moist about them: the floor and walls may be sprinkled twice a day to keep up a fresh agreeable atmosphere, but do not at present produce a moist atmosphere by evaporation from a heated surface, that will not be necessary with the artificial temperature indicated. Hunt up and destroy insects, especially thrip, bug, and scale; soap and water for washing, and gum and glue water, are good for shutting the insects from the air, and thus ensuring their destruction. When dipped in gum or *size* water, let the plants stand in a shady place for two days, then syringe and wash with water at 100°F.

MARCH.—“ Orchids now starting into growth, must have attention paid to the roots; such as are ready may be shifted; others will only require to be top-dressed with fresh lumps of peat. Blocks and baskets should be put in order, or renewed if necessary. Insects must be hunted out and extirpated. Shade during bright sun; damp the floors, stages, &c.; and slacken the fire, if the heating medium is hot, in preference to giving much air. A little given early, after the sun is well up, is the best plan.

APRIL.—“ As most of these plants will now be advancing rapidly, the temperature may be increased to 65°F. by night and 85°F. by day with solar heat; at the same time every means must be used to keep up a complete humidity in the atmosphere, both by the use of water on the shelves, and by evaporation. Be careful of syringing overhead until

the growth is more developed. Shading must now be resorted to on hot, bright, sunny days."

Remarks on the above.—In Simla, a temperature of 85°F. by day could only be secured by the steam process, and the humidity needed by the use of a *tattie* watered with hot water: the *tattie* might be made of rice straw (Hindee, *poo-aul*), and 2 feet by 3½ feet would be ample. The simplest plan would be to remove six panes of glass from a glass door, and to replace them with a *tattie* of corresponding size, which may be fastened to the cross bars. Of course, when a cool damp atmosphere is required, the *tattie* will, as usual, be wetted with cold water.

MAY.—"Many of these (Orchids) are now in great beauty, and amply repay any amount of care that may be bestowed upon them. Shading during bright sunshine will now be imperative. Persevere also in maintaining air moisture, particularly in the early part of the day, so that there may be time for all in excess to evaporate before night, in place of condensing on flower petals and discolouring them. Take down suspended baskets occasionally, and dip them (Orchids included) in water of the same temperature as the houses. *Dendrobiums* and others of the hardier sort may be placed in the conservatory for some time: do not water plants with bulbs approaching maturity.

JUNE.—"But little can be added to previous directions. The temperature must be regulated by external conditions. Shading must be applied during bright days, particularly after a series of dull cloudy days, as the plants are then much more susceptible of injury. Give water at the root freely to all plants in an active state of growth, but gradually withhold it from such as are approaching maturity; this will be the case with some of the *Dendrobiums*, and they

should be removed to a cooler place ; such as are placed in the conservatory for a short time will require less water.

JULY.—“ The same as June.

AUGUST.—“ Many of these (Orchids)—such as *Dendrobium* and *Epidendrum*—will have matured their growth, and must be removed to a cooler temperature and drier atmosphere, in order to induce a state of rest. Continue to dip the baskets, and more portable of the blocks, in tepid water every week, as formerly advised ; and use the syringe liberally to such as are not so easily moved, and indeed to growing plants generally, such as *Lælias*, *Huntleyas*, *Barkerias*, &c., which should be kept growing liberally by a high temperature and moist atmosphere ; but, at the same time, air liberally when possible, and keep the house well saturated with water.

SEPTEMBER.—“ The temperature of the Orchid-house should now be reduced a little, to inure the plants gradually to a lower temperature. Such as are past flower, and are going to rest, must be kept moderately dry, and in a cooler temperature ; but growing plants must still have a warm and moist temperature, and attention paid to watering, syringing, and dipping, as before described. Shading will not be necessary, unless on very bright days ; but air should be liberally supplied in fine weather, particularly to the dormant portion of the stock. Remove *Cypripedium insignis* and *Barbatum* to the conservatory, where they will bloom for a long time.

OCTOBER.—“ Growing plants (Orchids) generally will still require to be supplied with water, in quantities proportioned to their state of growth ; such as have attained maturity may be placed in the coolest situations, where they should have no water for some time : maintain a temperature

of 70°F. by day and 60°F. by night—not more, or else it may induce some which ought to be dormant to shoot out again.

NOVEMBER.—“The temperature in the Orchid-house must now be considerably lowered, and a drier atmosphere maintained, to induce that state of rest in the plants which is necessary, for the next two months at least. The temperature by day, without sun heat, should be kept at about 60°F.; with sun heat it may be allowed to rise to 70°F., but not more; night temperature 55°F. Blocks and baskets will not need to be dipped; but as they must not be allowed to get too dry, they may be slightly syringed once a week, provided the syringing does not light on other things that will be better by having their foliage and *pseudo*-bulbs dry.”

Remarks on the above.—In Simla the higher temperature cannot be secured in November without artificial heat, which will have to be kept up at night.

DECEMBER.—“As most of these (Orchids) should still be in a dormant state, the operations connected with them will not differ much from the former routine; a few, however, will no doubt be showing signs of renewed activity, and this must not be checked: let such plants have the warmest situations, and gradually increase the quantity of water. Use every exertion to destroy insects; it will save much trouble and vexation by-and-by. Cockroaches are very destructive, and should be exterminated. These and crickets—equally destructive when they are numerous—may often be induced to partake of their bread-and-butter, the butter sprinkled with arsenic, and two pieces folded together with the butter and the arsenic between, like a sandwich; this should be placed in holes where nothing else can get at it.”

Remarks on the above.—In India never use poisons, and especially arsenic. The cockroach is passionately fond of

oil (hence its name *tael-chutta*, "licker-up of oil"), and if a pan of oil be placed in the room infested by them, they will come to it, drink their fill, and generally drown themselves in it. In Simla, an economical mother, to save the price of a rat-trap, placed some arsenic in a saucer, and put it in the cupboard, for the rats to eat. The servant thinking it was sugar, put the saucer on the tea tray; two children found it there, and divided the contents between them. When the mother came home, she found one child dead and the other on its death-bed. The mere fact of poison being about, might induce the mild Hindoo, when in the sulks, to put it in a child's way; therefore keep poison out of the house. The crickets, or *jheengoor* of India, will come to the oil; and rats may be easily got rid of by feeding them in some quiet corner, where they may be trapped at leisure.

As constant reference has been made to the shading of plants, we give a *recipe* for making water-proof oil-cloth, which may be nailed on to frames, and will keep out the sun most effectually. A few of these oil-cloths might have $\frac{3}{4}$ -inch holes punched through them at regular intervals. A circular piece of talc should next be fastened over each orifice with litharge soap, and an annular piece of oil-cloth of suitable size should be placed over the talc, which will be kept in its place, allowing light to pass through, whilst the rain would be kept out. By this means expensive glass frames are dispensed with, and all their advantages secured.

TO MAKE OIL-CLOTH COMPOSITION.

Boil well together 2lb of turpentine, 1lb of litharge (Hindee, *ro rda-sung*) in powder, and 2lb or 3lb of linseed oil (Hindee, *u. ee-ka-tael*), and apply with a painter's brush to

American drill previously stretched on bamboos or other framework. A second coating may be needed. Let the oiled cloth dry in the sun, after which it is ready for use. The greatest sun heat will not affect the oil-cloth so prepared, and it may be used for making up water-proof clothing. In this case the stitching will have to be run over with some of the composition applied hot. Any chemist will supply the "lead plaster;" I therefore do not give the formula for making it up.

The Orchid-house being prepared, and all items connected with this branch of Floriculture being ready for use, we will proceed with a list of Orchids, which may be grown in the hills, and those parts of India where the *pawn* is freely cultivated.

Some of the most beautiful Orchids are natives of the Assam Hills, and have been successfully cultivated in and near Calcutta.

The following are brought to notice in the Revd. Mr. Firminger's work on Gardening:—

Dendrobium.

1. *D. AGGREGATUM*.—A lovely plant, with large flowers of a deep orange which grow in large compact clusters.

2. *D. FORMOSUM*.—A magnificent Orchid, with very large sweet-scented white flowers.

3. *D. PIERARDII*.—A most beautiful Orchid; flowers large, French-white, borne in drooping festoons of blossom several feet long. In Calcutta it succeeds admirably, grown on the bough of a tree.

4. *D. CHRYSANTHUM*.—Bears fine large trusses of orange-coloured flowers.

5. *D. DEVONIANUM*.—Produces flowers of great delicacy and beauty, having a large frilled white lip tipped with

crimson, and with two kidney-formed orange spots in the centre.

6. *D. FIMBRIATUM OCULATUM*.—A splendid plant, producing large, handsome trusses of bloom; flowers apricot-yellow, two inches across, with a kidney-formed blood-coloured spot on the base of the lip.

7. *D. JENKINSII*.—A pretty compact little Orchid; bears a pretty cluster of apricot-coloured flowers.

8. *D. NOBILE*.—A lovely plant when in full blossom; flowers two inches across. Color white, tinged with violet, with two club-formed deep-purple spots on the base of the lip.

9. *D. DALHOUSIANUM*.—Flowers in racemes, four inches across. Color creamy yellow, tinged with rose; lip yellow at the base, marked with a pair of large crimson spots.

10. *D. CALCEOLARIA*.—A hardy Orchid, similar in habit and character to the above.

Others less known in Calcutta collections are: *D. Amœnum*; *D. angulatum*; *D. cœrulescens*; *D. Chrysostoxum*; *D. densiflorum*; *D. Farmeri*; *D. Falconeri*; *D. Gibsoni*; *D. Griffithii*; *D. moschatum*; *D. multicaule*; *D. secundum*; *D. Paxtoni*; *D. speciosum*; *D. transparens*; *D. Wallichii*.

Cœlogyne.

A genus of Orchids entirely Eastern, and most are natives of the hills of India, besides the following well-known in Calcutta:—1. *C. media*; 2. *C. rigida*; 3. *C. nitida*; 4. *C. undulata*; 5. *C. cristata*; 6. *C. odoratissima*, which is unsurpassed for its fragrance. These two last are accounted the most beautiful of all of their kind.

SOUTH AMERICAN ORCHIDS.

Epidendrum.

Those most distinguished for the size and beauty of their flowers are :—*E. nemorale* ; *E. Skinneri* ; *E. vitellinum* ; and *E. prismaticarpum*. Firminger says these have not yet been introduced into India, but the following have, viz. :—*E. falcatum* ; *E. polyanthum* ; *E. macrophyllum* ; *E. cochleatum* ; *E. crassifolium* ; and *E. ciliare*, which bears white spider-like blossoms, two of the petals with pretty eyelash-like fringe.

Loelia.

A South American genus, containing some of the most superb of the Orchids. *L. anceps* ; *L. majalis* ; *L. purpurata* ; *L. superbiens*, accounted amongst the finest. These have been introduced into Calcutta; success unknown.

Cattleya.

A genus closely allied to the above; they belong to Central America and the Brazils. Some have flowers as much as seven inches across from tip to tip of the petals. The finest of all is *C. Warezewiczii*; the next *C. Mossiæ*; *C. labiata* ; *C. crispa* ; *C. Skinneri*. The four last have been introduced into Calcutta.

Brassavola.

A genus of Orchids of tropical America, remarkable for the fragrance of their flowers, with long-tailed petals. *B. cucullata* is met with in Calcutta.

Phaius.

A genus of terrestrial Orchids, natives of the East, of which 1. *P. maculatus*, with yellow flowers; and 2. *P. Wallichii*, with dull-orange or tawny flowers, are well known in

Calcutta ; as well as 3. *P. albus*, with white flowers, considered the most beautiful of all.

Arundina.

A. BAMBUSIFOLIA.—A terrestrial Orchid c. Nepal, nearly allied to *Bletia*. In Calcutta, bears thin purple flowers in September.

Bletia.

1. *B. HYACINTHUS*.—A terrestrial Orchid of China ; displays its bright pink flowers in abundance in February and March.

2. *B. VERECUNDA*.—A terrestrial Orchid of the West Indies ; grows in Calcutta, and flowers in September. The flowers are in full beauty for more than two months. It ripens abundance of seed during the cold season.

Spathoglottis.

S. FORTUNI.—A terrestrial Orchid of Hong-Kong ; bears yellow flowers.

Cyrtopera.

C. FLAVA.—An Indian terrestrial Orchid ; bears large yellow golden flowers, very beautiful upon their large-spike ; grows in the ground of the common border, where its spike of blossom springs up in May, before any of the leaves appear.

Vanda.

1. *V. GIGANTEA*.—A noble Orchid ; flowers large, thick-petalled, expanded, and somewhat resembling buffish-yellow butterflies. upon their fine, large, deep-green, handsome foliage.

2. *V. JENKINSII*.

3. *V. ROXBURGHII*.—Grows on Mango-trees in Bengal ; flowers above checkered with yellow and dusky ferruginous-purple, beneath white.

4. *V. TERRES*.—Native of Khâssya ; bears very handsome large flowers of a fine yellow color, the lip being white.

form of a monk's cowl, and large enough to hold a walnut; its color deep pink, with dark bars, tied on by two broad ribbons below the chin.

5. *V. CÆRULEA*.—Flowers borne in splendid racemes about a foot long, and ten or twelve on each raceme; having the general form of a star four inches across, with five wavy pear-outlined rays, beautifully mottled by the reticulations being of a deep violet-blue upon a paler ground of the same colour; the base of the lip small, deep-purple, projecting from the centre of the flower. This is one of the loveliest and most valued of the Assam Orchids.

6. *V. CATHCARTI*.—Flowers very large, rose-coloured externally, petals yellow internally, densely striped with transparent lines of deep-orange red. It has flowered in Calcutta.

7. *V. CRISTATA*.—An Assam Orchid of small size; bears curious greenish-white flowers, which somewhat resemble a *little bird* striped with crimson sitting in its nest.

Renanthera.

1. *R. COCCINEA* (Chinese Air Plant).—It thrives vigorously in Calcutta, and blossoms to perfection when bound to a large upright log by moss fastened with copper wire, and exposed throughout the year to the full power of the sun. Bears flowers with narrow bright coral-red petals of spider-like form, during the hot season, in immense profusion, and in long succession upon their antler-like flower-stems.

2. *R. ARACHNITES*.—Called also *Arachnis moschifera*. It bears sprays of about twelve flowers, much like huge spiders, five inches across, of a lemon colour with great purple spot. They emit a delicate scent of musk. It is considered one of the most remarkable of all the Orchids, and requires full exposure to the sun.

Phalænopsis.

1. *P. AMABILIS* (Queen of the Orchids—Indian Butterfly Plant).—The flowers are very large, milk-white, resembling a butterfly with expanded wings. They last unimpaired for several weeks. This most choice and magnificent plant is always grown fastened with moss and copper wire upon a log. It may be easily propagated by binding a piece of moss round one of the joints of the flowering stalk, which will emit roots, and may then be removed and attached in the usual way to another log. This Orchid is a native of Amboyna.

2. *P. GRANDIFLORA*.—A native of Java.

3. *P. SCHILLERIANA*.—A very beautiful plant. Flowers fragrant, pinkish-mauve, with dark-purple spots upon the lip. Its roots are flat and frosted, and its leaves are marked with transverse bands and blotches of white.

4. <i>P. ROSEA</i> .	} These are recent introductions, and no account is given of their flowers.
5. <i>P. LOWII</i> .	
6. <i>P. PARISHII</i>	

Saccolabium.

1. *S. GUTTATUM*.—An old-established Calcutta plant; bears small white flowers spotted with rose.

2. <i>S. MICRANTHUM</i> .	} Undescribed.
3. <i>S. MINIATUM</i> .	
4. <i>S. AMPULLACEUM</i> .	

Aerides.

1. *A. AFFINE*.—A native of Assam; bears rose-coloured flowers.

2. *A. ODORATUM*.—An Assam Orchid; bears pretty trusses of bloom with small white flowers tinted and spotted with

pink, having the form of a curved horn, and diffusing an exquisite lemon-like fragrance. Both grow in Calcutta.

3. *A. LOBBII*.

4. *A. FIELDINGII*.

