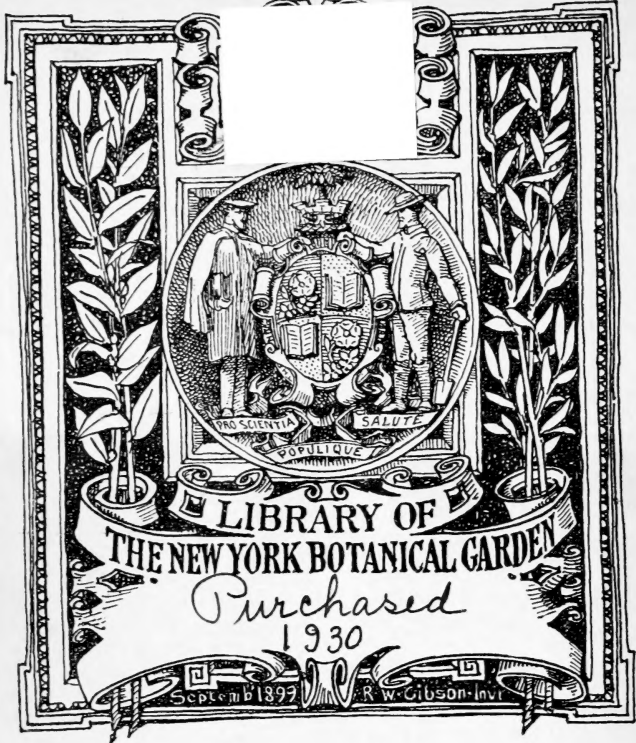


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VICTORIAL  
PRACTICAL  
CARNATION GROWING

WALTER P. WRIGHT

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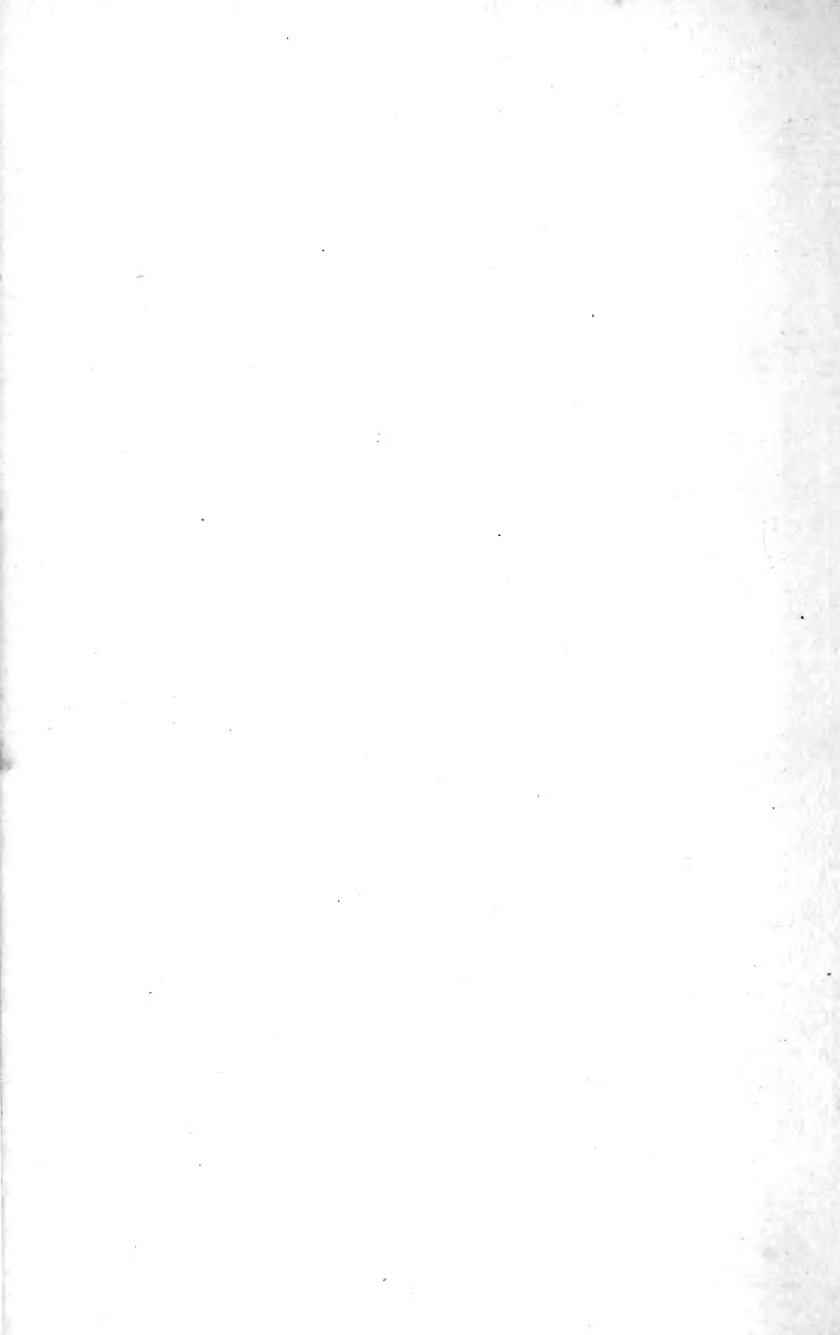
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## PREFACE.



WITH some apprehension of a cudgelling for my audacity from the specialists, I wrote, a few years ago, a little book about Roses. As much to my relief as my pleasure, it was received with equal favour by the experts and by the amateurs.

In these happy circumstances I have ventured to take up the sister flower, the Carnation, and to deal with it on the same plain, pictorial, practical lines.

My qualifications for the task are not those of the successful exhibitor—the most I can claim is to have grown a small collection for several years in my Kentish garden; to have been in touch with the specialists (and particularly with the all-important work of Mr. Martin R. Smith) during that time; to have learned much of the wants and troubles of amateurs, and to have had some little experience in putting gardening books together. Perhaps these things will compensate for the absence of cups and medals. I hope so.

There is no Carnation book in existence in the least like this one. An endeavour has been made in it to practically illustrate every important cultural item in every class of Carnations and Picotees worth growing.

The book is not meant for ornament, but for use. I trust its merits may be measured by what it tries to do, and not by what it tries to leave undone.

WALTER P. WRIGHT.

*March, 1906.*

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# PICTORIAL PRACTICAL CARNATION GROWING.

## Chapter I.—Past and Present.

**T**HERE is no true florist but loves to compare notes with old-time growers, and to talk of the flowers of the past. He may have a deep sense of the value of modern varieties, but that very feeling leads him into communion with the old workers, for he first interests himself in the raisers of his own favourites, and then in the means by which they developed their work.

Shortly before penning these lines, the writer stood in a large conservatory filled with modern examples of the *Chrysanthemum* fertiliser's skill, yet no variety interested his companions more than the old *Chrysanthemum Indicum*, which the owner had been able to procure, and which he had placed among the new sorts as a comparison. It was impossible to look from the old to the new without a grateful acknowledgment—albeit unspoken—of the patience and skill of the florists who had effected such marvellous changes.

The plant from which our modern Carnations have sprung is not under our eyes; if it were we should see a contrast quite as full of interest as, if a degree less striking than, that between the old and new *Chrysanthemums*.

The writer's personal recollections of Carnations and their raisers extend back some twenty-five years, and in that period enormous strides have been made. But the raisers of the early 'eighties were regarded as having brought their flowers very near to perfection. New sorts were few and far between; when they came there was a tremendous stir in the camp of the specialists. It should be noted that these novelties were almost exclusively Show sorts, such as Bizarres and Flakes, and White Ground Picotees. The Carnation as a garden flower was almost a negligible quantity, and Yellow Grounds were little grown. Selves were not very highly esteemed. Now Selves and Yellow Grounds are in the ascendant.

The writer dates his special interest in Carnations from two great events—an inspection of one of the Carnation shows organised by the late Mr. E. S. Dodwell at Oxford, and a visit to Gravetye Manor, Sussex, shortly after its acquisition by Mr. Wm. Robinson.

The schools of these two great growers were absolutely opposed to each other. When Mr. Dodwell acquired his great reputation as a Carnation grower he was a business man, and resided in a London suburb. His flowers were grown in a back garden. Bold effects

were out of the question, probably they were never thought of. Mr. Dodwell grew Carnations with the object of securing a certain number of flowers conforming to a fixed florists' standard. Within his limits he was highly successful. He became a great force amongst Carnation specialists, and was the paramount figure in the National Carnation Society. One of his most active sympathisers and helpers was the late Mr. Richard Dean. Presently there came a split, and Mr. Dodwell, breaking away from the National Society, formed an organisation of his own. He retired from business and moved to Oxford, where he had a much larger garden, which he filled with pits for growing prize Carnations in pots.

The writer has a vivid recollection of a summer day spent at one of Mr. Dodwell's annual *réunions*. The excellent old enthusiast was at his best and happiest when his garden was full of Carnations and Carnation lovers. He was getting into years, and growing feeble, but he crept about in cheerful mood, and was kindness and cordiality itself. The active work of the show was carried out by Mr. Dean, the very embodiment of resistless energy. When in due season Mr. Dodwell passed away the Oxford shows soon ended.

The rise of the Carnation as a garden flower may almost be said to date from Mr. Wm. Robinson's acquisition of Gravetye. This great hardy plantsman cared not a jot for florists' standards. His aim was a hardy, vigorous, free-blooming plant, capable of giving a good garden effect. With a capable and earnest grower in Arthur Herrington, the clever son of an obscure Kentish gardener, he taught hardy flower lovers the great value of Selfs for garden decoration. He searched for varieties that did not split their calyx, and found them. One of his earliest discoveries was Countess of Paris, a large and bold blush flower of fine form. Germania, which originated in

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CROSS FERTILISATION. FIG. 1 (NEXT PAGE).—THE  
PARTS OF THE FLOWER.

- A, a flowering branch of Carnation or Clove Pink, *Dianthus Caryophyllus*, as not infrequently occurs in gardens among plants raised from seed: *a*, stem; *b*, leaves; *c*, pedicel or flower stalk; *d*, calyx (five toothed, furnished at the base with imbricated bracts); *e*, petals (five, cut or serrated); *f*, stamens (either equal to or double the number of the petals—in the latter case five are alternate with the petals, and five are opposite them); *g*, pistil (ovary one celled, many ovuled, styles two, bearing the stigmas on their internal surface).
- B, section of a flower bud at the stage for close emasculation: *h*, basal bracts; *i*, calyx; *j*, petals; *k*, stamens, consisting of filament *l* and anther *m*; *n*, pistil, comprising ovary or ultimate capsule *o*, styles *p*, and stigmas *q*.
- C, calyx of an expanded flower: *r*, imbricated bracts at the base; *s*, calyx, commonly called a "pod"; *t*, calyx tube.
- Pollen, magnified.

*See also Chapter II.*

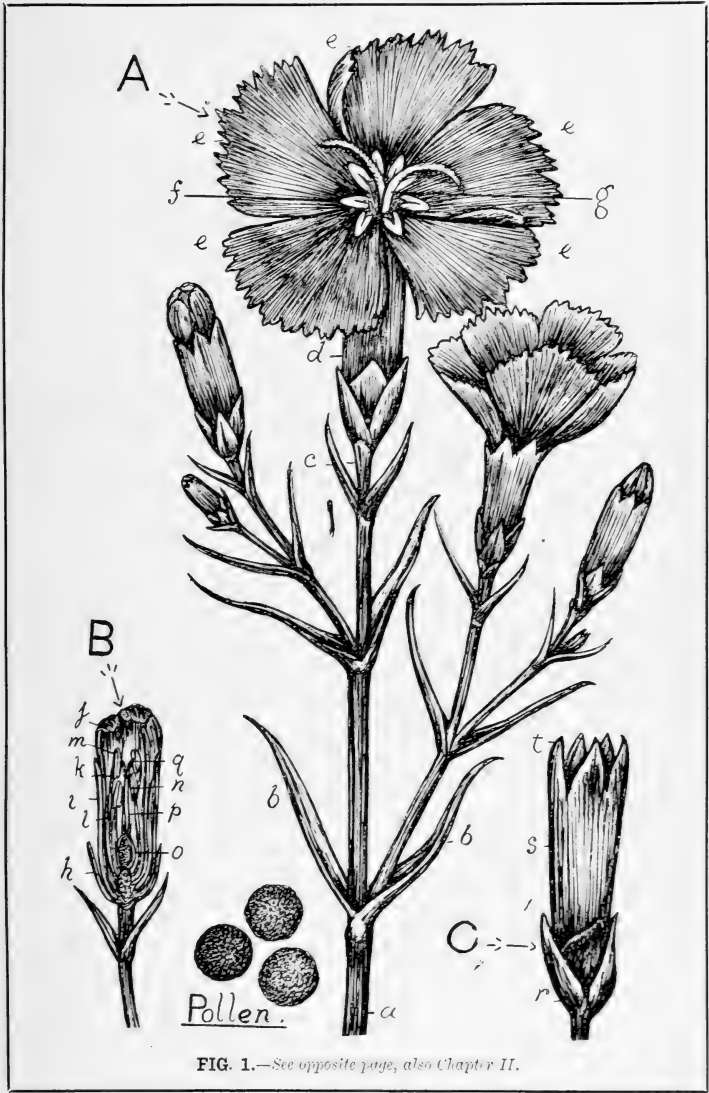


FIG. 1.—See opposite page, also Chapter II.

Germany, and was for several years our finest yellow, also helped him.

But the greatest fillip to Carnation growing came when the seedlings of Mr. Martin R. Smith began to appear. This gentleman, a wealthy London financier, was struck by the beauty of some Carnations which he saw on a holiday tour, and straightway proceeded to try his hand at cross fertilisation. His success was beyond all expectation. The old standard varieties fell before his victorious novelties like grain before the cutter. A few years, and they were forgotten.

Mr. Martin Smith handed his novelties over to Mr. James Douglas, by whom they were offered for sale. Their beauty won thousands of new lovers for the Carnation. The flower made a great leap in popular favour. Mr. Robert Sydenham then developed the Midland Carnation Society, which speedily acquired great influence, and further aided the onward march of the flower. Thus with the beginning of the twentieth century the Carnation was firmly established as one of the leading flowers—a position it is not very likely to lose.

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CROSS FERTILISATION. FIG. 2 (NEXT PAGE).—THE  
OLD CRIMSON CLOVE.

- D, a flowering branch : *u*, stem ; *v*, leaves ; *w*, pedicel ; *x*, basal bracts ; *y*, calyx ; *z*, petals (deep crimson, shaded maroon) ; *a*, anthers of the stamens (appearing low amongst the central petals, and commonly falling off before the pollen is mature) ; *b*, stigmas of the pistil, appearing when the flower is fully developed or fading, though not always ; 1, flower bud at the stage for close emasculation, and of which a section is shown at E ; *c*, point of cutting through the basal bracts and calyx in order to remove the petals and stamens ; 2, flower bud at the stage for close emasculation, shown emasculated at G ; *d*, point of making an incision with a sharp, thin bladed knife through and round the basal bracts and calyx.
- E, section of flower bud D1 : *e*, pedicel ; *f*, basal bracts ; *g*, calyx ; *h*, petals ; *i*, stamens ; *j*, ovary ; *k*, style (single in this instance and with one stigma).
- F, flower bud D1 after close emasculation : *l*, point where the basal bracts and calyx tube have been cut ; *m*, stumps of the stamens ; *n*, ovary ; *o*, style ; *p*, stigma, to which pollen is to be applied when sufficiently developed.
- G, flower bud D2 after close emasculation : *q*, point where an incision has been made and a portion of the calyx, with the petals and stamens, removed ; *r*, ovary ; *s*, styles (two) ; *t*, stigmas (two). The emasculated flower bud in all cases should be enclosed in a paper or gauze bag, alike to protect the pistillate organs from adverse weather influences and from pollination by natural agents. In selecting a flower bud for seed bearing, the leading one of the flower stem should be chosen, cutting away the side ones at an early stage.
- Pollen, magnified.

See also Chapter II.

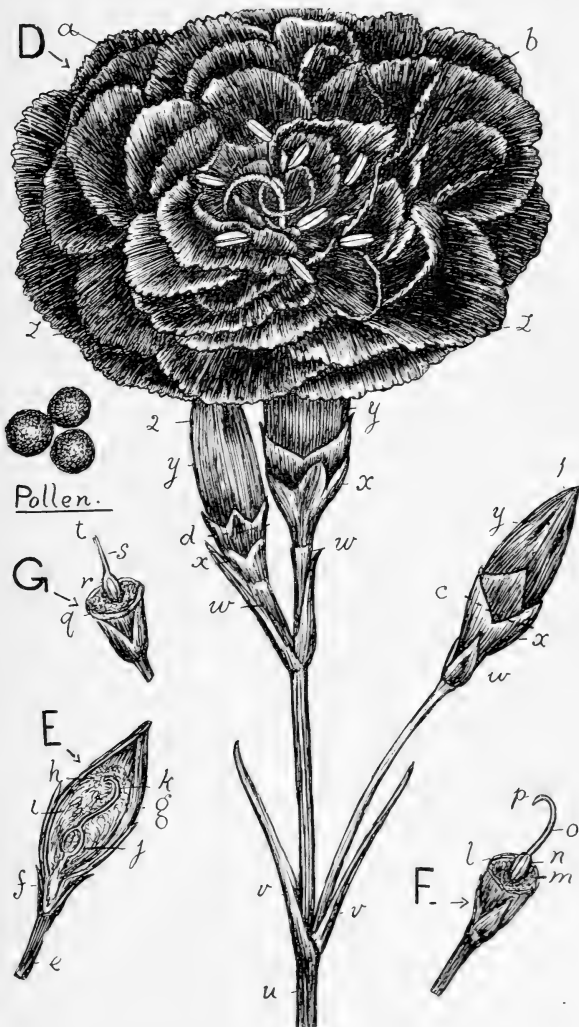


FIG. 2.—See opposite page, also Chapter II.

Mr. Martin Smith continues to introduce splendid novelties every year. Mr. Douglas, Mr. H. W. Weguelin, Mr. Sydenham, Mr. C. H. Herbert, and others second his efforts, and there is little room to fear that the work of improvement will cease. There are those who begin to speak of finality, but we have seen that this was talked of a quarter of a century ago. In this connection it is interesting to record that Mr. Martin Smith, standing amidst his 1905 novelties—themselves a great advance on anything previously brought out—declared to the writer his conviction that, so far from the cross fertiliser's work being nearly complete, it is only beginning. It is the matured and deliberate belief of the greatest Carnation raiser of all time that the future has in store for us varieties as far surpassing the best of the present time as the latter do those of a quarter of a century ago.

In view of this fact, it is not necessary to apologise for saying more about a flower which has already had great attention from authors. Chaucer made allusion to it. Gerarde, Parkinson, Lyte, and Rea all give it attention. It did not escape the notice of Shakespeare. The old authors spoke of it as the Clove, Gilofré, or Gilliflower; but to the great bard it was the Carnation.

The old classification of the flowers still lives, with certain modifications. Thus we still use the terms Bizarre (two distinct colour markings), Flake (one colour striped through the petals), Sels (one colour), and Picotees; but whereas modern Picotees have the colour on the edge only, the groundwork being pure white or yellow, the old Picotees were spotted.

Doubtless the old florists were a little too rigid in their rules. They looked too much to the model show flower, and too little to the garden plant. Consequently, there were periods when the Carnation

CROSS FERTILISATION. FIG. 3 (NEXT PAGE).—THE  
SERRATED FLOWER TYPE.

- H, a flowering branch of Raby Castle Carnation, flower large, full petalled, with serrated edges: *u*, side branchlet with two flower buds; *v*, buds to be cut off if pollination is decided upon; *w*, flower bud at the stage for close emasculation; *x*, point of cutting through the calyx for removing the portion above and admitting of the removal of the petals and stamens; *y*, expanded bloom, no stamens or pistillate organs visible.
- I, section of the expanded flower Hy: *z*, pedicel; *a*, basal bracts; *b*, calyx; *c*, petals; *d*, stamens; *e*, ovary; *f*, styles; *g*, stigmas (developing as the petals fade).
- J, section of the flower bud Hw: *h*, pedicel; *i*, basal bracts; *j*, calyx; *k*, petals; *l*, stamens; *m*, ovary; *n*, styles; *o*, stigmas.
- K, detached stamen from the flower bud J, showing that the bud would probably produce bolder pollen than the central flower if allowed to expand: *p*, filament; *q*, anther.
- L, close emasculated flower bud Hw: *r*, point where the calyx has been cut; *s*, ovary; *t*, styles; *u*, stigmas.
- Pollen, magnified.

*See also Chapter II.*



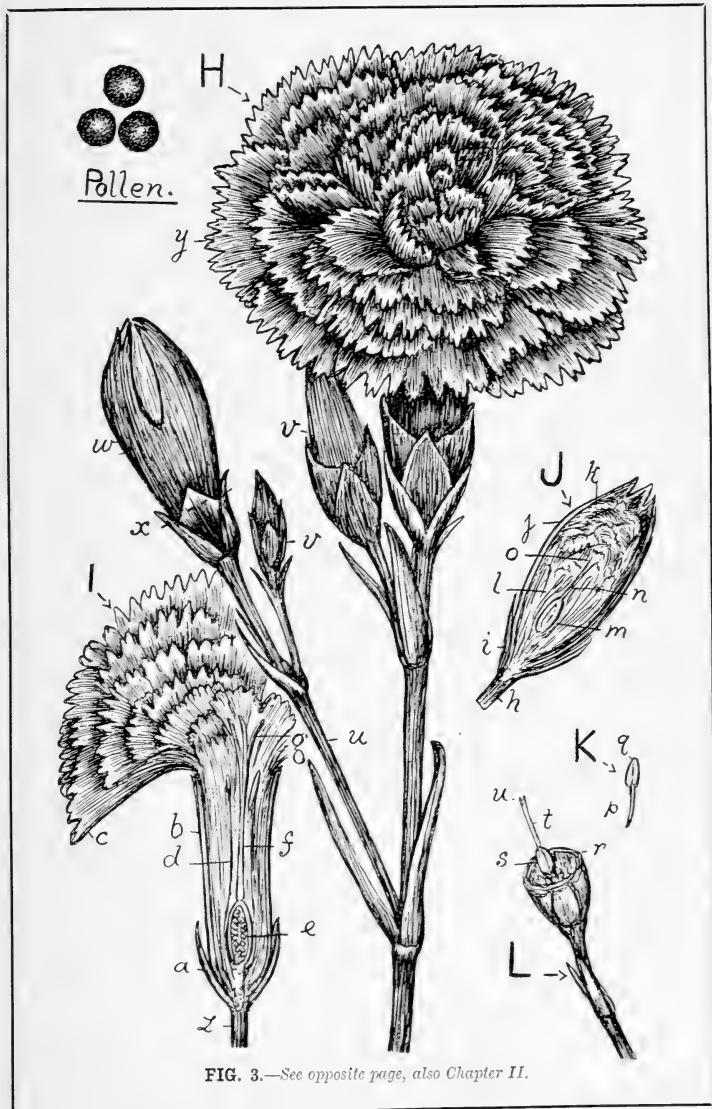


FIG. 3.—See opposite page, also Chapter II.

did not enjoy the favour of the great flower loving public; but such famous florists as the Rev. Charles Fellowes, Mr. Charles Turner, and Mr. Ben Simonite kept the flower alive. The beautiful Yellow Grounds languished even in the estimation of specialists, owing to their weak constitution, but when vigour was imparted they rapidly became popular. The Yellow Ground Fancies, flowers with colour flaked across the petals, were in special favour at the opening of the twentieth century.

It is hardly necessary to point to the great popularity now enjoyed by Tree or Perpetual Carnations, and by Malmaisons, for pot work. They are grown by everybody, and will receive their due measure of attention in this work.

## Chapter II.—Cross Fertilisation.

MODERN Carnations are a great advance in size, form, and length of pod on the older varieties. The last is one of the most important points to be considered, especially for border varieties, which include all classes—Selfs, Flakes, Bizarres, Fancies, and Picotees. Nearly all of these have a tendency to burst the calyx, and thus, at times, produce ragged blooms. The formation of the bud should be carefully considered in selecting seedlings. Although a promising seedling may burst in the open border and not under pot culture, there

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CROSS FERTILISATION. FIG. 4 (NEXT PAGE).—THE WAVY EDGE TYPE—SCARCE AND REplete POLLEN EXAMPLES.

M, expanded flower of Ketton Rose Carnation: *v*, basal bracts; *w*, calyx; *x*, petals; *y*, anther, only one visible; *z*, stigmas.

N, bloom M denuded of its petals when these commenced fading: *a*, pedicel; *b*, basal bracts; *c*, calyx or pod unburst; *d*, stamens, with filaments elongated beyond the anthers, petal-like, coloured rose; *e*, styles, elongated after the petals began fading; *f*, stigmas, feathered and viscid.

Pollen, top left hand corner, of M, N, magnified.

O, a flower of a semi-double seedling Carnation, with smooth edge petals: *g*, basal bracts; *h*, calyx; *i*, petals; *j*, anthers, prominent, in the centre of the flower, no pistillate organs being visible. This is given as an example of a pollen bearing parent, recourse having sometimes to be had to such for effecting fertilisation in certain cases.

P, section of the flower O after removing the petals: *k*, basal bracts; *l*, calyx; *m*, short and defective stamens in calyx tube; *n*, bold stamens and anthers, pollen laden; *o*, ovary; *p*, styles; *q*, stigmas, all well formed. Such a flower is capable of self-fertilisation.

Pollen, lower right hand corner, of O, P, magnified.

*See also Chapter II.*

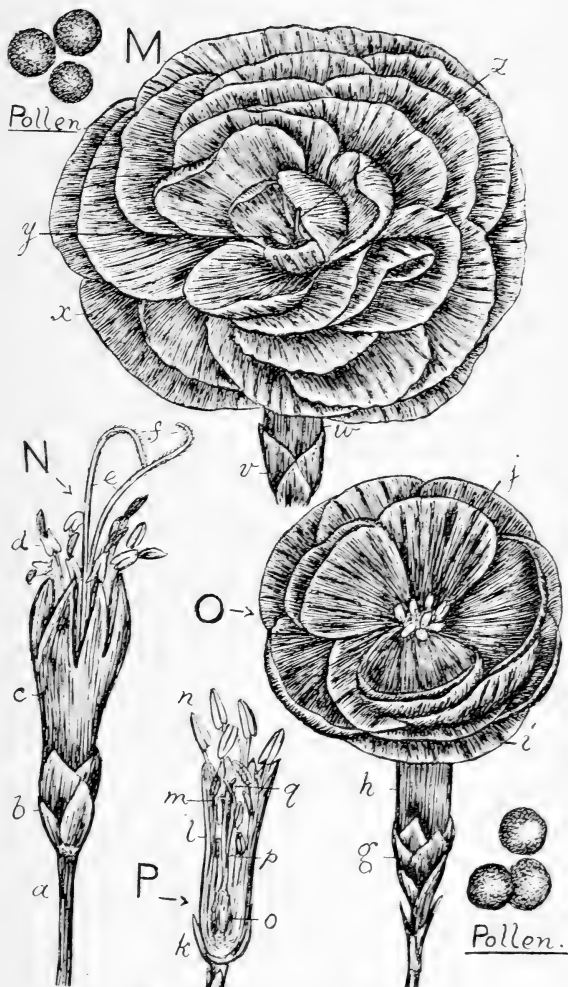


FIG. 4.—See opposite page, also Chapter II.

is no reliance to be placed on the variety that always produces short, round, blunt headed buds, such usually being a confirmed "burster." A sort that produces a long bud, the pod or calyx being about three times as long as its diameter, is generally a non-burster, and such alone is worthy of being selected from amongst seedlings as a border Carnation.

When pollinating to originate improved varieties, never select as parents flowers that have too many petals, and which burst the calyx. Avoid blooms with short, stumpy calyces crowded with small petals, which by force of expansion burst the calyx from top to bottom, and the petals fall out, completely spoiling the appearance of the flower. The flower selected as the seed bearer should have a long, firm calyx; the bloom should be of large size and good form, with petals firm and solid in texture, broad and slightly cupped, not reflexed. Further, the seed bearer should be a plant of vigorous habit and compact growth, yet throwing up plenty of "grass." Many of the most beautiful varieties are sadly deficient in the latter respect. The seed bearer should be of erect habit, the flower stems being strong enough to carry the blooms without drooping their heads. Finally, the seed bearer should be free flowering, throwing up several flower stems, and covering them well with buds.

In order to save seed in this country, the breeder plants, both pollen and seed parent, should be placed in a cool, airy greenhouse and in full sunshine. Do not disbud them, but allow them to bear a full crop of flowers, at least up to or near the time of pollination, for in some cases the large blooms on disbudded plants are devoid of pollen, while the secondary blooms may afford it relatively liberally. Lack of fertility in the Carnation and Picotee is most pronounced in

CROSS FERTILISATION. FIG. 5 (NEXT PAGE).—SMOOTH  
EDGED PETAL FORM.

Q, terminal portion of a flower stem of an unnamed variety raised from seed: *r*, stem, branched lower down, and bearing several other flower buds; *s*, flower stalks; *t*, expanded bloom, neither staminate nor pistillate organs being visible. If used as a pollen parent, the anthers must be searched for amongst the petals; if selected as a seed bearing parent, the centre petals must be drawn aside and pollen applied to the stigmas of the styles: *u*, flower bud at the stage for earliest close emasculation.

Pollen, magnified.

R, flower *Qt* denuded of petals: *v*, basal bracts; *w*, calyx; *x*, stamens; *y*, stigmas of styles, to which pollen should be applied.

S, flower bud emasculated at the stage *Qu*, arrived at pollinating state: *z*, point where the basal bracts, calyx, petal claws, and stamens have been cut and removed; *a*, ovary or capsule; *b*, styles; *c*, stigmas, downy or feathered, and readily retaining pollen. The flower bud, after emasculation and up to and after pollination, should be enclosed in a paper or gauze bag until the stigmas fade.

*See also Chapter II.*

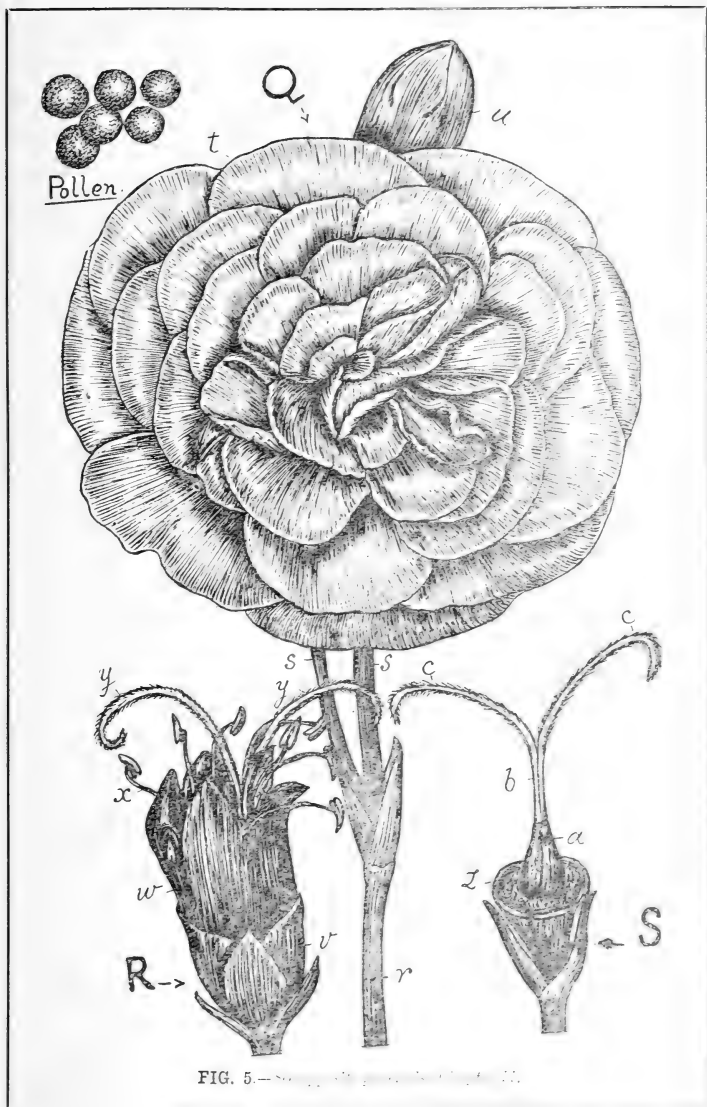


FIG. 5.—

the male element ; at the same time, the ovary of the seed bearer in an overfed, large bloom may become semi-petaloid and defective in the pistillate organs and ovules. The great thing is to secure pollen from well developed anthers displayed boldly. The stigmas of the pistil of the seed bearer should be well up above the petals, with their extremities somewhat curled, and their surface slightly roughened by a delicate down.