5. *A. QUINQUEVULNERUM*.

} Not described.

6. *A. LINDLEYANUM*.—Spoken of as perfection by Mr. Grote.

Angræcum.

1. *A. RICHARDIANUM*.—Flowers large and white.

2. *A. SUPERBUM*.—Not described.

Cymbidium.

1. *C. ALOIFOLIUM* (Indian).—Flowers dull-purple, and russet; grows well, left to itself, on the limb of a tree.

2. *C. GIGANTEUM*.—Bears very large brown tessellated flowers.

3. *C. MASTERSII*.—White fragrant flowers and rush-like leaves.

4. *C. EBURNEUM*.—Very large ivory-white flowers, smelling like Lilac.

5. *C. ELEGANS*.—Bears massive pendulous spikes of yellowish flowers.

Oncidium.

These Orchids are confined to tropical America. The few known in Calcutta are:—

1. *O. AMPLIATUM*.

2. *O. LURIDUM*.

3. *O. CRISPUM*.

4. *O. BICALLOSUM*.

5. *O. LANCEANUM*.—Accounted the most beautiful of all.

6. *O. F. PILIO*.—The famous Butterfly Plant.

The four last have been grown near Calcutta.

Calanthe.

C. VESTITA.—A terrestrial Orchid, from Moulmein; throws up trusses of flowers of great beauty in the cold season.

Limatodes.

L. ROSEA.—A terrestrial Orchid; very chaste and beautiful when in the cold season it sends up its spikes of large milk-white flowers.

Vanilla.

These Orchids are very ornamental, and are said to do best when potted in moss, the pots being well drained with potsherds, with a trellis for the plants to be trained upon. They should be fastened on to their logs with a little moss or cocoa-nut fibre. Thus cultivated, beautiful flowering specimens have been exhibited at the Calcutta shows. They are easily propagated by cuttings of the stem taken off at a joint. The following are grown in Calcutta :—

1. *V. ALBIDA.*
2. *V. AROMATICA.*
3. *V. GRANDIFLORA.*
4. *V. OVALIFOLIA.*
5. *V. PLANIFOLIA*, which emits a delicious fragrance at night.

Anæctochilus.

A. SETACEUS.—Comes from Ceylon, where it is called the *King of the Woods*. Its leaves are the most beautiful of all the leaves in the world. The ground colour is of a dark velvety-green, tinged with a metallic lustre, curiously inlaid, as it were, with streaks of golden network. If examined with a moderate microscope when the sun is shining, this golden-network is really glorious, having the

appearance of the richest rubies. But no description can do justice to the beauty of the leaves of this plant. •

It is a terrestrial Orchid, and is always grown in a pot under a bell-glass, and in Calcutta is considered a very rare and choice plant.

Cypripedium (Lady's Slipper).

A genus of most interesting terrestrial Orchids, which have been successfully cultivated in glass conservatories, thriving well and blossoming beautifully in the cold season at Calcutta.

The following are those commonly met with, viz. :—

1. *C. PURPURATUM*.—No description given.
2. *C. VENUSTUM*.—Native of Nepal and the Khâssya Hills; a small very handsome plant, with the underside of its leaves prettily tessellated with purplish-black; produces curious large white and russet-green flowers, spotted and striped with purple.
3. *C. INSIGNE*.—Native of Nepal, somewhat similar to the above; flowers large, pale, tawny-green, with spotted lid.
4. *C. CONCOLOR*.—Native of Darjeeling; a very beautiful plant, with strap-shaped, smooth, polished-green leaves, mottled with whitish markings; bears large handsome primrose-coloured flowers.

In closing this section on Orchids, it is necessary to observe that all those which flower in and about Calcutta will require artificial heat to make them do so in the Himalayas, whilst in the North-Western Provinces and Punjab the mat Orchid-house or room will require special arrangements to be made for creating an *artificial Assam climate*. We would suggest a roof made on the principle of a *khus-khus lattice*,

the *Moonj* grass being used in place of the other. Panes of glass might be fixed in suitable positions, as is done with the *khus tattie*; and the side walls might be made of common *date* or other matting, which, if besmeared with a mixture or paste made with fresh cowdung and sifted *chunam*, would keep out the dust and a good deal of the hot winds. If necessary, each Orchid could be protected from dripping moisture by a piece of oil-cloth being suspended over it. In conclusion, we trust that, with the information given, the Orchid fancier will be enabled to cultivate the rarest with success.

THE FRUIT GARDEN.

As the choice fruits of England and Europe can only be successfully raised in the Himalayas, and other mountain regions having a suitable altitude and climate, we have resolved to treat, in the first instance, of European fruits, and next, of such of the fruits of India as are worth cultivating and are capable of improvement; and we have made it a point to exclude all others.

The fruits produced in ordinary gardens in the United Kingdom and the Himalayas, including Cashmere, are of three leading kinds:—*Kernel fruits*, of which the Apple and Pear are the principal; *Stone fruits*, including the Peach, Apricot, Plum, and Cherry; and *Berries*, of which there are many species, as the Strawberry, Raspberry, Currant, and Gooseberry. The kernel and stone fruits are produced from trees, the others from shrubs, or from herbaceous plants. The imported Raspberry and Currant have grown well in the hills, though, for some unknown reason, the cultivation of the Gooseberry has not been attended with success at Simla.

In the hills, fruit trees are planted wherever a suitable plot of ground can be made available, and as the soil above the limestone formation is generally very poor in lime, sour fruits are the natural result; but where the trees are grown in and below the limestone *strata*, sweet fruits are the rule, the watery and sour the exception. Hence it follows, that if superior fruits be desired in a *non-calcareous* soil,

lime and its phosphate must be freely employed to produce them. We all know that sugar is a compound of carbon and water, and as this substance is most abundantly present in the Sugarcane, and also in the Grape, it may interest the reader to know that in the West Indies the heaviest sugar crops are obtained from *calcareous* lands; whilst in Spain the most luscious Grapes are obtained exclusively from such soils, and the sourest of Grapes from sandy or silicious soils. The celebrated Grapes of Palestine, in most ancient times, were produced on lands rich in lime, and watered by springs and streams in which it was fully present.

Limestone, as it exists in nature, is a compound of *calcium*, or lime united to carbonic acid, which, in its turn, is a compound of carbon and oxygen gas. The roots of fruit trees and the Grape Vine possess the power of dissolving the carbonate of lime, and the carbonic acid thus taken up into their circulation is, in due time, converted into sugar, and as such is deposited in the pulp and juice of all sweet fruits.

To show the important part played by carbon in the vegetable economy, we give below a table, and some interesting information, which will be found of much use by the practical gardener:—

36lb	carbon	and	45lb	water	form	81lb	of	woody	or	cellular	
								fibre,	or	of	dry starch or gum.
36lb	„	„	49½lb	„	form	85½lb	of	loaf	or	cane	
								sugar	or	sugar-candy,	and of
								milk		sugar.	
36lb	„	„	64lb	„	form	100lb	of	fruit,	raisin,	or	
								honey		sugar.	
36lb	„	„	27lb	„	form	63lb	of	humic	acid		

(Professor Johnston.)

An inspection of this table shows that whilst the carbon is a constant or fixed quantity, the water is not. The woody fibre, by being deprived of a portion of its water, is in time converted into humic acid, and in the hands of the chemist the starch can be converted into a sweet substance. In like manner sugar-candy can be changed into grape-sugar. But the art of converting fruit or raisin-sugar into cane-sugar and candy, has yet to be discovered.

The limestone, which yields calcined lime when perfectly pure, contains 28lb of lime united to 22lb of carbonic acid, and forms 50lb of limestone; and if the stone be inferior, the proportion of lime is less, and its value corresponds. Chemists are at present unable to explain why the carbonic acid (and carbon) derived from lime should possess higher sweetening powers than carbon derived from *humus* and manure. The fact, however, is undoubted; and were it but known to the Chinese, the numerous insipid fruits of that region would very soon be changed into luscious ones. The Bombay Mangoes of Saharunpore are not now what they were twenty years ago, and the change is due to want of lime.

The carbonic acid gas, wherever it exists, is formed by the union of 6lb of carbon with 16lb of oxygen, the result being 22lb of carbonic acid. It will be seen that 50lb of limestone contains 22lb of carbonic acid, and hence it follows that for every 50lb of pure lime present in any fertile soil there must be 22lb of this gas present with it; and as it is genuine plant food, we know the reason why sandy soils produce sour fruits.

The atmosphere contains carbonic acid gas, there being 2 gallons of it present in 5,000 gallons of air; and chemists tell us that 100 cubical inches of the gas weigh exactly

47·26 grains. The growing or mature fruit tree feeds on the carbonic acid of the atmosphere through its leaves, and the roots take it up from substances containing it and present in the soil. Of the quantity absorbed, a portion forms wood and cellular fibre, another portion forms the pulp and grape-sugar of the fruit, and the part which is in excess of the wants of the tree or plant, is exhaled by the leaves, and carried by the air to other localities.

The substance called humic acid is present in all fertile soils and in farmyard manure, and is formed in the soil by the substances indicated losing or parting with a portion of their water. This acid acts in two ways : it feeds the plant, and it helps to prepare and carry other kinds of food into its roots. After lime and humic acid, charcoal is a great supplier of carbonic acid, for one cubic inch of it will absorb 35 cubic inches of this gas; and being indestructible, it is ever ready to do its duty to the atmosphere and plant, absorbing it from the former, and surrendering its accumulations to the roots and rootlets of the latter, as needed.

Indian *mallees* are ready to ask for *goor* or coarse sugar as a manure. Now, as the quantity of carbon in sugar and soft-wooded decaying stalks of plants is exactly the same, the *mallee* may at leisure eat the sweets, and feed the plant with well-decayed stalks rich in humic acid and its component, carbon.

We have explained in our essays on "Agriculture" (published in the Supplement to the *Indian Economist*) the important part played by iron in the soil, and as its sulphate in aqueous solution produces high-flavoured, juicy, melting pulps in fruit, we are enabled, at our pleasure, to make the hard Pear or dry Peach sweet and succulent, whilst the sour or inferior Vine, duly supplied with iron and the phosphates, is made

to yield an abundance of luscious fruit. It is a very remarkable fact that iron in combination with lime (red marl) produces Grapes which yield a wine of great body. Such wines are called "noble," and their value does not depend on the quantity of their contained alcohol, but on the percentage of their solid residue, which includes all mineral matters. Thus, the highest priced Steinberger contains 10·87 per cent. of alcohol and 10·55 per cent. of solid residue, whilst the lowest priced Geisenheimer gave 12·6 per cent. of alcohol and only 3·06 per cent. of residue. The day is not far distant when Europeans of standing and wealth will settle in the Himalayas; and as Grape-farming is a safe and profitable undertaking, the information now given will be of value. It is not generally known that at Cheenee, in Kunawur (Busahir), there are seventeen distinct kinds of Grape, all of which ripen in the autumn, and consequently have only to be properly planted, pruned, and cared for, to yield productive harvests and superior wines and brandies at discretion.

The Vines, Apricots, Black and Red Currants of Cheenee, all grow in the limestone formation; and as disintegrating limestones are very common in the hills, the cultivation of choice European fruits resolves itself into a mere question of time, skill, and money.

In the Almorah Hills, a well-known tea-planter has for years grown various imported fruits to perfection; so there is little chance of failure if his practical example be properly and judiciously followed.

GENERAL MANAGEMENT OF FRUIT-TREES.

The proprietor of the estate or land having fixed on the spots to be planted with fruit-trees, should bear in mind that in whatever manner the tree is planted or designed to grow, the tendency of the main stem and branches of the plant is upwards into the atmosphere, and of the chief roots downwards into the soil. In general, the depth and spreading of the roots are proportional to the height and spreading of the branches, because the roots are the anchorage and food-seekers of the plant, and require a depth and compass of soil corresponding to the bulk of the tree and its demands for nourishment.

On these accounts it is of the first importance not to stint fruit-trees of a depth and breadth of good sound mould adapted to their expected dimensions. The principle is, the deeper the soil the less will the roots straggle. As already stated, their tendency is chiefly downwards, and it is only because they cannot get far enough down that they range abroad. Their object is to absorb nourishment, wherever it can be obtained; and, abstractly considered, it is of little consequence whether this nourishment be procured beneath the main stem, or at ten yards' distance: but as straggling roots interfere with the growth of other things, measures should be taken to keep them within bounds. To do this effectually, each tree should have not less than three feet in depth of good soil to grow in. The prepared soil is to be enriched with old manure, as new and undecomposed manure is injurious to fruit-trees. Some persons place a paving stone at a certain depth beneath to prevent the root of the tree from penetrating into the subsoil, but this is only waste of labor, for, if the descent be counteracted, the roots will proceed

laterally and penetrate downwards as soon as they can conveniently do so. By giving a proper depth of soil, and keeping that soil in heart, no fear need be entertained for the tree receiving that injury from the subsoil which it was the object of the paving stone to prevent.

When we say that depth of soil is advantageous, it is necessary to guard against an impression being formed that deep planting is also required. In general, the roots of trees should be placed near the surface. Deep planting is an evil much to be guarded against; and many of the disappointments which have attended the fruit-grower may be traced to this cause. On this subject Mr. McIntosh (the author of "The Orchard") observes:—"As some criterion for the guidance of the amateur, we would say, let every young fruit-tree, of whatever kind, be planted at least three inches above the ground level; that is to say, let the part of the stem which was level with the surface while in the nursery, be kept three inches above the general surface of the ground when it is planted, and let the earth be heaped up to that height around it for a couple of feet or so, in a form of a little hillock. Trees of a larger size may be rather more elevated. This applies to ordinary soils; but in damp soils the elevation should be still greater. When trees are set (planted) in a pit—which should always be a third larger in diameter than that of the extent of the roots, so that they may all spread out to their full extent without being doubled or turned round—they should be spread as regularly as possible, and the bottom should be made perfectly level. By this means the roots will have a horizontal direction given to them, which they will afterwards maintain. The intention of this arrangement is to induce them to extend themselves near the surface, and to prevent the roots extending downwards in a bad or cold subsoil."

PROPAGATION AND IMPREGNATION.

Fruit-trees may be propagated by seeds, layers, cuttings, budding, suckers, or grafting. By any of these methods a main object of the culturist is to improve, or at least not to deteriorate, the quality of the plant. In a state of nature, all fruits are inferior to what they will become by cultivation. The principal means employed to attain superiority is, to select such varieties as have arrived at a certain degree of perfection, and then crossing two of the most nearly allied, in order to produce an intermediate variety. The discovery of the sexuality of plants has rendered this a comparatively simple operation to skilled gardeners. Mr. Knight, the eminent Pomologist, obtained thousands of Apple-trees from seeds—many of which are of first-rate quality—by cutting out the stamens of the blossoms to be impregnated before their own *pollen* was ripe enough for the purpose, and afterwards, when the stigma was mature, by introducing the pollen of the other parent, either by shaking the pollen of it over the flower containing the stigma only, by introducing the flower when deprived of its petals, or by transferring the pollen upon the point of a camel-hair brush or pencil, from one flower to the other. By these means Mr. Knight prevented the possibility of the natural fecundation of the blossom within itself, and thus greatly increased the chances of obtaining intermediate varieties by making use of two distinct parents.

The *female* part of the blossom is called the *stigma*, and the *pollen* or yellow dust is the *male* part; and when two distinct parents are used to produce fecundation, the process is called “cross-impregnation,” and is in its nature highly curious. If the operation has been successful, the new variety will take chiefly after its polleniferous or male parent, and that at the

same time it will acquire some of the constitutional peculiarities of its mother. We are told by modern Phytologists that "the character of the female parent predominates in the flowers and organs of fructification of the hybrid; while the foliage and general constitution are those of the male parent."

As regards Apples, it is stated that "the numerous varieties of Pippins raised by Mr. Knight and others, have been obtained by the above rule." It is no doubt true that a small Apple—say, for example, the Golden Pippin—crossed with a much larger sort, will produce a variety sufficiently distinct from the other; but it is almost equally certain that this new variety will be of inferior quality to either; "the qualities of both parents," as Mr. Loudon has very justly observed, "of so very opposite natures being, as it were, jumbled together in the offspring." To avoid such mistakes, it should be remembered that "it would be proper to cross the Golden Pippin with other Pippins, and even with some Rennets; but it would be improper to cross it with Codlings or the larger growing kinds."