Before the blooms expand hexagon netting should be placed over the ventilators to exclude bees, and thus prevent pollination from outside. The flowers should be kept dry, for under damp conditions the pollen is apt to be lumpy, whereas it should be light and easily removed from the anthers on the point of a camel hair brush. The meridian sun is usually the best under which to operate, as near midday in bright weather the pollen is driest and the stigma most clammy. A label attached to the bloom pollinated, stating from what plant the pollen was taken, is advisable in all cases.

Fertilisation may not follow immediately after pollination, this depending upon the state of the stigmatic surface at the time of applying the pollen ; and though this will keep sound for days and even weeks, it sometimes occurs that the pollen first applied is not received, while a second, or even third, application effects fertilisation. When fertilisation is effected, the petals of the flower will begin to shrink and droop within twenty-four hours ; therefore, if a pollinated bloom remains full and fresh a day or two after pollination, the process should be repeated. When the petals become shrivelled and dry they should be pulled out of the pod or calyx tube. Be careful not to damage the styles, but leave them intact ; the seed pod or

CROSS FERTILISATION. FIG. 6 (NEXT PAGE).—SHOW  
OR EXHIBITION FORM.

- T, bloom of a Flake Carnation as cut from the plant : *d*, stem ; *e*, leaves or grass, from the axils of which the flower buds have been removed whilst quite small ; *f*, perfect petals of the outer circle, called guard petals, ground white, colour running from the edge inwards ; *g*, inner petals, gradually decreasing in size to the centre ; *h*, defective petals, which the "dresser" will carefully remove, readjusting the other petals, or discarding the bloom for exhibition ; *i*, stigmas of pistillate organs, to which pollen is to be applied.
- U, flower bud at the stage for close emasculation : *j*, basal bracts ; *k*, calyx ; *l*, petals ; *m*, point of cutting through the calyx tube in order to remove the petals and stamens.
- V, flower bud U after close emasculation : *n*, point where an incision has been made and the stamens removed, except two, which from their smallness were overlooked—as these may develop and mature pollen, they must also be removed ; *o*, small stamens ; *p*, ovary or capsule ; *q*, styles ; *r*, stigmas, to which pollen is to be applied.
- Pollen, magnified.

*See also Chapter II.*

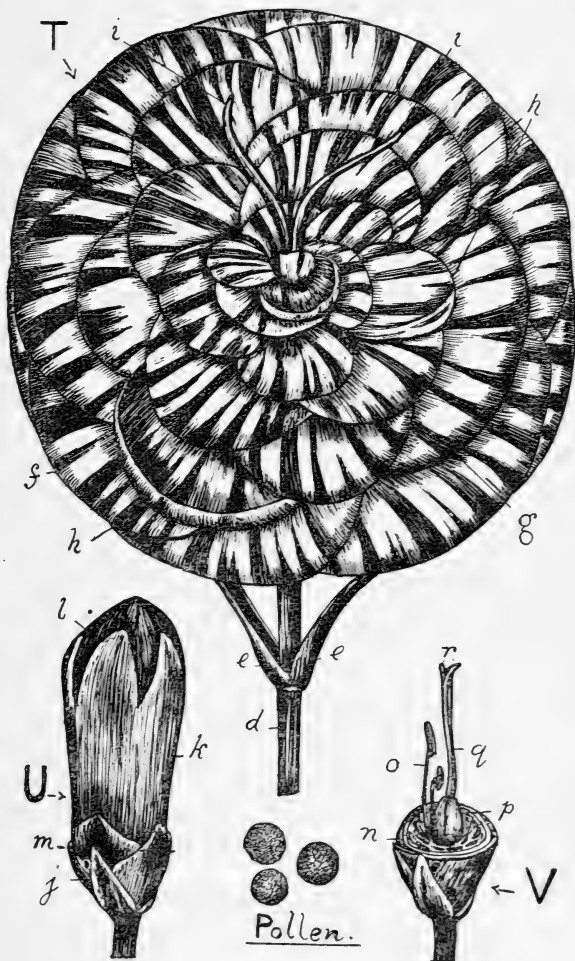


FIG. 6.—See opposite page, also Chapter II.

capsule will then have air, and will be prevented from dying off at the base, as not infrequently occurs during damp weather. To obviate the seed pods damping off some raisers split down the calyx on opposite sides, thus allowing air to reach the base of the capsule and prevent water lodging. Sometimes the calyx dies, when it may be cut away, thus leaving the seed pod wholly or partially exposed.

When the seed is mature, which is usually the case towards the end of summer, cross fertilisation being effected early in the season, the seed pods assume a brownish tint and open at the apex. The seed must then be gathered and spread out on sheets of clean paper in any airy place. When thoroughly dry, it may be readily separated from the pods. The seeds are generally black, but some are creamy white, and these are as good as the black. In all cases the seed should be carefully labelled with the names of the parents.

Such are the principles under which the cross fertilisation of the Carnation and Picotee is carried out on the open flower process. Emasculation is not generally resorted to, as self fertilisation is regarded as somewhat remote in the case of the more advanced Carnations and Picotees. The only other point to be attended to is to avoid practising indiscriminate crossing. Adhere to the respective classes, of which illustrations are given (Figs. 1-13), from the species up to the most recent introductions. Both open flower and close emasculation are shown. The examples are all from outdoor grown plants, not specially selected, but taken as ordinary specimens.

CROSS FERTILISATION. FIG. 7 (NEXT PAGE).—SERRATED  
AND SMOOTH EDGE PICOTEES.

- W, flower of yellow ground, many petaled, serrated edged Picotee: *s*, flower stalk; *t*, bloom, neither staminate nor pistillate organs visible. Pollen, magnified.
- X, faded flower W, the pod having burst when the flower was nearly expanded: *u*, basal bracts; *v*, calyx or pod, split; *w*, faded and dried up petals; *x*, stigmas (three) of styles.
- Y, section of the faded flower X after removing the faded petals: *y*, basal bracts; *z*, calyx; *a*, stamens (anthers pollenless); *b*, ovary dried and shrunken at the lower part; *c*, portion of styles shrivelled; *d*, stigmas, fresh looking, non-fertilised.
- Z, flower of smooth edged Picotee; *e*, basal bracts; *f*, calyx or pod; *g*, petals, relatively broad, with smooth edges; *h*, stamens, anthers disposed amongst the innermost petals and some visible; *i*, stigmas of styles. Pollen, magnified.
- A, faded flower of the smooth edged Picotee Z: *j*, basal bracts; *k*, calyx or pod, not split; *l*, remains of petals.
- B, section of the faded smooth edged Picotee flower A after removing faded petals: *m*, basal bracts; *n*, calyx or pod; *o*, stamens, anther cases empty; *p*, capsule with seeds developing; *q*, stigmas and styles shrivelled, self fertilisation having been effected.

*See also Chapter II.*





In seedlings there is great profusion of bloom, grand for cutting ; while not a few will have merit worthy of perpetuation under special names. All gladden the eye by their exquisite beauty and variety of colour. The far-seeing will reflect on the possibility of a reversion of the yellow ground to the white ground from which it probably sprang, and wait for seedlings from white ground varieties to give a yellow ground form with silver or white beneath.

Certain points in Chapters I. and II. are commented on by Mr. James Douglas as follows :

"I quite agree with a good deal of what is said. As I have grown and exhibited the Carnation for over thirty years, I may be allowed to add a little of my own knowledge to it.

"The first remark that caught my eye is towards the end of Chapter I., 'So far from the fertiliser's work being nearly complete, it is only beginning.' There is no finality in gardening, and the florist's motto ought to be 'Onward! ever onward.' But to say that the work is only beginning is not very complimentary to those who have given the best part of their life to this work.

"Let us look for a moment at the work of the florists for the last hundred years or more. The Flake and Bizarre varieties had obtained as high a point of perfection in the year 1787 as they have at the present day. At that date a Mr. Franklin cultivated and raised Carnations from seed near London (Lambeth Marsh). One of his seedlings is figured in the first volume of the *Botanical Magazine*. I examined the coloured plate of this Carnation, named Franklin's Tartar (it is a scarlet Bizarre), with my old friend Mr. Simonite a few years ago, and in comparing it with the best we had, we decided that this Bizarre, raised 124 years ago, was at least equal to any now

CROSS FERTILISATION. FIG. 8 (NEXT PAGE).—SHOW  
FORM OF PICOTEE.

- C, bloom of a light edged Picotee, as cut from the plant: *r*, stem; *s*, leaves or "grass"; *t*, flower stalk; *u*, guard or outer petals, with a clear ground colour (white) and a well defined edge of a contrasting colour; *v*, inner petals, gradually diminishing in size towards the centre; *w*, eye, clear; *x*, styles and stigmas of pistil, coloured at the tips.
- D, flower C after removing petals: *y*, basal bracts; *z*, calyx or pod not split; *a*, stamens, with bold, pollen laden anthers; *b*, styles; *c*, stigmas, more or less feathered, to which pollen should be applied.
- E, flower bud at the stage for close emasculation: *d*, basal bracts; *e*, pod or calyx; *f*, petals; *g*, point of cutting through the basal bracts, calyx, petal claws, and stamen filaments in order to remove all those parts above the incision.
- Pollen, magnified.

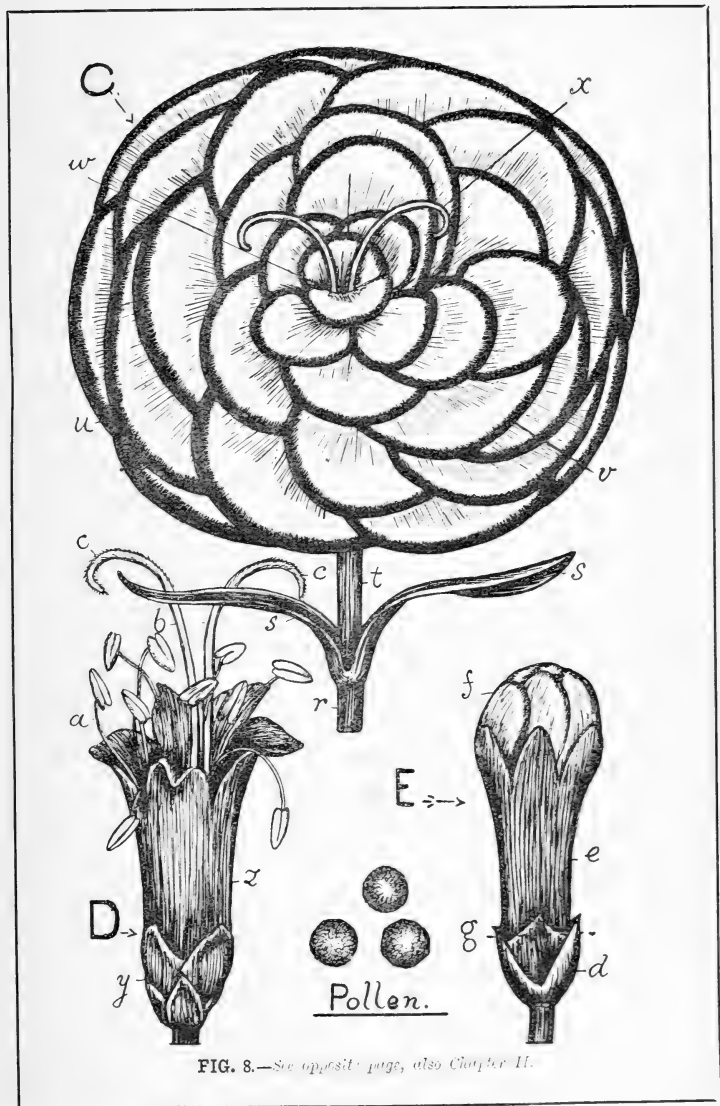


FIG. 8.—See *opposit.* page, also Chapter II.

in cultivation. The coloured plate can be seen by anyone who cares to refer to it. It is plate 39 of the *Botanical Magazine*.

“Mr. W. Curtis, writing from his Botanic Garden, Lambeth Marsh, said: ‘Carnations which are cultivated from age to age are continually producing new varieties, hence there is no standard as to name, beauty, or perfection amongst them but what is perpetually fluctuating. Thus the Red Hulo, the Blue Hulo, the Greatest Granado, with several others celebrated in the time of Parkinson, have long since been consigned to oblivion, and it is probable that the variety now exhibited may in a few years share a similar fate, for it would be vanity in us to suppose that the Carnation, by assiduous culture, may not in the eye of the florist be yet considerably improved.’ Thus wrote Curtis, referring to the Bizarre Carnation in 1787. We are in a position to judge how far the improvement has gone.

“Referring to the yellow ground Picotee, the yellow Carnation was introduced to this country in the reign of Queen Elizabeth, and developed into the yellow ground Picotee early in the seventeenth century.

“I have Hogg’s ‘Book on the Carnation,’ published seventy years ago, before me; it contains a chapter on the yellow Picotee. He states that it was abundant in many countries, and that the Empress Josephine, wife of Napoleon I., had an admirable collection of yellow Picotees at Malmaison, also that Queen Charlotte and the Princesses had a superb collection of yellow Picotees at Frogmore. Hogg gives the names of fifty-three varieties, and adds that many more were in cultivation. The colours were also said to be very bright and vivid. We may take it that they were more like yellow ground Fancies than the modern type of Picotee.

“The standard of excellence for florists’ flowers, including the Carnation and Picotee, was fixed by half a dozen old florists meeting

CROSS FERTILISATION. FIG. 9 (NEXT PAGE).—FANCY  
FORM OF CARNATION.

- F, expanded bloom of yellow ground Fancy Carnation: *h*, flower stem; *i*, pedicel; *j*, basal bracts; *k*, calyx; *l*, petals (yellow ground, slightly edged and flaked scarlet, neither a Carnation nor a Picotee, yet something of both, very bright). Staminate and pistillate organs not visible.
- G, a flower after removing all the petals (in this instance forty-eight): *m*, bracts; *n*, calyx (pod) with six segments; *o*, stamens, with fertile anthers; *p*, stamens devoid of anthers; *q*, styles and stigmas of pistil (three).
- H, section of a flower denuded of petals: *r*, stem; *s*, pedicel; *t*, bracts; *u*, calyx; *v*, support to ovary, to which petals were and stamens are attached; *w*, stamens, mostly situated in the calyx tube; *x*, ovary with ovules; *y*, styles of pistil; *z*, stigmas.
- Pollen, magnified.



in a room at Cambridge more than fifty years ago, and no florists' special society has meddled with their dictum since.

"The yellow ground Picotees, so much admired by the Queen of England and the Empress of France in the early years of the nineteenth century, were flowers of a much richer, deeper yellow than any now in existence. The modern Picotee has to conform to the standard of the florists—the flowers must be of good form, with large, broad petals; no spot or bar ought to be seen on their glossy surface, except the marginal line of colour running round the edge of each petal. This is rose, red, or purple, and may be of different widths. No rule is laid down for this. The royal and imperial ladies who admired the yellow ground Picotees did not confine their admiration to square and rule. Hogg gives a coloured plate of one in his book, and none of our present day flowers is of so deep a yellow; the markings, of a rich crimson scarlet, would drive a modern florist to do something desperate, but they made an artist seize his colour box and pencils, and some lovely pictures are in existence from Jan Van Huysum downwards.

"I favour a well formed, well marked florists' flower myself. I

CROSS FERTILISATION. FIG. 10 (NEXT PAGE).—MALMAISON  
FORM OF CARNATION.

- I, outdoor grown bloom of Souvenir de la Malmaison Carnation: *a*, stem; *b*, stem leaves; *c*, flower bud pushed from axil of stem leaf; *d*, pedicel or flower stalk proper; *e*, bracts; *f*, calyx; *g*, petals, bluish when fully expanded; *h*, anthers of stamens. Pistillate organs not visible.
- J, section of a flower after removing petals: *i*, stem; *j*, flower stalk; *k*, bracts; *l*, calyx; *m*, stamens; *n*, filaments; *o*, anther (note stamens in calyx tube); *p*, support of ovary to which the petals were and the stamens are attached; *q*, ovary with apparently normal ovules; *r*, styles of pistil; *s*, stigmas of pistil developing as the flower fades (per dotted outlines), seldom extending beyond the height of the calyx tube, and very feeble in stigmatic surfaces, possibly the cause of Malmaison Carnations not seeding.
- K, innermost petal collateral with stamens and with stamen sprung from its claw: *t*, claw of petal; *u*, petal expansion; *v*, filament of stamen; *w*, anther of stamen, usually extended as per dotted outlines.
- L, flower bud at stage for close emasculation: *x*, flower stalk; *y*, bracts; *z*, calyx; *a*, petals; *b*, point for cutting through bract and calyx, also claws of petals, then slipping off the upper part—some of the stamens will be left, and these, if removed, will leave the pistillate organs intact. (This is suggested in order to secure more complete development of the styles and stigmas, thus possibly rendering them receptive of pollen and capable of effecting fertilisation.)
- M, section of a flower bud: *c*, flower stalk; *d*, bracts; *e*, calyx; *f*, petals; *g*, stamens; *h*, support of ovary; *i*, ovary with ovules; *j*, styles of pistils; *k*, stigmas of styles.
- Pollen, magnified.

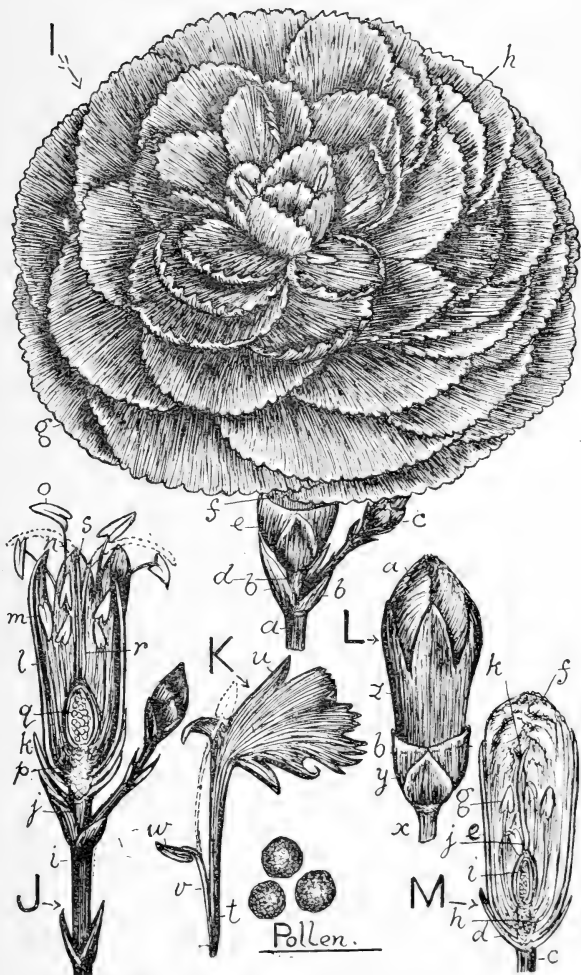


FIG. 10.—See opposite page, also Chapter II.

have had seventy first class certificates awarded me for seedlings of my own raising of Auriculas, Carnations, and Picotees from the National Society alone since it was founded, exactly thirty years ago. But there are many very beautiful flowers, outside the standard of excellence laid down by the florists, which have their admirers. For instance, the Fancy Auriculas, which I have grown and admired for twenty years, have scarcely any worshippers, and the late Mr. R. Dean used to give them his benediction annually the week after the Auricula Society's exhibition; but, on the other hand, when I first exhibited a group, a well known artist, the late Mr. Harrison Weir, admired them greatly, and the late Dowager Lady Howard de Walden at the same exhibition thought them superior to any others; but they both had artistic tastes, and were not even aware of standards of excellence.

"The flaked Carnation shown on p. 19 is stated to be of exhibition form. It is what the florists want, but they have not yet obtained one of such symmetrical build; and if such a flower were laid out on a card, it might obtain the award of premier at the exhibition. But the general admirers of flowers for their sweetness and beauty are not yet educated up to this kind of thing, and the process of education does not go on so rapidly as

CROSS FERTILISATION. FIG. 11 (NEXT PAGE).—MARGUERITE CARNATION.

- N, expanded double flower of Marguerite Carnation: *l*, stem; *m*, bracts; *n*, calyx; *o*, petals; *p*, stigmas of styles just visible in the centre of the flower. The stamens are sometimes, but not always, externally discernible amongst the central petals.
- O, section of double flower denuded of petals: *q*, flower stalk; *r*, bracts; *s*, calyx; *t*, stamens; *u*, filaments; *v*, anther; *w*, support of ovary, to which the petals were and the stamens are attached; *x*, ovary with ovules; *y*, styles; *z*, stigmas.
- P, expanded single flower of Marguerite Carnation: *a*, stem; *b*, bracts; *c*, calyx; *d*, petals; *e*, narrow, style-like parts, but really staminate (see section Q); *f*, styles, two, with simple stigmas. Flower abnormal.
- Q, section of single flower of Marguerite Carnation denuded of petals: *g*, bracts; *h*, calyx; *i*, stamens (only ones with anthers located in the calyx tube); *j*, style-like parts, but really stamens, neither transformed into petals nor terminated by anthers, yet if any pollen is produced in these it is at the tips; *k*, support of ovary, to which the petals were and the stamens are attached, also the petal claw-like staminate processes *j*; *l*, ovary with ovules; *m*, styles; *n*, stigmas.
- R, detached, style-like stamen, probably indicating passing of stamen into petal: *o*, filament or claw; *p*, point where the anther should be, or broadening into a petal, and where pollen, if any, is produced in such staminate organ.
- Pollen, of both double and single flower, magnified.



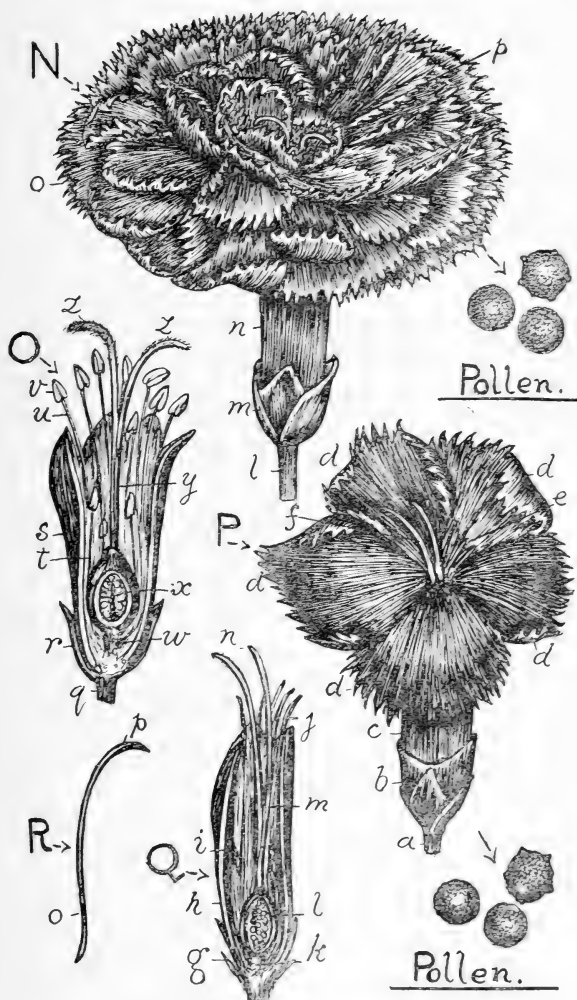


FIG. 11.—See opposite page, also Chapter II.

is desirable in the interests of the florists' type of flower. I can admire all of them, and it is well that there is no finality; and while one amateur works on strictly florists' lines, there is no need to look down on those who cannot quite see eye to eye with him, and who prefer an altogether different class of flower. Let our motto be *Labor omnia vincit.*"

May not the author add to these interesting reflections of an old and true florist, for *laborare est orare*? The points of difference between the strict florist and the amateur whose ideas of form are less exact are natural, and not to be regretted. The one acts as a drag upon the other, and prevents him from going to extremes.

CROSS FERTILISATION. FIG. 12 (NEXT PAGE).—ACCELERATING THE REPRODUCTIVE ORGANS.

- S, portion of a flowering stem with terminal or best flower bud commencing to unfold petals: *q*, stem; *r*, side growths with flower buds to be cut off at the cross lines; *s*, bracts well embracing the base of the calyx; *t*, calyx (at least 1 inch long, and sufficiently strong at the top to keep the bases of the petals in a strong and circular body); *u*, petals developing, outer or guard petals to be removed, either with the fingers or ivory tweezers, one by one, with a clean pull upwards, holding the stem firmly, and so on inwards till the bloom is reduced to the state of a semi-double flower.
- T, flowering stem disbudded and the flower reduced to a semi-double state: *v*, stem; *w*, points where side growths have been cut off; *x*, petals surrounding the central ones and not to be removed with safety, as the adjoining inner ones may be also pulled out, and with these stamens issuing from their claws; *y*, innermost petals, in no case to be removed when the object is to secure well developed staminate as well as pistillate organs.
- U, flower after treatment advised under S and T: *z*, petals left to guard the innermost ones; *a*, central petals, with stamens springing from their claws; *b*, anther of stamen; *c*, stigmas of styles. In this case both staminate and pistillate organs are well developed, and self fertilisation is possible, though usually cross pollination is essential to effect fertility. If such flower is required to be cross pollinated, all the petals may be removed, and all the stamens before the pollen in the anthers matures, thus leaving the pistillate organs with the styles and ovary protected by the calyx (see Z, p. 33), protecting the flower thus emasculated by a parchment paper or gauze bag from pollen other than that applied. But, not uncommonly, the pistillate organs develop at the expense of the staminate ones; hence it may be desirable, in case of pollen being wanted of a particular variety, to concentrate all the energies on the staminate organs (see V).
- V, flower bud pistillately emasculated to develop staminate organs: *d*, point where the calyx has been cut and the petals removed; *e*, stamens after removing the ovary with steel tweezers and a downward pressure without damage to its support; *f*, pistillate parts removed.
- W, pistillately emasculated flower with well developed stamens: *g*, point where the calyx tube has been cut; *h*, filament; *i*, anther.



Ideals are admirable things, but they have a way of creating narrowness in some minds. It is certain that if there had been no standard of excellence established to work to our Carnations and Picotees would not be what they now are. Herein we owe a deep debt of gratitude to the oldtime florists. Possibly some of their followers have worked within lines that are a little too rigid; they have interpreted the laws almost too strictly. But at least they have kept the flag flying. Other influences have operated to prevent the mischief that sometimes accrues from arbitrary interpretation. They have shown us that there is a world of beauty in Selfs as well as in Flakes and Bizarres, that habit of plant and freedom of blooming are equally as important as contour of flowers, and that the garden has its claims not less than the exhibition.

It is to be feared that both sides have been a little lax in one respect—the maintenance of perfume. To the broad-minded flower lover a Carnation without sweetness is like a lark without song.

CROSS FERTILISATION. FIG. 13 (NEXT PAGE).—PROCESS  
OF POLLINATION.

- X, flower showing the stamens or male organs boldly, which usually furnish pollen abundantly to fertilise the seed bearing flower: *j*, stem; *k*, bracts; *l*, calyx; *m*, petals; *n*, anthers of the stamens that produce the pollen, magnified, on the right hand side.
- Y, bloom having the pistillate or female organs prominent, and generally most desirable for the seed parent: *o*, stigmas to which pollen is to be applied, called open flower cross pollination, protecting from self fertilisation by enclosing in paper or gauze bag when the petals unfold, and continuing till the stigmas fade after pollination.
- Z, flower denuded in bud state or without removing the calyx or pod (though here shown with one side removed for clearness), stamens in calyx tube being cut off with fine pointed, long bladed, or Grape thinning scissors, and removed from the calyx tube: *p*, support of ovary from which the petals have been drawn and the stamens cut off and removed; *q*, ovary or capsule; *r*, styles; *s*, stigmas to which pollen is to be applied. The calyx in this case remains to protect the ovary and styles, but pollination by bees or other natural agents must be prevented.
- Pollination. 1, a flower emasculated by drawing out all the petals and removing all the stamens when expanding: *t*, stigmas downy or feathered; *u*, camel hair brush laden with the fertilising pollen; commence to use low down on the feathered part of the stigma, drawing the brush gently upwards to the tip; *v*, stigma after pollination. 2, after pollination and fertilisation are effected and the stigmas are drying up. 3, an emasculated, pollinated, and effectively fertilised flower: *w*, point where the bracts and calyx tube have been cut in close emasculation, and petals and stamens removed, the flower being afterwards protected and pollinated; *x*, capsule swelling, opening when seed is mature by teeth at the apex. 4, ovules from the capsule at the stage shown in 3: *y*, fertilised and developing into seeds; *z*, not fertilised, both occurring in the same capsule.



FIG. 13.—See opposite page, also Chapter II.

### Chapter III.—Raising from Seed.

WE have seen how the flowers of Carnations may be cross fertilised with a view to the production of new and improved varieties ; and we may now proceed to consider the raising of the plants.

To the everyday amateur there is but one means of propagating the Carnation, and that is by layers. That this system is generally the best for increasing the stock of established varieties is readily admitted, and in due course copious and complete instructions for practising it will be given ; but it is obvious that it is only a secondary process, inasmuch as it cannot be practised until a plant has already been produced.

The natural means of increase is by seed. If the beginner asks why it is not always resorted to, and artificial systems such as layering abandoned, he is reminded that what is the strength of the plan—namely, the variable and unexpected results which accrue from it—is also its weakness. A new variety may be secured from seed by cross fertilisation, and fixed, but that variety could not be increased regularly and kept true through the medium of seeds. The more nearly a flower approaches to perfect doubleness the fewer reproductive organs it has, and that means little or no seed. To put the

#### RAISING FROM SEED. FIG. 14 (NEXT PAGE).—SOWING.

- A, the seed : *a*, dark or black, natural size and magnified ; *b*, light or white, natural size and magnified.
- B, thin and thick sowing : *c*, seeds placed separately, about 1 inch apart ; *d*, seeds broadcasted at irregular distances.
- C, section of a 3-inch pot : *e*, drainage ; *f*, layer of rough siftings of soil ; *g*, compost ; *h*, seeds placed on a layer of fine soil,  $\frac{1}{2}$  inch apart ; *i*, covering of fine soil ; *j*, space for holding water in watering ; *k*, sheet of glass.
- D, sowing in a 6-inch pot : *l*, drainage ; *m*, layer of moss or fibre ; *n*, rougher parts of the compost ; *o*, soil ; *p*, seeds ; *q*, covering of fine soil ; *r*, space for holding water ; *s*, pane of glass.
- E, sowing in a pan : *t*, drainage ; *u*, soil ; *v*, seed ; *w*, fine soil covering ; *x*, space for holding water ; *y*, sheet of glass.
- F, sowing in a box about 14 inches long and 10 inches wide inside, and 4 inches deep : *z*, drainage ; *a*, soil ; *b*, seed ; *c*, fine soil covering ; *d*, sheet of glass.
- G, sowing in the open ground : *e*, drills made with the finger about  $\frac{1}{8}$  inch deep, and seeds placed in  $\frac{1}{2}$  inch apart ; *f*, portion of a drill covered with fine soil, drills  $1\frac{1}{2}$  inches apart. For general outdoor sowing the situation may be open but sheltered.

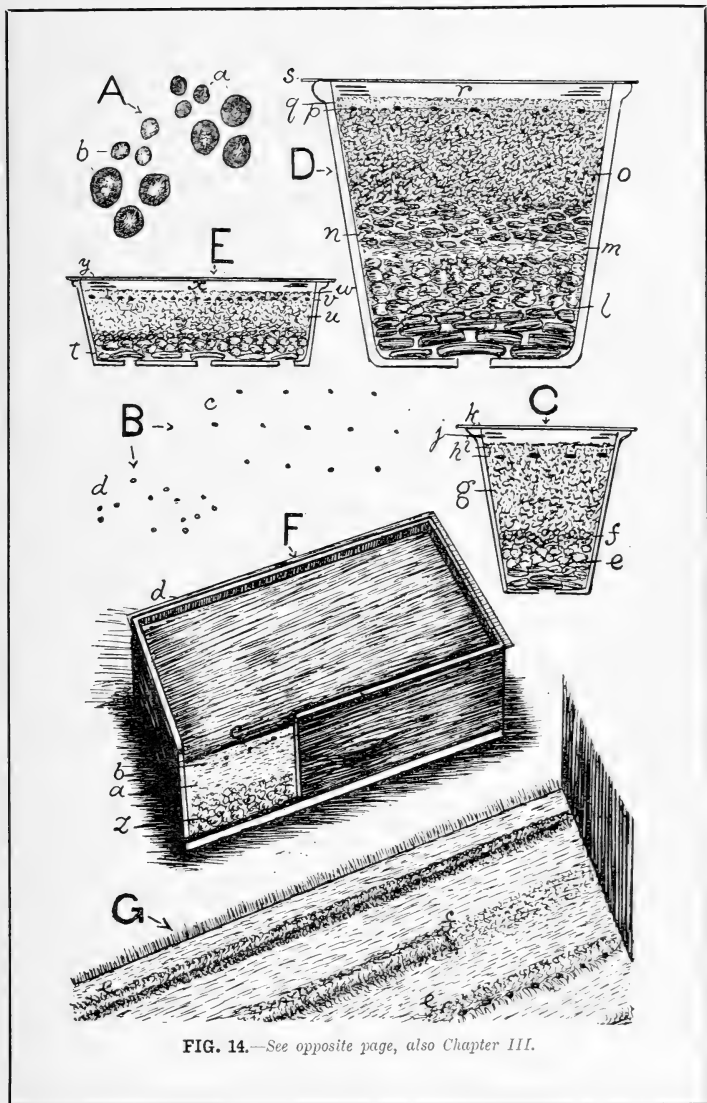


FIG. 14.—See opposite page, also Chapter III.

matter in brief, we secure new sorts through the medium of seeds, and increase them when established by the use of parts of the plant, such as cuttings and layers.

In the chapter on cross fertilisation it was advised that the seed, which is mature towards the end of summer, should be separated from the pods when thoroughly dry. It keeps perfectly well in a paper packet, small bag, or envelope if stored in a dry place. The names of the parents should be written on these, or, to secure secrecy if desired, numbers may be given, which will, of course, be made to correspond with names in a book. There is no pretence that the cross fertiliser, when he thus carefully records a cross, may confidently expect that the progeny he rears will combine the merits of its parents. It is quite likely that the majority of the young plants will totally differ from their parents. The greater number may be worthless, because inferior to existing forms, but the interest of growing them is profound, because amongst them may be found a really distinct and good novelty. The reward for such more than compensates for a host of failures.

Well, we have got our seed, and the time comes to sow it. To secure strong flowering plants for examination the second year, a sowing may be made in the month of February. This, of course, presupposes glass. It is interesting and important to record the

RAISING FROM SEED. FIG. 15 (NEXT PAGE).—SEEDLINGS AT EARLIEST STAGE FOR PRICKING OFF.

- H, drawn and weakly seedling Carnation: *g*, radicle, or main descending root, from which side roots are emitted; *h*, surface of soil; *i*, stem; *j*, seed leaves; *k*, central, ascending axis, with second or true leaves appearing; *l*, proper depth of inserting in soil in pricking off.
- I, seedling Carnation affected with blackleg: *m*, radicle, dark brown or black, shrunken and dead; *n*, soil level; *o*, sound portion of stem; *p*, seed leaves; *q*, central axis, intact but stunted; *r*, depth of inserting in soil, in the hope of inducing roots to push from the sound portion of the stem, the blackleg portion being cut away at the cross line.
- J, desirable form of seedling Carnation: *s*, radicle, with soil adhering to the ramifying roots; *t*, soil level; *u*, seed leaves; *v*, second or true leaves.
- K, seedling Carnation, showing lowest depth to prick off: *w*, hole made with a dibber; *x*, seedling placed in the hole.
- L, seedling Carnation, showing the greatest desirable depth of insertion in soil at pricking off: *z*, stem, with the growing point clear of the soil.
- M, seedling Carnation pricked off too high: *a*, surface of soil; *b*, long and exposed stem, liable to lean to one side as soon as pricked off, or afterwards by growth of the top, as shown in outline at N; *c*, crooked stem.
- O, seedling Carnation pricked off too low: *d*, growing point below the surface of the soil and therefore liable to decay as shown at P; *e*, decayed centre.



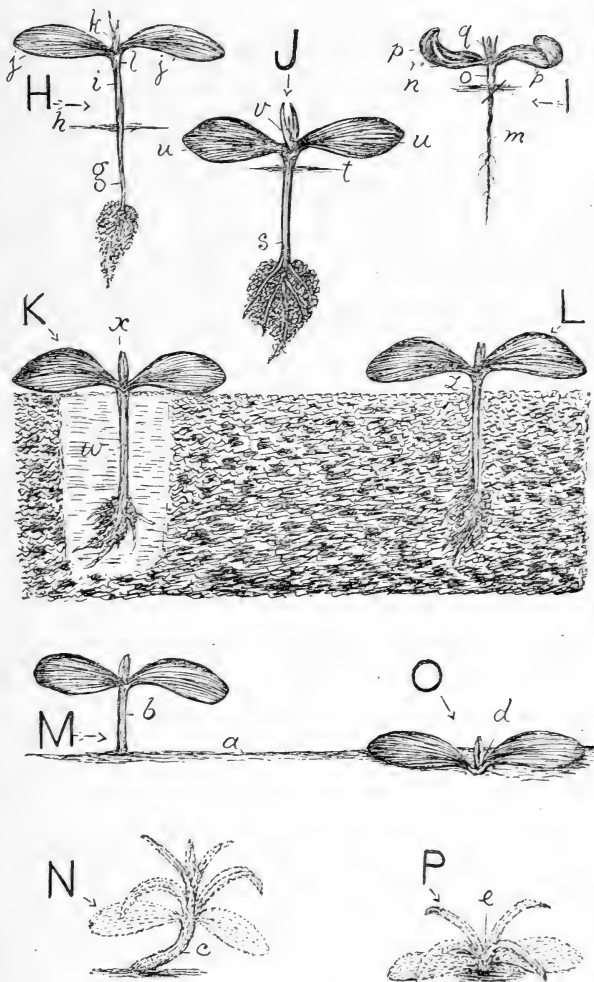


FIG. 15.—See opposite page, also Chapter III.

plan which is adopted at Hayes by Mr. Martin Smith. He refuses to coddle his plants. The seedlings, raised from a February sowing and grown on, are planted out in May and pass the winter in an open field, and there they flower and are selected the following summer.

It may be asked if the plants could not be flowered the same year as sown. The reply is that a winter or early spring sowing could not be relied upon to give flowering plants before the second year unless the plants were pushed forward in heat; and this, while quite feasible in places where warm structures are at command, cannot be recommended, because it tends to make what should be a hardy plant tender.

Sowing out of doors in May or June is a practicable system, and can be recommended. Plants from sowings made much later than this would hardly be strong enough to stand the winter, especially in stiff, wet land.

Seedling Carnations grown from mixed seed, sown with such things as Wallflowers or Sweet Williams in May and June, are generally very floriferous. They make large, bushy plants, which bloom profusely. A large proportion of the flowers is double if the seed is from a good strain, but there will be a certain percentage of single and semi-double blooms. These are of no use for special propagation, but will come in useful for cutting.

In sowing under glass either pots or boxes may be used, but in both cases a compost of loam, leaf mould, and sand in equal parts will suit. Make it firm, and have it moist but not saturated. Set the seeds in singly, as then all danger of overcrowding will be

RAISING FROM SEED. FIG. 16 (NEXT PAGE).—PRICKING  
OFF UNDER GLASS.

- Q, potting off singly into a 2½-inch pot: *f*, drainage; *g*, thin layer of moss  
*h*, soil; *i*, space for holding water; *j*, seedling, carefully lifted when  
the second or true leaves are showing.
- R, pricking off into a 3-inch pot: *k*, drainage; *l*, soil; *m*, seedlings, placed  
round the side at about 1½ inches apart.
- S, pricking off into a 6-inch pot: *n*, crocks, *o*, cinders; *p*, rougher parts of  
compost; *q*, soil; *r*, seedlings, about 1½ inches apart.
- T, pricking off into a pan: *s*, drainage; *t*, rougher parts of compost; *u*, soil;  
*v*, seedlings, about 1½ inches apart.
- U, pricking off into a box: *w*, bottom, with holes and a crock over each;  
*x*, drainage; *y*, soil; *z*, seedlings, placed about 1½ inches apart.
- V, pricking off in a frame: *a*, bed of ashes on which the frame is placed;  
*b*, ashes or ballast to make the plants an even distance from the glass;  
*c*, layer of rough compost; *d*, soil; *e*, plants placed 3 inches apart;  
*f*, height of ashes or other protective material placed against the sides  
and ends when the seedlings are wintered in a frame.

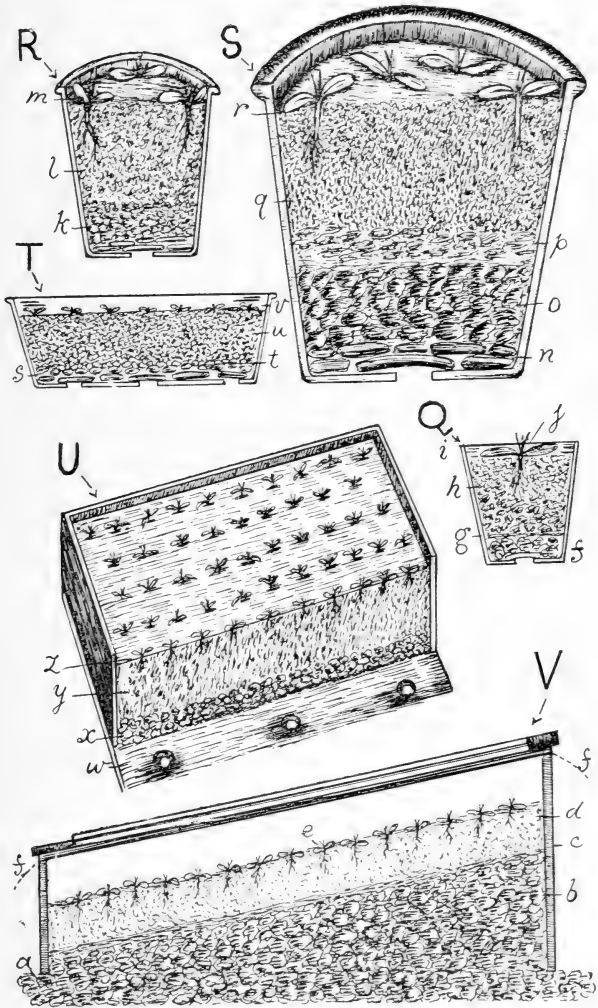


FIG. 16.—See opposite page, also Chapter III.

averted, and cover about  $\frac{1}{2}$  inch deep. The references to the illustrations give details.

When the young plants begin to grow keep them close to the glass, give them abundance of air, and avoid overwatering. This will result in sturdy plants. If crowded together a long way from the glass they will become drawn and weakly. If kept very wet blackleg may attack them.

The seedlings should be pricked off directly they touch each other, and they may either go  $1\frac{1}{2}$  inches apart into other boxes, or singly into small pots, or be put out in a piece of well prepared, finely pulverised soil in the open ground.

## Chapter IV.—Propagation by Pipings or Cuttings.

THERE are people who hesitate to embark on the special culture of Carnations for no other reason than that, in looking at lists, they see that the price of novelties is high.

It must be at once admitted that if the beginner fills up all his space with the very latest varieties he will have a rather heavy bill to foot. But who need do this? There are plenty of Carnations of great beauty that may be purchased very cheaply; in fact, they cost no more than a Chrysanthemum or a Dahlia. One or two novelties added to the collection will impart interest and distinction, and if

### RAISING FROM SEED. FIG. 17 (NEXT PAGE).—PRICKING OFF OUTDOORS.

- W, pricking off bed in section: *g*, ordinary soil, broken up a few inches deep and made fine and even on the surface; *h*, prepared compost, placed on the natural soil about  $2\frac{1}{2}$  inches deep and made moderately firm; *i*, seedling properly inserted.
- X, arrangement of seedlings in pricking off bed in squares, as indicated by the dotted lines: *j*, alley; *k*, bed; *l*, plants.
- Y, seedlings pricked off into a bed outdoors and arranged in equilateral triangle order, thus giving them full advantage of space: *m*, alley; *n*, bed; *o*, plants.
- Z, plants pricked off, 3 inches apart, the object being to allow them to remain where pricked off until late summer or early autumn: *p*, alley, about 1 foot wide; *q*, bed, not more than 4 feet wide; *r*, seedlings planted equilaterally 3 inches apart.

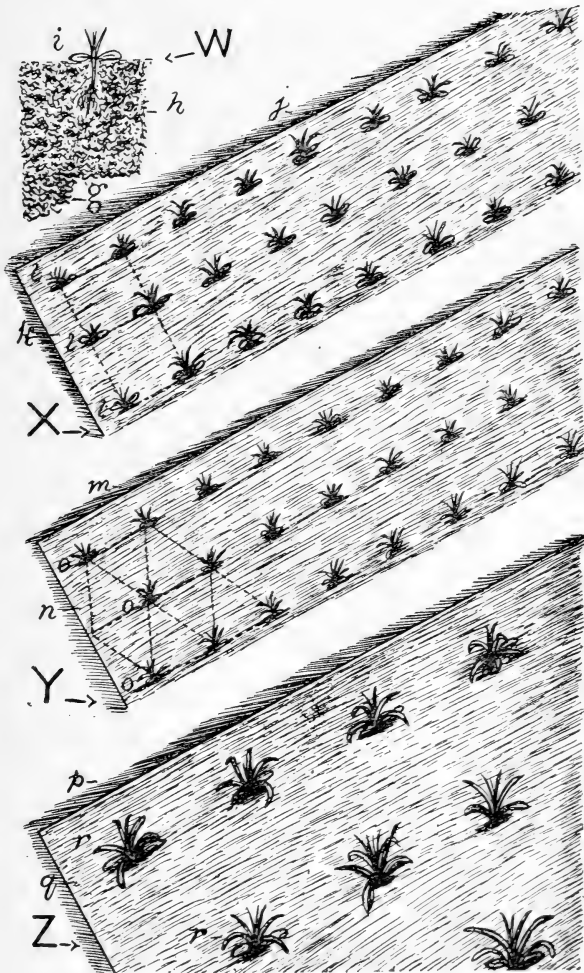


FIG. 17.—See opposite page, also Chapter III.

taken in homœopathic doses they will not unduly strain the purse strings.

The writer made a start on the lines of about twelve standard sorts to one novelty. The stock varieties were purchased from various well-known dealers; the specialities were direct from the famous Hayes source.

It would not be easy to express the pleasure which these various acquisitions imparted. They gave the writer a new gardening interest. He followed the doings of the leading exhibitors, the proceedings of the Carnation Society, and the description of novelties, with the utmost alertness. Alas! most of the plants went the way of much Carnation flesh during the first winter from the attacks of mould. In frames and out of doors it was just the same. The stock steadily dwindled, until it was reduced to the most saddening meagreness. He tried again; again the winter thinned the plants severely, and not until he had discovered a means of baffling this deadly enemy did he succeed in maintaining the stock. As to this, more in a later chapter.

It is a point in favour of the Carnation that it can be propagated so readily. When every plant gives its half-dozen or more young ones there is no reason why gardens should go without Carnations. Of layering it is proposed to speak fully later on; at present it is desired to point out how readily stock may be increased by pipings and cuttings. It frequently happens that there are growths on a Carnation which are not suitable for layering. They may be too short, or they may be so situated that if they were drawn down for layering they would snap off. Material of this sort need not be wasted where there is a shortage of stock. It may be utilised in the form of either a cutting or a piping.

Propagation by pipings is not now practised much in connection with Carnations, although common enough with Pinks, which have more slender shoots and a more tufted habit than their sisters. Oldtime Carnation growers did not despise a piping. They pulled

RAISING FROM SEED. FIG. 18 (NEXT PAGE).—PLANTING OUT.

- 1, sturdy seedling raised by sowing seed at the end of March or early in April, pricking off, growing on, and planting outdoors at the end of May or early in June. The outlines show the depth of planting in flowering quarters.
- 2, planting out bed, in an open, selected position, where the ground has been trenched to a depth of 18 inches, and cultivated for some years, so that the mould is in a friable, open condition. A good dressing of thoroughly rotted manure should be added, but the manure ought not to be placed in immediate contact with the roots: *w*, alleys, 16 inches wide; *x*, bed, 4 feet wide, and plants 16 inches apart in equilateral triangle arrangement; *y*, hole taken out with a trowel; *z*, plant placed in the hole with its ball of soil.

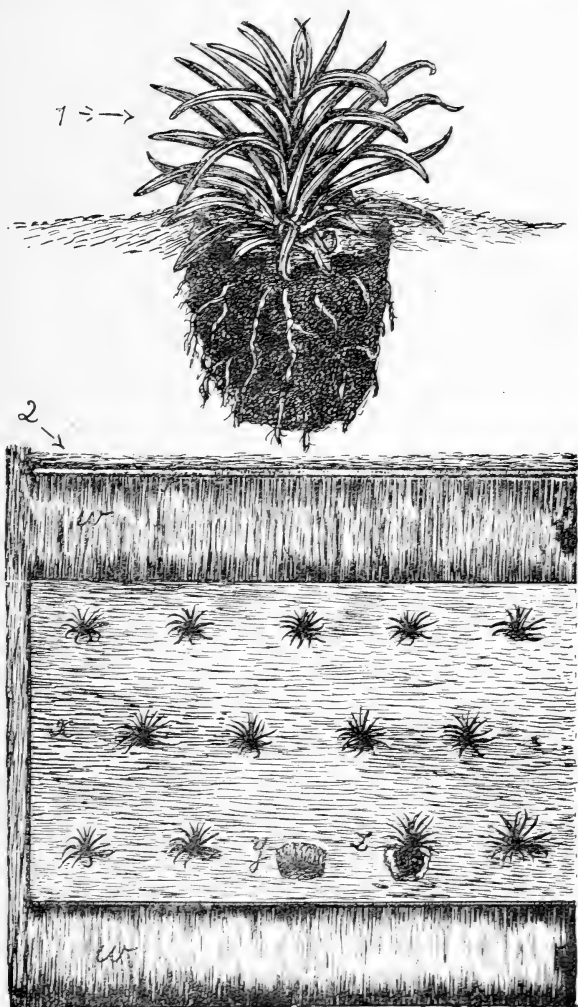


FIG. 18.—See opposite page, also Chapter III.

the short shoots out of their sockets with a jerk, or removed them with a part of the joint, and struck them.

Propagation by cuttings is still practised extensively. It is almost universal with Tree Carnations, and it is followed with both Malmaison and Border sorts. Cuttings may vary in length

PROPAGATION BY PIPINGS OR CUTTINGS. FIG. 19 (NEXT PAGE).—  
PREPARING AND INSERTING IN POTS.

- A, plant with young growths, none of which is sufficiently long, or which is so placed as not to admit of layering: *a*, point where the flower stem has been cut off; *b*, fairly good "grass," long enough, but in danger of snapping off in bringing down for layering; *c*, point of detaching for a cutting. In taking a piping proper, the part below this point is held firmly in one hand and the portion above grasped by the fingers and thumb of the other hand, and with a sharp jerk upwards this portion is plucked out from its socket; *d*, a moderately long shoot, which it is desirable to cut off at the cross line, thus leaving the basal joints on the plant to push new growths; *e*, short shoots 2 to 4 inches in length, to be detached close to the stem, known as "heel" cuttings.
- B, a piping proper: *f*, point of detaching from the stem and with about half of the joint, the separation being made at the side; *g*, depth of inserting in soil. This mode is now obsolete as regards the Carnation.
- C, a vigorous shoot, *Aa*, made into a cutting: *h*, joint from which the leaves have been carefully cut off; *i*, point of cutting transversely immediately below the joint; *j*, slit made upwards just through the joint—an old practice, and by some still followed.
- D, a moderately strong shoot as slipped off, with a base too firm for quickly pushing roots: *k*, point of removing the lower leaves.
- E, a moderately strong shoot, *D*, made into a cutting: *l*, cut made just below a joint; *m*, depth of inserting.
- F, a short shoot, *Ae*, prepared for insertion: *n*, base, pared smooth and the leaves removed from the lower joints; *o*, depth of inserting in soil, in no case so deeply as to bury the "hearts" of the cuttings.
- G, a cutting of a vigorous shoot, with leaves shortened, as practised by some growers: *p*, base of the cutting.
- H, cutting inserted in a 2-inch pot: *q*, drainage; *r*, soil; *s*, surfacing of sand; *t*, hole made with a dibber, the cutting resting on and surrounded with sand; *u*, space for holding water.
- I, cuttings inserted in a 5-inch pot: *v*, drainage; *w*, rougher parts of the compost; *x*, soil; *y*, surfacing of sharp, clean sand; *z*, cuttings inserted in holes made by a dibber; *a*, cutting properly inserted; *b*, space for holding water.
- J, cuttings inserted in a pot, the pot stood in a well drained pan with a layer of mould and sharp sand placed in level with the rim, and a bellglass placed over the cutting pot: *c*, pan to be placed on the stage of the greenhouse; *d*, pot of cuttings; *e*, bellglass.
- K, cutting pots placed in a cold frame: *f*, ashes in which the pots are plunged.



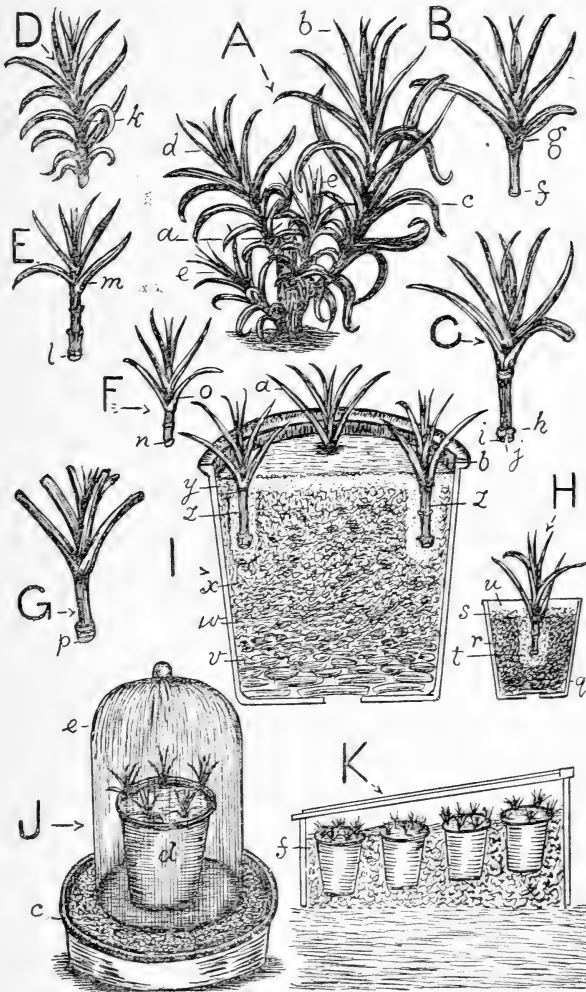


FIG. 19.—See opposite page, also Chapter IV.

and character. They may be the upper part of growing shoots, or they may be short shoots, cut close to the stem. In all cases they should be severed transversely, and if the base is not cut clean it must be pared quite smooth. The lower leaves should be shortened, and the cuttings inserted firmly. Beginners frequently press the soil hard round the upper part of the cutting, and leave it loose below. The base should be made firm by pressing it against the soil with a blunt stick inserted diagonally.

One cutting may be inserted singly in the centre of a 2-inch pot, or several together in a 5- or 6-inch. In the latter case they must stand well clear of each other. Use a crock and a little clean moss for drainage, finishing off with the rougher parts of the compost. Half each of loam and leaf mould, with a heavy dash of sand, may be used with advantage. A little sand may be dropped into the hole for each cutting, and the pots surfaced with it. As a rule, the cuttings root readily in a cold frame. If put in a frame, stand the pots on a layer of cinders to check the ingress of worms. Where convenience exists they may be covered with a bellglass or handlight in a greenhouse. Naturally rooting is quicker with bottom heat than without it, but it is not absolutely essential. Whether it is used or not may depend on circumstances.

The illustrations will make the various points clear, and the potting of the young plants when rooted may now be dealt with.

When top growth commences to be observable at the apex of the Carnation cutting, it may generally be taken as granted that roots are also being emitted. If any doubt exists upon this point, an average, healthy cutting should be gently lifted by inserting a label under it. Any cuttings which show a tendency to yellowing, or are affected by blackleg disease, as depicted in Fig. 21, Q, p. 49, should be thrown away or burnt as soon as their condition is noticed.

When roots are being pushed freely, a number of 2- or 3-inch pots should be prepared by thoroughly cleaning and drying

PROPAGATION BY PIPINGS OR CUTTINGS. FIG. 20 (NEXT PAGE).—  
UNDER A HANDLIGHT, WITH AND WITHOUT BOTTOM HEAT.

- L: *g*, hotbed formed of sweetened stable manure, about 6 inches larger all round than the handlight or frame to be placed upon it, and 18 inches in height; *h*, soil; *i*, cuttings; *j*, handlight.  
M: *k*, ground level; *l*, layer of ashes, 6 inches deep; *m*, soil, 4 inches deep; *n*, cuttings inserted; *o*, handlight. Where the ground is light and porous it is not necessary to form a cinder bed.  
N, cutting, with the leaves shortened, at the callusing stage: *p*, callus.  
O, cutting, with the leaves not shortened, showing the earliest stage at which it is desirable to repot: *q*, roots; *r*, grass starting from a bud below the ground; *s*, grass pushing from the stem just above the soil; *t*, growing point, from which ultimately springs the flower stem.

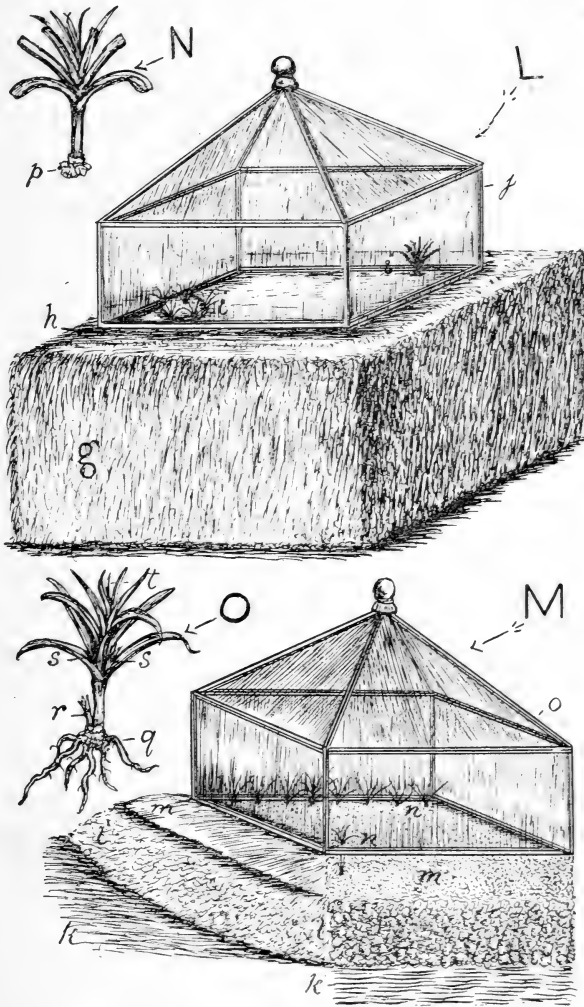


FIG. 20.—See opposite page, also Chapter II.

them, placing a large crock, hollow side downwards, over the drainage hole, and sprinkling a few finely broken pieces of soft brick or flower pot over it. A thin layer of half decayed turf or clean moss should be placed over the crocks, and then may come the compost. This should consist solely of fibrous, sandy loam, pulled to pieces with the fingers and mixed with one-third of its bulk of coarse sand. If used fairly dry such a compost may be firmly compacted, which will provide a root run suitable to the production of sturdy plants. The cuttings should be inserted to the basal leaves, spreading the roots well out, and taking care to leave sufficient space for applying water.

Strong cuttings frequently assume a tree-like growth, as shown at U (Fig. 21, p. 49). They should be staked and encouraged, as they generally yield quantities of bloom. Should a cutting after potting become weak and spindly, as shown at V, its top should be pinched out with the finger and thumb, taking care to leave at least four good leaves. From the axils of these young shoots will arise, and the plant ultimately become a sturdy specimen. Green fly must be watched for at this stage, and promptly checked by the application of tobacco powder.

When the roots of the young plants in 3-inch pots commence to show round the ball of soil, repotting should be carried out without delay. The next shift should be into the flowering pot,

PROPAGATION BY PIPINGS OR CUTTINGS. FIG. 21 (NEXT PAGE).—  
POTTING ROOTED CUTTINGS.

- P, a rootless and useless cutting: *u*, base, callusless and rootless; *v*, stem sound, but inclined to yellowness; *w*, top, no growth having been made since insertion.
- Q, a blacklegged cutting: *x*, stem, black and dead; *y*, top, stationary; *z*, point where mould usually appears and causes damping off—such a cutting should be removed as soon as noticed.
- R, a vigorous rooted cutting of a Pink-like border Picotee, lifted and potted in a 3-inch pot: *a*, drainage; *b*, soil; *c*, roots; *d*, space for holding water.
- S, an ordinary Carnation cutting, rooted and potted into a 2½-inch pot: *e*, drainage; *f*, soil; *g*, roots; *h*, space for holding water; *i*, top growth.
- T, an ordinary Carnation cutting with the leaves shortened at the time of insertion, rooted and potted into a 2½-inch pot: *j*, drainage; *k*, soil; *l*, roots; *m*, space for holding water; *n*, top growth.
- U, a plant propagated from a cutting assuming a tree-like style of growth, to which there is a tendency in plants propagated from cuttings: *o*, stem-like basal part; *p*, side growths, pushing from the axils of the leaves; *q*, point where the flower stem springs.
- V, a young plant from a cutting having a tendency to spindle: *r*, point of topping to induce back growth.
- W, a young plant, V, pushing growth after stopping: *s*, young shoots which are usually convenient for layering.