Good Apples from England and Cashmere have been introduced into Simla and have borne well; but most of the gardens are stocked with the ordinary inferior Apple-tree met with in Upper India, which seems incapable of improvement, though, from its hardy nature and vigorous growth, it would answer well for grafting purposes.

-We consider it would be time and money thrown away in attempting to grow superior Apples in the plains of India; and with this expression of our opinion we proceed to the next section of our work, which treats on the subject of "Grafting, and its theory."

GRAFTING—ITS THEORY.

Grafting, which is a practice of great antiquity, is the union of two plants in a growing state through the medium of the circulating juices. It is now a well-known fact in surgery, that if a piece of a finger, which has been accidentally chopped off, be immediately applied to the stump whence it was severed, and the wound properly bandaged, it will adhere and become part of the living member as formerly. This, then, is grafting in the animal economy, and it is analogous to the grafting of one vegetable on another; the only dissimilarity is, that the piece of finger is restored to its own stump, whereas the vegetable union is between parts of two distinct trees. But this is a point of no consequence; for it is probable that if two persons, in equally good health, were to have a finger chopped off at the same time, the pieces might respectively be changed, and each individual might have on his hand part of the finger of his neighbour.

Gardeners assign five reasons for grafting :—1. The perpetuation of varieties of fruit, which could not be insured by sowing seed; 2. Increasing, with considerable rapidity, the number of trees of any desired sort; 3. Accelerating the fructification of trees which are tardy in producing their fruit; 4. Improving the qualities of fruits; 5. Changing the sorts of fruit of one tree and renewing its productiveness. When a tree becomes old, but has still healthy and vigorous roots, and it is thought advisable to renew or improve its fruitful qualities, it is cut off across the lower part of the stem, and forms the stock on which *scions* are ingrafted, which scions taking root, become in time the fruit-bearing branches of the tree. As a general principle, the sort to be united require to be considerably alike as respects disposition

of woody fibre and sap and pulp vessels, so that no decided interruption may take place in the ascent or descent of the juices : yet to effect any improvement in fructification, there must be a certain difference between the varieties. For example, the wild Apple-tree, which bears only Crabs too sour to be eaten, forms one of the best stocks on which a graft can be made ; and for that reason alone it is grown by nursery-men from seeds.

The notice of this remarkable fact leads to a consideration of what are the radical principles on which improvement is effected by grafting. On this intricate subject we subjoin the scientific explanations of Dr. Lindley :—

“ In proportion as the scion and stock approach each other closely in constitution, the less effect is produced by the latter ; and, on the contrary, in proportion to the constitutional difference between the stock and the scion, is the effect of the former important. Thus, when Pears are grafted or budded on the wild species, Apples upon Crabs, Plums upon Plums, and Peaches upon Peaches or Almonds, the scion is, in regard to fertility, exactly in the same state as if it had not been grafted at all ; while, on the other hand, a great increase of fertility is the result of grafting Pears upon Quinces, Peaches upon Plums, Apples upon White Thorn, and the like. In these latter cases the food absorbed from the earth by the root of the stock is communicated slowly and unwillingly to the scion ; under no circumstance is the communication between the one and the other as free and perfect as if their natures had been more nearly the same ; the sap is impeded in its ascent, and the proper juices are impeded in their descent, whence arises that accumulation of secretion which is sure to be attended with increased fertility. No other influence than this can be exercised by the scion upon

the stock. Those who fancy that the contrary takes place—that the Quince, for instance, communicates some portion of its austerity to the Pear—can scarcely have considered the question physiologically, or they would have seen that the whole of the food communicated from the alburnum of the Quince to that of the Pear is in nearly the same state as it was when it entered the roots of the former. Whatever elaboration it undergoes must necessarily take place in the foliage of the Pear, where, far from the influence of the Quince, secretions natural to the variety go on with no more interruption than if the Quince formed no part of the system of the individual.”

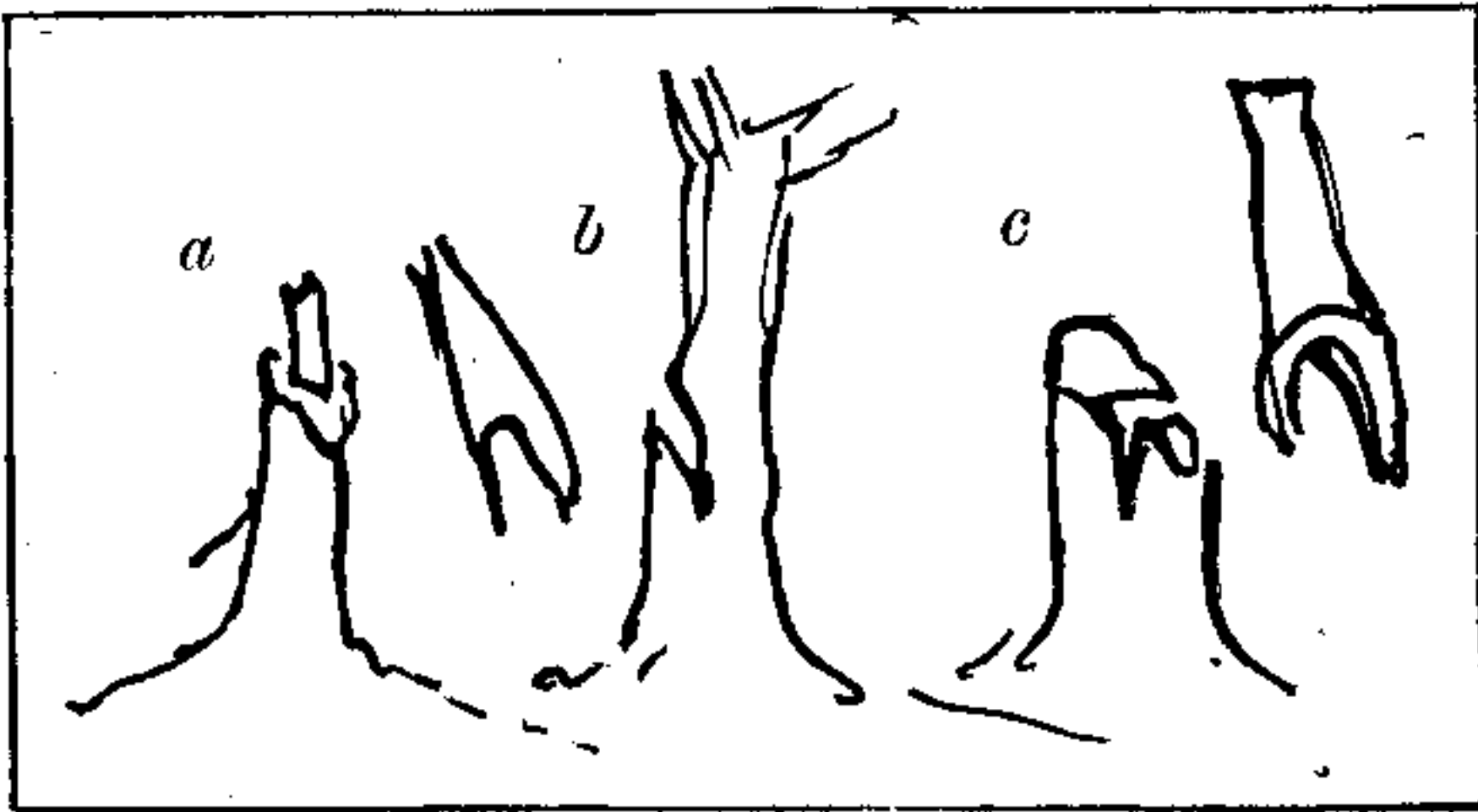
Referring the reader to Vegetable Physiology for an account of the functions of the ascending and descending sap, we need only remark that although increased fertility is produced by a decided difference between stock and scion, it is at the expense of durability; and that the practice is eligible only where it is wished to diminish the vigour and growth of the tree, and where its durability is not thought important.

All things considered, therefore, it is preferable to ingraft the scion of any approved variety on a sound stock properly prepared for the purpose. As already observed, Crab stocks are often grown to form the foundation of good Apple-trees, and so are several other stocks propagated by professional gardeners from seeds and layers. We may now describe the different modes in which grafting is performed.

SCION-GRAFTING—BUDDING.

Grafting is performed in two principal ways—scion or slip-grafting, and grafting by approach or inarching. Of the first kind we have examples in the following figure.

Three modes are shown—*a*, *b*, and *c*—in each of which the process consists in placing a scion in an opening or cleft of a growing stock: *a* is called whip-grafting, *b* side-



grafting, and *c* tongue-grafting. By either method the scion may be a shoot of a single year's growth, cut from a tree in a healthy condition. The season for the operation is about the middle of March, when the sap is rising and the buds beginning to be developed. The grafting should not take place immediately on cutting the scion. After removal from its parent stem, place it in the ground for a few days, so that it may be partially exhausted of its juices, and be more ready to receive the ascending sap from the stock: keep it in dry ground, and not exposed to the sun. A scion may be brought from a distance by being stuck in a raw Potato. Before applying to the stocks, cut the extremity of the scion afresh.

Tongue-grafting—by which a tongue or slice raised in the sloping cut of the scion is inserted in a corresponding notch of the stock—is the more common method of procedure. It is performed when the stock is young, so that the scion,

which is added, forms the stem of the future tree. The cut in both pieces requires to be smooth, and the joining so neat that the bark on one side of the scion must be even with the bark of the stock. Having joined the two pieces, bandage them together with a flat strip of mat, but not so tightly as to prevent the circulation or expansion of the fibre. Over the bandage, plaster all round a handful of soft adhesive material, formed of clay, cowdung, and chopped straw, taking care not to disturb the united edges. This mass will form a hardened lump, and may remain till the end of summer, when, the union being complete, it may be removed.

The principle upon which the external plaster is applied to the junction is that of excluding the atmosphere from the wound, and is thus scientifically explained by Rennie:—"It is to prevent the oxygen of the atmosphere from getting to the fluid pulp at the joining, where it would unite with the carbon and form carbonic acid gas, and thereby rob the pulp of its solidity. The exclusion of light is necessary on the same account; for, as in the case of a finger cut, the oxygen would unite with the carbon and prevent the thickening of the matter of the blood. On the same account, moisture, by supplying oxygen, would be injurious; and dryness might act both by exhausting the pulp, and by causing the edges of the bark to shrivel and gape, which would facilitate the entrance of the air with its oxygen. It must be obvious from the simple principle (never, so far as I am aware, before stated with reference to grafting), that no composition, whatever may be said of its peculiar power of healing, can act in any other way than this, any more than the farrago of plasters and salves for healing fresh wounds and cuts, which are only advantageous in so far as they keep the lips of such wounds together and exclude oxygen and light."

If the grafting has been properly performed, and other circumstances be favorable, the scion in two years will be in blossom and yield a crop of fruit. What its quality will be, must depend on the nature of both stock and scion. If the scion be of a fine variety, then it will remain; and if the stock be equally fine, the quality will be improved. The excellence of the scion, however, is the prime consideration, for it is the part which is immediately concerned in the elaboration of the descending sap, or proper juice, upon which depends flavour and quality of the fruit.

Speaking of the descending sap, it may be here observed that the thickening of this juice, which is necessary for its accumulation, does not take place without the aid of heat and solar light; and thus in cold, wet situations plants seldom produce so much fruit as in warm ones. Abundance of carbon and nitrogen is further necessary, and scientific cultivators, having observed these facts, take advantage of them when they wish to throw trees into fruit, by keeping the roots so near the surface as to be within the reach of atmospheric air, from which they obtain carbonic acid and nitrogen. They also bend the branches in training them against a wall, so as to prevent the too rapid descent of the sap, and to force it to accumulate in those places where they wish flower-buds to be produced. If a ring of bark be taken off a tree in spring, the sap will rise just the same as usual; but when the sap begins to descend, a protuberance will be formed just above the ring, which will be occasioned by the accumulation of the sap, its further descent being stopped by the removal of the liber which contains the vessels of the latex. This theory also explains why gardeners sometimes ring the branches of trees in order to throw them into fruit.

The process of *budding* is analogous to that of grafting.

INARCHING.

This is an ingenious mode of grafting; by which one growing plant, without removal, is made to strike upon another plant, and thus form a union. It may be performed in various ways: for example, two branches of a tree may be bent so as to meet and strike upon a wound in the main stem, by which a gap will be filled up. One growing tree, either from the ground or a pot, may be led to unite with another; or several suckers may be led from the ground, archwise, to strike upon a point in the stem, thus bringing fresh aid to the productive part of the tree. By means such as these, quickset hedges may be thickened like a network, so as greatly to improve their appearance and productive qualities.

EUROPEAN FRUITS.

KERNEL FRUITS.

Kernel fruits—or *pomes*, as they are scientifically named—include the Apple, Pear, Quince, and others: those which require any notice here are the varieties of Apples and Pears.

THE APPLE.

The Apple-tree, if favored by a good soil and climate, will live to a great age; two hundred years being not an unusual duration in a fruit-bearing condition.

The varieties of cultivated Apples are now innumerable. The numerous varieties are of three sorts:—Apples for the table; or to be eaten raw; Apples suitable for baking and other culinary purposes; and Apples for cider. Table Apples are, again, sub-divided into those which will keep and those which will not. The choice kinds include the Ribston Pippin, the Downton Nonpareil, Scarlet Pearmain, and Blenheim Orange.

The Keswick and Kentish Codling and Hawthornden are early ripe; but the fruit will not keep beyond October. The Nonsuch is a fine Apple, and remains good in October. The best baking Apples are the Colvilles, for early use; the Rennets and Pearmain, for autumn; and the Russets and Padley's Pippins, for winter and spring.

In Simla and other hill stations almost every estate might have its stock of Apple-trees, the rules given for cottage gardens being made applicable to them. Where the soil and situation are favorable for the production of the Apple,

the following sorts should be tried. According to Mr. Thompson's plan—"where the space will admit of only one tree, the best is the Ribston-Pippin; where two, the Ribston Pippin and Dutch Mignonne; where three, the Wormsley Pippin, Ribston Pippin, and Dutch Mignonne; where four, the Wormsley Pippin, King of the Pippins, Ribston Pippin, and Dutch Mignonne; and where five or more may be grown, the best additions are the Old Nonpareil, the Downton Nonpareil, and the Alfreston." Messrs. Carter & Co., of London, can supply "dwarf standards" of all the kinds named; and as the Suez Canal and railway offer immense facilities for the introduction of superior fruit-trees into the hills (Kussowlee to Simla), we venture to hope that regular annual visitors will take the subject under notice into favorable consideration.

THE PEAR.

The Pear-tree, like that of the Apple, is found in a wild state in all parts of Europe, and has been similarly domesticated and improved into many fine varieties. The tendency of the tree is to a handsome pyramidal form. It is much longer in attaining maturity than the Apple-tree; and on a dry soil it will survive and continue fruitful for centuries. The tree may be propagated by seeds, layers, cuttings, budding, and grafting: it is more frequently raised from seeds than the Apple; but grafting on its own species is also common, and is generally successful.

The observations already offered respecting soil for Apple-trees, apply equally to those of the Pear kind, and nothing more need here be said either on that subject or on general culture. The pruning, however, is different, because the Pear

is a very independent growing tree, and, as a standard, will assume its own natural figure in opposition to all restraint. All branches which lash one another must be removed; but unless the pruner cut and deform his trees in his attempts to create fruitful spurs, there will seldom be a redundancy of wood. A little foreshortening or disbudding in the spring and summer may be useful; but in general, as the Pear can seldom become fruitful under seven or eight years from the grafting or budding, it will be prudent to watch the gradual development of the natural spurs, and to cut back the laterals to them when formed, and not before. Mr. Knight pruned very little, shortening the main shoots occasionally, not sooner than July. He thus expressed his opinion on the subject in April, 1833, in a letter to a professional gardener:—"I would recommend the knife to be little used upon the young Pear-trees, particularly upon the horizontal branches. As a general rule for pruning trees that are to be kept low in gardens, I recommend the upright shoots, shortened about the beginning of July."