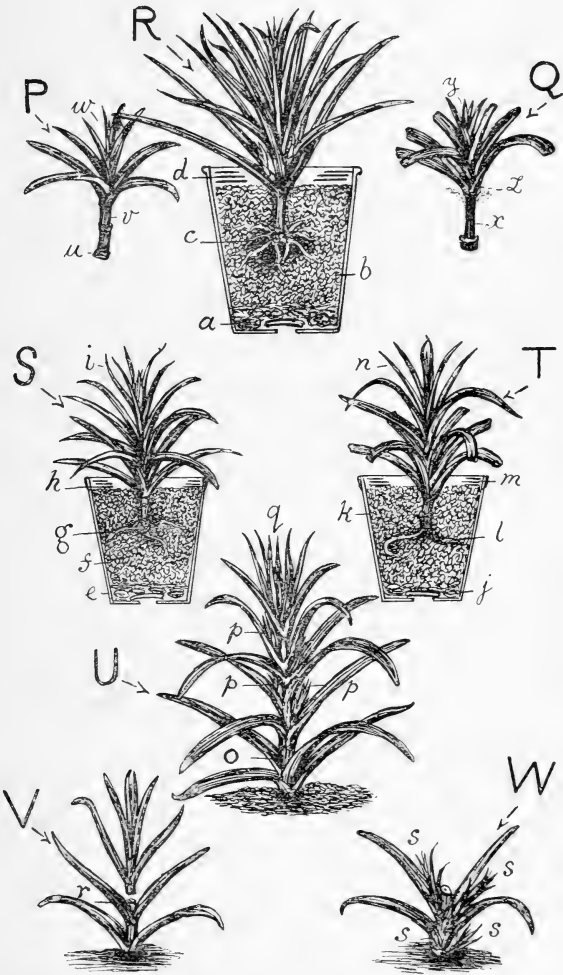


FIG. 21 —See opposite page, also Chapter IV.

if the plants are to flower under glass, and the fresh pot may well be, for the average plant, 6 inches in diameter. An extra strong plant, such as shown at U, p. 49, may have an 8-inch pot, and a weakly on a 5-inch pot, but the 6-inch size is the best for general use. Abundant drainage should be provided, and both pots and compost should be sweet and clean. For this potting the soil should consist of turfy loam 2 parts, dried horse manure rubbed through a sieve 1 part, and a 6-inch potful of coarse sand and old lime rubble, mixed, to every peck of compost. As before, pot firmly, and leave space for top-dressing and watering.

Premature flower stems should be removed at their points of origin, as shown at Y, p. 51, and every effort made to secure good grass at the base of the plant, as this will afford layers for future propagation, on the lines to be described in Chapter V.

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## Chapter V.—Propagation by Layering.

IN the chapter on increasing Carnations by seeds we said that layering was an artificial and not a natural process. Nevertheless, it is extremely valuable to the cultivator. Save for the sportiveness to which many cultivated plants are prone, and which, in the case of valuable florists' flowers, enhances rather than diminishes their interest, propagation by layering ensures flowers on the progeny identical with those on the parent. This is of immense value for commercial purposes. Seedlings are variable, and amateurs who grow varieties for certain special qualities of colour or form, as distinct from cross fertilisers who work for new features, would soon find their interest and satisfaction evaporate if they did not get the particular qualities they wanted.

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PROPAGATION BY PIPINGS OR CUTTINGS. FIG. 22 (NEXT PAGE).—  
 POTTING A PLANT RAISED FROM A CUTTING INTO ITS  
 FLOWERING POT.

- X, potting into a 6-inch pot : *t*, drainage ; *u*, soil ; *v*, space for holding water.  
 Y, weakly plant throwing up a flower stem : *w*, buds ; *x*, point of cutting out the flower stem when it begins to rise, so as to strengthen the growth and afford good layers.  
 Z, result of cutting or pinching out the flower stem : *y*, vigorous upper grass, which should be depressed, so as to encourage the lower growths *z*.

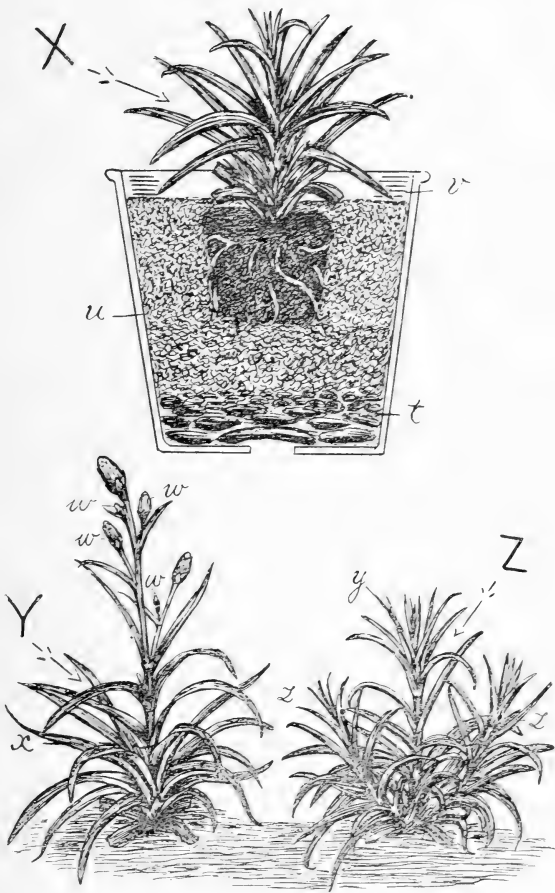


FIG. 22.—See opposite page, also Chapter IV.

It is the habit of the Carnation to throw up a long, wiry stem on which to support its bloom in early summer. Simultaneously with this development there goes on another—that of the formation of a cluster of low, tufty shoots round the base of the stem, which are technically called “grass.” It is amazing how rapidly an apparently puny, almost leafless plant will clothe itself in grass when spring growth begins. By the end of July the shoots are strong, and the layering may soon begin.

A typical tuft of grass for layering is shown at A. It consists of a hard, central stem thickly covered with leaves. There may be only one such on a plant, but usually there are several. Sometimes there are two or three strong tufts and other weak ones. The latter should be cut out altogether.

A little preliminary preparation is necessary before the shoot can be layered. First get ready a supply of soil. It is common to layer into the ordinary soil of the garden, but if this is stiff and wet rooting is slow. It is best to get the sweepings of the potting bench, mixed with a third of sand and, if available, some leaf mould. This compost will encourage free rooting. It should be placed in small mounds round the plant, a few inches from the main stem—one layer one mound (see *q* in F).

PROPAGATION BY LAYERING. FIG. 23 (NEXT PAGE). MODE OF PREPARING AND INSERTING LAYERS IN BED OR BORDER.

- A, portion of a small plant of Border Carnation: *a*, rootstock; *b*, flowered stem, cut off; *c*, stump of a shoot; *d*, weak grass removed, being too short for layering; *e*, shoot suitable for layering; *f*, point up to which it is desirable to remove the leaves.
- B, the proposed layer stripped of its leaves up to the highest advisable point: *g*, stem; *h*, first joint on the stem below the leaves, through which a cut is made halfway, commencing on the under side and passing right through the joint as shown; *i*, tongue.
- C, portion of a larger shoot with a cut made at the third joint below the leaves retained: *j*, base of leaves; *k*, joints with grass buds; *l*, joint through which the cut is made, forming a tongue from which roots are emitted.
- D, portion of a layer shoot with cut or tongue made at the fourth joint below the leaves retained: *m*, joints with grass buds, not to be rubbed off; *n*, joint through which the cut is made to form the tongue, the lower part of which is cut off just below the joint.
- E, mode of making the tongue cut from above: *o*, blade of a knife, sharpened on both sides, thrust through the third joint and brought out just below the joint by means of a clean and rapid cut; *p*, point of shortening the tongue.
- F, layer with shortened leaves inserted in soil: *q*, new sandy soil; *r*, tongue of the layer opened; *s*, peg for fastening the layer.
- G, ordinary wooden peg, about 4 inches long, made from a dried branch of Birch, Hazel, Hawthorn, or Oak.



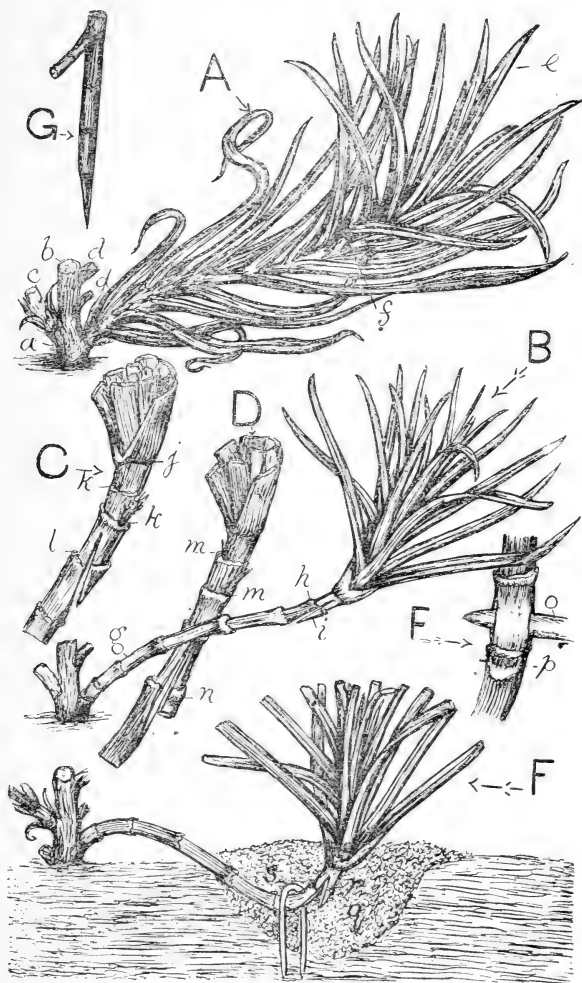


FIG. 23.—See opposite page, also Chapter V.

Now prepare the layer by pulling off the leaves on the lower part and putting them, to avoid littering, in a box. The extent to which this defoliation may be practised is indicated at *f* in A, and at *h*, *i* in B, p. 53. The stem, *g* in B, is left bare except for a tuft or crown of leaves, which may be trimmed in, but this is not absolutely essential. Just below these leaves, say at the third joint, pass the blade of a sharp knife into the lower part of the stem, and draw it up through the joint; or with a keen pointed knife, with both edges sharp, pierce the joint, and bring the knife out with a downward slicing stroke. The exact method is not material. The important point is to cut through a joint and form a tongue, which should be drawn gently open before the layer is pegged down on its mound. Pegs may be made quickly from old Hazel that has been used for Pea sticks, or they may be bought ready made. The "Unique" Layering Pin, sold by Mr. R. Sydenham, Tenby Street, Birmingham, is one of the best.

If the layering is done by the middle of August the plants will have good time to make roots before autumn. With suitable soil they will form a strong cluster of fibres in six weeks, so that by, say, the end of September they will be ready for separation from the parent.

Before detailing the subsequent treatment it may be well to glance at other methods of layering. For instance, Carnations are frequently flowered in large pots. Exhibitors often adopt the plan of growing their plants in pairs in 9-inch pots. Strong specimens, grand blooms, and abundance of grass are thus secured. Naturally

PROPAGATION BY LAYERING. FIG. 24 (NEXT PAGE).—LAYERING IN POTS.

- H, section of part of a 9-inch pot in which a pair of Carnation plants have flowered: *t*, pot; *u*, space for holding water; *v*, plant untrimmed; *w*, flowered stem, to be cut off after fading; *x*, shoots too short and too high up for layering, but which may be taken off and inserted as cuttings; *y*, basal shoot that may be utilised as a heel cutting; *z*, shoots suitable for layering; *a*, plant showing preparing processes; *b*, shoot carefully trimmed of leaves with scissors preparatory to tonguing; *c*, shoot trimmed of leaves; *d*, cut made through a joint forming a tongue *e*, and leaves shortened to about level with the central growing point leaves, *f*; *g*, soil taken out of the pot 2 inches or so deep, this being done all round the inside, or where the layering is to be effected. This space should be filled with new soil, raised level with the rim.
- I, part section of a 9-inch pot in which layering has been done: *h*, new soil; *i*, tongue open; *j*, peg; *k*, surface level; *l*, layer with leaves shortened, this being optional; *m*, layers prepared for insertion; *n*, shoots not eligible for layering, being short and too high up on the plant. The pots in which the shoots are layered should be stood out in the open until the layers have rooted. If layered in August, the layers will be sufficiently rooted to admit of potting off by the end of September.

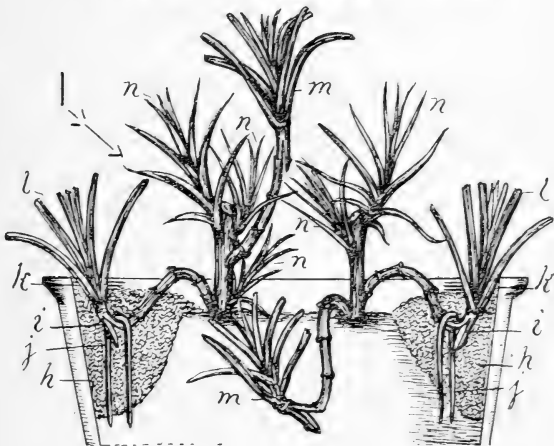
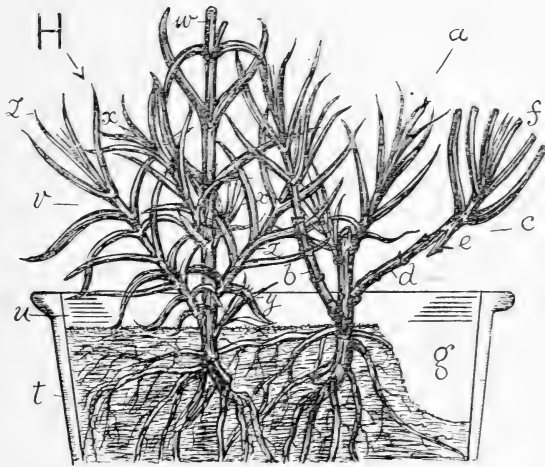


FIG. 24.—See opposite page, also Chapter V.

the shoots vary somewhat in strength and position. The stronger basal shoots may be layered with as much success as, and with little less ease than, plants out of doors. They should be prepared in the same way, so far as stripping and tonguing are concerned. The same practice may also be observed with regard to soil, *i.e.* the preparation of a special gritty, root-encouraging mixture. To make room for this, carefully remove about 2 inches of soil from the pot, and substitute the fresh, making it firm right up to the brim. The plants will be best in the open air while the rooting is proceeding.

In the case of shoots that are of the right character for making good layers, but are very high up on the plant, layering direct into small pots stood on or within the rim of the large pot may be practised. As the layer cannot be taken down to the soil, the soil is taken up to the layer; or a zinc band or artificial rim may be pressed into use in order to raise the soil. In either case the details of layering are the same (see p. 57).

Where the plants are grown in smaller pots, and the grass extends so far beyond the pot rim as to render the use of other pots or a band of no avail, the simplest plan is to plunge the

PROPAGATION BY LAYERING. FIG. 25 (NEXT PAGE).—LAYERING INTO POTS STOOD ON THE PARENT PLANT POT. LAYERING WHEN THE PARENT PLANT POT IS SUNK IN ASHES OR SOIL.

J, plant with grass or side growth too high up to allow of layering in its own pot: *o*, basal grass or shoots too short for layering; *p*, shoots too high up on the plant to be brought down for layering into the same pot; *q*, section of a pot stood on the parent plant pot and into which a shoot, *p*, is trimmed, tongued, and layered; *r*, drainage; *s*, soil; *t*, layer tongued, pegged, and soil pressed firmly; *u*, space for holding water; *v*, layer as it appears after being properly made and inserted. Note: Instead of using pots for layering high up grass, a top-dressing or layering band may be used. One is made by A. Porter, Stone House, Maidstone, of zinc. The ends are not fastened, but overlap about 6 inches, so that by pulling out or pressing in they can be made to fit any pot up to 10 or 11 inches. In using the band, lift the pot, and pass it up from the bottom; then pull out or press in to the side of the pot, just inside the rim. If soil is placed in high up, the grass may be layered into it.

K, layering grass grown beyond the pot rim at the layering joint, by plunging the plant pot in ashes and layering in a pot, or plunging in soil and layering in prepared compost outside the rim: *w*, pot plunged to its rim; *x*, grass grown considerably over the rim of the pot, but capable of being brought down for layering. Layering when the pot is plunged in ordinary soil: *y*, ground level of ordinary soil; *z*, prepared soil placed in where the layer is to be affixed; *a*, layer prepared and properly inserted. Layering when the pot is plunged in ashes: *b*, layering pot fixed firmly in ashes after filling with proper soil, and a layer duly inserted.



FIG. 25.—See opposite page, also Chapter V.

pots up to the rim in ashes or soil, and layer into mounds of prepared compost placed at convenient distances around, or into small pots, just as in the case of plants growing out of doors. In every case the preparation of the layer is the same.

By one or other of these various processes we increase our stock of Carnations. The parent feeds the young plant through the partially severed stem until such time as it has roots of its own. There should be plenty of these by the end of September, and when signs of central growth in the layer appear it may be taken that roots are present. These will mostly form on the tongue, and in severing the young plant from the parent stem a sharp knife may be passed through the latter close to the tongue, L, Fig. 26.

The layer is now a plant with an entirely separate existence from that of its parent. What shall be done with it to ensure its future welfare? Where shall it pass the winter? These are important questions, and merit deliberation.

In growing hardy plants for exhibition purposes it is recognised that in certain stages they may be subjected to treatment which will rob them of a measure of their hardiness. This is the case with Chrysanthemums, and it is also the case with Carnations. The defence of the exhibitor is frank—he does not grow the plants for the object of improving their constitutions, he grows them with the object of getting the finest possible flowers from them. This being admitted, the reason for growing Carnations under glass in winter is

PROPAGATION BY LAYERING. FIG. 26 (NEXT PAGE).—LIFTING ROOTED LAYERS FOR PLANTING OR POTTING. POTTING SINGLY AND IN PAIRS. PLACING IN A FRAME FOR WINTERING.

- L, lifting a rooted layer : *c*, soil removed over the layer stem ; *d*, point of cutting through the stem between the layer and the plant ; *e*, trowel thrust by the side of the layer so as to lift the (new) plant with the mass of roots as nearly as possible intact, and with a ball of earth round them ; *f*, top, central growth made, indicating rooting, and from which a flower stem pushes in the succeeding season ; *g*, side growths pushing, called grass, and from which cuttings or layers are made in the succeeding year.
- M, lifted layer potted singly into a 3-inch pot or even larger, according to strength : *h*, drainage ; *i*, layer of moss or rotted leaves ; *j*, rougher parts of the soil ; *k*, soil ; *l*, roots, spread out evenly, if lifted without soil ; *m*, space for holding water.
- N, potting layers in pairs into a  $4\frac{1}{2}$ -inch pot : *n*, drainage ; *o*, layer of moss or partially decayed leaves ; *p*, rougher parts of the compost ; *q*, soil ; *r*, layers placed on opposite sides of the pot ; *s*, space for holding water.
- O, section of a frame for wintering plants : *t*, ground level ; *u*, rough ashes, surfaced with finer, placed so as to bring the plants well up to the light ; *v*, pots stood on ashes ; *w*, pots plunged in ashes to the rim ; *x*, growth space ; *y*, light ; *z*, ashes or other material placed against the sides and ends of the frame in severe weather.

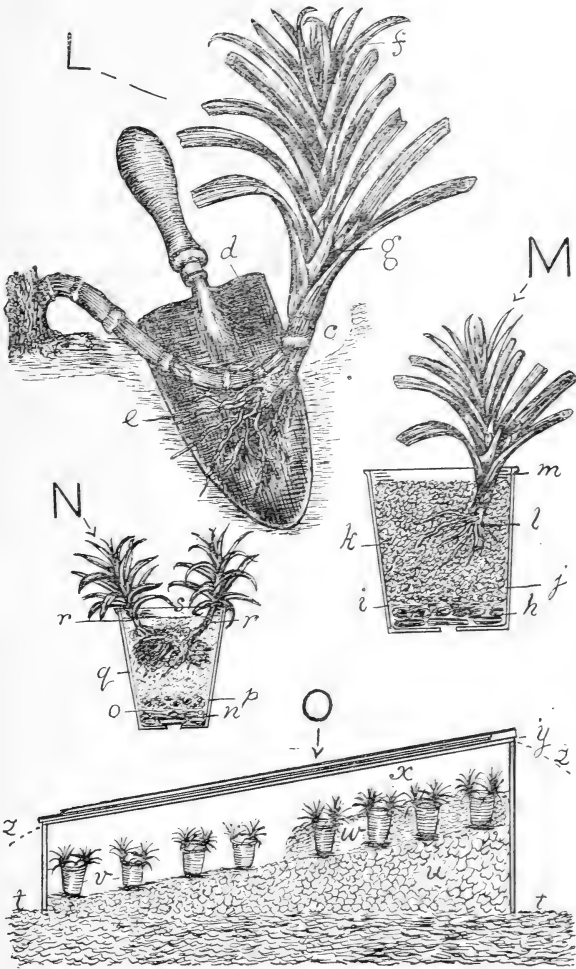


FIG. 26.—See opposite page, also Chapter V.

found, and most experts pot their rooted layers, and winter them in frames.

While the writer avoids the presumption of teaching the leading exhibitors how to grow Carnations, he yet has doubts as to the wisdom of glass for wintering. In his own experience, he has found that plants in frames are a constant source of anxiety during the winter. They are particularly liable to mould, even when given plenty of room and abundance of air in favourable weather. After losing several hundreds of plants, he resolved to plant the rooted layers straight out into beds, and has had no reason to regret the practice. Mould can be kept under with greater ease in the open air than in frames, and if there is a certain wastage of grass, and only a small plant remains when spring arrives, it develops very rapidly. A raised and well-drained position is chosen, so that there may be no fear of stagnant moisture about the plants.

Amateurs who do not grow for show, but for ordinary results in beds and borders, are advised to try the open air treatment. The Carnation is a hardy plant, and although flowers of the finest exhibition quality may not be possible out of doors, very nice blooms can be got.

Where potting for wintering in frames is practised, the plants should be carefully taken up with a trowel while the soil is moist, in order to get a good ball of earth with the roots. With care, the roots are neither bared nor broken, and only a very slight check to growth is imparted. The plants may be potted singly in 60's or in pairs in 48's, taking care to drain the pots. A compost of loam 3 parts, leaf mould 1 part, and a good dash of sand, is suitable. Plunge the pots in cinders in a frame. M, N, and O, Fig. 26, give the details.

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## Chapter VI.—Culture in the Garden.

WE have seen how Carnations may be raised from seed, cuttings, and layers, and by one or other of these processes we have got a stock of plants. We may now proceed to consider methods of bringing them to perfection (1) for the garden; (2) for exhibition.

The beauty of Carnations when grown in beds by themselves is fully realised when a garden is visited where these lovely flowers are specialised, such as that of Mr. Martin R. Smith at Hayes, Kent. The glorious flowers, with their soft foil of glaucous, grey green grass, are markedly effective. It may be asserted with little fear of contradiction that no garden plant is capable of giving brighter or more pleasing floral pictures than the Carnation.

Where a large collection is grown they may be planted in a series of beds skirting the lawn, or in a group of rectangular beds with



paths or alleys between. In smaller gardens perhaps a couple of circular beds in turf can be provided. The writer secured a much admired effect by throwing up a mound on the farther slope of a small dell, and edging it with stone. Eighteen inches of soil on a base of old stumps and rubbish comprised the rooting medium. Here the plants thrived splendidly.

The light, graceful habit of growth which the Carnation possesses should be considered. It is a pity to huddle the plants up in a mass close under the eye like a bed of Geraniums. Distant effect should be considered.

The position chosen should be open and well drained. The Carnation does not like either stagnant air or stagnant moisture at the roots. Shade must be avoided, and tree drip regarded as fatal. The plants will thrive on heavy ground if it is well drained, but not on clay in a damp bottom. On the other hand, although they like a light, loamy soil, they will not make good grass in a shallow, impoverished medium.

Soil that has only been lightly cultivated should be deepened by thorough digging. Bastard trenching is still more advantageous. This is effected by marking out the bed, throwing out the soil to a good spade depth in a 2 or 3 feet wide strip across the plot, and wheeling it to the other end for filling in, then laying on a coat of manure, breaking up the subsoil thoroughly, and filling up the strip with top soil from the next, so proceeding through the bed. This deepens the rooting area, raises the level, renders the soil friable, and facilitates the passing away of surface water. If the top soil is poor it may be enriched with a coating of manure, provided it is well decayed. Rank wet manure straight from a yard is not so safe.

This preliminary deepening should be done a few weeks before planting if possible; the surface will crumble readily, and may be raked over for planting. In the case of seedlings, the alleys between the beds may be 18 inches wide, and the spaces for the plants marked 1 foot apart, but for choice plants it is well to have the alleys wider, to facilitate the inspection by visitors, allowing the plants 16 inches of space. This will give plenty of room for development, and if they are "angled," *i.e.* each three plants in neighbouring rows forming a triangle, there will be plenty of room for layering.

In very stiff, cold soils it is wise to raise and lighten the bed by the addition of old mortar rubbish and road scrapings, after laying drain pipes in openings made at the sides of the bed. These openings, filled with rubble and surfaced with cinders or gravel, will make excellent alleys.

Where borders instead of beds are to be planted, the soil preparation may be the same. It is no use looking for the best results unless the soil preparation is thorough.

Assuming that the grower has decided not to pot his rooted layers, he may plant direct into the beds early in October. It is wise, however, in any case, to pot a few to save for a reserve; they may come in useful for filling up gaps. With the soil

prepared on the lines already advised, planting may be carried out expeditiously. Use a trowel or hand fork, avoid disturbing the roots, plant well up to the lower leaves, and press firmly. Be careful not to have a hollow beneath the roots, or water may collect in it; let the ball be in contact with the soil beneath and around it.

In the case of plants which have been cultivated in frames,

OUTDOOR CULTURE. FIG. 27 (NEXT PAGE).—PREPARING THE GROUND.

- A, section of ground: *a*, top spit; *b*, second or bottom spit, closer and stiffer than the top spit; *c*, substratum.
- B, portion of ground marked off for bastard trenching: *d*, when the bed is to be 4 feet wide with 18-inch alleys; *e*, when the bed is to be 4 feet wide with 3-foot alleys; *f*, trench  $2\frac{1}{2}$  feet wide, one full spit and shovellings deep, and the soil wheeled to the side of the spot where it is intended to finish, *g*; *h*, surface soil skimmed off the second trench and placed in the trench from which the top spit is taken; *i*, bottom spit, on which well decayed manure is placed before breaking it up; *j*, top spit from the second trench to be thrown on the first, and so on to the end of the plot, when the soil first thrown out will come in to fill up the last trench.
- C, section of bastard trenched ground for a bed 4 feet wide with 18-inch alleys: *k*, undisturbed stratum; *l*, bottom spit, broken up and manured; *m*, top spit; *n*, excess rain passing off the surface.
- D, bed prepared 4 feet wide with 18-inch alleys: *o*, alleys taken out about 3 inches deep sloping from the bed, and the soil placed on the bed; *p*, bed raked down moderately fine and level, and marked for plants in squares 6 inches from the sides of the bed, and 1 foot apart.
- E, bed prepared with stations 16 inches apart, the outside rows 8 inches from the edge of the bed: *q*, alleys (3 feet wide); *r*, bed (4 feet wide), the plants in opposite vacancy order.
- F, raised bed on heavy or clay soils, bastard trenched, and burned clay, mortar rubbish, or road scrapings added: *s*, alleys; *t*, the bed raised 8 inches above the surrounding ground, with alleys on the latter's level, or higher.
- G, section of preparing bed on wet ground: *u*, stiff clay subsoil with only a few inches of ameliorated surface soil; *v*, land drain; *w*, excavations made in V form on both sides of the proposed bed, the top soil placed alongside; *x*, bad stratum cleared away and a tile drain laid along the trench *y*, with outlet to land drain; *z*, bottom of bed convex (falling from centre each way to the drain); *a*, subsoil broken up, manured, and opening materials added; *b*, top spit soil, with additions of opening substances; *c*, good soil taken from the alleys and placed on the bed.
- H, section of bed after preparation: *d*, land drain; *e*, trench drains; *f*, rubble; *g*, surface of gravel, thus forming dry alleys above the surrounding ground level; *h*, subsoil broken up; *i*, good soil.
- I, bit of border partly in section and partly in surface. Section: *j*, substratum; *k*, subsoil broken up, but not brought to the top; *l*, surface soil or top spit worked, enriched, and kept on the top. Surface: *m*, grass or gravel; *n*, border 8 inches above the level; *o*, plants in single line; *p*, plants in equilateral triangles; *q*, plants in quincunx groups.

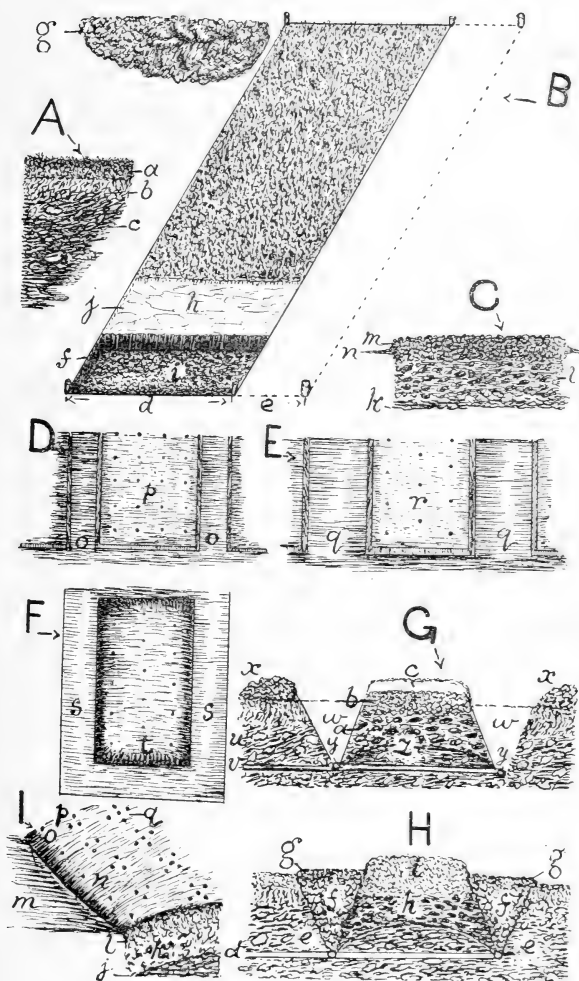


FIG. 27.—See opposite page, also Chapter VI.

open weather in March may be chosen for planting. Of course, the same regard should be had for firmness.

A great many amateurs may have no home stock from which to draw material for filling their beds. These may purchase their plants in March, April, or even May, but very late planting should be avoided, as it is desirable to get the plants well established, and making grass, before the hot weather comes.

The simplest way of planting is in straight rows of single plants about 16 inches apart. The front row may be 8 inches from the edge, and the second double the distance behind, the plants in these being "angled" with the front row, that is, the first plant in the second row is not exactly behind the first plant in the front row, but equidistant between the first and second plants, so that the three form a triangle. To give a very bold effect the plants may be "triangled" in clumps (L and O at *a*) or planted in blocks of five, one plant at each corner of a 16-inch square, and one in the centre (M). With abundance of plants the whole of the three systems may be adopted with magnificent effect in a wide

OUTDOOR CULTURE. FIG. 28 (NEXT PAGE).—PLANTING.

- J, a plant from a layer, carefully lifted: *r*, hole made with the trowel, using a line to keep the rows straight, and also a measuring rod or rule to ensure the distances being equal; *s*, plant placed in position; *t*, ground level or depth of planting, all the best of the foliage being left above the surface.
- K, a plant from a pot: *u*, ball; *v*, surface.
- L, plants arranged in equilateral order, sometimes practised in beds, but more commonly in borders, to give a good effect at a certain point, the plants being 16 inches apart, one at each angle of the triangles.
- M, a group of plants arranged in quincunx order, as is sometimes practised on borders to form a fine clump of bloom, four plants being put at each angle of a square, 16 inches apart, and one plant in the centre.
- N, a bed properly planted: *w*, alleys not less than 18 inches wide; *x*, bed, 4 feet wide, plants 16 inches apart, the outside row 8 inches from the alleys.
- O, a bed planted in two ways: *y*, alleys, 3 feet wide; *z*, portion of the bed with plants 16 inches apart; *a*, portion of the bed with the plants in equilateral triangles, 16 inches from clump to clump (centre to centre), a mode sometimes adopted when the plants are required to supply abundance of blooms for cutting.
- P, a portion of a border: *b*, turf or gravel; *c*, border raised about 8 inches above the grass or border level, and with a slight rise to the back; *d*, portion with plants 16 inches apart, the outside row 8 inches from the edge; *e*, a portion planted for effect, the outside row 8 inches from the edge, and the plants (single) 16 inches apart, the next row in equilateral triangles, 16 inches from centre to centre, the back row in quincunx groups, 16 inches from centre to centre; *f*, evergreen shrubs, such as Rhododendrons, with Hollies at the back, these affording shelter from north and east winds, while the Carnations and Picotees have every advantage of light and air.

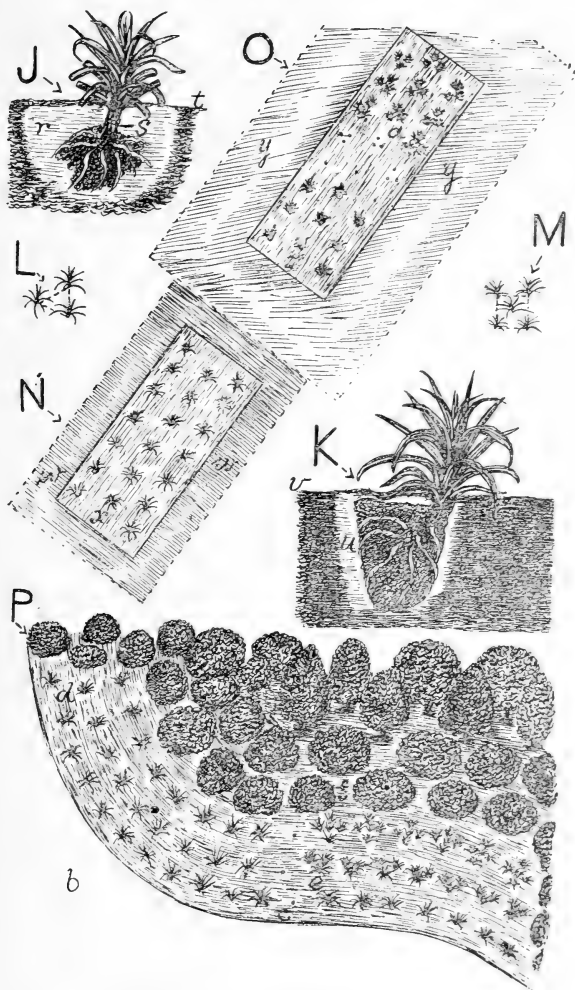


FIG. 28.—See opposite page, also Chapter VI.

border. By having a single row in front, room is afforded for stepping on the border and getting free access to the splendid sheaves of bloom behind, also for layering.

Remember, however, that although these "thorough-paced" plants are indicated, the amateur with a few plants in a single small bed can get just as much pleasure from them, provided he interests himself in them thoroughly, and grows them well.

When thorough soil preparation and careful planting have been practised a long step towards success has been taken. They should

OUTDOOR CULTURE. FIG. 29 (NEXT PAGE).—STAKING.

- Q, one year old plant (layer of previous summer) properly staked and tied: *g*, growths from the base, called grass (prospective layers, or cuttings, or following season's flowering parts); *h*, flower stem; *i*, lateral branches that usually extend considerably, and with a bold terminal bud *j*, and sublateral growths with buds, *k*, springing from the axils of leaflets at the joints; *l*; *m*, short lateral branchlets that usually have a terminal bud with one or more just below it on its stem; *n*, crown bud, or bud at the extremity of the flower stem, and not infrequently a minor bud in the axil of the leaflet; *o*, stake (deal, painted light green), or Bamboo cane (unquestionably the best of wooden stakes), or Hazel; *p*, ligature of raphia, Raffiatape, or other soft material placed round the flower stem, brought up to the stake (not too tightly) and there tied round it, but not fastened to the stake, so that the ligature may be slipped up the stake as the flower stem elongates. When it is desired to have fine blooms for cutting, all the buds but the terminal ones on the lateral branches *i*, and the short lateral branchlets *m*, with any buds in the crown bud, *n*, stem, must be removed as soon as they can readily be seen—thus the flower stem depicted will give four fine blooms, all with long stems and some leaves, which add to the beauty of the cut blooms in vases.
- R, coil stake (such as Porter's Improved Coil Stake, made of stiff, galvanised wire, enamelled green), the dotted line indicating the Carnation stem and mode of adjustment. No tying is required. The stakes are made in three lengths so as to suit different heights of stem, the longest stake being 2 feet 6 inches; *q*, ground level.
- S, Hazel branch stake, a branch of Hazel with the small twigs cut off and the others shortened so as to form a number of forks both in the stem and branchlets; the stake is thus made suitable for placing in and round large plants of seedlings and clump plants of border Carnations, or along the sides of rows of plants in beds, the stems of the plants resting in the forks of the stakes; when not too twiggy, and the flower stems adjusted from time to time, the effect is good; *q*, ground level.
- T, a two years old Carnation staked with coil stakes R, and disbudded to the three best buds—the crown, *n*, and the third and fourth branchlet terminal buds from the crown buds, *s*; *t* grass for layering.
- U, a one year old plant of Old Crimson Clove Carnation, Hazel branch staked, the stakes *u* being placed outside the flower stems, and these arranged so as to rest in the forks; the stems are not disbudded, as some prefer to see and even cut them with buds, these having beauty as well as the expanded flowers.

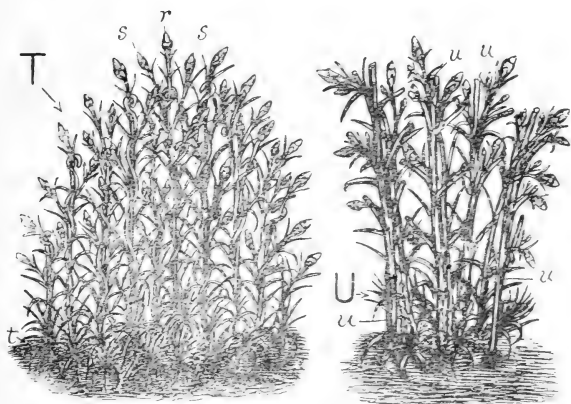
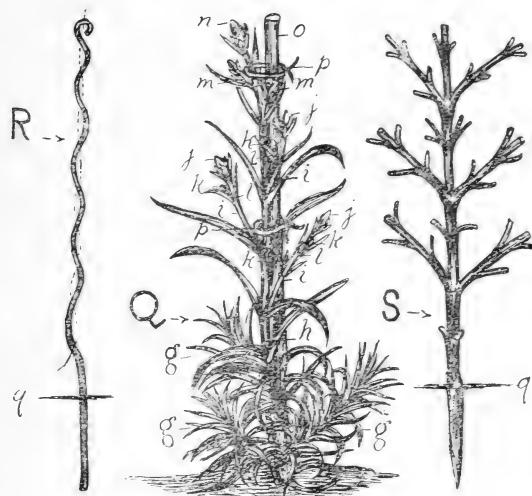


FIG. 29.—See opposite page, also *Figure VI.*

be followed up by intelligent routine, so that the plants may have every chance of doing themselves justice.

If the ground was handpicked for the roots of perennial weeds when the bastard trenching was done there will be no trouble on their account, but annual weeds will appear, and must be kept under by regular hoeing, which also helps to keep the soil moist.

In hot, light, shallow soils mulchings with cocoanut fibre refuse, lawn mowings, or short manure will be a help, but they are not attractive, and can very well be dispensed with where deep cultivation has been practised. Where watering has to be resorted to in

OUTDOOR CULTURE. FIG. 30 (NEXT PAGE).—STRAINED WIRE STAKING AND DISBUDDING.

- V, bed with a double row of plants: *v*, rows of plants; *w*, end parts, deal,  $1\frac{1}{2}$  by  $2\frac{1}{2}$  inches, 2 to 3 feet long, according to the height desired, with a hole bored near the top for the wire to pass through; *x*, stays, 1 inch by  $2\frac{1}{2}$  inches, the lower end abutting on a flat stone, and the upper secured to the end part with screws; *y*, uprights, 1 inch by  $2\frac{1}{2}$  inches, pierced with holes similar to the end posts, and fixed at the same height above ground, these acting as guides for the wire; *z*, stout pegs to which the wire is to be fastened, and the pegs driven into the ground so as to draw the wire taut; *a*, wire ( $\frac{1}{8}$ -inch, No. 10, galvanised and painted green); *b*, stems secured to the wire.
- X, one year old plant at the disbudding stage: *c*, grass; *e*, basal side flower stems, which attain vigour secondary only to the main or central flower stem, and which must be removed only when a few fine flowers are desired; for decorative purposes and cutting they may be retained, and fair flowers had by leaving only their crown buds *f*, and terminal buds of sublaterals *g*; *h*, central or leading flower stem, the only one to be retained when fine blooms are required; *i*, lateral flower stems, to be removed early; *j*, vigorous side branch flower stems likely to produce good blooms, their axillary leaf buds being removed, *k*, only retaining their terminal ones; *l*, lateral flower stems, usually weak and likely to impoverish the crown bud, hence they should be removed; *m*, crown bud, generally giving the best bloom of the plant. It will thus be seen that for securing fine blooms on a plant only the crown bud, 1, the third, 2, and fourth, 3, from the top are retained on the plant.
- Y, upper part of a flower stem, all the side growths below having been removed: *n*, crown bud; *o*, point where buds sometimes appear—they must be removed; *p*, second and third side branchlet buds that must be removed; *q*, third side branchlet from the crown bud having a good terminal bud *r*, to be retained, and axillary bud or buds *s*, to be rubbed off; *t*, fourth side branchlet from the crown bud, usually vigorous, and having sub-branchlets *u*, that must be removed, leaving the terminal bud only, *v*.
- Z, upper part of a flower stem properly disbudded: *w*, crown bud; *x*, terminal buds; *y*, points where branchlets have been removed; *z*, points where axillary buds have been taken out, the leaves in all cases being retained: the dotted cross lines show points where flowers can be cut so as to have long stems.



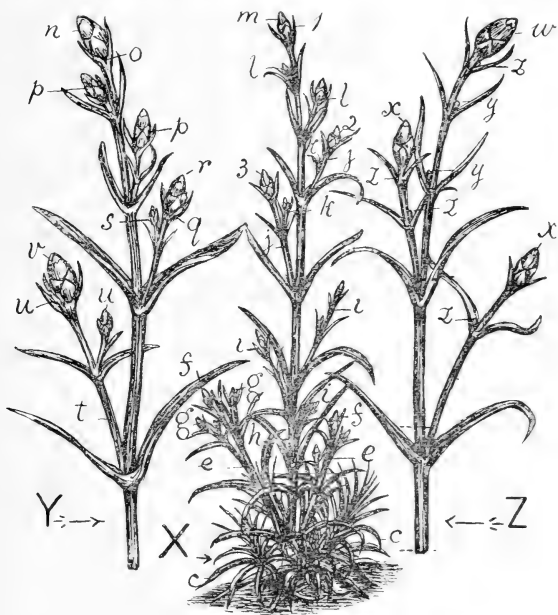
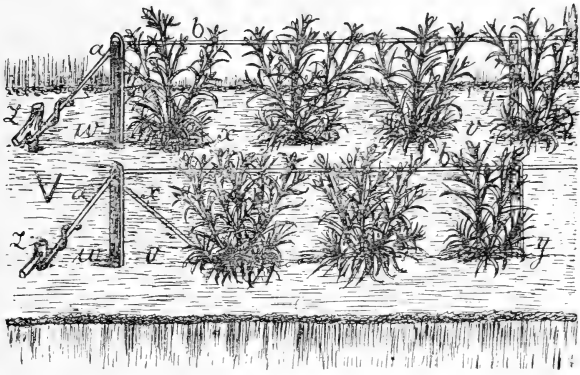


FIG. 30.—See opposite page, also Chapter VI.

case of thin, dry soil it should be done in the evening, the mulching being drawn off for the purpose, and afterwards replaced.

Rabbits are fond of Carnations, and in country districts often cause considerable trouble. Wire netting, and a shot gun in the early morning and evening hours, baffle them. When young rabbits establish themselves in a garden where there is a good deal of cover they are not easy either to trap or shoot, being very watchful and elusive; but with patience and observation they can be laid low. They have their favourite times and places of feeding. They generally come forth in the stillness of early evening, and at dawn. The writer has overcome many a quick and cunning "bolter" by carefully noting his preference as to hour and place, and then making a stealthy barefoot approach in the "wee sma' hours," or in the gloaming.

There are various other enemies, such as insects and fungi, to be kept down, but these we shall consider separately.

Staking will need timely attention. Much may be done with Bamboo stakes and green Raffiatape. They are neat and inconspicuous. Tight tying must be avoided, or the flower stem will not spindle up freely. Looping, rather than tying, should be practised. Many growers prefer special wire stakes. Porter's is good. An excellent stake is made by Mr. R. Sydenham, Tenby Street, Birmingham; and Mr. C. E. West, of Higham Hill, the inventor of Raffiatape, supplies a useful Carnation stake, in common with a great many other valuable appliances for the garden. A twiggy piece of Hazel, well trimmed in, makes a capital support for a clump or big seedling. In some cases, where the plants are grown in long rows, strained wires are resorted to.

Disbudding next demands attention. Plants that are grown from seed, like Canterbury Bells, to give a profusion of bloom in the garden, need not be disbudded. They will give huge masses of pretty flowers, quite suitable for giving a bold effect in a border, and for cutting. Where, however, fine individual flowers are wanted, to exhibit, for example, disbudding is indispensable. The beginner may expect his plant to throw up a single flower stem plant, crowned with one fine bloom, but this is not Nature's way. She believes in profusion to secure her ends. The stem will not only show several buds near the summit, in addition to the central or crown bud, but also, probably, throw out subsidiary flowering growths. This trait is well portrayed in Q, Fig. 29, and in X, Fig. 30, which have been carefully drawn from life. If the lower flowering stems are left on they very seriously tax the strength of the plant, and the main stem suffers in consequence. The lower buds on the main flowering stem should also be picked out immediately they can be got hold of, and the upper buds thinned to three, namely, the crown bud of the leading shoot, and the third and fourth, counting from the top, below it. A reference to Y and Z, p. 69, will make the point quite clear.



*Photo: Cassell and Co., Ltd.*

**FIG. 31. A LAWN BED OF CARNATIONS IN MR. MARTIN SMITH'S GARDEN.**



FIG. 32.—PRIZE CARNATIONS IN A MIDLAND GARDEN.

## Chapter VII.—Culture in Pots for Home and Exhibition.

IN the present chapter it is proposed to show how Carnations and Picotees are managed by those specialists who cultivate them for prize winning purposes. The words "for exhibition" need not alarm any amateur who wishes to grow his plants in pots for the decoration of his greenhouse alone; the hints to be given about soil, potting, tying, etc., will be thoroughly helpful to him. He may not wish to go so far in the way of disbudding, but even here the advice to be given will have some value, for every plant, whether grown for giving prize blooms or not, will be benefited by a certain amount of disbudding.

It should be noted that reference is not made now to the Tree or Winter-flowering Carnations, which will be treated on separately in due course.

In speaking of the wintering of rooted layers, it was remarked that young plants which are intended for exhibition are usually potted up in autumn and wintered in frames. We may now take these young plants in hand, and deal with the potting and future treatment. They may be potted singly, in pairs, or in threes. Many prominent exhibitors grow their plants in pairs in 8- or 9-inch pots, and get magnificent flowers.

In all cases the drainage must be perfect, and the soil of the very best. Adequate drainage may be secured by placing a large crock, or oyster shell, hollow side downwards, over the drainage hole, then smaller pieces evenly overlapping it, next a thin layer of small bits, and then some rough pieces of the compost, or a little clean moss. Not a few growers prefer to do away with the old fashioned large potsherd for covering the hole, and substitute one of the modern, worm excluding wire "corks." These can be had from Mr. C. E. West, of Higham Hill, and perhaps other dealers in garden sundries.

The staple of the compost should be good fibrous loam well broken up; quite 3 parts of the heap should consist of this, and the remaining fourth may consist of well decayed, dried, and crumbled manure and leaf mould in equal parts. Carefully look over the ingredients for wireworms and small earthworms before putting them together. These creatures must be rigorously excluded. The mixture may be rendered more gritty and porous with a dash of sand, and a 4-inch potful of superphosphate may be incorporated with every bushel. The heap should be well turned, centre to outside, outside to centre, three or four times, to ensure thorough mixture, without which it is imperfect. If dry it should be watered the day before using; this act should not be left until the time for starting to pot, or the soil will be messy.

It is hardly likely that the ball of the young plant will require interference when it is shaken out of its small pot, but if the outside soil is sour crumble it away gently with the drainage. In potting, first put in a little of the compost, and make it moderately firm by pressing with the fingers; then put the plant into position, and while keeping it steady with one hand drop the soil around it with the other, making the mould quite firm round the ball. A small potting stick is useful, as the soil can be made firmer than it can with the fingers.

This potting should be done at the end of February or the beginning of March, and the plants replaced in a frame, which may be kept closed for a few days. There will be no need for daily waterings at this period of the year; indeed, if the soil is kept saturated new roots will push very slowly. At the first sign of growth, which will be an indication that the plant is established in its new pot, give air freely. The grower should resist any temptation to push the plants on in heat. They do not need it, and will be the worse for it.

As to whether the plants are potted singly, in pairs, or in threes, convenience may have its say. The expense of large pots is a deterrent to some amateurs. Those who specialise, and have some little reason to hope for prize money, will probably face the cost, and practise the orthodox plan of having pairs in an 8-inch pot, or threes in a 9-inch. In any case the principles of potting are the same, and

CULTURE IN POTS FOR EXHIBITION. FIG. 33 (NEXT PAGE).—POTTING  
IN SPRING INTO THE FLOWERING POTS.

Potting singly. A, section of 7-inch pot for a strong plant: *a*, drainage; *b*, layer of the rougher parts of the compost or moss; *c*, soil; *d*, height to which the soil is to be placed and made firm, thus bringing the collar of the plant very slightly below the rim; *e*, ball; *f*, soil placed round the ball after placing the plant in position and pressing it down moderately firm; *g*, space for water; *h*, plant; *i*, collar or junction of the plant with the soil; *j*, grass; *k*, central or main growth, from which the flower stem springs.

B, section of 6-inch pot into which a moderately vigorous plant is placed; the references are the same as for A.

C, section of 5-inch pot with small or weakly plant properly potted; the references are the same as for A. The only difference in B and C is the depth of the drainage and the space for holding water.

Potting in pairs. D, section of 9-inch pot: *l*, crock; *m*, drainage; *n*, soil; *o*, space for water; *p*, ball of soil, not broken; *q*, a pair of the very strongest plants.

E, a pair of medium or moderately vigorous plants in an 8-inch pot. A small or weakly pair of plants should be placed in a 7-inch pot.

Potting in threes. F, 9-inch pot partly in section: *r*, crock; *s*, drainage; *t*, soil; *u*, space for water; *v*, plants.

G, three medium plants from 2½- or 3-inch pots, properly potted into an 8-inch pot. Small or weakly plants should be placed three in a 7-inch pot.

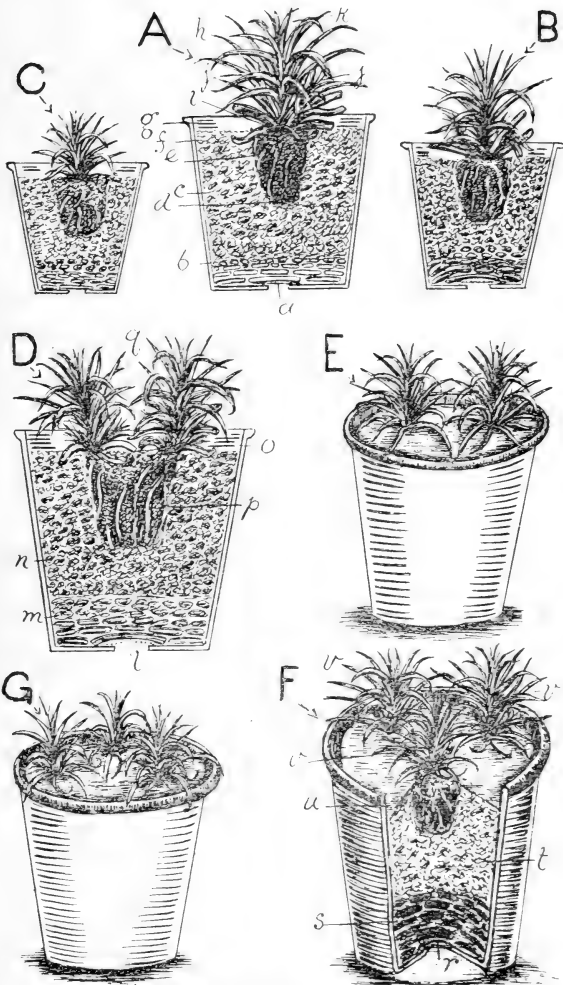


FIG. 33.—See opposite page, also Chapter VII.

it is quite certain that if they are faithfully carried out, and due attention is given subsequently, success will follow, whatever the exact system of potting may be.

It may be well to caution amateurs not to throw away the weakest plants from a batch of seedlings of a choice strain. They often prove to be the best varieties. Flower them all, and so be on the safe side.

### Disbudding.

It may be laid down as a general rule in this important matter that, just as weak plants of Roses should be pruned harder than strong ones, so weak plants of Carnations should be disbudded more severely than their larger sisters.

It is always dangerous to prevent a vigorous plant from having a natural outlet. Refuse it this, and it will kick over the traces at some part of the journey. In the case of a strong Carnation, very severe disbudding is apt to result in coarse or malformed blooms. It may be said: "Why not carry the argument to its logical conclusion, and abstain from disbudding altogether?" But this would not do. What we have to aim at is a happy medium—good sized flowers with refinement, not huge, coarse flowers on the one hand, nor very small, characterless blooms on the other.

Growers learn with experience what to expect from particular varieties. They learn about what strength the plants should be, and what disbudding they need, to give the very best flowers.

#### CULTURE IN POTS FOR EXHIBITION. FIG. 34 (NEXT PAGE).— DISBUDDING.

- Plants in threes in a 9-inch pot, showing the several disbuddings to one, two, and three buds respectively.
- 1, to one bud (central shoot), the crown or main of the flower stem: *w*, main bud; *x*, points where buds have been removed as soon as they could be taken between the finger and thumb; *y*, points where lateral flowering shoots were stopped as soon as they could be gripped, this being done to throw all the vigour into the main stem.
  - 2, to two buds (right hand shoot): *z*, main bud; *a*, fourth flowering stem from the main bud retained; *b*, the first bud below the main bud removed, because it is likely to appropriate nourishment; *c*, the second bud removed; *d*, the third bud removed; *e*, the fourth bud on the stem, chosen because it is more promising than the three above, any bud or buds on its sub-stem being removed, *f*; *g*, points from which lateral flowering shoots have been removed.
  - 3, to three buds (left hand figure): *h*, joints from which lateral flowering shoots have been removed or stopped as early as practicable; *i*, side or lateral flower stem retained, being the fourth from the main bud, the buds in the axils of the leaves being removed, *j*; *k*, third lateral flowering shoot, from the main bud, relatively promising and therefore retained, the bud in the axil of the leaves being removed, *l*; *m*, points at which weakly buds have been removed, being calculated to impoverish the main bud; *n*, main bud.





FIG. 34.—See opposite page, also Chapter VII.

While learning, it is well to disbud to one flower on a stem, except in the case of very vigorous plants with particularly strong stems; in their case two, or even three buds may be left. Generally speaking, Sells are stronger than Bizarres, Flakes, and Picotees. In no case should one plant be allowed to carry several flower stems. Restrict the plant to the main stem. If any secondary or basal lateral stems begin to rise nip them out at once. Exercise equal promptitude with the buds. If a bud has got to go, pick it out directly it can be got hold of; do not wait until it is half expanded.

The upper or crown bud is the most important. If a stem is to be allowed to carry two flowers let them be the crown and the fourth from the top; if three buds the crown, third, and fourth from the top. The respective systems are shown in one pot of three in Fig. 34, and the references accompanying it will make the details quite clear.

The results of disbudding are shown in Figs. 35 and 36, respectively a Picotee and a Carnation.

In Fig. 35 three Picotee plants are grown in an 8-inch pot. Each plant has been restricted to one flowering stem, the others being pinched out at an early stage. Disbudding has been practised, so that only three buds have been left on each flowering stem, namely, the crown or main bud and the third and fourth from it. The shoots have been secured to spiral stakes, and the buds lightly looped to them. Such a pot of plants is handsome and effective in itself, apart from the fact that it yields exhibition flowers.

In Fig. 36, p. 81, one Carnation plant has been grown in a 6-inch pot, and a little more freedom allowed. Side flowering shoots as well as the central have been retained, and only basal flower buds removed. The blooms are not so fine individually, but they are good for cutting.

### Staking.

Attention to staking is as necessary in pots as in the garden, for if the plants are not so much affected by wind the large prize flowers are heavy and the stems long.

The commonest and cheapest form of stake is the green deal "flower stick" of the florist. It can be purchased in bundles of 50 or 100, either plain or painted, of various lengths. This with West's green Raffiatape, makes a neat and inconspicuous combination. Ordinary bass or raphia may be used, but it is more obtrusive than Raffiatape, and, what is more, is not in so convenient a form for use. It is purchased in bundles, Raffiatape on reels.

Whatever tying material is used, care should be taken to allow of the stem spindling up freely. This cannot be the case if the

FIG. 35 (NEXT PAGE).—RESULTS OF DISBUDDING.

Three plants of a Picotee in an 8-inch pot, only the central flower stem having been allowed to remain on each.

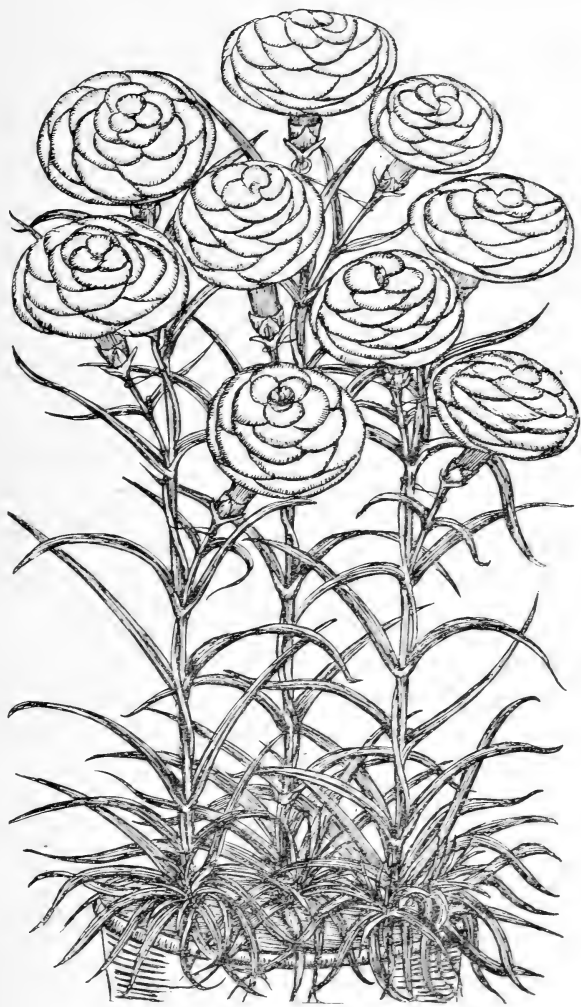


FIG. 35.—See *op. post.* page, also Chapter VII.

tie is fastened to stem and stake, or indeed to either. It should form a loop, which will rise with the stem, and at the same time prevent it breaking over.

The necessity for free extension has led to the introduction of clips so made as to clasp both shoot and stake. A good one is sold by Mr. R. Sydenham, Tenby Street, Birmingham, under the name of Unique. It costs 9d. per 100. It can be used with a Bamboo stake, if this is preferred to the deal stick. It may be added that Mr. Sydenham also sells a cheap and useful layering pin. Undoubtedly Bamboo stakes are excellent. They are cheap, neat, and lasting.

Wire coil stakes are coming more and more into use. They are practically everlasting, and no ties are needed, except for the buds near the top, as the stem is worked into the coils of the wire and through the loop at the top of the stake.

All three of these methods of tying are shown on p. 83. Of course, it is not suggested that they should be practised on the same pot of plants, as there shown—the object is to save the necessity for several illustrations, and bring all the various modes at once under the reader's eye.

Staking and tying should always be done betimes. Much harm accrues if the stems swing loose and bend over.

#### **Pod Bursting and its Prevention.**

Enough has already been said in respect to pod bursting to show that the sympathies of the writer are with those who aim at raising and selecting non-bursters. But the time has not yet come when all can entirely dispense with artificial aids. There are many beautiful varieties which, when grown to a good size, are liable to split. The results of this contretemps are disastrous. The mass of petals causes a bulge; the flower becomes lopsided, and its symmetry is gone.

An examination of Fig. 38, p. 85, will teach the construction of a Carnation flower. It will be seen that the calyx tube, or pod, has a support in the form of basal bracts; but the burst does not come at the base, it comes near the top of the tube, just below the point where the latter becomes segmented. What are wanted are greater toughness and elasticity at this point; they exist in some varieties, which rarely "burst," but by no means in all. It is at this point that the support must be placed. Indiarubber rings are generally used. They must be of a size to fit the tube without severely compressing it. Directly a crack occurs, causing the petals to lean to one side, ease the other lobes with a series of slits, and place a ring in position; the flower will then expand evenly all round, and a symmetrical bloom will be secured. But many growers anticipate the trouble by putting a band in position before a slit shows itself.

#### **Shading and Protecting the Blooms.**

When the flowering period approaches the expectant grower sees the crown of his labours at hand, and it behoves him to see



FIG. 36.—RESULTS OF DISBUDDING.

A flaked Carnation in a 6-inch pot, allowed to push side flowering stems as well as the central stem.

that the reward of his care is not snatched away from him at the last moment.

Shading will have to be thought of. If the grower is in the happy position of having a large, roomy, airy house for his pets his trouble will be small, as with the usual blinds he can shade at will. Plenty of air will be needed, but insects are not wanted. Mr. Martin Smith has his houses fitted with wire doors in summer, so that abundance of air can be admitted without letting in swarms of bees and other undesirable insects. The grower prefers to do his own pollinating; he does not want the bees to do it for him.

The person who is engaged in the laudable task of trying to win first prizes in good company, without the aid of glass other than frames, is less favourably situated. His best plan will be to stand the pot plants in a group, and fix an awning over them. At the very least the pots should stand on sharp cinders; it would be still better to knock up a stage for them, with the legs stood in pans of water, as not only will worms be excluded, but other creeping pests as well. Earwigs, it is well known, have wings, but it is certain that they do not use them as freely as they might, for, failing the ability to creep up a plant from the base, they will generally leave it alone altogether.

Any provision of this nature should be ready by the middle of June, as from then onwards the plants may be expected to advance rapidly into bloom, and with no shade from the sun they might move too fast. A suitable height for the stage will be 18 inches, as this will bring the flowers nicely under the eye.

If the wood is first of all dressed with a paint of Stockholm tar thinned with paraffin oil, three coats being put on in succession as each one dries, and then painted to the desired colour, it will last a lifetime.

So much for the support. With respect to the shelter, something

CULTURE IN POTS FOR EXHIBITION. FIG. 37 (NEXT PAGE).—  
STAKING.