About 200 varieties of Pear are enumerated in recent catalogues, all differing from each other in their qualities, time of ripening, &c. Among the finest sorts may be mentioned—

THE JARGONNELLE.

MARIE LOUISE.

BEURRE DE CAPIANMONT.

MUSCADELLE.

BOUCHRETEIN.

ST. GERMAIN.

ROUSSELET.

WILDING.

BEURRE DIEU.

GLOUT MORCEAU.

EASTER BEURRE.

BEURRE RANCE.

The word *Beurre*, which here occurs several times, is from the French word for "butter;" and that, as well as the other names, show how much we are indebted to our continental neighbours for perfecting this delicious-fruit. In selecting

Pear-trees, the nature of the locality must be consulted, subject to which the Jargonelle and others mentioned, also the Windsor, are general favourites. The summer, autumn, and winter Bergamots are not excelled for rich muskiness of flavour. The Pear requires a warmer climate than the Apple; hence some of the finer sorts, which grow well as standards in the south and central parts of England, will require a wall, and shelter in northern or more keen situations. Any sorts worth the cultivating should have a rich aromatic flavour, and be either of the melting kind (*Beurre*), or be firm and crisp, like the winter Bergamots.

STONE FRUITS.

The finest wall fruits of the garden are included in this division; these are the Peach, Nectarine, Apricot, Plum, and Cherry, and all their numerous varieties. Under these well-known names we shall take a cursory view of each, referring the reader for minute particulars to the catalogue in Lindley's "Guide to the Orchard and Kitchen Garden," and to that of "The Fruit Cultivators"—a small work of great merit by the late Mr. Rogers, of the Southampton Nursery. Beside the familiar term *stone fruits*, botanists refer all the trees which bear fruit with a kernel contained within a hard bony shell, surrounded by a rich and saccharine pulp; this consequently would embrace that division (*Amygdaleæ*) which has the Almond-tree for its type. The Peach and Nectarine (*Amygdalus*) have been separated from that family and constituted into a distinct genus (*Persica*). The Nectarine—by some considered as a mere variety of the Peach, and by others as a separate species—differs only in the epicarp, or outer covering of the pulp part, being smooth instead of downy.

PEACH AND NECTARINE.

Both are natives of Persia, introduced from that country in the year 1562, and extensively cultivated since that period. Each admits of two leading sub-varieties—the Melting Peaches and Nectarines, or *free stones*; and those with more solid flesh adhering to the nut, and therefore termed *cling stones*. The French consider them as one fruit, but arrange them under four divisions; but we prefer to simplify our description as above, and shall even dismiss the cling stones altogether from our catalogue, deeming them comparatively worthless, being later in their season, and of a flavour altogether inferior to the true Melters.

The Peach and Nectarine (*P. vulgaris* and *lævis*) can be raised by sowing the stones, and excellent varieties have been so obtained; therefore it is not a fact that the trees raised from seeds are wildings. But as there is no certainty of what a seedling may ultimately become, it is not prudent to trust to this mode of propagation; and though we would urge every gardener to make himself intimate with the process of budding—that approved and certain method of perpetuating approved varieties—yet, as much time must thus elapse before a wall can be stocked with fruitful trees, we think it advisable that he purchase of a good and trusty nurseryman such varieties as are found to be adapted to the locality. The Peach and Nectarine are seldom grafted; it is usual to select buds of trees that are approved bearers and of fertile habits, and to insert them into young, vigorous stocks of the Muske Plum or Seedling Peach.

The Peach produces its fruit upon the spring wood of the previous year; occasionally also, if the habit of the tree be very vigorous, upon secondary shoots from that wood; but this is by no means desirable under ordinary circumstances,

because it proves that the tree is too luxuriant in young wood, which, being developed after midsummer, can scarcely become duly mature. A tree cannot be expected to produce or support a crop of fruit in a period short of four or five years from the budding; but during that period the art of the gardener should be employed to lay in six or more regular branches to the right and left, which will form the skeleton or figure of the tree, and remain the permanent supporters of the young bearing wood. In the fair method of training, secondary fruitful shoots are permitted to form at the under as well as the upper sides of these main branches; but in the Seymour training, the fertile secondaries are led off from the upper sides only; all those which break from the front (called *fore-rights* and *breast-wood*), or from the back next the wall, or from the under side, are obliterated as they appear, either by pinching them off with the finger and thumb, or by amputation with a sharp knife: this process is termed *disbudding*. The quantity of wood to be retained year after year, so as to obtain a regularly increasing proportion of fruit without redundant wood, is chiefly produced by the judicious use of the knife in disbuddings.

The following is a selection of a few of the finest netting Peaches adapted for the hills* :—

- | | |
|----------------------------|------------------------------------|
| 1. BELLEGARDE, or GALANDE. | 4. NOBLESSE. |
| 2. CHANCELLOR. | 5. ROYAL GEORGE. |
| 3. LATE ADMIRABLE. | 6. ROSANNA,* or YELLOW
ALBERGE. |

NECTARINES.

- | | |
|------------------------------|------------------------------|
| 1. ELRUGE, or CLAREMONT. | 2. FAIR CHILD'S EARLY WHITE. |
| 3. VIOLET HALIOS (the best). | |

* *Vide* p. 204.

THE APRICOT.

It is believed, upon the authority of Pliny and others, that the Apricot is a native of Armenia, whence its present Latin name *Armeniaca vulgaris*. It partakes of the habits of a Plum and Peach, and, till lately, was considered a Plum (*Prunus Armeniaca*). It is multiplied by budding either upon the common Plum or the Musclee Plum. The operation of budding, like that of grafting, may be most readily acquired by observing the practice of a good budder. The season of budding is comprised between the third week of July and the 16th of August, and showery weather is propitious. The buds should be selected from shoots of the spring wood; and in taking them off, a piece of bark one inch-and-a-half long should be retained, from which the strip of wood, it contains ought to detach itself freely without bringing with it the eye of the bud. This eye or point is a vital organ, without which a bud cannot grow. This remark applies to every kind of bud, whether it be that of the Apple, Pear, Peach, or any of their kindred; or of any ornamental tree or shrub which admits of being thus propagated. The best varieties of Apricot are—

1. THE PEACH APRICOT.—Fruit high-coloured and very large.

2. MOORPARK.—Of high flavour, and also pretty large.

3. BRUSSELS.—Oval; capable of ripening on an open standard.

4. THE ROMAN.—Hardy, and an abundant bearer.

The Apricot is indigenous to the Himalayas. A very fine variety is met with in Ladak, which, when properly prepared and dried yields a very superior description of *Khoobanee*. In the district of Kotegurh, 40 miles north of Simla, the hill zemindars largely cultivate the sweet-kernelled Apricot, or *Shee-roll-Too*.

It is raised from seed ; bears in four years. The fruit is good, and the kernels are eaten like Almonds ; these, when pressed, yield a clear edible oil, which is also used as a hair-oil. Imported Apricots thrive in Simla, but the fruit degenerates from want of suitable manure ; but when this is applied in season, the fruit is first-rate. In November the roots near the surface should be bared and exposed to the frost, and kept so till the middle of March, when a compost made of well-rotted cowdung (freed from worms) and lime, or lime riddlings, should be made use of. When the trees come into bud, water once a week with an aqueous solution of sulphate of iron. By keeping the roots exposed during the winter, the flowering is kept back, better fruit is obtained, and all fear of losing the crop from hailstorms during April is guarded against. The Apricot requires a good deal of pruning, as it produces much wood in a very short time. For the winter, prune, shortly after the leaves fall, to six inches, in order to obtain new branches. In April more wood should be removed, so as to produce short fruitful spurs in abundance. In all winter prunings and curtailments, the longest shoot that is retained ought not to exceed eighteen inches in length ; thence diminishing, according to the strength of each, to nine or even six inches. The Apricot loves warmth and sunshine ; it should therefore be planted from east to south—and, say, to 20 degrees west of south. By following these directions this delicious fruit ~~may~~ be grown to perfection.

THE PLUM.

The common Sloe of Britain is the type of this genus, *Prunus* ; but those rich and luscious fruits which have been so long cultivated throughout Europe are of eastern origin.

Plums are propagated by budding upon the common Plum stock; and for standards Lindley recommends the insertion to be made nine inches from the ground, when, under favourable circumstances, the buds will produce vigorous shoots—standard high the first year. Open standards require little attention; they should be divested of all the superfluous shoots by pruning them out close to their origin just before the season of spring growth; but wall-trees and espaliers are to be treated as espalier Pear-trees; that is, by training them with a central stem, and a series of horizontal branches proceeding from it on each side nine inches apart. These branches are not to be shortened; and the spurs which form naturally upon them are to be kept short and compact as they advance in length. Artificial spurs may be obtained by July foreshortening; but as fertility is promoted by whatever checks the luxuriance of the wood, it will, we think, be preferable to train in the supernumerary laterals, depressing them below the horizontal level till some natural spurs are formed near their origin, and then to cut the shoots back to the lowest spur.

The Plum ripens in September and October. Of the earlier dessert Plums, the Greengage and the two Orleans are the best. Coe's Golden Drop and the Goliath come into season in October; and for preserving, we name the Winesour, Violette Native, the two varieties of Magnum Bonum, and the Damson or Damascene.

The Imperatrice is the best late Plum, being delicious in November. The soil already mentioned is favourable to the Plum, though the tree will prosper in one of more binding quality. Plums are used at desserts, in tarts and preserves; and, when dried, form the well-known Prunes of the fruiterer. The fruit of the Sloe, when ripe, makes a good preserve.

All imported Plums ripen their fruit in the Himalayas. At Simla and Kussowlee many Plums ripen just before and during the rains. This can and should be prevented by exposing the roots to the winter frosts. When this is regularly done, the Plums ripen after the rains. We have shown how fruits may be forced, and how retarded or thrown back; and in the Simla Hills, by judicious management we have had our Apples, Plums, Quinces, and Pears, ripe and ripening in September and October, when not a fruit was to be seen in other gardens.

THE CHERRY.

The Cherry-tree—or *Cerasus*, as it was called by the Romans—has been known as a cultivated tree for at least three centuries; orchards, the produce of which was sold at a high price in the year 1540, existing to a large extent in Kent. This circumstance conferred the name of Kentish Cherry on that peculiar species. Lindley enumerates and describes twenty-eight, and Rogers twenty-five, different kinds of Cherries; among which the best for general cultivation are the Kentish, the May-duke, the Graffen or Bigarreau, Harrison's Heart, the Black Heart, and Morella. All may be grown as standards, but the May-duke and Morella produce larger fruit when trained against a wall. Standard trees form their own spurs, and require only a little thinning out of superfluous branches; but wall trees ~~must~~ be treated as the Apricot and Plum, avoiding, however, to shorten the leading branches. The Morella requires a somewhat different treatment, because it not only bears on spurs, but, like the Peach, on young wood of the last spring. Mr. Rogers offers some remarks in the form of anecdote, which are deserving of attention. In the Surrendon

Gardens, of which he had the charge, "a north wall, ten feet high, had a border twelve feet wide, and very shallow, reposing on loose or rubble rock. The soil was a dark, hazelly loam of rather inferior quality: the roots were very near the surface, those nearest the stem actually above it. Five trees were originally planted, but subsequently the second and fourth were removed, leaving the centre tree at thirty-two feet from the end ones. Even at this distance the branches met; and in their progress, being kept very thin of bearing wood, the crops were magnificent. The trees were simply planted on the natural surface of unprepared ground, without any manure or deep trenching. Neither was this border ever dug with spades, but slightly stirred with blunt forks, and having a little well-rotted horsedung bestowed every second or third year. There cannot be a more mistaken notion and injurious practice than overloading and poisoning the fruit borders with rich dung. In the early training of the Morella, the knife should be used freely, to gain a sufficient number of leading branches, thinning out the laterals, but never shortening them." The Cherry-tree grows to a large size, and its wood is highly valued by turners and musical instrument-makers from its suitableness for being bored and formed into smooth tubes: in the luxurious East it is much used for the tubes of tobacco-pipes. Fruit of the Cherry seems less impaired by growing in a wild state than other garden fruits. In Scotland, the wild Cherries, called *geans*, are small, but fine flavoured; and in Germany, the favourite liquor *Kerschvasser* is distilled from the juice of this species of fruit. The liquor called cherry-brandy is made by putting the best black varieties in brandy. *Boyeau* is a liquor flavoured by the kernels of the *C. occidentalis*; and a large Black Cherry is employed in the

manufacture of the *Ratafia* of Grenoble. The *Maraschino* of Zara is made from a peculiar species cultivated in Dalmatia.

The Cherry is indigenous to the hills (Kussowlee to Rampore in Busahir), and a variety introduced from Cashmere grows most vigorously in some gardens at Simla. With proper care and culture there is nothing to prevent all kinds of imported Cherries from growing and fruiting at Simla.

Carter & Co., of London, supply all descriptions of Cherries—well-rooted dwarfs—which are well established in pots, and well furnished with buds, for fruiting next year in orchard houses.

B E R R I E S .

In this division will be comprised the Currant and Gooseberry, both members, with all their now innumerable varieties, of the same family or genus, *Ribes*—the Raspberry, Strawberry, Cranberry, and Grape Vine.

THE CURRANT.

The Currant is a native of the Himalayas as well as of Britain. The Black and Red Currant grow wild in the mountain ranges beyond Kotegurh; the Black Currant grows most luxuriously on the south-western face of the Darun Mountain, at an altitude of 7,000 feet; and plants brought thence grew well at Simla. The imported Red Currant bears fruit in the garden of the "Highlands" estate, which is close to the summit of Mount Jacko; but the imported Black Currant, though it grew well in several Simla gardens (at various levels), did not bear fruit, and the fact is easy of explanation. In England and Europe, "Currant

shrubs prosper only in cool climates, and they are somewhat arbitrary in their choice of a situation; they grow to an astonishing perfection in the rich, moist vales of the middle counties, but the Berries dwindle in hot and arid situations." This holds good in the hills, for where the Currant grows wild it is never hot. The Red Currants grown by the hillmen in warm situations, and brought into Simla for sale, are very small and sour. The soil best suited to the Currant is a loam; but it likes manure, and this can be advantageously and freely applied as a top-dressing in November, to remain on the surface till after the pruning in February, when it should be lightly forked into the soil without disturbing the roots.

Currants may be raised from seeds; but well-rooted cuttings can be so easily obtained from England that we offer no remarks on the subject of seedlings. The plants being established (they should be put down between April and August), prune them for fruit in the following month of March. In pruning, shorten all the leaders, and spur in the laterals till the bushes appear like deformed masses of scrubby twigs. By these spurrings and shortenings the trees progress somewhat slowly, but the fruit is produced in massive clusters from the numerous spurs. The Black Currant requires a cooler and more moist site than the White and Red, and it is necessary that the wood be kept young, but never pruned or spurred. Whatever shoots become black and scaly, must be cut entirely out, leaving those bearing branches only which are of a delicate brown colour. The trees require frequent renewal, by taking vigorous cuttings—for old wood produces small Berries.

THE GOOSEBERRY.

In the Simla Hills the Gooseberry has not as yet been successfully cultivated; and the late General Tapp spared neither time, care, nor money in trying to acclimatize this plant. If grown in the open, it failed; and it would not answer under glass. The culture was finally abandoned by him as hopeless. The amateur, if inclined to try the experiment, might obtain some rooted plants from England. Carter & Co. charge in London six shillings per dozen rooted plants of the best Lancashire varieties.

THE RASPBERRY.

The Raspberry is indigenous to the Himalayas. Three kinds are met with: the Yellow and Red are very common; but the large, deep-coloured variety, with the true Raspberry flavour, is rare, and not met with within 70 miles of Simla. The imported varieties grow well; but not being looked after, the fruit has degenerated.

This delicious fruit deserves the amateur's best attention, and we would recommend McLaren's Prolific Raspberry to his especial notice. It is a "Red Raspberry of immense size, fully twice the size, and a fortnight earlier than Carter's Prolific; and is a most prolific bearer throughout the season." It obtained the certificate of the Royal Horticultural Society on the 3rd of August, 1870, and is consequently the best Raspberry at present procurable in England.

The Raspberry requires a light loam, which should be well manured; and experience proves that "an occasional dressing of lime rubbish produces fine canes and very fine fruit." The plants should be placed between four and five apart in the

end of April; cut off all the young fructiferous shoots from the former year's canes, and in a brief period they will spring again from the same eyes, and instead of one shoot they will produce from two to four from the same eye, each equally as fruitful as the former, with the fruit upon all as fine as upon the earlier single canes, and continue to produce plentifully through the months of July and August. The double-bearing varieties of the Raspberry are valued for the purpose of late fruiting upon the strongest canes of the same season, but the fruit is inferior. To grow to perfection, the Raspberry requires light, heat, and air; hence it should never be planted under trees or on the shady side of a cliff.

THE STRAWBERRY.

The imported Strawberry has, for the last thirty-five years, been acclimatized at Simla; and so profitable is its culture, that numerous zemindars within ten miles of Simla have put their best irrigated lands under the much-sought-after Strawberry. The culture of the Strawberry is well understood by the Simla *mallees*; but the original stock was inferior, and as new varieties have not yet been introduced, the fruit is nothing out of the common.

It will rest with the public-spirited amateur to introduce superior descriptions of this superb fruit, and we give below a list of the best:—

NEW ENGLISH STRAWBERRIES.

1. BRADLEY'S AMATEUR.—The plant is exceedingly robust, hardy, healthy, and a prodigious bearer; the bunches of fruit are very large and numerous, and well thrown out from amongst the leaves; the individual fruits are large in size,

handsomely formed, of a deep rich crimson colour, firm, juicy, and of the most delicious flavour, having a distinct smack of the Hautbois; it commences to ripen two or three days after the first fruits of Keen's Seedling continues to swell off fine full-sized Berries to quite the end of the Strawberry season. A peculiarity of the variety is that the fruit does not suffer any deterioration whatever if allowed to remain on the plant for several days after being fully ripe; but, on the contrary, if the weather is dry, the quality is markedly improved. The plant is so vigorous and hardy in constitution that it will produce immense crops of splendid fruit for several seasons in succession; this, with other excellences, constitutes it pre-eminently the "Amateur's" Strawberry—hence its name.

2. TROTMAN'S ROYALTY.—Raised from the Black Prince and British Queen; it combines the sweetness of the one with the piquancy of the other; while in constitution, habit, and growth, it is most hardy, vigorous, and free.

BROWN'S WONDER.—This variety is recommended as likely to supersede all others for market purposes; fruit large, well formed, of medium color, and good flavour; will bear well in any situation, and on rich, well-manured soil will produce a crop exceeding all expectation.

NAMES OF STRAWBERRIES FOR FORCING.

BRITISH QUEEN.	KEEN'S SEEDLING.
BLACK PRINCE.	PRESIDENT.
CAROLINA SUPERBA.	PREMIER.

The following old English Strawberries are also recommended:—

AUSTRIAN SCARLET.	ABERDEEN SEEDLING.
ROSEBERRY.	GROVE END SCARLET.
SCOTCH SCARLET.	DOWNTON'S.

The Strawberry has been successfully cultivated in the plains of Upper India and the Punjab for a great number of years. At Meerut, the late Colonel Farrington, of the Artillery, grew them on ridges some nine inches in height, so that when the beds were irrigated the roots absorbed moisture without the leaves and runners getting wet. To save the fruit from being soiled by the rain, he caused flat pottery plates to be made by the *koomhar* or potter. These plates were nine inches in diameter, and had a circular opening in the centre some two inches in diameter. They were used as follows:--The growing plant was carefully gathered up, Lettuce-fashion, and passed through the orifice of the earthen plate, which was gently but firmly pressed down on the surface soil of the ridge. The plant was then let go, and during the night resumed its natural position. It flowered in due time and bore fruit, and as both flowering and fruiting took place on the surface of the plate, the flowers remained uninjured, and the fruit was of the best description. We would recommend this plan for adoption by all amateurs who may be inclined to import and cultivate the various choice Strawberries above-named. Plants taken up by the roots (the soil being removed), and packed in damp moss, within a tin box or canister well soldered down, will reach India in perfect safety, and if put down in boxes under cover, will be ready for planting out in March-April in the hills.

To Major Shelley, B. S. C., belongs the honor of growing and preserving the Strawberry plant through the hot season, so that when the rains ceased they were ready for re-planting. For this admirable plan, see the proceedings of the Agri-Horticultural Society of India for 1870-71.

As Strawberry cultivation is a novelty in some hill stations, the information given below will, we trust, be useful.

The following comprehend the general directions for culture :—The seasons for planting are March or September. The soil that all affect is a rich unctuous loam, trenched to the depth of two feet. The best and strongest rooted runners of July are always to be preferred; and these should be planted at the periods above-named, with all their roots, into beds or borders recently prepared. Many persons retain their beds or rows during an indefinite number of years in a tolerable state of fertility; but the triennial system appears to combine every advantage, while it avoids the two extremes of annual renewals and of protracted duration. When a bed is formed and in full bearing, it will require an annual surface-dressing of loam and manure—two parts of the former to one of the latter—early in the winter, to protect the plants and receive the new roots, which always are enitted just below the lowest leaf stalks. In March the old leaves ought to be all cut off, leaving the hearts untouched; and the beds should be cleared of litter by a wooden rake. Prior to the fruit becoming ripe, the mowings of a lawn, or of any soft grass laid over the surface, will prevent the Berries from being soiled.

THE CRANBERRY.

There are two species of this plant, the fruit of which is now so very largely employed as a kitchen article for tarts, and as a cheap and effective anti-scorbutic among seamen. The common Cranberry (*Oxycoccus palustris*) grows wild both in England and Scotland. It is a trailing plant, with slender shrubby shoots, which are clothed with small linear leaves; the fruit is an auster Red Berry, about the size of a common

Currant. . It flourishes near flowing springs and small streams. The American Cranberry (*O. macrocarpus*) is a larger and more luxurious plant, and its fruit is of a longish shape and larger. Both would grow in the hills, but have not as yet been introduced.

THE FILBERT.

The Hazel Nut grows wild in the Himalayas ; and the English Filbert, when introduced, would answer expectations.

INDIAN FRUITS.

We purpose excluding from this Handbook all Indian fruits which are unfit for the table; and if any such exist in the proprietor's garden, we would recommend their summary removal.

ANANASSA SATIVA (THE PINEAPPLE).

The Pineapple, as its Sanscrit name (*Umanas*) indicates, was known in India ages before the discovery of South America, and so was the Maize, which is mentioned in the *Maha Bharrut*; and though in modern times superior descriptions have found their way to India from America, still there is little doubt that very good kinds were grown in various parts of Lower India in very remote times. The Pineapple requires a rich soil similar to that in which Sugarcane will flourish, but to make such soil produce superior Pineapples, the ground must be manured with a compost containing slaked lime (*chunam*), common salt, and saltpetre. The salt ($2\frac{1}{2}$ seers) should be dissolved in a *ghurrah* or more of water, and the solution be sprinkled over 40 seers of *chunam* through the rose of a watering-pot; care should be taken not to drown the lime, but to moisten it. When dry, turn it over and moisten again, and

so proceed till the saline solution is used up and the lime impregnated with salt.

The saltpetre (5 seers) should be similarly dissolved and applied to 40 seers of brick-kiln ash or refuse, that is, the mixture of burnt and half-burnt matters which have to be removed before the burnt bricks can be taken out. This refuse is very rich in compounds of ammonia, lime, and iron, and being of a porous nature, absorbs the nitrous solution, and induces catalytic chemical action, when the compost is mixed, made, and applied.

The mineral portion of the compost—*i.e.*, the lime impregnated with salt, and the kiln refuse with nitre—are to be mixed together, and to this mixture 8 maunds of fresh horse, goat, or sheeps' dung is to be added, or a mixture of all three. The compost being ready, prepare the ground as directed for the planting of Standard Roses, and put down the young plants accordingly.

The plants are propagated very readily during the rains by striking suckers or the green crowns from the fruit in sand. A boxful of superior Pineapples may be easily obtained from Calcutta by rail, and after the fruit is consumed, the crowns should be planted; and if the stumps be placed in a damp pit, the latent eyes will spring forth, and a crop of young plants be the result.

The Pineapple enjoys light, heat, and moisture. It flowers in February and March, and ripens its fruit in July and August; and in September and October makes its principal growth. The proper season for planting is in August, and the first week or ten days in September. If a glass house (which can be artificially warmed) be available, the Pineapple may be easily grown in the Himalayas.

The following is a list of the best kinds which may be procured from Calcutta :—

1. The CEYLON.—The fruit is rather large and of an orange colour, and is “decided to be the finest in flavour of all procurable in Calcutta.”

2. The SYLIET, or *Koomla*, enjoys a very high reputation. The fruit, when young, is of a black colour, and bright-yellow when ripe. It is remarkable for the very large size of its eyes, and for not having more than seven or eight of them.

3. The DACCA is a fine fruit, remarkable for the smoothness of its rind and the white colour of its eyes.

4. The CAYENNE.—A variety much cultivated in Europe, where it is in high estimation, and is esteemed the best kind for winter fruiting.

5. The MOSCOW. } Both imported varieties, of which
6. The QUEEN. } the former had been grown by
Mr. L. Berkeley in his green-house at Lahore, and had fruited.

The Pineapple grows almost wild in America and Burmah, and the fruit is delicious.

MUSA (PLANTAIN—BANANA).

At one time the Plantain and Banana were considered as two distinct species, but it has now been decided to a certainty that the latter may be regarded as merely a variety of the former. In India all kinds are indiscriminately termed Plantain.

The Plantain delights in a very rich soil ; but in order to obtain first-class fruit, and plenty of it, it is indispensable that the saline manures be fully present. The pulp of the ripe Plantain is rich in saccharine matter, but poor in gluten or albumen—hence it is not a sustaining fruit when ripe ; but the green fruit contains starch with sufficient gluten to make its meal, as well as the dried fruit, of considerable value as an article of food. The coarser kinds of Plantain afford very good food for cattle ; and as the Hindoos and Burmese use the green or unripe fruit as a vegetable, we may witness a feast at which Plantain *curry* is eaten with Plantain bread or cakes, whilst the ripe fruit is served as dessert.

“The fruit of a single tree sometimes weighs 70lb or 80lb, but averages from 30lb to 40lb ; and according to Humboldt, the same space of a thousand square feet, which will yield only 462lb of Potatoes, or 38lb of Wheat, will produce 4,000lb of Bananas, and in a shorter period of time.”

The European philanthropist who introduces a superior description of Plantain into any part of India not provided with this tree, confers a far greater benefit on the people than does the wealthy Hindoo who spends thousands of rupees in forming a Mango-tope.

The Plantain requires a rich soil, and it is essential that it should be saline. To make it so, the quantity of common salt prescribed for Pineapple manure should be doubled, and the compost so made be freely used when putting down the plants, and subsequently after the fruit has been gathered.

Firminger states :—“Plants should be put out six or eight feet apart in a trench about a foot or more deep and three feet wide, which should be well-supplied from time

to time with fresh cowdung and abundantly watered. Three stems of each plant is to be the limit; and the suckers, which will be constantly springing up, should be removed as soon as they make their appearance. The stem that has once borne fruit should be cut down close to the ground, *as it will never bear a second time*; and a fresh sucker should be allowed to grow up to replace it."

We would give each plant at least ten feet of room, and make the trench fully two feet in depth. The Plantain requires ample growing room, both for its roots and branches; and it is absurd to expect large, heavy bunches of fruit if there is not sufficient growing room for the roots.

The fruit of the Plantain is very poor in mineral matters, but these are so very abundantly present in the skins of ripe Plantains, that it has been proposed to manufacture the muriate of potash from their ashes: soda salts are also present, with lime and its phosphate. These facts show why the Plantain exhausts the soil so rapidly, and why fresh supplies of saline manure are necessary.

The muriate of potash (which is generally present in most salt marsh plants) causes cows to give a rich milk, and it is very fattening. Hence it is good husbandry to grow common Plantains as food for cattle; but to be of the proper quality, the skins must be rich in mineral matters—a result which cannot be attained if the soil is deficient in salt and potash; and as these can be artificially supplied, the success or failure of the crop depends, not on Providence, but on the liberality and skill of the cultivator.

The Plantain grows at Kapoo, on the banks of the Sutledge below Kotegurh; and it is common in most of the villages in the neighbourhood of Simla: 4,000 to 4,500 feet is apparently its natural limit.

It sometimes snows at Syree on the Simla road; and as the Plantains there stand both snow and frost, suckers obtained therefrom would answer anywhere in the North-Western Provinces and the Punjab.

For garden cultivation the following kinds are recommended, viz. :—

- | | |
|------------------------|--------------------------|
| 1. The CHAMPA. | 4. The DACCA. |
| 2. The CHEENEE CHAMPA. | 5. The CHINESE or CAVEN- |
| 3. The MARTABAN. | DISH PLANTAIN. |

These are all grown for the Calcutta market.

The Arracan Plantains recommended by Captain Ripley are—

1. HPEEGYAN.—A very pleasant fruit, of a mellow sub-acid flavour.

2. THENAISA.—A small sized fruit of excellent flavour.

3. NATTABOO.—A very luscious fruit.

4. MOUNGBYA.—A pleasant sub-acid fruit, skin dead white.

5. MAYDANBETTHE.—A long narrow Plantain, growing in handsome bunches, and a luscious fruit.

6. BYAT TAUS.—A large well-flavoured fruit.

Common Plantain used green as a vegetable and suited for cattle are—

1. KUNTELA.

2. KUTCH KALA.—A fruit of great size; used only in its unripe state for *curries* by the Bengalees.

THE FIG.

The Fig, or *Ujcer*, is indigenous to the Himalayas. The *Jagoo* is sweet and luscious, and about the size of a

Walnut. The *Tee-mul* is much larger, sweet and luscious when ripe. These are the local or *paharee* names, and the fruit would no doubt be improved by cultivation. In the plains (Umballa) we have three kinds of Figs, of which two are evidently of Afghan origin, the fruit resembling in size and form the dried Figs brought down annually for sale from Cabul. The third is a small Fig, which was quite green on the 28th of June, and under ordinary circumstances could not ripen till the middle of August. The first-named ripened in all May, and were very fair, though far inferior to the hill kind.

The Spanish Fig would no doubt grow well in the hills, provided it was planted at a suitable elevation, *i.e.*, from 4,500 to 6,500 feet above the level of the sea. The Sycamore or common wild Fig is met with in various parts of the Simla Hills, and affords information as to the site on which superior kinds should be planted.

THE PAPA W.

The Pepiya (*Carica papaya*) is a native of South America and the West Indies, but has become thoroughly naturalized in India. The fruit when ripe is agreeable, cool, and refreshing, the pulp resembling that of a fine Orange-flesh Melon. The tree comes into flower during the rains, and the fruit is in season during the whole of the cold months. Plants are raised from seed, and are of very rapid growth, rising to eight or ten feet high in about ten months, and coming into bearing. The flowers with male, and those with female organs, are borne on distinct plants—hence the unproductiveness of many trees.

THE PUNNEEALA PLUM.