- 1 (left hand), plant staked with an ordinary deal stake, painted light green: *a*, points where lateral flowering shoots have been stopped or removed; *p*, places where buds on the main stem have been removed; *q*, stake; *r*, ligatures; *s*, lateral flowering shoots retained on a strong growing variety, all the buds but the terminal one of each being removed, and the shoot looped up with raphia, neither tied to the stake nor the shoot, but in the middle, *t*; *u*, main or crown bud.
- 2 (right hand), a plant staked with a Bamboo cane; *v*, clip (Sydenham's Unique) by which the main stem is secured to the stake; *w*, bass loop ties for preventing the breaking or the excessive drooping of the lateral flowering shoots.
- 3 (centre), a plant staked with a coil stake, the wire galvanised and enamelled green; *x*, the main stem gently twined in a spiral coil of the stake, and into the loop at the top; *y*, no ties on the main stem; *z*, lateral flowering shoots looped up with Raffiatape or green soft cotton ligatures.

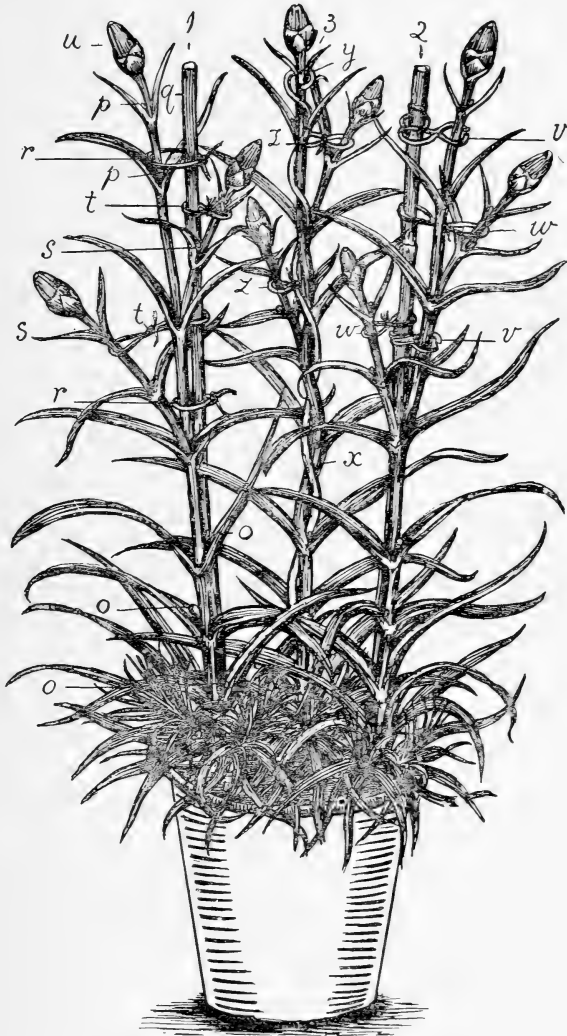


FIG. 37.—See opposite page, also Chapter VII.

must depend upon the means and time of the grower. An ingenious man will have his own ways of effecting his object, but a few suggestions will not be out of place. A light framework of hexagon netting, fixed over and around the plants, will exclude bees, but it will not turn heavy rain. Waterproof canvas will do this. It is best tacked on to light sashes, so that the covering can be easily removed at will. A framework of uprights and rafters (p. 87) will first be necessary. The posts should stand about 6 feet out of the ground, and have the lower part creosoted. The frames can be clipped down to the rafters with bolts and screws. Similar side frames can be clipped on to the uprights, so completing the enclosure. They need not fit tight up to the eaves, for the sake of admitting air, and if fitted near the base on each side with hinged boards opening outwards, there will be ample ventilation. The openings may be protected with hexagon netting, and the door may be of the same material, tacked on to sashes. Further, as already hinted, netting frames may be made to substitute for the canvas frames in favourable weather. Of course, glass sashes may be used instead of canvas if desired, but then the place approximates to a greenhouse; or there may be a glass roof and canvas sides and ends. The very simplest form of awning is one falling close down to the side of the stage, as shown by the dotted line; but, wherever possible, more room should be given.

Exhibition blooms growing in the open will also need protection, as burning sun or heavy rain might seriously mar them. West's

CULTURE IN POTS FOR EXHIBITION. FIG. 38 (NEXT PAGE).—TYING  
THE CALYX TO PREVENT POD BURSTING.

- H, a calyx of average shape: *a*, stem; *b*, basal bracts; *c*, calyx tube, called the pod; *d*, calyx segments, called teeth.
- I, a flower bud of average shape: *e*, main stem; *f*, point where a bud is removed; *g*, sub-leaves that support the peduncle of the flower bud; *h*, bracts that guard the calyx; *i*, calyx tube; *j*, segments; *k*, petals (note the teeth in the centre of the petals); *l*, point where pod splitting occurs, if at all; *m*, point where the ligature is to be placed if necessary to prevent pod bursting.
- J, bud of a large flowered and highly cultivated variety: *n*, stem; *o*, guard leaves; *p*, bracts; *q*, calyx or pod; *r*, calyx segments; *s*, petals; *t*, point where the ligature is to be placed to prevent pod bursting.
- K, flower bud, J, to which an indiarubber ring has been affixed: *u*, ring very slightly less in diameter than the calyx tube or pod, the measurement being taken by calipers, as only pressure enough for holding on is required—indenting the pod is bad.
- L, bud of average shape, I, bursting the pod: *v*, calyx segment pressed outward by the growth of the petals within causing a slit, *w*; *x*, indent of calyx lobe that must be eased by a slit down the pod, as per dotted line, and so on with the other lobes, affixing a ring at the point *y*, and turning down the teeth of the pod *z*.
- M, flower bud of average shape, L, which is inclined to burst the pod, properly adjusted: *a*, ligature placed round the pod; *b*, calyx lobes turned down; *c*, petals given an opportunity of developing equally all round.





shades, which most sundriesmen supply, are good. Or shades may be made at home of cardboard or tin. Waterproof transparent canvas may also be used, if procurable.

### Collars.

There is no detail in connection with exhibiting Carnations which has been so severely criticised as that of staging them on collars. The attack has gone on for generations. The fiercest invective, the most pungent sarcasm, have been launched at collaring, without having the slightest effect in restricting the practice. The exhibitor has serenely pursued his placid way, either unconscious of the "slings and arrows" aimed at him, or disdainfully ignoring them.

The critics declare that exhibiting a flower with a "ruff" round its neck is hollow, artificial, and an offence to good taste. Exhibitors (or such few of them as think it worth while to notice the attacks) contend that it is only when a bloom rests on a snow white base of cardboard that its true refinement can be seen. The critics, they

FIG. 39 (NEXT PAGE).—PROTECTING THE BLOOMS.

- N, stage or stand; *d*, receptacles filled with water; *e*, posts or legs, 4 by 4 inches, and 18 inches long, the lower part turned for appearance sake, but not too much diminished for stability; *f*, bearers, 4 by 3 inches long, narrow part upwards; *g*, platform of battens,  $1\frac{1}{4}$  inches thick, 3 inches wide, fixed so as to allow about 1 inch between each two.
- O, section of the shelter or awning over stage; *h*, brickwork foundation on which the posts of the stage stand; *i*, pans; *j*, hollow for water; *k*, stage or stand; *l*, posts, 8 feet 6 inches to 9 feet long, fixed 6 feet out of the ground, and 3 feet of the lower part creosoted, the exposed part squared to 3 or 4 inches; *m*, plate, the width of the posts and sloped to suit the pitch of the rafters; *n*, rafters, 3 by  $2\frac{1}{2}$  inches, grooved  $\frac{1}{2}$  inch from the sides of the upper edge, narrow face upwards; *o*, ridge piece, 6 by  $1\frac{1}{2}$  inches, to which the rafters are secured by screws, as also to the eavesplate; *p*, iron tie rod; *q*, cap of zinc secured to the ridge; *r*, light frames made similar to glazed lights, covered with canvas, and so wide that their edge will come in the middle of each rafter, where at the bottom should be a projecting bolt and screwdown nut gripping the frames to keep them in place; *s*, side frames corresponding to the roof frames, covered with canvas, jammed under the rafters, and resting on a board at the lower part, *t*, being secured there with nuts; *u*,  $\frac{1}{2}$ -inch feather edge boards, preferably battened, and hinged at the top to open outwards as shown by the dotted line, so as to admit air on the opposite side to that on which strong wind blows.
- P, cover for shielding Carnation blooms in the open air from sun and rain; *v*, stake; *w*, arm or support of galvanised iron affixed to the top of the cover *x*, and with socket, *y*, for receiving the top of the shade handle or stake; *z*, cover or shade formed of tin, the disc about 1 foot in diameter, height 6 to 9 inches.
- Q, conical shade of cardboard, oilcloth, or thin tin, any diameter; *a*, stake; *b*, point of the stake where a peg or nail is driven through to support the shade; *c*, shade; *d*, wedge inserted between the stick and the cover to make it firm.

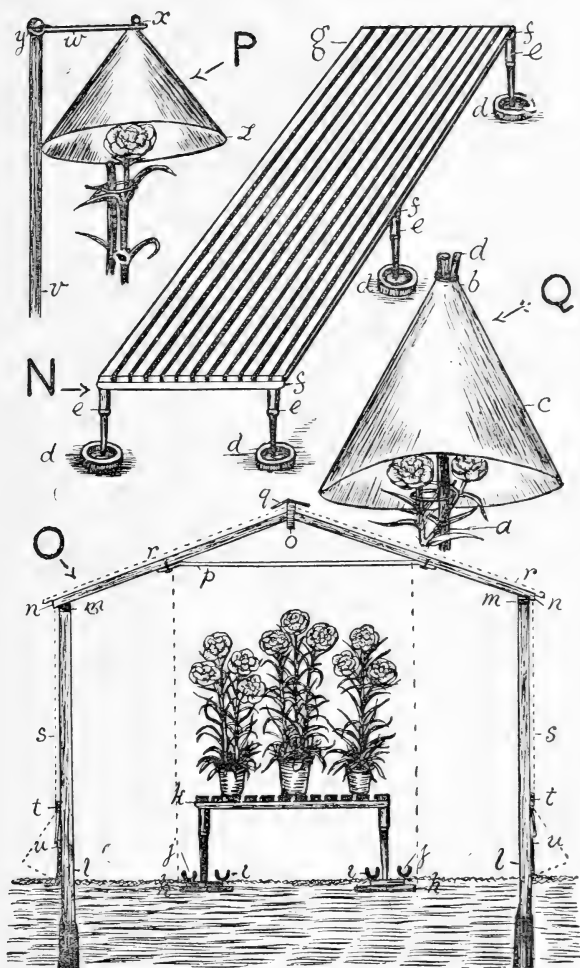


FIG. 39.—See opposite page, also Chapter VII.

declare, are not educated up to the higher plane, but are superficial and badly informed.

In what is professedly a practical book it would be out of place to take sides on what is, after all, a question of taste. Whether collars shall or shall not be used is a question for the majority of the authorities to settle. As they declare in favour of collars, we must assume that these adjuncts are a necessary part of the exhibitor's equipment, and give them a little attention.

The collar may consist of a circular portion of medium Bristol cardboard, about 4 inches in diameter. It affords, so to say, a groundwork for the flower. Being a little longer all round than the latter, the bloom is shown up by a margin of pure white. Good points are readily observable; bad ones are easily detected. A slit running from the outer edge of the collar leads up to a circular opening, a little wider than the calyx tube, at the centre. In order to get the flower in, the exhibitor depresses one edge of the slit and raises the other; then settles it round the petals above the calyx lobes, which are turned down with tweezers, and on which the card rests. The slit can be closed by neatly gumming a piece of white paper underneath.

The outer or guard petals of the bloom will show when the time for "collaring" has arrived. Directly they begin to turn down, fix the collar in position. These guard petals will rest on the collar, and with careful dressing (which will be discussed separately) the inner ones will be evenly disposed to the centre, each slightly overlapping the one below it, but all clearly visible in their full substance and purity.

It is undeniable that a stand of first class flowers, well finished and displayed, appeals with overpowering force to an educated eye.

### Dressing the Blooms.

A certain amount of dressing is necessary to finish off flowers intended for the show board. There is such a thing as overdressing, and competent judges are able to discern and punish it. But this

FIG. 40 (NEXT PAGE).—COLLARS.

- R, collar, and outline of bloom affixed: *e*, stem; *f*, bracts; *g*, calyx or pod; *h*, indiarubber ring to keep the calyx lobes from splitting; *i*, calyx lobes or teeth turned down with steel tweezers about horizontally with the base of the indents, thus forming a rest for the collar, which girdles the petals; *j*, aperture about one-third larger than the diameter of the calyx tube at the point of turning down of the calyx lobes; *k*, collar; *l*, slit in the collar from the central aperture to the edge, so that by opening one edge upward and the other downward it may be passed round the petals, the collar resting on the calyx lobes; *m*, outer or guard petals commencing to turn down—the latest stage for "collaring," so that they may develop flat, *n*, on the collar.
- S, effect of collaring, as shown on a Self bloom: *o*, collar; *p*, outer or guard petals.

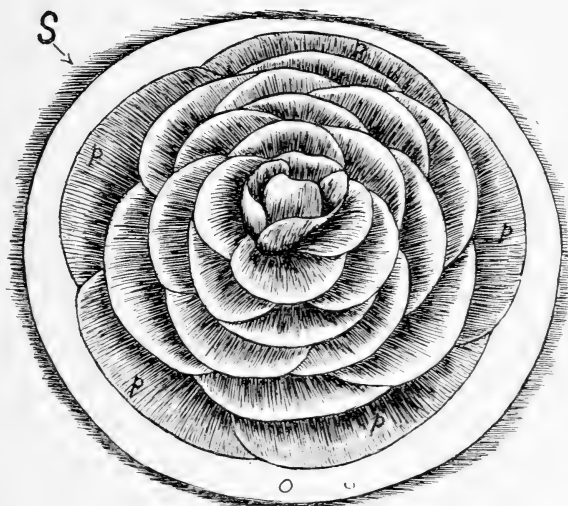
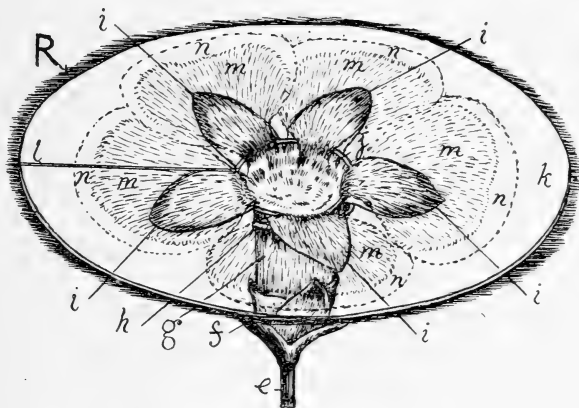


FIG. 40.—See opposite page, also Chapter VII.

does not condemn reasonable dressing, which greatly improves a flower, imparting neatness and perfect symmetry. A beginner may acquire valuable practical hints about dressing by watching a skilled exhibitor put on the finishing touches on the morning of a show. The writer has seen the deft fingers of that great exhibitor Mr. James Douglas at work, and stored away what he has learned thereby for future use if wanted.

Two cards are necessary for dressing each flower, one a little larger than the bloom, the other much smaller. The small one supports the larger, which in turn supports the bloom. The largest card has a central hole considerably wider than the pod which it encloses; this is necessary to allow of the free movement of the petals in dressing. In the case of the small card, however, a clean central hole is not made by punching a portion out; on the contrary, the centre is divided into a series of segments, the tips or points of which bend outwards as the stalk is pressed through, and clasp the pod gently but firmly. The flower is thus held steady, while at the same time the larger card is supported above, and will, in its turn, support the bloom without gripping it.

The calyx lobes are turned back on the small card with steel tweezers, and the petals are arranged on the large card with ivory tweezers. Any deformed petals, or those with "run" colours, are removed. The guard petals are evenly disposed, then the second row placed over their divisions so as to evenly overlap, and the work thus continued to the centre. With practice, and observation of the operations of skilled dressers, the young exhibitor will soon learn to dress his flowers without imparting an artificial appearance to them.

The details are clearly shown in the various sections of Fig. 41.

FIG. 41 (NEXT PAGE).—DRESSING THE BLOOMS.

- T, card to place under the flower and arrange the petals upon: *q*, round hole in the centre; *r*, outline of smaller card which is placed under the larger one to hold it in position.
- U, small card cut with a star shaped pattern in the centre: *s*, circumference described by two-thirds the diameter of the pod, this being taken with calipers; *t*, segments cut to the centre; *u*, teeth or points; *v*, portion of card supporting, when in position, the larger card above.
- V, small card showing: *w*, aperture through which the flower stem is passed; *x*, teeth for gripping the pod; *y*, portion upholding the large card.
- W, part of work preparatory to affixing the large card: *z*, indiarubber ring to prevent the pod splitting; *a*, calyx lobes turned outwards with steel tweezers; *b*, large card placed under the flower; *c*, dotted lines indicating the arrangement of the lower guard petals upon the card (the other side, of course), this being done with ivory tweezers.
- X, affixing the smaller card: *d*, pod; *e*, teeth binding gently on the sides; *f*, small card; *g*, large card.
- Y, bloom with petals arranged on the large card, showing a clear margin all round the flower; *h*, card; *i*, bloom dressed.

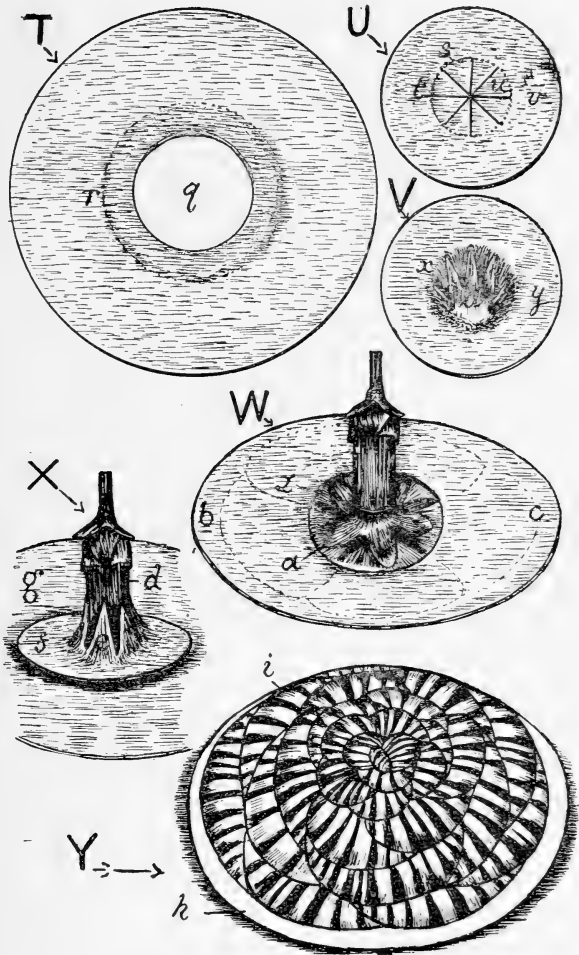


FIG. 41.—See opposite page, also Chapter VII.

**Stands for Exhibiting.**

A stand for exhibiting twelve blooms of the largest size may measure 18 by  $13\frac{1}{2}$  inches, the depth at the back  $4\frac{3}{4}$  inches, and the depth at the front  $2\frac{1}{2}$  inches. The holes for the tubes may be  $2\frac{1}{4}$  inches from the edges, and  $4\frac{1}{2}$  inches from each other, measuring from the centre of the holes. This gives plenty of room for the cards.

The exhibitor in small classes may prefer to have his boxes made for sixes, and put two together if he stages in a twelves class. A stage for six may measure  $8\frac{1}{4}$  by 12 inches, with a depth of  $4\frac{3}{4}$  inches, the holes  $2\frac{1}{4}$  inches from the edge, and  $3\frac{3}{4}$  inches from each other. Two thus placed together would measure  $16\frac{1}{2}$  by 12 inches, with a space of  $4\frac{1}{2}$  inches between the two inner rows of holes. This will accommodate twelves of most sections without crowding. The distances here given must not be varied much in the direction of saving space, for although this might be done for Picotees, the huge Fancies we now have want a great deal of room, and if they are much crowded the effect is lost. As long as exhibitors continue to use cards each flower should be shown clearly on its card.

The stands should be painted green. The travelling cases made to carry them should only very slightly exceed the width of the stands, by inside measurement, and should be fitted with strips or ledges to sustain the latter, which must be wedged in firmly so that shaking is impossible.

Tubes for the stems may be obtained from all dealers in horticultural sundries, and it may be added that not only tubes, but cases can be purchased from Mr. R. Sydenham, Tenby Street, Birmingham.

FIG. 42 (NEXT PAGE).—STANDS FOR EXHIBITING.

- Z1, stand for six blooms : *j*, length,  $8\frac{1}{4}$  inches ; *k*, width, 12 inches ; *l*, depth,  $4\frac{3}{4}$  inches ; *m*, distance from centre of outside row to edge,  $2\frac{1}{4}$  inches ; *n*, distance from centre to centre of the holes for the tubes,  $3\frac{3}{4}$  inches—the holes are suitable for 1-inch tubes.
- Z2, a stand for six blooms placed alongside another of the same size so as to make a stand of twelve : *o*, blooms placed in position.
- Z3, sloping stand for twelve blooms of large size : *p*, length, 18 inches ; *q*, width  $13\frac{1}{2}$  inches ; *r*, depth at back,  $4\frac{3}{4}$  inches ; *s*, depth in front,  $2\frac{1}{2}$  inches ; *t*, space of  $2\frac{1}{4}$  inches from the edge to the centre of the stand, and  $4\frac{1}{2}$  inches from centre to centre of the holes for the tubes : *u*, the circumference of the large card ; *v*, the face of the box painted green ; *w*, a dotted line indicating the size for a stand to show six blooms ; *x*, six blooms of Picotees ; *y*, card showing clear face all round the bloom ; *z*, blooms.



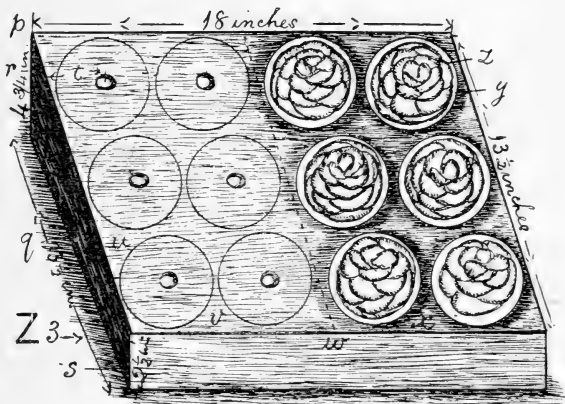
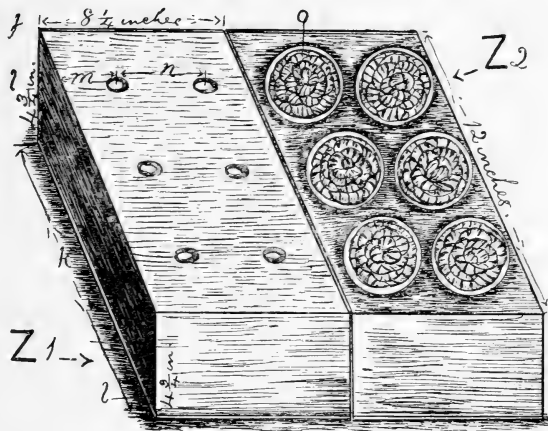


FIG. 42.—See opposite page, also Chapter VII.

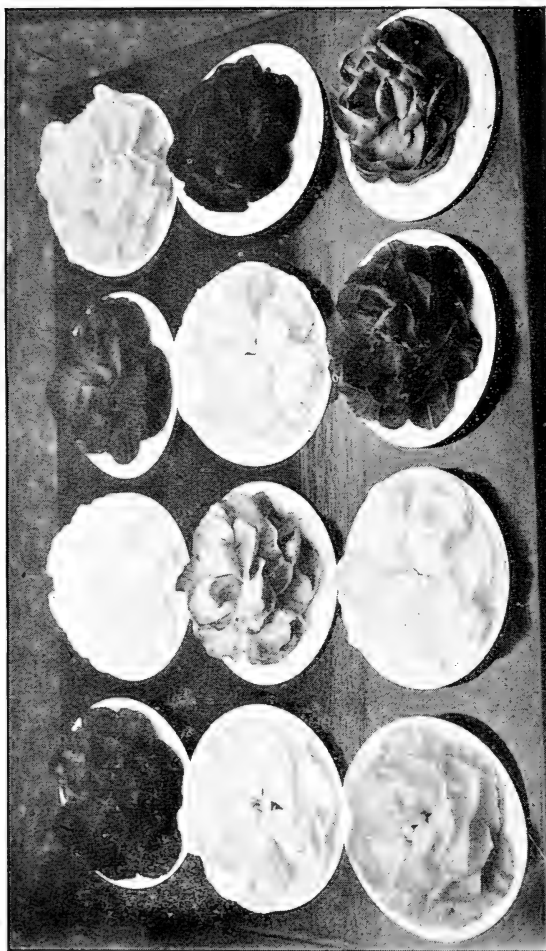


FIG. 43.—A PRIZE STAND OF 12 SELF CARNATIONS.



FIG. 44.—A PRIZE STAND OF YELLOW GROUND PICOTEES.

## Chapter VIII.—The Culture of Malmaisons.

THE closing years of the nineteenth century saw a considerable development in the culture of the class known as Malmaisons. The name is reminiscent of La Malmaison, the famous château near Rueil (Seine-et-Oise), which was the residence of Napoleon Buonaparte and Josephine : but this fact must not lead us to suppose that the section was in cultivation during the opulent days of the First Empire. The hapless *divorcée* had probably been in her grave nearly fifty years when the famous blush coloured Carnation Souvenir de la Malmaison first saw the light.

The popularity of Malmaisons is partly due, perhaps, to the large size, good form, and pure hues of the flowers ; but partly, also, to their remarkably rich perfume. They have the true Clove scent. For many years the Old Blush was the only one we had, and even now the range of colour is far more limited than in the Border section. But in the pink Princess of Wales, the rose Mrs. Martin Smith, the salmon Mrs. Trelawny, the crimson Lord Welby, and

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### CULTURE OF MALMAISONS. FIG. 45 (NEXT PAGE).—LAYERING OUT OF DOORS.

- A, portion of a one year old plant that has carried one flower : *a*, point where the old flower stem has been cut off ; *b*, side growth or grass ; *c*, old foliage at the base, to be removed to within 4 or 5 inches of the top ; *d*, the growing point, to be retained intact in all cases.
- B, Sydenham's layering pin, made of galvanised iron.
- C, layering in an improvised frame : *e*, deal boards, 11 inches deep and  $1\frac{1}{2}$  inches thick, placed on edge ; *f*, stakes driven into the ground to support the boards ; *g*, lights, fitting closely ; *h*, trench made large enough to hold a row of plants turned out of the pots and trimmed of the old leaves ; *i*, layering compost spread on the top of the garden soil 3 inches thick.
- D, a portion of a 4-foot wide bed in the open ground, with two rows of two years old plants trimmed of the small shoots and part of the old foliage : *j*, hole made in the garden soil and the ball of the plant placed in, afterwards filling in firmly ; *k*, 3 inches of layering compost ; *l*, plants as they appear after the layering compost is placed on, but each with short shoots, *m*, that should be removed ; *n*, a plant showing the whole layering process ; *o*, the shoot properly tongued, the cut being started at a joint, and carried from 1 inch to  $1\frac{1}{2}$  inches up the stem ; *p*, a shoot tongued and placed in a hole made for its reception with the finger ; *q*, the stem of the layer pegged down with Sydenham's layering pin ; *r*, old stem lightly covered with soil, taking care not to bury the collar of the prospective young plant too deeply ; *s*, a plant with the layers properly made and adjusted in the layering compost.

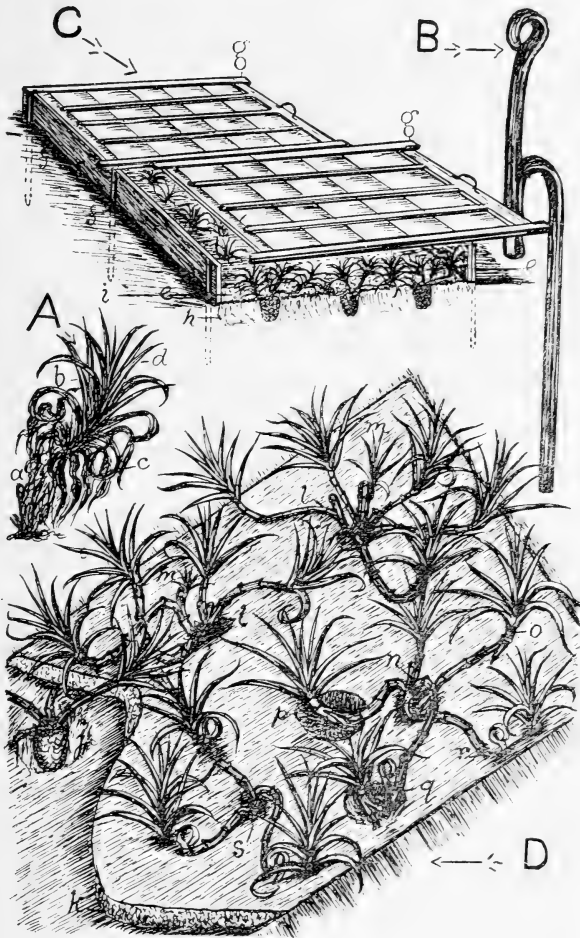


FIG. 45.—See opposite page.

the white Thora, we have a fair range of colour, combined with great size, splendid shape, and delicious fragrance.

It cannot be said that the Malmaisons are a tractable class. They are always more or less capricious, and are particularly troublesome when grown in a mixed collection of plants. Even in a large establishment, where a fine house was devoted specially to them, and every requisite provided, the writer has known a change of attendant lead to a marked decline in health and vigour, albeit the new man had had previous experience of the class. It was as though the plants, like a captious filly who had bestowed her affections on one particular stable lad, resented any change as an encroachment on their royal rights and privileges! The one house amateur who takes up Malmaison culture does so at his own risk. Should he succeed, much honour will be due to him.

### Propagation by Layering.

The Malmaisons were formerly propagated by cuttings, but the modern plan is layering. This should be done with glass protection after flowering in late spring or early summer. Where frames are few and overcharged an enclosure may be made by placing two boards on edge, with a central bearer flush with the woodwork at the centre to carry a couple of lights. These can, of course, be drawn up or down at will.

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#### CULTURE OF MALMAISONS. FIG. 46 (NEXT PAGE).—LIFTING AND POTTING LAYERS.

- E, a layer made from long grass, hence somewhat weakly: *t*, ball of soil and roots; *u*, proper depth of potting; *v*, the usual depth chosen for appearance sake—too deep.
- F, a leggy layer, the result of making a tongue too low down on the shoot: *w*, ball of soil and roots; *x*, proper depth of potting; *y*, the usual depth of placing in the soil, the roots at the bottom of the pot—very bad practice.
- G, a plant resulting from making the tongue just under the crown leaves in order to secure a short stemmed plant: *z*, ball of soil and roots; *a*, proper depth of potting.
- H, a shoot showing: *b*, point where the tongue should be made to secure a short stemmed plant; *c*, crown of leaves.
- I, sturdy, vigorous plant from a layer put into a 4-inch pot: *d*, drainage; *e*, a thin layer of moss; *f*, rough parts of the compost; *g*, soil; *h*, ball of soil and roots; *i*, space for water.
- J, a somewhat tall plant put into a 4-inch pot: *j*, drainage; *k*, soil; *l*, ball of soil and roots; *m*, space for water; *n*, stake.
- K, an improvised frame in which the plants are placed after potting: *o*, bricks on which the sides of the frame rest; *p*, boards 11 inches deep; *q*, stakes to which the boards are nailed; *r*, light; *s*, the dotted lines show the usual type of frame, in which the plants are some distance from the glass, and become drawn; *t*, ground level; *u*, ashes on which to stand the pots; *v*, plants given plenty of room.