The Punneecala is common in Bengal, somewhat rare in the Upper Provinces, and quite unknown in the Punjab. It is propagated from seed, and in time attains a height of between twenty and thirty feet. "The fruit ripens during the months of September and October, and is of the form and size of a Cherry, slightly compressed into a five or six-sided shape. It is of a deep dull-purplish chocolate colour. The flavour resembles that of an indifferent Plum, but it affords an exceedingly nice *compote* when cooked with sugar."—(*Firminger.*)

We consider that under proper cultivation the Punneecala would yield good fruit, and, in addition, it would supply a vigorous stock for grafting purposes. We would recommend all standing trees to be cut down to a height of twelve feet; all old and useless wood should be unsparingly removed, and the bearing branches should be pruned Plum-fashion. The roots should be exposed, and fresh soil, enriched with (fruit) manure, made to take the place of the exhausted or old soil. The improvement of the fruit would follow as a matter of course; and by subsequent management a really superior fruit would be obtained. The fact of the Punneecala (*Flacourtia cataphracta*) ripening its fruit after the rains have ceased, is greatly in its favour as regards improvements. The introduction of this Plum into the hills is much to be desired; for, if acclimatized, we should not only have a late Plum, but a good stock for other kinds.

THE INDIAN SORREL OR PUTWA.

There are two kinds of this fruit (*Hibiscus sabdariffa*), the red and the white; the latter is less acid than the former.

The part of the plant made use of is not the fruit itself, but the large, thick succulent sepals which envelope it. Of these most delicious tarts, puddings, jams, and jellies are made. The seeds are sown about the end of May, and the plants are put out in the ground at the distance of four feet from each other. It grows to the height of three or four feet, and bears a large, handsome yellow flower, with a dark crimson eye. The gathering for use may be made in November-December. The plant will not grow at Simla; but if the seed be given to the Syree *mallees*, who keep the Simla market supplied with vegetables, they would cultivate and produce the fruit in all October. The Bhindee (or *Hibiscus esculentum*) grows all about the Syree valley, and as Cotton does the same, it stands to reason that the Putwa could be as successfully grown.

THE PHALSA.

The Phalsa (*Grewia Asiatica*) is a native of India, and, when allowed to grow, attains a height of from twelve to sixteen feet. Its foliage is very handsome and umbrageous, and the *mallees* should not be allowed to cut down and disfigure the tree as they do under the pretence of pruning it; the real object in view being to secure a gratuitous supply of fuel for the winter months. The fruit is a Berry of the size of a large marrow fat Pea; when ripe, its color is dark-purple—its flavour sub-acid, and by no means unpleasant.

The fruit ripens in May, and when mashed down with sugar, and the pulp separated from the seeds, it affords a mass which, when dissolved in water and iced, produces a very good *snerbet*, and also an excellent water ice. If

grown on sandy or inferior soil, the fruit will of necessity be sour : hence the necessity for selecting good soil, and using suitable manures.

THE LICHEE.

The Lichee (*Nephelium lichi*) is a native of China, and its foliage is dense and handsome. In Bengal it blossoms about the middle of February, with sprays of small pale-green flowers, and ripens its large bunches of fruit about the end of April or beginning of May. The fruit is of the size and form of a large Plum, and is covered with a rough, thin scale-like rind, which, while the fruit is hanging ripe upon the tree, is of a beautiful red tinge. The pulp of the fruit is simply delicious. In the best fruit the contained single stone is small. The station of Chinsurah, on the banks of the Hooghly river, has the credit of producing the very best of Lichees. The Lichee-tree grows well in all parts of India. In the Upper Provinces it is liable to be killed by the cold, if the winter be severe. It should therefore be protected from frost, just as young Mango-trees are cared for. The Lichee may be propagated by seed, which should be sown as soon as removed from the fruit. Firminger says :—"The sure way to obtain plants that will produce good fruit is to propagate by *gootee* about the end of May. The *gootee* made at that time will be ready for removing and potting off by the commencement of the cold weather; and may be planted out, where it is finally to remain, in the following rainy season." The trees should be watered daily till the rains set in, and once a week during the winter—the daily watering to be resumed in March.

The Lichee should be well manured during the winter, and calcareous mineral manure should be applied in March, so that the rising sap may be enriched, and a heavy crop of fruit secured. When potting down young rooted grafts (*gootees*), care should be taken to mix old pulverised mortar or lime riddlings with the excavated soil. It is the want of lime in the soil which prevents the Grape, Lichee, and other fruits from bearing and coming to perfection.

THE CUSTARD APPLE.

The Custard Apple, or *Shureefa* (*Anona squamosa*), is a native of both tropical Asia and America. Its Sanscrit name, *Seeta-phul* (fruit of Seeta), shows that it was known in India in very ancient times. In the province of Bundelcund it is met with in a wild state. The Hill of "Callinger," on which the ancient Hindoo fortress of that name stands, is covered with Custard Apple jungles; and Punnah, the ancient capital of the province, is famed for its Custard Apples. This fruit, when full grown, is of the size of the largest Apple. It flowers about the middle of May, and as it falls to pieces, when ripe, from its own weight, it should be removed when nearly ripe, and be allowed to ripen in baskets containing chopped straw, with which it should be covered. The custard-like substance of the interior has a most delicious and delicate flavour. The Custard Apple is propagated from seed, and the seedlings are of very rapid growth, coming into bearing in three years' time. It should be pruned in October, and farm-yard manure should be applied to the exposed roots in December, calcareous manure being used in the March following: an immense crop of flowers, followed by a large quantity of young fruit, is the certain result of the operation.

This tree grows in the highest perfection in the most rocky, hot, and barren parts of the country, and consequently its culture in the fertile plains of India is always attended with success.

THE BULLOCK'S HEART.

The Sanscrit name of this fruit, *Ram-phul* (*Anona reticulata*), establishes its antiquity; and the fact of its being a native of tropical America, tends to show that at some very remote period of the world's history some connection must have existed between the Eastern and Western Hemispheres.

This fruit differs from the Custard Apple in having a perfectly smooth rind. The interior is full of a thick, luscious, custard-like substance, but not so delicate in flavour as the Custard Apple. It ripens its fruit during the hot months. Plants are propagated from pips.

THE WOOD OR ELEPHANT APPLE.

The Kut-bael (*Feronia elephantum*) is considered a jungle or forest tree in the Lower Provinces. It is rare above Cawnpore, and unknown in the Punjab. The fruit is round, of a pale-green colour, and about the size of a cricket ball. Firminger says:—"When the hard shell-like rind is cracked, the interior is found full of a brown, soft mealy kind of substance, rather acrid, having a strong smell of rancid butter, and by no means palatable. It ripens in October." Dr. Wight says:—"The pulp of the fruit affords a very pleasant jelly, so closely resembling Black Currant jelly as to be only distinguished by a trifling degree of astringency." This jelly is considered a valuable

remedy for cases of habitual constipation ; or in other words it acts as a laxative.

The tree may be propagated by seed, or by cuttings put down during the rains.

We have heard it stated that the ripe fruit, when eaten, acts as a decided purgative ; and this property, in a milder form, is possessed by the jelly.

THE BAEI FRUIT.

The edible Bael (*Aegle marmelos*) is met with in most parts of India. Firminger says :—"The fruit varies much as to size. The largest are sometimes seen bigger than a man's head, while those of the ordinary size are not much larger than a cricket ball ; the very large ones, however, are considered of not nearly so good a quality as those of a more moderate size. The interior (of the shell) contains a soft yellow substance of peas-pudding-like consistency, intermingled with a limpid kind of slime of a very fragrant scent, and of a flavour very agreeable to those accustomed to it. The high reputation it bears for its medicinal properties, induces many to partake of it, and those who do so usually become remarkably fond of it." The sherbet made from the pulp of the ripe fruit is much valued by persons suffering from chronic dysentery. The jelly is said to relieve and cure this disease ; but medical men have no faith in it. This table fruit is not to be confounded with the non-edible wild Bael of the Himalayas, which is not fit to eat even when ripe, and, when green, possesses very decided medicinal properties. The wild Bael, which, it is said, grows near the summit of the Parasnath Hill in Bengal, is perhaps identical with that of the Himalayas

The wild Bael met with in Coorg (Mysore) is called "medicinal," and from its having cured dysentery, when all other remedies failed to do so, we consider it to be the same as that of the Himalayas.

The Esculent (*Ægle marmelos*) may be propagated either by layers or by seed. In Bengal the fruit is in season in January and February; and in March-April in Delhi, where it is carefully cultivated.

THE MANGO.

The Mango is a native of India, and, if left to itself, soon becomes a tree of stately growth, with wide-spreading umbrageous foliage.

The Aum (*Mangifera Indica*) of the Hindoos is mentioned in their ancient *Shasters*. Its leaves were used in forming garlands connected with religious ceremonies; and the orthodox Hindoo considered his soul in a fair way to Elysium, if his body was burned to ashes with Mango-wood.

The Mango-tree blossoms in all February and March, and sometimes later in the Punjab. It puts forth sprays of small greenish flowers, which for a week or two perfume the air for some distance. The fruit of most kinds begins to come into season in Bengal towards the middle of May; and in June-July, north of Delhi. In the hills north of Simla the Mango does not ripen till September. The fact of the Mango growing within six miles of Rampore (Busahr), and about two from the Sutledge river, is curious, and tends to show the Himalayan origin of the tree and fruit, which is almost round, and more like a Peach than a Mango.

The Mango has been greatly improved by change of soil, climate, and cultivation ; and if the Mango of the Nowgirree Valley is the original or stock fruit, its introduction into the plains would be beneficial, for it withstands a degree of cold which would destroy the hardiest Mango grown in the plains of India.

The uncultivated Mango yields a large supply of good timber, but not much fruit. The cultivated Mango, however, or that which has been propagated by cutting or graft, becomes altogether dwarfed in character, attaining then to a size not too large for it to find a place in the amateur's garden. Firminger says :—"It would be almost impossible to describe, or even to enumerate, the various kinds of Mango to be found in India." Now, as the ancient and a great many modern Hindoos look upon fruit-grafting as a deadly sin, the superior kinds could only have been produced by preserving and sowing the stones of choice fruit ; and as seedling fruit can very seldom be relied upon, we have an endless variety of Mangoes.

The following list contains the names of the best kinds grown in different parts of India :—

1. ALPHONSO.—A Mango of high repute : Bombay.
2. CHINA.—A small fruit of little merit ; remarkable principally for the tree bearing a second crop in October. In Runjeet Sing's time there was such a tree in Mooltan, the fruit of which was highly prized. As this Mango grows in Calcutta, its introduction into the Upper Provinces and the Punjab is a *desideratum*.

3. GOPAL BHOG.—The name indicates a cross or graft made by a man named Gopal. This Mango comes from Malda, and is held in high estimation. It is of a moderate

size, of a deep amber and orange colour when ripe; the flesh of livery consistency, and of peculiar flavour.

4. KYSAPATEE.—A small fruit, of rich and exquisite flavour: from Malda.

5. THE LARGE MALDA.—A middling-sized fruit, of an olive-green colour when ripe, the interior of a deep-orange colour; said to be the finest, if not the very finest, of all. Young plants may be obtained from the Royal Botanical Gardens, Calcutta.

6. THE MADRAS.—A moderate sized fruit; ripens of a straw colour, and is of a very fine flavour. Procurable as above.

7. BINDO-BUNNEE.—A small egg-formed fruit, of fine flavour, green when ripe. The name indicates North-Western origin.

8. BHUTTURA.—A small fruit of long and flattened form, ripens of a dark-green, with vivid red streaks on the sunny side; the interior of a straw colour, very delicious, having a spice of anisee-seed in its flavour. The name indicates Himalayan origin. Both procurable as above.

9. ARCHAE.—A Bombay Mango, of first-rate excellence, ripening some time after the season for other kinds is over (Calcutta).

10. BAEL MANGO.—A very peculiar and curious description of fruit, of a flavour in no way distinguishable from that of the fruit whose name it bears (Calcutta).

11. BOGUL.—A very large cylindrical-formed fruit, of a pale-green colour when ripe, the flesh of a butter-like consistency, and of a most delicious Apricot-like flavour.

12. KUCHCHAE MEETHEA.—A fruit remarkable for being sweet, and eatable in its unripe state; eaten pared like an Apple.

13. **KALA-PAHAR** (*Anglice*, of or from the Black Mountain).—This is a first-rate fruit.

14. **KELOOA**.—A moderate sized fruit, of an orange colour and a fine Gooseberry flavour. The name indicates Himalayan origin.

15. **KHEERAH CHOTA**.—A first-rate Bombay Mango.

16. **MOHUN BHOG** (*Anglice*, Mohun's graft).—A small red fruit of the very highest merit.

17. **NAREECH**.—A Bombay Mango which bears a very large whitish coloured fruit; ripe in August. The introduction of this late Mango into the Punjab is much to be desired.

18. **PHEETA KHAS**.—A superior fruit; its flesh of a pale straw colour; very sweet and luscious.

19. **PHOLEE**.—A small fruit, red outside; flesh of primrose colour, and of exquisite flavour.

20. **SUREES KHAS**.—A long flat-formed fruit of moderate size; flesh of a deep-orange colour, second only to the Malda in fineness of flavour.

Nos. 9 to 20 are grown in the garden of Baboo Jeebun Kishen Paul at Hooghly, near Chinsurah.

“The mode of propagation almost always resorted to is by inarching. Stones are sown at the time the fruit is in season, and the plants raised from them are potted off into single pots, to be inarched upon on the setting in of the rains in the second year after. At the close of the rains the union between the graft and the stock will be complete; and the plants should then be separated and removed to some shady spot, where it is well to keep them till the following rains, that they may become thoroughly established before planting out. Grafted Mangoes come into regular bearing when about five years old.

“The Mango is much benefited by having the earth around it removed, and the roots left exposed for two or three weeks in November and in December. The roots should be well supplied with manure, and then covered in again with entirely fresh earth, and not that which had been previously removed. Likewise, when practicable, during the month of April copious drenchings of the soil around the stem with water or liquid manure would no doubt be of great advantage.”—(*Firminger.*)

We would recommend the amateur to cultivate the late kinds of Mango. The grafts should be made to bear fruit as dwarfs. The root growth should be kept under control, and all superfluous wood should be carefully removed. Five years is a long time to wait for fruit, and we see no reason why the period should not be shortened by the well-understood process of forcing.

The kernel of the Mango stone contains much starch and tannin. The skin and fruit stem are rich in oil (Mango turpentine), and the reddish liver colour of the young leaves shows that sulphuric acid is freely present in the sap.

To produce these substances in abundance, we must use a suitable compost. The carbonate of lime will supply the indispensable carbon. Mustard or Rapeseed oil-cake (Hindee, *khul*) will supply oily or hydro-carbonaceous matter mixed with sulphur; saltpetre will provide the potash; and the sulphate of iron, the sulphuric acid and iron. To prepare the compost, take ten seers of sifted lime (*chunam*), half-a-seer of nitre, one seer of sulphate of iron, and two-and-a-half seers of oil-cake. Crush the oil-cake to powder, and gradually mix it with the *chunam*. Pulverise the nitre, and mix it with two-and-a-half seers of

soorkhee (brick-dust), and moisten the mixture with water, and turn over several times. When dry, mix the brick-dust, imbued with nitre, with the *chunam*. This done, dissolve the sulphate of iron in a *ghurrahful* of cold water, and sprinkle over the mass, so as to moisten it throughout, without drenching any portion of it. Turn it over several times, and let it rest for two or three days; and if not required for immediate use, store under shelter. Any quantity may be made by following the process and proportions given; and when required for use, mix one part by weight of the calcareous compost with three parts by weight of horse, sheep, or goats' droppings—the fresher the better. As soon as ready, apply the compound freely over the exposed roots, and cover over with soil; water next day between the hours of 10 a.m. and 2 p.m., but not later; and thereafter water once a week, but no drenching. As regards quantity, if the tree be an old and large one, the full quantity of compost made with 10 seers of *chunam* should be applied; and for middle-sized and small trees, half, or one-third, or one-fourth should be used. When the Mango is in blossom, a moderate daily watering should be given. One *massuck* or three *ghurrahful* of water for a large tree will be ample—to be discontinued whenever it rains, and to be resumed as soon as the soil appears dry.

The Mango yields abundantly, and when the fruit is of superior quality, very high prices are realized; hence any and all outlay for manures is money exceedingly well laid out.

The trees will require manuring every year; but one-sixth or one-eighth of the original quantity will suffice. Any falling off of the fruit crop will show that more manure is needed, and it should be freely applied. In fact, to make things sure and safe, a certain quantity of liquid mineral

manure should be applied after the second year, so that the third year's crop may show no falling off. The preparation of this liquid manure will be detailed under the culture of the Grape Vine.

THE LOQUAT (*ERIOBOTRYA JAPONICA*)

Is a small tree with handsome foliage and large noble leaves. It is a native of Japan and China, and grows at Simla nearly as well as in the plains. It is not injured by frost or snow. The fruit is borne in clusters, and resembles a very small Pear. There are no distinct varieties, but there is a great difference in the fruits produced from different trees. One sort is remarkable for its deep Apricot colour, while another ripens of a light Primrose colour. Others are distinguished by their acidity or sweetness, or the largeness of their stones, and by the size of the fruit itself. The fruit, when properly cultivated, is considered delicious. It is in season during March, April, and May, according to latitude. Besides being excellent for the dessert, a remarkably fine preserve may be made from it.

Plants are usually propagated from seed, which should be sown as soon after eating the fruit as possible; but to make sure of a good sort, it is best to obtain grafts from some tree the merit of whose fruit has been already ascertained.

We would recommend Loquat seedlings being treated exactly like Mango seedlings, and the same system of grafting (inarching) should be adopted. In pruning, care should be taken not to touch any of the young shoots of the past season's growth, as it is from the extremities of these that flowers are always produced. In winter use calcareous fruit manure.

THE BAER.

In India the name Baer is applied to three trees, as also to their fruit; but they are known botanically as 1. *Zizyphus vulgaris*; 2. *Zizyphus jujuba*; and 3. *Zizyphus lotus*. The first is cultivated for the sake of its fruit, which, when ripe, is pleasant and refreshing. It is from this fruit that the confection called jujubes receives its name, and which should consist of gum-arabic and sugar dissolved in the decoction of this fruit, and then evaporated to dryness.

There are two varieties—one of the form and size of a swan's-egg Plum; the other of the same size, but round. Firminger says:—"The tree that bears the oval fruit has oval leaves, and the one that bears the round fruit, round ones." The tree is of the most rapid growth; and as it grows to a good size, and yields a first-class charcoal, its cultivation as a fuel-producer is much to be desired. The plants raised from seed yield inferior fruit, hence the necessity for propagating by grafting on stocks of the common Baer.

The second is a small very thorny tree, which blossoms in the rains, and ripens its fruit at the beginning of the cold weather. The fruit is of the size of a very large Cherry, and of a tawny-yellow colour, and rather acid in flavour. It affords a very nice dish cooked with sugar. This tree is also of very rapid growth, and attains the height of fifteen feet in a very short time. It is propagated from seed, and requires no care bestowed on its cultivation.

The *tussur* silkworm feeds on its leaves, and after leaving the Bush Baer, crawls up its trunk and spins cocoons on its twigs. The *lac* insect is very partial to this tree, on which it breeds rapidly, and yields very good *seed lac*. We would recommend this Baer being extensively cultivated on waste lands.

The third (*Zizyphus lotus*, or *Bush Baer*) is called *Jher-Baeree* by the Hindoos. It produces a small round red Berry. These are sourish, and are gathered and dried by the natives for future use. This Baer thrives in hot, dry situations. Its leaves, when dried, afford excellent cattle fodder, and the scrub is used for fuel. The *tussur* silkworm and this Baer are generally met together. The plant is evidently of Himalayan origin, and is met with all along the valley of the Sutledge river to within a few miles of Rampore. The valley below Subathoo, and the table-lands above Hurreepore, on the old Simla road, are well stocked with this Bush Baer, and the *tussur* silkworm and its cocoons are abundantly met with. In Kooneehar the jungle consists chiefly of the *Jher-Baeree*, and in September-October the cocoons may be gathered in great numbers. The Bush Baer does not grow much above 4,500 feet in altitude above the level of the sea, and the owners of waste lands in the hills, which may be unfit for tea cultivation, would do wisely if they planted a few acres with *Jher-Baeree*, and in due time introduce the unhatched cocoons from Kooneehar, which is a few miles distant from the Hurreepore dâk bungalow. The *tussur* silk is of considerable value, and if it could be bleached so as to take all colours, this value would be more than doubled. The worm takes care of itself, and if the *Zizyphus jujuba* be planted here and there (say two to every square chain), the worms would ascend the trees to spin, thus reducing the trouble of collecting the cocoons to a minimum.

THE TIPPAREE.

Firminger says :—"The plant (*Physalis Peruviana*) is of a tender nature, and will not endure much cold. I endeavoured to cultivate it several seasons at Ferozepore, but without success. It thrived vigorously all the hot season ; but the cold destroyed the large crop of fruit before it could ripen."

This information is curious, and shows that the soil of Ferozepore, in its natural state, is not fitted to grow the Tipparee, which runs wild in many gardens at Simla, and may be found growing about Kussowlee without care or culture. We have grown it for years at Simla at an altitude of 6,500 feet above the level of the sea, and gathered large quantities of ripe fruit, which is of a bright amber colour, of the size and form of a Cherry, and is concealed within a dry leafy envelope of geometrical form, which, when opened, discloses the fruit. The plant is a native of Peru, and, after being naturalized at the Cape, has been introduced into India, where it is very generally cultivated, the fruit being very palatable, and its preserve still more so. It is propagated from seed, which should be sown about the middle of February in the plains (March-April in the hills), and the seedlings planted out in rows four feet apart, and at the distance of three feet from each other. The soil should be well limed two or three months before the plants are put down, when properly prepared farm-yard manure should be applied to each plant, and the manuring should be annually repeated. This herbaceous perennial is greatly improved by culture, and is well worth all the trouble bestowed upon it.

THE ANAR.

The *Anar*, or Pomegranate (*Punica granatum*), grows all over India ; but the fruit is of inferior quality. A wild kind

is common in the hills at lower elevations, 5,000 feet being about the limit. Superior kinds from Afghanistan grow well in a garden at Simla, some 600 or 700 feet above the waterfalls. The fruit produced is large and fully developed, but exceedingly sour. This is undoubtedly due to the nature of the soil, which is very inferior, utterly wanting in lime, and deficient in everything but iron. We feel convinced that the Cabul varieties would succeed admirably if planted either on or just below the limestone formation, which commences at the second waterfall; and from the stock so obtained young plants might be distributed amongst the zemindars, and a new and valuable article of export be produced in the Simla district.

The Pomegranate may be multiplied either by seed, by cuttings, or by layers. "The best plan" (according to Firminger) "is to raise seedlings, and to graft upon them, when of sufficient height, from trees of a superior kind."

We would suggest the introduction of young grafted plants from Cabul, and if these were properly cared for, very good fruit would soon be forthcoming. The Pomegranate is a native of Arabia and Palestine. Captain Burton describes three kinds, viz. :—

1st and best, the SYRIAN or SHAMI.—A deliciously perfumed, almost stoneless fruit, and as large as an infant's head.

2nd, the TURKI, which is large and of a white colour.

3rd, the MISRI, which has a greenish rind, and a somewhat sub-acid and harsh flavour. The fruit of Muscat is also highly praised by Burton. The Pomegranate, with its dark-green foliage, and its brilliant scarlet blossoms, which no flower can surpass, will always be a favourite, and maintain its place in all Indian gardens.

The rind of the fruit is a powerful astringent, and a decoction made with the fresh bark of the roots is a most powerful vermifuge.

THE GUAVA.

The Guava, or *Umrood* (*Psidium Guajava*), is, we believe, indigenous to India as well as to South America. It is a quick and vigorous grower, and soon attains a height of fifteen feet, producing much useless wood. It comes into flower with the hot season, and bears fruit during the rains, though the finest fruit is to be met with when the general season of bearing is over.

“Young plants are raised from seed; but to make sure of a good kind, propagation by layers is usually resorted to. Rooted suckers, also, may be occasionally taken from the base of the main stem.”—(*Firminger.*)

The improvement of this fruit has apparently never been attempted, and as we consider the production of an almost seedless Guava as of far more value to mankind than the production of a Blue Dahlia, we venture to hope that the process* by which the Pomegranate and Grape have been made seedless (*bae-dana*), will be experimentally applied to some of the best kinds of Guava; and as the list given below is comprehensive, the first set of experiments might be tried on the common kinds with which almost every garden in the Bengal Presidency is supplied.

LIST OF GUAVAS.

1. THE PEAR GUAVA.—Of this there are two varieties. “The fruit of the best cultivated kind is of the size and form of a Lemon, with a perfectly smooth exterior, of a

* See “*Bae-dana* Pomegranate and Grape” at p. 208.

pale straw colour outside and white within; soft as butter, with a very strong perfume. This is borne, one only, upon the footstalk.

2. "The KAFFIREE (African) is the Indian name of a variety very distinct in appearance from the previous one. It is a large, irregular-formed fruit, warted and furrowed, not unlike a Citron. Of the two kinds this is considered somewhat the inferior, though the difference perhaps is trifling. Of this variety I have observed as many as three borne on one footstalk."—(*Firminger.*)

3. APPLE OR RED GUAVA.—This variety is produced on a shrub. The fruit is red inside, but has generally the fault of being densely filled with seeds. It has a somewhat Strawberry-like flavour.

4. The PURPLE-FRUITED GUAVA (*Psidium Cattleianum*) is a native of China, and attains a height of twenty feet. It is rare in India, and the fruit is of the size and form of a large Plum, of a deep-claret colour. The beauty of this variety is thus described by Sir J. Paxton:—"Its dark shining foliage and pendulous branches make it a great ornament. It is perhaps the most perfect and graceful Evergreen that an amateur of plants ought to desire, or even can possess." We would recommend seeds being obtained from China; and any of the Calcutta firms in the China trade would no doubt aid in executing so useful a commission.

5. The *PSIDIUM PUMILUM* has no special local name, and is a moderate sized shrub common to India; remarkable for the smallness of its leaves, which somewhat resemble those of the Myrtle. It bears in the rains, and Dr. Voigt states "that its fruit is of a delicious flavour."

6. GUINEA GUAVA (*Psidium Guiniense*).—This variety has no local name; its fruit is about the size of a Nutmeg, the pulp being red and of an exquisite flavour; height of shrub from eight to twelve feet. It is rare.

7. MANY-FRUITED GUAVA (*Psidium polycarpum*).—This variety has been introduced from Trinidad. It is a moderate sized shrub, and bears a fruit of delicious taste. Firminger says:—"The fruit produced by this plant in Calcutta is worthless. Propagated by seed. The soil of Trinidad is exceedingly rich and fertile, which is not the case with the soil of Calcutta, hence the degeneration of this and several other fruits." We would recommend the free use of calcareous manure and solution of iron in all February. The plant blossoms at the end of March, and ripens its fruit at the beginning of July. The fruit is Pear-shaped, pale-yellow, and of the size of a Plum.

8. THE STRAWBERRY GUAVA (*Psidium sp.*)—This species is met with in Calcutta. "The fruit is of the size of a Nutmeg, pale-yellow, contains a soft pulp, and possesses in a high degree the delicious fragrance and flavour of the Strawberry."—(*Firminger.*)

It is a small low shrub, with large, dark pendulous leaves, and ripens its fruit after the 15th of September, when it blossoms again almost immediately, and ripens fruit a second time in December. The great fault of the fruit consists in being densely full of small hard seeds. This remarkable fruit is easily propagated by seed, which may be obtained through the kindness of friends in Calcutta.

We would recommend the immediate introduction of this species into Upper India and the Punjab. When established, the summer crop of flowers should be carefully and

entirely removed, so as to make it produce a full winter crop. The size of the fruit can be increased in the usual manner, and by carrying out the *bae-dana* process,* the seeds may be gradually got rid of, and we should thus obtain a most excellent winter fruit.

This fruit is remarkable for its Strawberry flavour, and by following the system of pollen impregnation (*vide* "The Apple"), new varieties could be obtained, and in course of time the so-called Pear and Apple Guavas would become very delicious fruits. The bees are very partial to the flowers of the Guava, and the presence of two or three Strawberry Guavas in the garden would very soon have a beneficial effect. The removal of the second or autumn crop of flowers would cause the production of a heavy summer crop of fruit, and by carrying out the system, one set of trees or shrubs would produce winter, and the other autumnal fruits. The Guava would grow in the hills alongside of the Pomegranate.

THE ORANGE.

The Orange (*Citrus aurantium*) is a native of India, and a very beautiful wild kind grows in the Himalayas. The fruit is large, but exceedingly sour. There is also a small kind which grows all over Sirmoor, and up to Solem, twenty-six miles from Simla. This is also very sour. The rind of both has the true Orange aroma and flavour, and makes first-rate marmalade and other confections.

The Orange of Europe has apparently not as yet been introduced into India, though it thrives wonderfully at Port Natal, which has somewhat of an Indian climate, with the seasons reversed.

* *Vide* p. 208.

In India there are not more than four varieties under cultivation. They are as follows :—

1. The SYLHET ORANGE, which is brought down to Calcutta from Sylhet in great abundance during the cold months. The growth of this Orange is in a great measure confined to the Sylhet Hills, and when we remember that Calcutta obtains stone lime from the same locality, the superiority of the fruit is accounted for.

2. A variety common to the Upper Provinces of India and the Deccan. "This is an ill-shapen fruit, with a thick deep-coloured rind, which is much larger than the pulp can fill out."—(*Firminger.*) The defect will vanish if calcareous manure be used. The cowdung manure employed produces an over-abundance of vegetable matter or skin, and as the production of saccharine juice is very intimately connected with the presence of lime in the soil, of which cowdung contains a very insignificant quantity, the phenomenon under notice is accounted for.

3. A small Orange, said to be of Chinese origin. It is sweet and well-flavoured, and much used for preserves.

4. A kind much resembling a Sweet Lime. The fruit, though of good size and fully developed, is inferior or insipid; this is owing, as before, to the want of lime.

The SEVILLE ORANGE has been introduced into Calcutta, and grafted Oranges of good kinds may be obtained from the Saharunpore and Lahore Public Gardens; but the kinds named are commonly grown. In Delhi there is a variety of Orange which produces two crops—the second in March-April. At Nagpore there is also an Orange which bears twice. The trees blossom in February and March, and ripen their fruit in June and July. They blossom again in the end of July and August for the cold weather crop which

last still March. These Oranges are of great size and exquisite flavour; and the trees, under favourable circumstances, attain a height of from twenty to twenty-five feet. The introduction of this Nagpore Orange into the North-Western Provinces and Punjab is much to be desired, as the want of Limes and Oranges during June and July is much felt by all classes, and especially by the sick. The best bottled lime-juice produces *sherbet* far inferior to the worst freshly-expressed lime-juice, and in the intense heat few drinks are more refreshing than a glass of cool or iced lemon *sherbet*.

The Orange is propagated both by budding and inarching; the former method is preferred, and both Sour and Sweet Lime stocks are employed. The plant bears fruit in the third year. We would recommend wild Orange stocks being employed; and as these may be raised from seed, the matter can be very easily managed.

Firminger says:—"The great enemy of Orange cultivation is a grub, which attacks the tree when five or six years old. It perforates the stem where the branches divide, and working up through their cores, causes them to wither as if by blight. To remedy this evil, we would suggest the part of the tree indicated being washed once a week regularly with strong decoction of dried Tobacco leaf. Snuff blown into the hole made by the grub will either kill or cause it to leave its domicile. Tobacco smoke blown up the hole will also be beneficial; but as prevention is better than cure, the application of the Tobacco wash will keep all sorts of grubs at a respectful distance, and a gallon of it will last for months, if applied with a suitable sized hog or horse-hair paint brush, which can be easily made by any *syce* or shoemaker."

In Natal and elsewhere it is no uncommon occurrence for a full-grown Orange-tree to produce 20,000 Oranges

annually ; but this fruitfulness is due to culture, soil, and climate. In India the *mallees* actually take very considerable care and trouble to prevent the Orange from becoming fruitful. The *modus operandi* adopted by them to increase the crop of fruit has the immediate effect of diminishing it, and injuring the tree as well. Firminger states :—"The plant (grafted Orange) bears fruit in the third year. After the rains are well over in October, the roots are opened out for a space of four feet in diameter, and nine inches or a foot in depth ; all their fibres are removed, and after about a fortnight's exposure, the holes are filled in with well-decayed cowshed manure or night-soil."