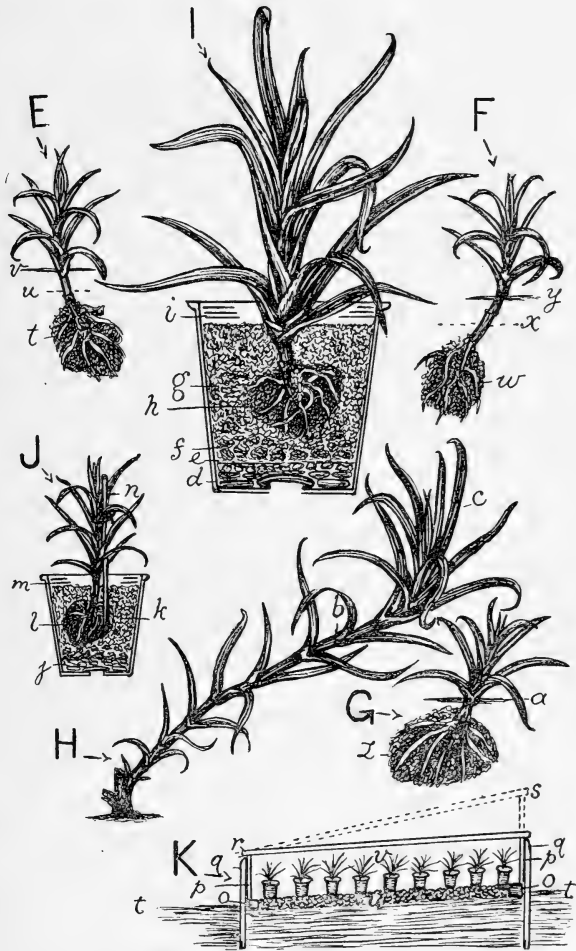


FIG. 46.—See opposite page, also Chapter VIII.

The plants may be turned out of the pots and put in separate holes, or in a shallow trench dug across the enclosure, far enough apart for the shoots to be spread out for layering without crowding. The plants may be one year, two years, or more old. The old flowering stem should be removed, also the old foliage near the base of the plant, but the growing point must be retained, as it is to form the future plant.

When the plants have been placed in position a layer of fresh soil 3 inches in depth may be spread over the bed amongst them, for layering in. It may consist of loam, leaf mould, and sand. The best growths to choose for layers are those of a sturdy, tufted nature, as a long, bare stem is objectionable. Very weak, small shoots should be removed. The tongues may be made in the way advised in a previous chapter, and the shoots fastened down with Sydenham's galvanised iron layering pin, or by some other selected means.

When the layering is finished a gentle watering may be given, the lights put on, and shade given in sunny weather. Keep the frame close, the soil moist but not sodden, and continue the shading as required until the shoots freshen up; then give a little air, and steadily increase it as signs of growth become more and more apparent. In fine weather the lights may be removed altogether, and kept off during light showers, but should be replaced if drenching rains come on. This course of treatment will result in sturdy, healthy plants.

### Potting.

The difference between plants from well-selected and well-prepared layers, and those from poor, leggy material, is well seen when the time comes for potting. The former will show but little

#### CULTURE OF MALMAISONS. FIG. 47 (NEXT PAGE).—SHIFTING INTO THE FLOWERING POT.

- L, section of a 6-inch pot, into which a sturdy, vigorous plant is shifted from the 4-inch pot at the end of September: *w*, Invincible crock placed over aperture; *x*, drainage; *y*, thin layer of moss; *z*, rough parts of compost; *a*, ball of soil and roots; *b*, new soil made very firm; *c*, space for water; *d*, young growths appearing at the base of the plant; *e*, growing point, from which the flowering stem springs in due course.
- M, a somewhat tall plant put into a 6-inch pot, showing the advantage of staking at the first potting: *f*, drainage; *g*, soil; *h*, ball; *i*, space for water; *j*, stake.
- N, a tall plant put into a 6-inch pot: *k*, drainage; *l*, soil; *m*, ball; *n*, space for water; *o*, the head of the plant leaning because it was not secured to a stake at the time of the first potting, generally inadvisable, though sometimes desirable, in order to cause grass to push from joints at the base, *p*, for propagating purposes—indeed, in the case of some very floriferous varieties it is necessary to head down the plant to secure growth for layering, foregoing flowering for a season; *q*, point of cutting down to cause grass to push.



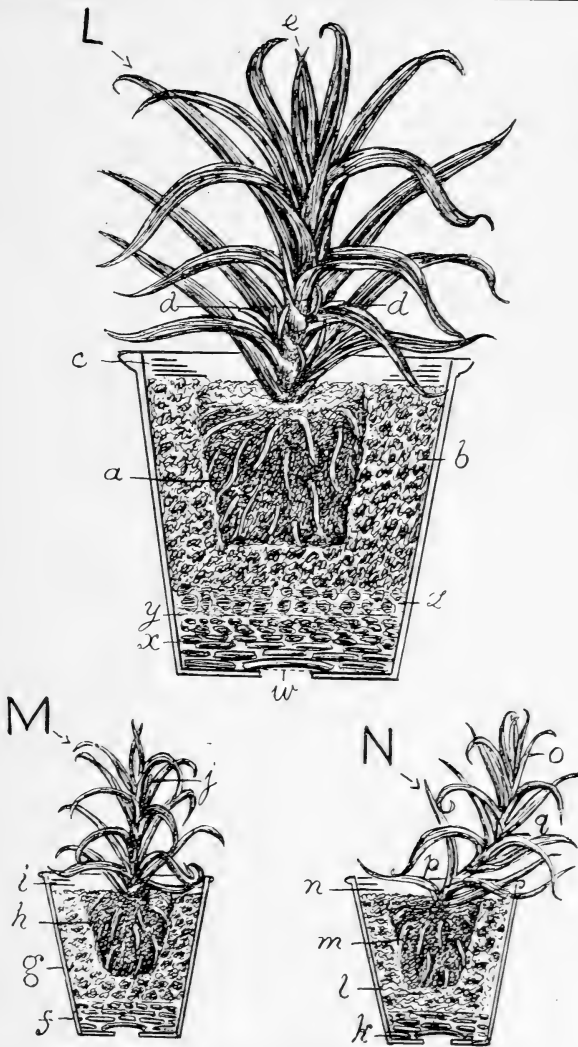
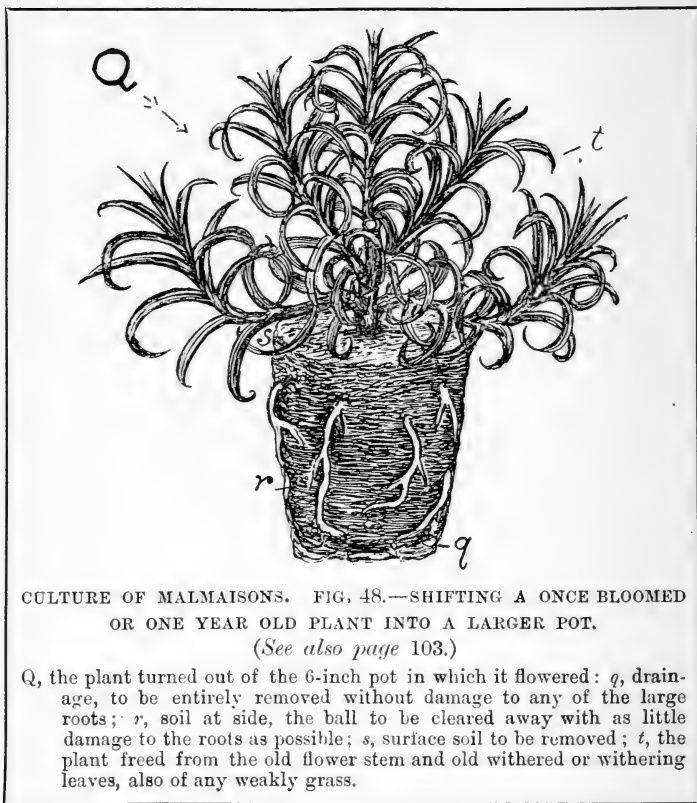


FIG. 47.—See opposite page, also Chapter VIII.

stem, and the foliage will be close to the soil. The latter will have a long stem, and present a gawky appearance, which nine cultivators out of ten will endeavour to correct by potting the plants very deeply. This practice, however, must be condemned, as it brings the roots too close to the drainage.



CULTURE OF MALMAISONS. FIG. 48.—SHIFTING A ONCE BLOOMED OR ONE YEAR OLD PLANT INTO A LARGER POT.

(See also page 103.)

Q, the plant turned out of the 6-inch pot in which it flowered; q, drainage, to be entirely removed without damage to any of the large roots; r, soil at side, the ball to be cleared away with as little damage to the roots as possible; s, surface soil to be removed; t, the plant freed from the old flower stem and old withered or withering leaves, also of any weakly grass.

Four-inch pots may be used, and the method of draining may be similar to that advised in a previous section. A similar compost will do, also. Pot firmly, and place the plants in a frame. A large, deep frame is not the best, unless provision is made for raising the plants, as, being some distance from the glass, they are liable

to become drawn. A makeshift frame, of boards on edge and spare lights, such as was described in another chapter, will answer well.

The pots may be stood on a bed of cinders. For a few days after potting the plants should be shaded from hot sun, and kept close. As soon as signs of growth are apparent, air must be given, and shading should be discontinued. Give more air, and daily

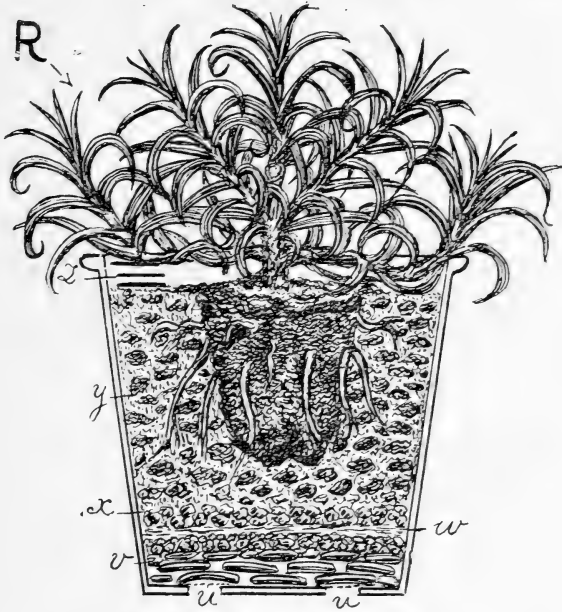


FIG. 49.—See also Fig. 48, previous page.

R, the plant put into a 9-inch pot : *u*, Invincible crocks over the apertures ; *v*, drainage ; *w*, layer of moss ; *x*, rough parts of the compost ; *y*, new soil ; *z*, space for water.

syringings, as the plants progress, and they will make sturdy specimens.

By the end of September they should be quite ready for the flowering pots, which may be 6 inches in diameter, except in the case of very strong plants, which may have 7-inch pots. Drain the pots carefully in accordance with previous advice. Fibrous loam should form the bulk of the soil, but a fourth each of peat and decayed

manure may be added, together with about a tenth of the whole of coarse sand. The ball of soil and roots from the small pot should not be broken up, but merely dressed of any loose or sour particles and drainage. The new soil must be pressed very firmly round it.

As soon as the plants are well established basal shoots (grass for next year's layers) will begin to push, and soon a strong specimen will be had.

Successional batches may be layered to ensure a long period of flowering.

Young plants which have flowered in 6- or 7-inch pots may be repotted about the middle of August, and grown on into large specimens, which, if properly treated, will give six to a dozen good blooms the following May, according to the extent of disbudding practised. Plants from 6-inch may go into 8- or 9-inch pots; plants from 7-inch pots into a still larger size. When turned out the drainage must be picked away, exercising care so as to avoid injuring the roots, and the soil from the outside and top of the ball should also be crumbled away gently, to the extent of about a fourth. The old flower stems should be removed, likewise any dead or decaying leaves, thus leaving a neat and fresh-looking plant, bushy in habit, and with strong grass.

The reduced ball may be placed in the centre of the larger pot, which has been drained and partially filled with soil previously; fresh compost must then be pressed firmly round and over the ball. The plants may be placed in a frame and kept rather close and shaded until established, then given abundance of light and air. They may be housed about the end of October.

### Disbudding.

This is conducted on the same principles as recommended for other sections, and the details also are practically the same. A sturdy one year old plant may be disbudded so severely that it

CULTURE OF MALMAISONS. FIG. 50 (NEXT PAGE).—ONE YEAR OLD PLANT AT THE DISBUDDING STAGE.

- S, plant: *a*, stout grass; *b*, grass not so strong, yet, from its position, likely to attain vigour when the plant is cut down; *c*, flowering stem; *d*, side growths with terminal buds, *e*, to be retained; *f*, weak side growth to be removed as soon as it can be gripped by the thumb and finger; *g*, crown or main bud, usually giving the largest, though not always the finest, flower; *h*, buds to be removed as soon as visible.
- T, flower stem in outline disbudded to three buds: *i*, joints from which side growths were rubbed out when quite small; *j*, side growths with their terminal buds retained (one omitted from lack of space), all the other buds having been removed; *k*, crown bud.
- U, flower stem showing disbudding to the crown or main bud: *l*, joints from which the side shoots have been removed, this applying also to weakly grass on the lower part of the flowering stem; *m*, crown bud.

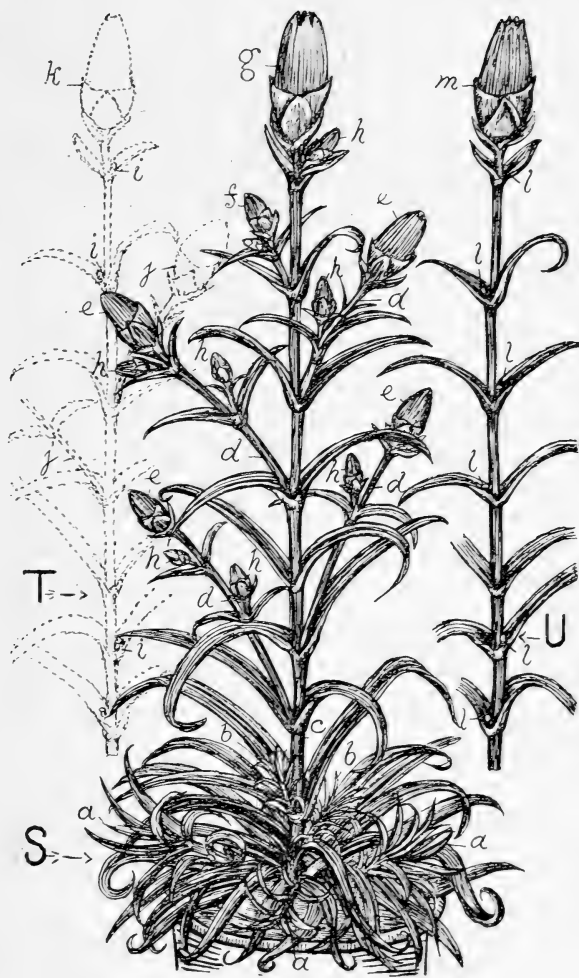


FIG. 50.—See opposite page, also Chapter VIII.

carries only one bloom, or it may be less vigorously treated, and allowed to bear five flowers. In the one case a very large bloom is secured at the expense of some loss of beauty in the plant; in the other smaller flowers but a more attractive plant will result.

In moderate disbudding the best buds on the side flowering growths are retained, in addition to the crown or principal bud on the main stem. In severe disbudding only the latter is retained. The medium course of disbudding to three may be practised if desired. The three systems are clearly shown in Fig. 50.

### Houses.

In the introductory remarks it was pointed out that those who grow Malmaisons as a special feature find it necessary to have houses devoted to them, owing to their fastidious nature. This is not practicable for small growers, unfortunately, because of the cost, but it is a matter we must consider. A span roof house, with a lantern ventilator running the whole length, and iron ventilators in the side walls on a level with the hot water pipes, in addition to side light ventilators, is the best. With these provisions the house can be ventilated in damp, muggy weather, as the side lights can be kept closed, and the iron and lantern ventilators open. The air passing through the former is dried and warmed by passing over the pipes, and a fresh, lively, buoyant atmosphere is maintained. This suits the plants far better than a damp, stagnant atmosphere.

A small house may be 12 feet wide, and have two side stages, with a rain water tank receiving the roof water at one end; the water for the plants is thus about the same temperature as that of the house. Short iron pillars may support the stages, which may consist of slate shelves surfaced with clean shingle or gravel. A flow and return 4-inch pipe may run round the house for heating. It should be noted that a high temperature is not needed; in fact, it is

CULTURE OF MALMAISONS. FIG. 51 (NEXT PAGE).—HOUSES FOR THE PLANTS.

O, a section of a span roof house, 12 feet wide: *r*, ground level; *s*, side walls (9-inch); *t*, iron ventilators perforated inside, with a flap opening outwards; *u*, side lights opening the whole length of the structure; *v*, spouts; *w*, drip bars, which carry the condensed moisture to the eaves; *x*, lantern ventilator running the whole length of the house; *y*, rain water tank; *z*, iron grating forming the path; *a*, iron pillars to support tables or stages for the plants, the other edge resting on the walls; *b*, slate shelves, with an edging on the face next to the path; *c*, shingle or clean washed gravel on which to stand the pots; *d*, hot water pipes, flow and return, 4 inches, on each side.

P, a section of a span roof house, 18 feet wide: *e*, ground level; *f*, side walls; *g*, iron ventilators; *h*, side lights; *i*, drip bars; *j*, lantern ventilator; *k*, rain water tanks; *l*, iron gratings forming the paths; *m*, iron pillars; *n*, slate shelves; *o*, clean gravel; *p*, hot water pipes, 4 inches.

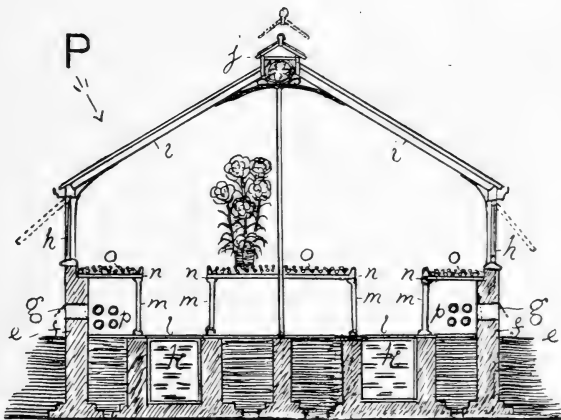
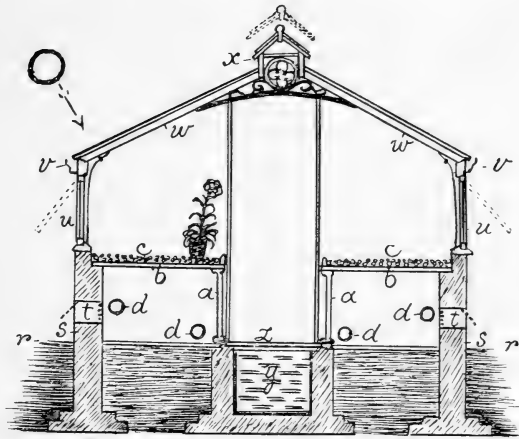


FIG. 51.—See opposite page, also Chapter VIII.

harmful. The exclusion of frost and the dissipation of damp are the most that will be needed of the pipes, which, therefore, must not be kept hot. Drip bars are advisable, as by carrying the condensed moisture down to the eaves drip on the plants, with all its attendant evils, is avoided.

A larger house may be 18 feet wide, and have a broad central and two narrow side stages. This makes a splendid show house, and the plants can be seen to the fullest advantage. One year old plants may be put on the stages, and older, larger specimens on the central stage.

In both houses it will be observed that internal woodwork is reduced to a minimum.

### General Cultural Hints.

Constant watchfulness must be exercised in watering and ventilating throughout the winter, and particular care must be taken to give water only when it is really necessary. The hollow ringing of the pot when rapped is the best call for water, and this may not happen for several weeks in the dull season. Even after fresh growth begins in late winter water should be sparingly applied. In spring give more water, with a little weak liquid manure twice a week, and be as careful not to allow the plants to suffer from drought when the flower stems are rising as you were to avoid over-watering in December. During bright sunshine shade will be required, or the colour will be "washy." The light substance known as tiffany, which is procurable from all horticultural sundriesmen and many seedsmen, is suitable.

Here, then, is the culture of the noble and fragrant Malmaison epitomised and practically illustrated. Assuredly the flower is worthy of the trouble entailed.

#### TREE OR PERPETUAL SECTION. FIG. 52 (NEXT PAGE).—RAISING FROM CUTTINGS.

- A, a strong side or top growth not generally suitable for a cutting because *a*, the base is too firm and not likely to push roots freely; *b*, the crown has clustered leaves, usually indicative of pushing a flowering stem.
- B, a portion of a plant with short, stubby side shoots good for cuttings: *c*, side growths from the main stem, always to be given preference; *d*, side shoots more prone to pushing flowering stems early than healthy growths from the main stem.
- C, side growth slipped off with the fingers, the lower leaves removed: *e*, the base pared smooth and cut transversely; *f*; *g*, depth of insertion.
- D, a section of a 4-inch pot showing the proper insertion of the cuttings: *h*, drainage; *i*, thin layer of moss; *j*, rough parts of the compost; *k*, soil; *l*, surfacing of silver sand about  $\frac{1}{4}$  inch deep; *m*, cuttings firmly inserted, being careful to let the cutting rest on the bottom of the hole; *n*, space for water.
- E, cutting pots plunged in bottom heat ( $70^{\circ}$  to  $75^{\circ}$ ): *a*, cocoanut fibre refuse, sifted spent tan, or other open material; *p*, a square of glass resting on the labels.



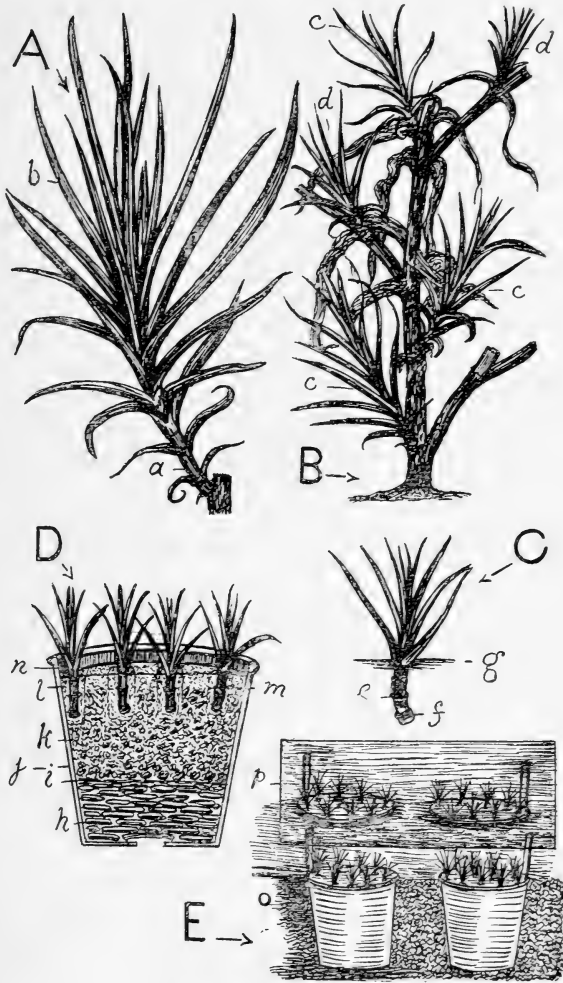


FIG. 52.—See opposite page.

## Chapter IX.—The Tree or Perpetual (Winter Flowering) Section.

THE Tree Carnation has moved onward with the wave of popularity which has influenced all other classes of Carnations during the past few years. Its lovers are legion. Giving, as it does, beauty and fragrance at a period of the year when flowers are scarce, it proves its worth and value in a thoroughly convincing manner.

It is not uncommon for one particular new variety to give a fresh impetus to a whole class. It was so in the case of Roses with the Crimson Rambler, and in the case of Tree Carnations with Uriah Pike. This beautiful sort had not great size to recommend it, but it had a distinct colour, and, what was still better, a fine Clove perfume. Many lovely novelties have followed it, and doubtless there are more on the way.

With certain conveniences, it is quite possible to get a long succession of Tree Carnations. Indeed, the alternative term of

TREE OR PERPETUAL SECTION. FIG. 53 (NEXT PAGE).—POTTING OFF.

- F, struck cuttings turned out of the cutting pot: *q*, ball of soil; *r*, points where a label or finger may be introduced to break up the ball and detach each young plant with some soil and all the roots possible.
- G, plants as they appear on breaking up the ball: *s*, well rooted, sturdy topped plants, the soil adhering well to the roots; *t*, a plant with roots set on horizontally, and not much soil adhering; *u*, a plant with relatively few roots striking down vertically; *v*, a plant with only one straight down root, and soilless; *w*, an extra strong plant and particularly well rooted; *x*, an average plant with a fair amount of roots and soil adhering, *y*, and good top growths, *z*.
- H, a plant put into a thumb ( $2\frac{1}{2}$ -inch) pot: *a*, drainage; *b*, a thin layer of moss; *c*, a little of the rougher parts of the compost or half decayed leaves; *d*, soil; *e*, space for water.
- I, the one root plant *v* put into a thimble pot (2-inch): *f*, the root coiled at the upper part; the other references are the same as H.
- J, the strong plant *w* put into a 60 (3-inch) pot; references the same as H.
- K, a section of a forcing house suitable for striking cuttings and for plants after potting: *g*, side walls; *h*, wall ventilators for admitting air in bad weather so as to cause it to pass over hot water pipes and thus become warmed; *i*, side lights, opening the whole length of the house; *j*, roof with dripproof rafters; *k*, lantern ventilator opening the whole length of the house; *l*, rain water tank covered with a slate or flagstone; *m*, hot air chamber for bottom heat; *n*, bottom heat hot water pipes (4-inch); *o*, internal ventilators to regulate the heat in the hot air chambers; *p*, slate or flagstone covers, joints open; *q*, plunging material; *r*, cutting pots; *s*, hot water pipes (4-inch) for top heat; *t*, plants stood in the bed; *u*, shelves (the best position for potted off plants); *v*, iron grating path. Scale of house,  $\frac{1}{8}$  inch equals 1 foot.

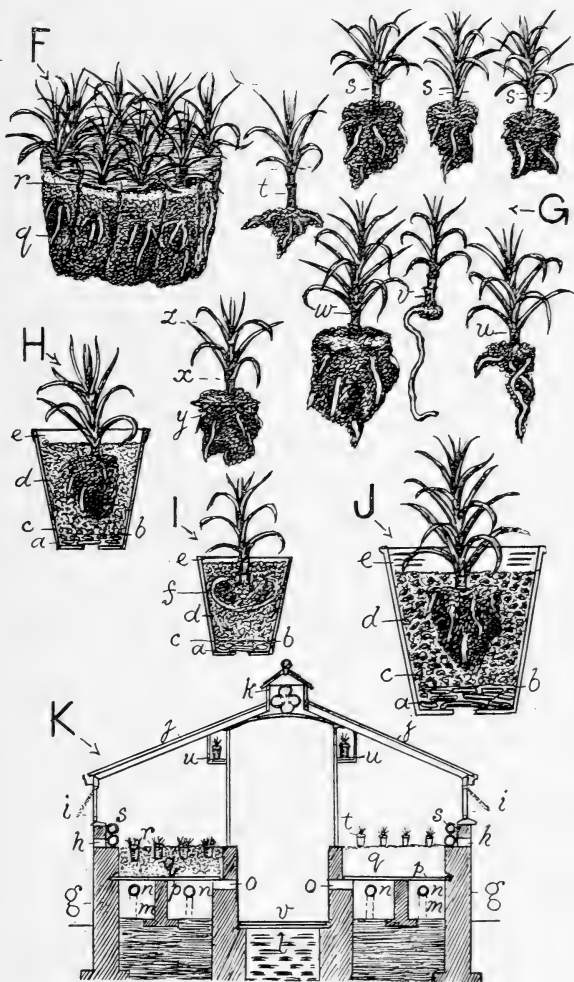


FIG. 53.—See opposite page, also Chapter IX.

"Perpetual," which is frequently applied to the section, indicates a long period of blooming. This succession is further ensured if batches are propagated at various periods. Cuttings may be, and are, inserted in summer, autumn, and winter; but if bottom heat can be provided, January, February, and March propagation is the best, as strong flowering plants can be had in the shortest time. It must be remembered that summer struck plants will not bloom to any purpose in the following winter, but in the second, the plants passing the first winter in small pots, being shifted into larger ones in spring, and having the flower buds picked off in the intervening summer months. These make very strong plants, but are a long time in hand.

Assuming that the cuttings are to be struck in winter or early spring, first give attention to the choice of shoots for cuttings. Strong, densely grassed main growths are not desirable, as they are apt to throw up a flower stem too soon. Short, sturdy side shoots are better. These may be pulled off the parent plant, and have the heel pared smooth and the lower leaves removed. They may be inserted round the edges of a 4-inch pot, just clear of each other, in a compost of loam, leaf mould, and sand in equal proportions, and with a surfacing of silver sand. The compost should be moist but not saturated, and kept so; extremes, either of wet or drought, are dangerous, as they may cause the cuttings to rot or shrivel. The rooting will be quickest if the pots can be plunged in cocoanut fibre refuse in a propagating frame, or under squares of glass. A top heat of 55° to 65° will be suitable. Wipe the glass daily if moisture condenses on it.

When the cuttings have struck and rooted freely they may be potted singly in small pots. The roots should not be disturbed more than can be helped when the plants are taken out of the cutting pot. By careful manipulation with the finger and thumb the clump can be separated so that each has a nice ball. The plants will not be exactly alike; some will be stronger and better rooted than others. The biggest may go into 3-inch, the medium into 2½-inch, and the smallest into 2-inch pots, if these three sizes are all available.

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TREE OR PERPETUAL SECTION. FIG. 54 (NEXT PAGE).—SHIFTING INTO LARGER POTS.

L, a strong growing plant which after being put into a 3-inch pot and grown on is shifted into a 5-inch pot: *w*, invincible crock to exclude worms; *x*, drainage; *y*, thin layer of moss; *z*, rougher parts of the compost; *a*, soil; *b*, ball; *c*, space for water; *d*, side growths or grass; *e*, growing point; *f*, point of stopping when the plant is about 5 inches in height, the roots having got well hold of the new soil.

M, a plant shifted from a thumb into a 4-inch pot; references the same as for L.

N, a plant in a 4-inch pot after topping: *g*, point of pinching out the leading growth; *h*, side shoots from the joints; *i*, the stake to which the main stem is secured.

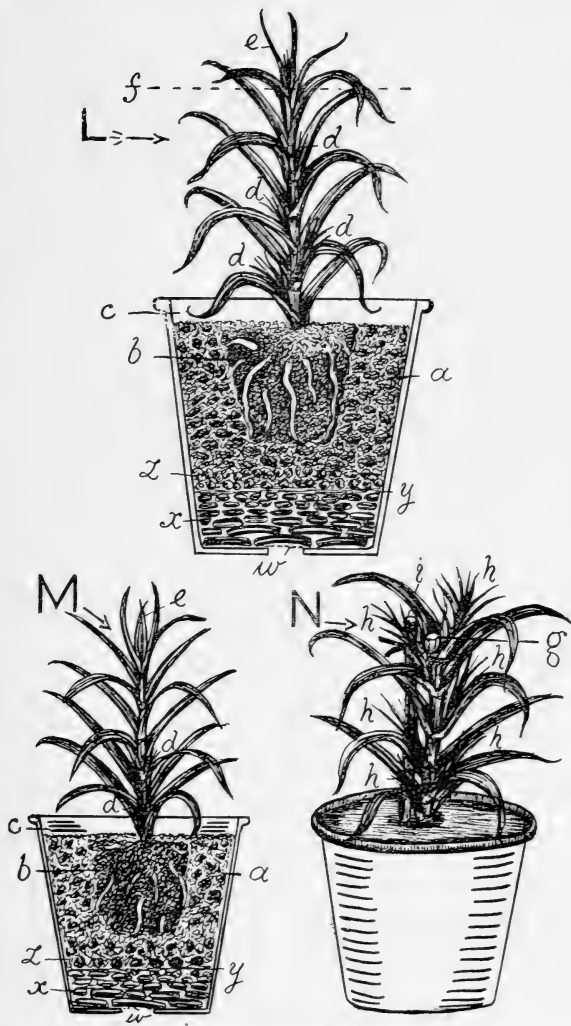


FIG. 54.—See opposite page, also Chapter IX.