It has been explained elsewhere that the roots and rootlets of a plant or tree constitute its underground feeding apparatus, and of these the rootlets (whether they spring from the main stem, tap root, or branch root) are the most valuable and important : hence their studied destruction, as laid down, is equivalent to signing and carrying the death-warrant of the plant into slow and certain execution. To manure a plant after destroying its feeders, is ignorance and stupidity of a very high order, which happily does not exist out of India. The Orange-tree is remarkable for producing three different kinds of oil. The leaves yield an oil, the flowers a valuable essential-oil, and the Orange peel a second essential-oil. The juice of the Orange is luscious and nutritious, which is owing to the presence of gluten ; and its richness in sugar provides breathing material for the consumer. Unlike the Grape, it is not rich in mineral matters, but, like it, in yielding a juice which, after undergoing fermentation, produces good wine.

In the Mango we have a delicious fruit, and an oil resembling turpentine. In the Orange we possess a superb fruit, which is in no way interfered with by any oil; but as the development of the leaf, the flower, and the fruit cannot take place apart from the development of oil, the use of oil-cake manure becomes apparent. Therefore, in making Orange manure, use twice the quantity of oil-cake prescribed for Mango manure, and apply it in like manner. The liquid mineral manure used with the Grape Vine is also to be used with the Orange. In place of opening and exposing the roots, the ground within a radius of five or six feet should be carefully forked, and the holes made by the prongs filled up with liquid mineral manure, and, when that has been absorbed, with dry pulvurent calcareous manure. By this means the ground can be richly manured to the depth of fully eighteen inches without disturbing a single root or rootlet and the natural consequence will be a flourishing tree yielding an abundance of first-class fruit.

When forming an Orangery, care should be taken to trench and manure the ground to the depth of twelve inches at least.

The best plan would be to describe a circle on the ground twelve feet in diameter, and to trench it to twelve or fifteen inches, the soil being enriched with 40 seers of *bazar chunam*, and the like quantity of *kunkur* reduced to powder. Two maunds of fresh horse or camel-dung, or sheep and goats' droppings, or a mixture of them all, should be worked into the soil before it is replaced within the excavation. As the Orange grows to a good size, there should be a clear space of eighteen feet between every two plants measuring from the centre of each circle. The

intervening space, after the Orange-trees are put down, should be devoted to Strawberry culture. The trees are not to be manured till they have come into flower for the first time, when the liquid manure should be applied. To bring old trees under treatment, proceed as follows, viz.—

With the trunk of the tree as a centre, describe a circle having a radius of eight feet. Fork the ground well within the circle, and fill up the prong holes with dry calcareous manure. This done, raise the soil all round so as to make an annular embankment some six inches in height and sixteen in diameter. Fill this with water once a week for one month. If the flowering season be at hand, with the tree as a centre, describe a circle having a diameter of six feet, and make a corresponding embankment. Fork the soil within this circle, and then fill up the holes with liquid mineral manure, and thirty-six hours after this has been absorbed, make fresh cowdung into liquid manure, and with it drench the soil within the circle, and when it has been absorbed, sprinkle charcoal dust over its surface, and leave it alone for a week or ten days. When the flowers begin to shed their petals, lightly fork the soil within the circle, and apply liquid mineral manure; and repeat this operation when the young fruit is of the size of a small Walnut. If the weather is sultry, a *ghurrahful* of well water should be allowed every other day, or daily, to each tree, and this should be applied close to the trunk of the tree, which may be best effected by making a small circular embankment close to the trunk, taking care to avoid all disturbance of roots and rootlets. These latter operations will have to be repeated annually, and the entire surface soil should be limed every third year, the ground being forked and irrigated on the day of liming. The

young trees in the Orangery will not require the soil to be limed for six years, after which they will have to be treated like old trees. Messrs. Carter & Co., of London, supply all kinds of grafted and dwarfed Oranges; and as the cultivation of this fruit is very remunerative, all trouble and first expenditure may be considered as money exceedingly well laid out.

THE LIME.

The *Nimbo* is the common native name for all kinds of Lime (*Citrus acid.*), and of the ten varieties cultivated in various parts of India, we select and give the names (Hindoo) of four, viz.:—

1. PATEE.—A small round fruit, very highly esteemed.
2. KAUGZEE.—Of the size and form of a hen's egg; ripens of a pale lemon-yellow colour, and is the next best, yielding much juice of good flavour.
3. GORA.—A small oval fruit, much cultivated.
4. CHEENEE GORA.—A superior, thin-skinned, fine flavoured kind, and of the size of a large Orange.

The Lime is easily propagated by layers or by sowing the pips. It requires calcareous manure, to be followed by animal manure.

THE LEMON.

The natives call the Lemon the *Kurua Nimbo*, and of the four kinds named two are selected, viz.:—

1. The common SPANISH LEMON, which may be obtained from the Agri-Horticultural Society of India. "The tree is very valuable for being in constant bearing all the year through."—(*Firminger.*)
2. BURTON'S—"Peculiar for the large beak with which the fruit terminates."—(*Firminger.*)

THE CITRON.

The Citron, or *Gulgul*, is a native of the Himalayas, and grows to a very large size. We have seen them fully a foot long at Dhamie. It is also common in the plains. The Fingered Citron is a curious fruit, resembling a man's hand with the fingers bent up with cramp. It is not uncommon in the North-Western Provinces.

We may here mention that various kinds of Peaches grow in the plains; those of Saharunpore and Shahjehanpore are not only large but superior. The flat Peach of China grew remarkably well at Meerut, and we would strongly recommend its culture in all gardens. It is a very curious fruit, resembling in form a man's open hand, without thumb and fingers. It has a small round stone in the centre. This Peach ripens perfectly, and its flavour is most delicious. It requires a rich soil and calcareous manure.

THE GRAPE.

The Grape (*Vitis vinifera*), or *Ungoor*, is undoubtedly indigenous to the hills and plains of India. The Black Grape of Rewah and Callinger (Bundelcund) have grown wild for ages, but the magnificent kinds met with in Kunawur (which are quite distinct from the wild Grape of the Himalayas) must have been introduced partly from Cashmere and Central Asia. Of these none have as yet been introduced into the plains. At Bangalore (Madrac) they have a Grape which ripens its fruit in October-November, and is quite unknown in the Bengal Presidency. The Grapes introduced from Afghanistan in 1840—1843 have nearly all died out at Umballa, where they once thrived well.

The Spanish proverb says—"A man should inherit an estate from his father, and a vineyard from his grandfather." In the Simla Hills the Vine bears fruit in four years after planting the cuttings. In the plains the period is longer. To improve the old Vines to be found in many a garden, carefully expose the roots in February and the same day pour over them two *ghurrahsful* of liquid mineral manure (of which presently), and when this has been absorbed, dust all the exposed roots and rootlets freely with bone ash obtained by calcining a sufficient quantity of beef or horse bones with cowdung cakes. Make a hole one foot deep and three in diameter, and fill this with alternate layers of bones and cowdung cakes (native name, *oopla* and *gooha*), and pile twenty or thirty on the top of the heap; set it on fire in three places, so that the fuel may ignite together and so burn out. When cold, remove the bones and reduce them to powder, which put by, and carefully collect the ashes for use. A maund of bones will yield about half a maund of bone ash; and two seers by weight should be sprinkled over the roots, which are then to be covered over with two inches of pulverised fresh rich soil, and on its surface the cowdung ashes are to be strewn till all are used up. This done, cover over with the excavated soil, and leave it alone till March, when one *mussuck* of water should be applied twice a week to each Vine under treatment. When the Vine comes into flower, a second application of liquid mineral manure will be necessary, and this will be applied in the same way as the water. After this application, let the ground dry, and when it begins to crack and form fissures, resume the bi-weekly watering. As the season advances, the Vine will make most astonishing growth, and

will shortly be laden with well-formed bunches of Grapes, which must be placed in cotton bags to protect them from birds, squirrels, and bats.

We subjected a neglected Vine to this treatment, and by the end of May it was literally laden with fruit, many of the bunches of Grapes being fully nine inches in length.

We neglected to have bags in readiness, and paid the penalty of losing nearly the entire crop of fruit. But of the remarkable success of the operation there was not the least doubt. A second Vine which we left alone, made no growth and did not flower, and as a large and sixteen years old Vinery in the next garden was as unproductive, the results obtained were very satisfactory.

The liquid mineral manure employed was made as follows, viz.:—

Take of prepared sulphate of lime ... 3 seers.

„ „ nitrate of potash ... 1 seer.

„ „ sulphate of iron (*kussees*) ... $\frac{1}{2}$ „

Water, one *mussuck* or three *ghurrahs*.

Place the saltpetre in a tub and add the water, and when perfectly dissolved, add the proto-sulphate of iron; mix until dissolved, when gradually add the sulphate of lime. Mix all well together, and tilt the contents of the tub over the exposed roots of the Vine; all undissolved lime found at the bottom of the tub to be strewn over the roots, or along their course (we uncovered the roots for five feet of their length, so that they were well covered over with the manure), and when the moisture has been absorbed, the bone ash powder is to be applied. The second application of liquid mineral manure will be half the quantity used at first, *i.e.*, with the exception of the water, all the other components will be reduced by half. This system of manuring is

to be annually adopted. The use of cowdung, night-soil, and oil-cake manure for the Vine, as also molasses, is simply absurd. If we wanted leaves, they would produce them in abundance, as also twigs and tendrils. But they cannot produce fruit, because the Grape, when ripe, is very rich in potash (as proved by the quantity of *argol*, or crude tartar deposited when the *must*, or Grape juice, is fermented in the manufacture of wine), magnesia, lime, and the phosphates, which are very sparingly present in the components named (night-soil excepted), and the natural consequence—a grand leaf crop, with a small crop of fruit of very inferior quality. The night-soil contains phosphates; but as the bone ash is infinitely richer in them, and causes the formation of other phosphates—those of lime, magnesia, potash, and iron—its superiority is obvious.

We give below a list of the finest kinds of Grape at present cultivated in Great Britain, and procurable from Carter's, London:—

ROOTED VINES.

- | | |
|----------------------|--------------------------|
| 1. BARBAROSSA. | 12. GROS. COLMAN. |
| 2. BLACK ALICANTE. | 13. GROVE-END SWEET- |
| 3. BLACK HAMBRO'. | WATER. |
| 4. BLACK MUSCAT. | 14. LADY DOWNE'S SEED- |
| 5. BLACK PRINCE. | LING. |
| 6. BOWOOD MUSCAT. | 15. MRS. PRINCE'S BLACK |
| 7. BUCKLAND SWEET- | MUSCAT- |
| WATER. | 16. MUSCAT OF ALEXANDRIA |
| 8. CHASSELAS MUSQUÉ. | 17. ROYAL ASCOT. |
| 9. FERDINAND DE LES- | 18. ROYAL MUSCADINE. |
| SEPS. | 19. TRENTHAM BLACK. |
| 10. FRANKENTHAL. | 20. WHITE FRONTIGNAN. |
| 11. GOLDEN CHAMPION. | 21. WHITE NICE. |

THE BAE-DANA POMEGRANATE AND GRAPE.

In Afghanistan a very superior description of Pomegranate is cultivated, which is designated the *Bae-dana* (*Anglice*, destitute of seed or stone).

We have often asked Cabulees and Cashimerees how the seedless Pomegranate was produced, and the answer has invariably been as follows, viz. :—"The young Pomegranate-tree was neatly split down the centre with a sharp thin knife for not less than nine inches. The pith was then carefully removed from both halves, and the stem was next well and quickly bandaged up with narrow strips of calico. When the plant commenced to grow after the operation, it was a sign that a junction had taken place, and the bandages were removed; and if, on examination, the union was not found complete, the stem was re-bandaged, and sooner or later the most perfect union took place; the tree grew, and in due time bore flowers, and fruit which was seedless." It was explained "that the pith (*gooda*) being abstracted, the material needed for the formation of the seed and stone could no longer be evolved, and the *bae-dana* fruit was the result." In addition it was asserted "that the Grape Vine, treated in the same way, produced the *Kissmiss* or stoneless Raisin of Afghanistan."

The process detailed is apparently very simple, and might be tried on the Loquat, Lichee, Custard Apple, Guava, and any other stone fruits.

The word *gooda* means "marrow" as well as "pith;" and if we look upon the stem of a fruit tree as its spinal column, and the central pith (*which is evidently connected with every fruit growing on the tree*) as the spinal marrow, then the operation performed would be equivalent to a species of emasculation, the tree no longer being able to produce seed,

though it may be propagated by grafting. The grafts being but rooted members of an emasculated parent, would like it produce seedless or imperfect fruit.

We have never had the opportunity of inspecting a *bae-dann* fruit-tree; but it is evident that the break in the pith (spinal marrow), caused by its removal, must in a short time be filled up with wood, or a fresh pith may be developed which is incapable of transmitting the virility of the original pith, connected with the root, to the pith growing above the healed wound. The want of the substances needed would soon be felt, and the pith above the wound having no seminal or seed-forming matter to supply, would degenerate into a mere medium of communication between various parts of the tree, keeping up the circulation of sap, but incapable itself of evolving the various substances needed by the seed, to wit—the germ of the future plant, with the necessary oil, starch, and gluten, as well as the inner skin envelope and outer stone covering.

This interesting subject deserves careful consideration at the hands of the Phytologist; and to aid him in his labors, we give the results of Mr. Solano's experiments on the Lichee, which were communicated to the Agri-Horticultural Society of India by the Revd. Mr. Firminger:—

“The following mode of treating the Lichee was communicated to me by Mr. R. Solano, of Shahabad, about a year ago. He told me the result of it was that the stone of the fruit became much lessened, and the pulp consequently much more abundant, and considerably improved in flavour. At any time during the cold season select a branch that is to be used afterwards for inarching. Split up carefully somewhat less than a span long. From both halves of the branch thus split scoop out cleanly all the pith; then bring the split

halves together again, and keep them bandaged till they have become thoroughly united. At the usual time—the beginning of the rains—inarch the branch thus treated upon suitable stock, taking for the place of union the portion of the branch first below where the split was made.

Upon a branch of the tree thus produced, a similar operation is performed, and so on in succession: the result being that the stone of the fruit becomes less and less after each successive operation. Being unable, as indeed I still am, to conceive on what principle a proceeding like this could have ~~any~~ such effect as was stated, I must say I felt at first rather incredulous on the subject. Mr. Solano, however, assured me that from having practised it in his own garden, he could bear full testimony to its efficacy. He also informed me that the process had been applied likewise to the Grape Vine at Malaga, in Spain, and that plants thereby had at last been produced which bore the finest fruit without the slightest vestige of a stone within them."

It will be observed that an emasculated branch was grafted on a stock on which no operation had been performed, and this process had to be repeated several times before the object in view was attained. We would suggest that the seedling stock be operated upon in the first instance, and, when it was ready, that the emasculated graft be made to strike upon the stock in such a manner as to effect a junction between the parts which have undergone the operation. By repeating the process on a second stock, similarly prepared, we think very considerable success would be secured. Mr. Firminger also communicates some information, derived from the late General F. Jenkins, on the subject of producing seedless Guavas, which we extract:—

“To prevent the formation of seed in Guavas, take a young tree, split in the middle with a carving knife, about 12 or 15 inches up and down; pick out the pith, close it, cover up with earth, and bind it up with straw. The tree will grow as before, but the fruit will have no seeds in them.”

The General informed Mr. Firminger that he had never tried the process himself, and could not testify as to its merits, nor could he remember having learnt it.

It would appear that this process had been supplied to the Date-tree; for, according to Mr. M. J. Worth, “there was one (Date) tree at Mooltan which was a stone (*bae-dana*), which was in former times considered a royal tree, and the fruit preserved for the reigning sovereign.”

In conclusion we would wish to observe, that as young Guava-trees are to be met with in most gardens, the *bae-dana* process might be tried at the reader's convenience and pleasure.