A compost of loam, with a quarter of dried manure rubbed through a sieve, and about a tenth of sand, will be suitable. Leaf mould may be substituted for the manure if convenient, or used in addition to it. If no manure is used 1 pint of superphosphate or bone flour may be used to the bushel. A sprinkling of charcoal is also advantageous.

Quick establishment is ensured if the pots are plunged in a propagating pit, but in a house with a top heat of 55° to 65° they root steadily and surely on a shelf. If put into a propagating case, care must be taken to remove them directly they are well rooted, and to harden them in a cooler temperature, say, 45° to 55°. On the whole, the shelf, if slower, is safer, as it keeps the plants sturdy.

In about three months, probably, from the time of inserting the cuttings, the young plants will be ready for a bigger pot. The exact time may depend upon the state of the roots; when they begin to twist round the sides of the small pots in which they were first put singly the time has come to give them a shift. An average plant from a thumb pot may go into a 4-inch, an extra large plant into a 5-inch. A similar soil to that formerly used will do. There is not likely to be any cause for pulling the ball to pieces; merely trim it, and pick away the drainage from the base. Pot firmly, and place the plants at once into a cold frame, standing them on cinders. They may be kept close for a few days, but afterwards abundance of air must be given. Keep them on the dry side just after potting; when they get into active growth they will need plenty of water, and must be examined daily to see that they do not suffer from drought. When they have fairly started into growth, and are about 5 inches high, pick out the growing point; side shoots will then push.

In about another two months, should all go well with the plants, they will be ready for a shift into the flowering pots, which may be 6- or 7-inch according to the strength of the plants. As the summer will now be here, or at hand, the plants will hardly need glass, although they are none the worse for a few days in a frame after being potted. Subsequently (or immediately if more

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TREE OR PERPETUAL SECTION. FIG. 55 (NEXT PAGE).—SHIFTING INTO THE FLOWERING POTS.

- O, a plant of a compact growing variety shifted from a 3½-inch into a 6-inch pot: *j*, crock; *k*, drainage; *l*, thin layer of moss; *m*, the rougher parts of the compost; *n*, the ball; *o*, soil well pressed under and round ball; *p*, space for water; *q*, point of stopping the main stem; *r*, side growths or grass.
- P, a plant of moderately vigorous habit shifted from a 4-inch into a 7-inch pot; references the same as in O.
- Q, a plant of vigorous growth transferred from a 5-inch into an 8-inch pot; references the same as in O.
- R, a side shoot showing the second stopping when the growth is early and strong: *s*, point of taking out the point of the shoot.

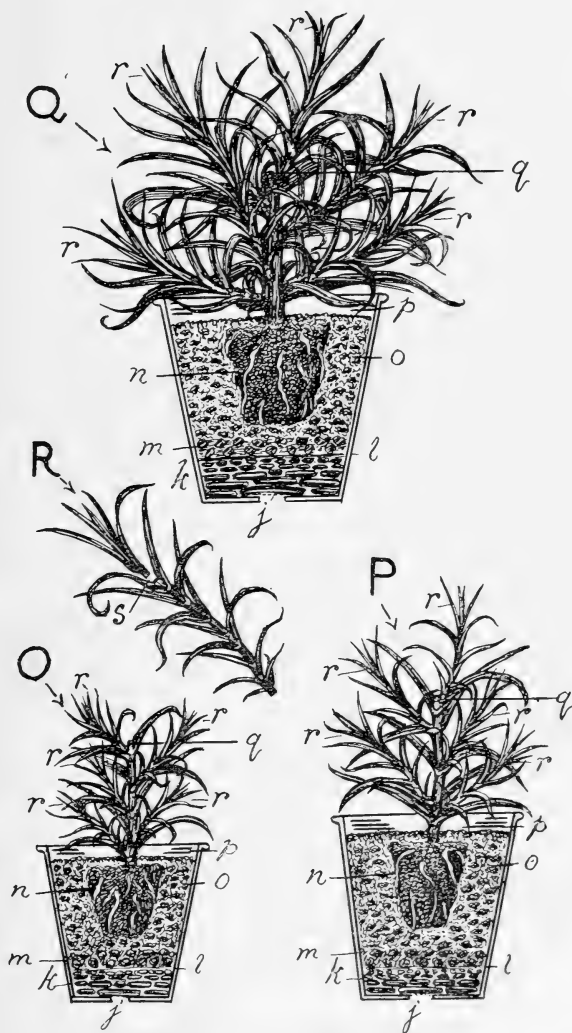


FIG. 55.—See opposite page, also Chapter IX.

convenient) they may be provided with an open position out of doors, but with a little shelter from the colder quarters if it can be provided without robbing the plants of sunshine. The pots may be partially plunged in ashes.

When the plants are in growth again they may have their second topping, and this should be the last, unless the plants have been pushed by early hot weather or are naturally late bloomers, in which case another stopping may be given. Speaking generally, stopping after June is not advisable.

The stopping will ensure a bushy plant, and a point free from thick, clustering grass, which, without the stopping, would prevent the formation of a strong flower stem. A little finger and thumb work will be required subsequently on the side shoots which are secured by the stopping. One or two side shoots may be allowed at the base, but those higher up, especially near the tips, must be removed. A vigorous flower stem will then push.

Staking may be done with one central Bamboo stick 2 to 3 feet long. To this the main stem may be secured, and the side shoots looped up to it with Raffiatape.

A typical plant, struck in January, stopped once, shifted by stages into a 7-inch pot, the grass thinned, and the flower buds reduced to three on a stem, is shown on p. 120. This handsome yearling plant may be grown on into a fine specimen for flowering a second season, if desired. The old flower stems and leaves should be removed, together with any weak grass, in spring. Then the ball should be reduced, removing the drainage clinging to the base, also all sour or exhausted soil, and finishing by crumbling down the shoulders. The plant is now ready for the larger pot. Assuming that the first flowering pot was a 7-inch, the shift may be into a 9-inch. Drain well in accordance with the rules previously laid down, and pot firmly. In staking, place one strong Bamboo in the centre, and others round the sides to the number of the shoots which the

TREE OR PERPETUAL SECTION. FIG. 56 (NEXT PAGE).—STAKING AND DISBUDDING.

- S, a plant in an 8-inch pot supported by one stake, twice stopped, disbudded, and with the shoots looped up to the stake : *t*, stake ; *u*, point of first stopping the main stem at about 5 inches high ; *v*, side shoots which were stopped after having made about 5 inches of growth, *w*, and the succeeding grass disbudded to two shoots on a branch, *x*, the shoots being looped up to the stake, as shown, with strong green thread.
- T, an unstopped shoot not disbudded : *y*, grass which has pushed from the joints and is taking food from the upper part of the shoot ; *z*, tufted extremity, which is usually indicative of a flower stem pushing from the growing point of the branch, the result being much crowding of grass and indifferent flower stems.
- U, a side shoot disbudded : *a*, well placed grass reserved for furnishing the plant ; *b*, the point of the shoot free from clustering grass and thus induced to push a strong flowering stem.



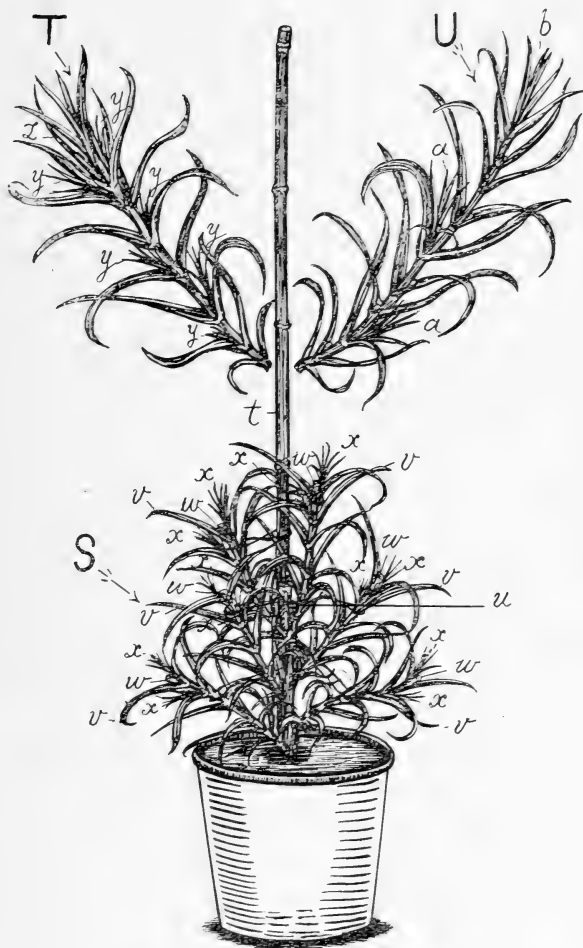


FIG. 56.—See opposite page, also Chapter IX.

plant possesses. Plants thus treated will summer well out of doors, and bloom profusely the following winter, as shown on p. 121.

### American Carnations.

A few remarks may well be devoted here to what is termed the American Carnation, for it, too, is a winter and spring bloomer.

There is little doubt that this beautiful class will grow rapidly in favour in Great Britain. The plants have large flowers of brilliant colours and delicious perfume, borne on very long, strong stems. The vigorous flower stalks are a great feature of the American Carnations, as they render the blooms so valuable for decoration.

Straitlaced florists of the old English school look askance at the fringed edges of the American type. The writer has seen such a one shiver in very horror at the sight. But it must be remembered that there are thousands of flower lovers in this country who care nothing whether the petals of Carnations have smooth or wavy, whole or cut, edges, so long as the colours are vivid and the perfume is strong. We must not let insular prejudice blind us to the real merits of these transatlantic flowers. They have their value and their place. Who that has seen the charming collections at recent great shows of the Royal Horticultural Society can fail to admire them? They are winning thousands of fresh adherents yearly, and this means that new varieties will keep springing up, for home raisers will certainly enter into rivalry with American cross fertilisers.

It is hardly likely that novelties will make so great a stir, and realise such extraordinary prices here, as they have done on the other side of the streak. The sensational advent of Mrs. T. W. Lawson will be remembered in this connection. The demand is so great in America that thousands of pounds are invested in popular sorts. The great object there is to get cut bloom at Christmas. The plants are not grown in pots, as a rule, but planted out on benches or stages.

In this country the outline of culture indicated for the ordinary Tree Carnations may be applied to the American varieties with success.

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TREE OR PERPETUAL SECTION. FIG. 57 (NEXT PAGE).—REPOTTING  
A YEARLING FLOWERED PLANT FOR THE SECOND SEASON'S  
BLOOMING.

V, the plant turned out of the 7-inch pot in which it flowered in autumn and winter, denuded of old leaves, the flower stems cut off, and the ball reduced preparatory to repotting: *e*, points where the flower stems were shortened to in March or April; *d*, young grass retained for furnishing the plant; *e*, ball.

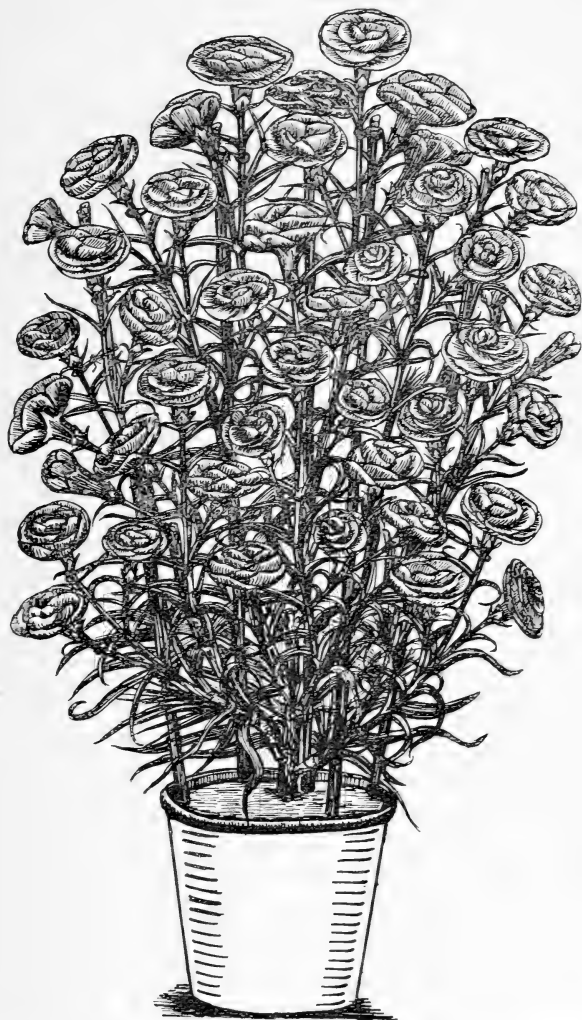
W, the plant after repotting and staking: *f*, drainage; *g*, rougher parts of the compost; *h*, ball; *i*, soil; *j*, space for water; *k*, stakes; *l*, 9-inch pot stood on a level bed of rough ashes, *m*, and half plunged in finer ashes, *n*, in an open but sheltered position out of doors.



FIG. 57.—See opposite page, also Chapter IX.



TREE OR PERPETUAL SECTION. FIG. 57.—A YOUNG TREE CARNATION IN FLOWER IN WINTER.



TREE OR PERPETUAL SECTION. FIG. 58.—A TWO YEAR OLD  
PLANT IN BLOOM IN A 9-INCH POT.

## Chapter X.—Diseases and Enemies.

[BY "PATHOLOGIST."]

### I.—Mildew.

CARNATIONS, both under glass and in the open ground, are liable to attack by a white mould commonly called mildew (*Erysiphe communis*), which produces patches of a white or grey meal-like coating here and there on the leaves. The attack cripples, stunts, and disfigures the growths. The young growth of plants raised late from layers is often affected, possibly from tenderness of the growths encouraged by the rooting so late in the season. The dews of late summer, and the moisture on the leaves for long periods, render the plant more susceptible.

It is towards autumn that mildew makes its appearance on the young plants, commonly after a period of dry weather, especially on light soils outdoors, and on plants that after being potted up are kept close and moist in frames or houses. If allowed to spread the mildew soon renders the plants weak, and they give indifferent results as compared with others kept clear of the pest. The closer and moister the conditions, the more rapidly the mildew develops.

Mildew is best avoided out of doors by choosing an open and airy situation, and under glass by giving plenty of air, with a position in full light. Great care is necessary in watering. Spraying with a solution of sulphide of potassium ( $\frac{1}{4}$  oz. to 1 gallon of water) about twice a week, prevents and represses attacks in the conidial stage (*Oidium erysiphoides*), which is the proper one at which to combat it. The fungicide has no effect on the epiphytal parasite in its perithecial form or resting stage. The grower should pick off and burn any leaves with minute black bodies on them.

As a dry preparation for dusting on the plants, flowers of sulphur mixed with one-third of slaked lime answers well, if the dusting is

#### FUNGOID ENEMIES. FIG. 59 (NEXT PAGE).—MILDEW.

- A, a young plant in a  $4\frac{1}{2}$ -inch pot badly affected with mildew: *a*, stumps of shortened leaves at layering; *b*, young grass crippled and stunted; *c*, patches of mildew on the leaves; *d*, the central growth deprived of nourishment and distorted.
- B, a young plant outdoors infested: *e*, patches of mildew on the leaves; *f*, stunted crown.
- C, mildew, or conidial condition of the fungus named *Oidium erysiphoides*: *g*, mycelium effused, arachnoid, on both surfaces of the leaf; *h*, conidiophore; *i*, conidium or spore, magnified.
- D, the final or resting stage of the fungus, *Erysiphe communis*: *j*, perithecium, superficial, spherical, minute (just visible to the naked eye as black points), scattered or gregarious; *k*, appendages short, asci (contained in perithecium) sub-globose, four to eight spored, four to eight in a perithecium; spores elliptical, magnified.

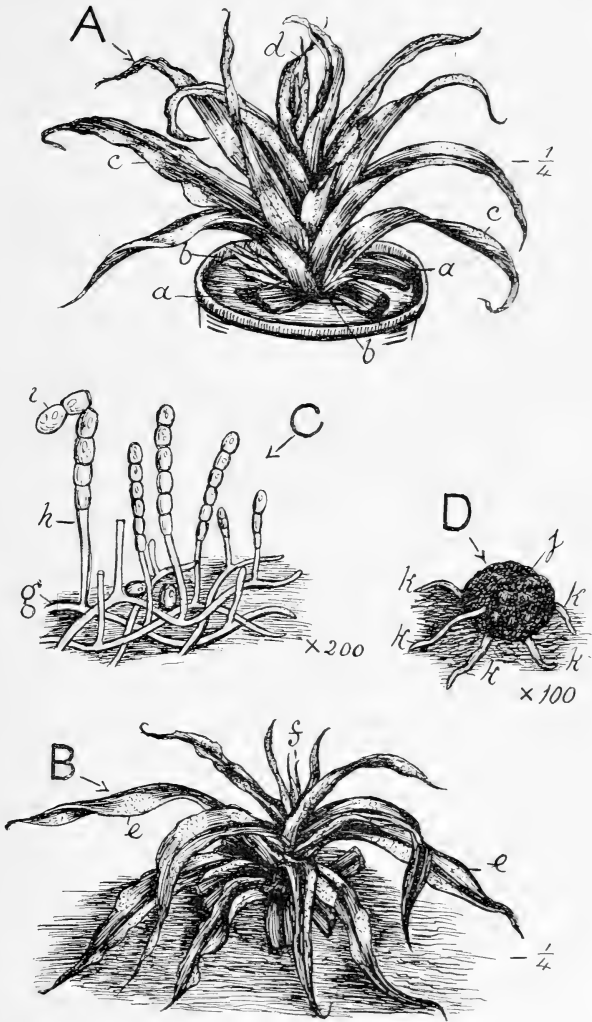


FIG. 59. — See opposite page.

commenced as soon as the first trace of the mildew is noticed. The application may be at short intervals until the *Oidium* is completely eradicated.

## II.—Rust.

Carnation rust or brand produces at first pale spots on the leaves and stems, followed by scattered, minute, elevated blisters, which are for a long time covered by the cuticle. These particles crack at the apex, and disclose the powdery chocolate or orange coloured spores. The first spores are uredospores, spheroid or elliptical, and rather large, externally rough, and pale brown, chocolate or orange in colour. No aecidia spores or cluster cups are associated with the uredospores.

The teleutospores or resting spores are the last to arrive; they are globose, rarely oblong, with the cell membrane thickened at the apex, and a little narrowed below into the long, deciduous pedicel; they are brown, becoming darker with age, one celled, and smooth.

The fungus grows wholly within the leaf or stem of the Carnation, which it distorts, ultimately bursting the cuticle on both sides for the emission of the spores. These—uredospores—are produced in great numbers, and are scattered far and wide. They quickly germinate upon Carnation leaves, and push germ tubes, that quickly gain access to the interior of the leaves by the stomata and then form new pustules. This process is repeated till in bad cases all the foliage and sometimes the stem is involved in the disease.

The resting spores hibernate for a time, or through the winter, in dead Carnation refuse, and germinate in this decaying material in or on the ground in the spring, at which time they make their attack on previously unaffected Carnations. In greenhouses the fungus grows continuously all through the winter by its uredospores; it frequently produces resting spores in the same pustules with the uredospores.

Carnation rust is usually confined to plants grown under glass, the fungus apparently being powerless to attack plants outdoors. Plants with exceptionally blue foliage generally resist its attacks.

### FUNGOID ENEMIES. FIG. 60 (NEXT PAGE).—RUST.

- E, a plant in a 5-inch pot infested with rust: *l*, pustules on the leaves; *m*, pustules on the stem.
- F, a deformed leaf showing: *n*, blisters or pustules, natural size.
- G, a fragment of a Carnation leaf showing the pustules in section: *o*, leaf tissue; *p*, raised and broken cuticle; *q*, spores (*uredo*) *in situ*, magnified.
- H, a bit of a pustule in the uredospore stage: *r*, mycelium; *s*, pedicel; *t*, spore (*uredo*, sometimes called *Uredo Dianthi*)—it is chocolate or orange in colour, and covered with minute spines; *u*, a dropped spore which has germinated, magnified.
- I, a portion of pustule in the final stage (teleutospore) sometimes referred to as brand, *Uromyces Dianthi*, syn. *U. caryophyllinus*: *v*, mycelium; *w*, pedicel; *x*, teleutospore, brown in colour, turning darker; *y*, smooth.



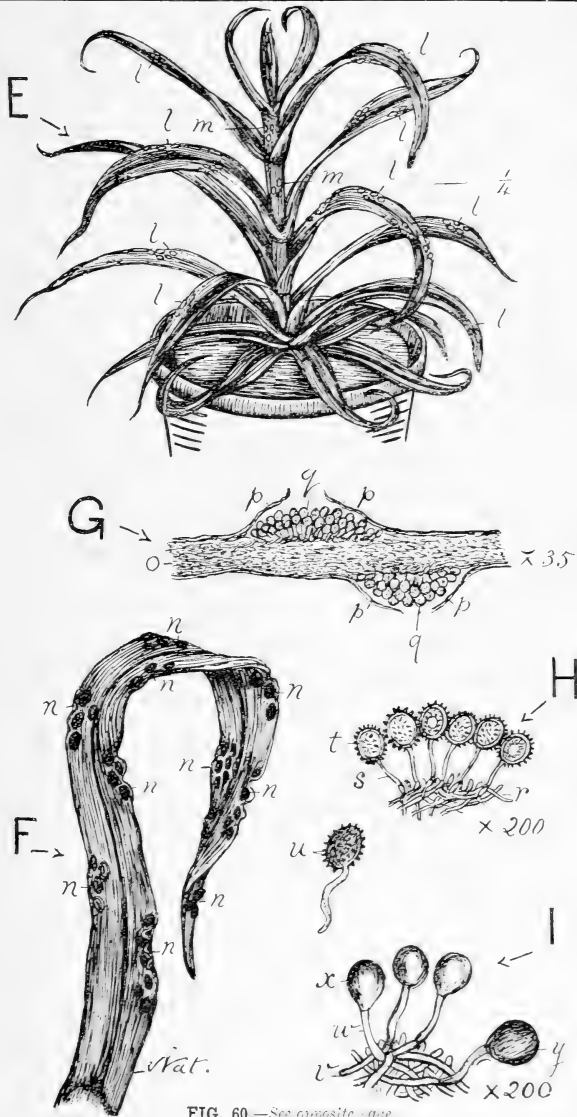


FIG. 60.—See opposite page.

In case the pest makes its appearance the affected leaves should be cut away before the pustules burst, together with affected stems, which should be promptly burnt. Badly infested plants should be destroyed, for if they cannot be saved the disease can be prevented from spreading by clean culture, plenty of light, air, and room, and the destruction of all tainted material.

In case of plants slightly affected the fungus may be prevented from spreading by sponging with Condy's Red Fluid diluted to a deep rose colour with water. Healthy plants may be sprayed with it as a preventive. Permanganate of potassium is of the same nature as Condy's Fluid, and the crystals may be dissolved in soft water so as to give a deep rose coloured solution, say about 1 oz. of crystals to 1 gallon of water for sponging, and 1 oz. to 3 gallons for spraying. About two spongings with the permanganate solution suffice to kill the fungus.

Carnations badly infested with rust have also been freed from the pest by persistently sponging the plants with a weak solution of Gishurst Compound. Blue Water or Eau Celeste is also effectual in repressing the pest.

### III.—Black Mould or Spot.

This parasitic fungus is one of the worst enemies of the Carnation, and was first described and figured in 1870. The leaves of affected plants become studded at first with large, round, whitish spots, upon which sooty brown, mouldy patches quickly spread, giving a velvety appearance. The fungus grows on both sides of the leaf in concentric fashion; a minute spot first appears, next a ring round that spot, then a larger ring, one outside the other, till in bad cases the disease spots become confluent, and the foliage is soon destroyed. Owing to the tufts of fruiting threads being arranged in irregular circles, the mould has acquired the cognomen of fairy ring of Carnations.

In the fruiting state the fungus is superficial, but the mycelium from which the fruiting threads or conidiophores arise is partially within the membranes of the leaf, and lives upon the juices of the

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FUNGOID ENEMIES. FIG. 61 (NEXT PAGE).—BLACK MOULD, SPOT,  
OR FAIRY RING.

- J, a plant in a 5-inch pot affected with Carnation black mould, commonly called spot, and also fairy ring of Carnations: *a*, disease spots in the early stages, round or oval, and whitish.
- K, a plant in the open ground infected: *a*, disease spots.
- L, an affected leaf stunted and disfigured: *b*, disease spots showing the tufted clusters of the fruits of the fungus, arranged in irregular circles, resembling "fairy rings" in miniature as formed by *Marasmius oreades* in pastures.
- M, Black Mould, *Heterosporium echinulatum*, representing a small tuft of fungus fruit: *c*, a portion of a compact mass of mycelium from which the cluster of conidiophores springs, and which eventually forms a sclerotium; *d*, conidiophores or fruiting threads; *e*, conidia or spores.

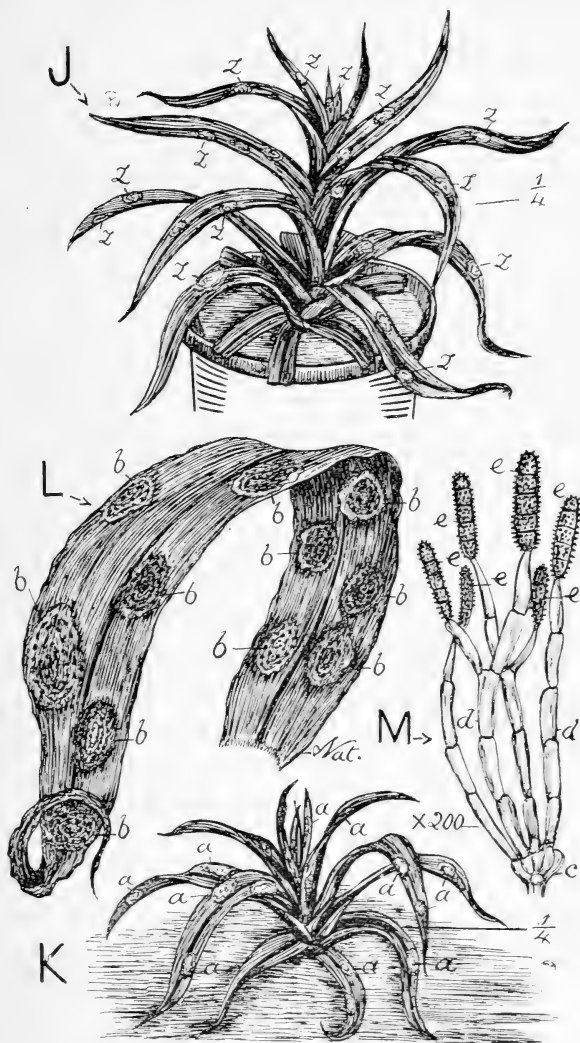


FIG. 61.—See opposite page.

Carnation. The fruiting threads are very regular, pale olive in colour. They form little tufts, each thread being simple or branched, with very short branches, sometimes only like knots or nodules, the upper knots, as well as the apex of the thread, bearing the spores or conidia. These are cylindrical, with two to five transverse divisions, mostly two or three, externally rough with minute warts, slightly coloured. The conidia are capable of germinating from each one of the separate cells. The conidia at maturity may break to pieces, each producing a germinal tube capable of reproducing the disease, either by directly piercing the cuticle of the Carnation leaf, or by forming a dark coloured secondary spore at the tip of the branched germ tube. It thus has "two strings to the bow" for reproduction. The secondary spores, being light and smooth, are probably capable of distribution over wider areas than the warted spores. Probably the latter hibernate during the winter out of doors; the warted spores certainly hibernate in greenhouses, although among Carnations and in favourable conditions for germination, they keep on reproducing and infecting new centres.

In dying leaves numerous minute sclerotia are said to be formed, which remain as resting spores during the winter, and in the following season they produce conidia, which on Carnation leaves give origin to the first patches of disease.

The consensus of opinion amongst practical gardeners is that a damp and stagnant atmosphere, sodden or unsuitable soil, a severe check or chill, and overcrowding the plants, all conduce to the attacks of *Heterosporium* (formerly *Helminthosporium*) *echinulatum*. The fungus is certainly developed rapidly under any and all of these conditions, especially that of a damp and stagnant atmosphere; hence, in the case of plants in pots, it is all important to give them as much light and air as possible, keeping them as dry as is consistent with safety, both at the roots and in the atmosphere. When plants are grown under glass the foliage should be kept as free from moisture as possible, for if the surface is dry floating spores alighting on the leaves do not germinate.

Spraying with potassium sulphide, 1 oz. being dissolved in 1 quart of hot water, and when thoroughly dissolved diluted to 3 gallons

FUNGOID ENEMIES. FIG. 62 (NEXT PAGE). — CARNATION MACROSPORE.

N, a plant affected with macrospore, *Macrosporium nobile*: *f*, stumps of shortened leaves at layering; *g*, side growths; *h*, disease spots on the leaves; *i*, disease spots on the stem.

O, a portion of a plant showing the partial result of fungus infection: *j*, stem pale above and about the diseased spots, the tissue ultimately shrinking, and the dark coloured spots or fruits of the fungus appearing on the destroyed parts; *k*, spots on the leaves; *l*, spots that have become confluent, and are causing the leaves to wither at the extremities, at first almost white, but becoming brown and shrivelled.

P, three conidia of the fungus: *m*, pedicel; *n*, a conidium.

Q, a conidium germinating: *o*, germ tube.

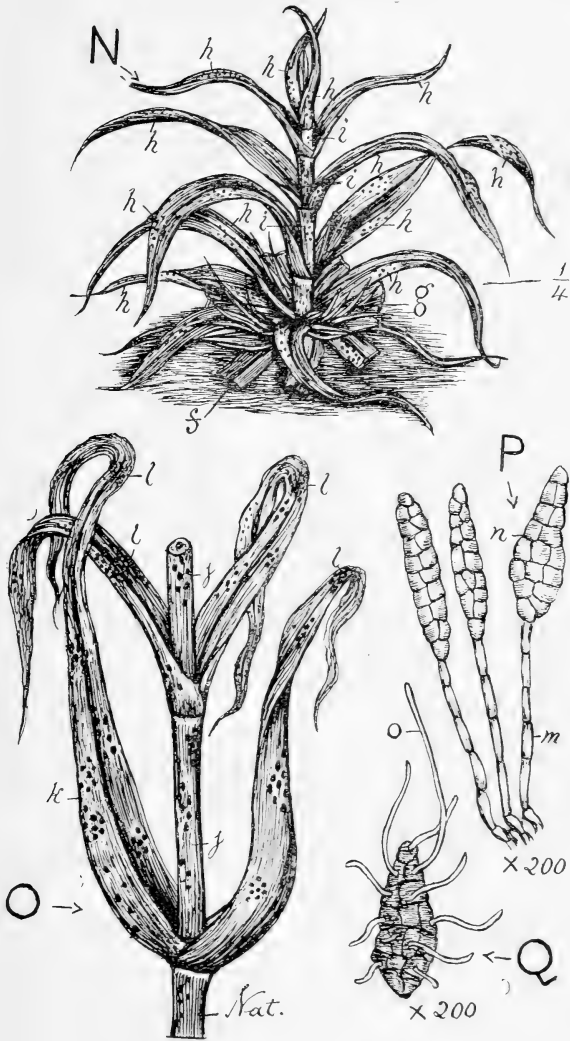


FIG. 62.—See opposite page.

with water in which 6 oz. of soft soap has been dissolved is good. Sulphide of potassium discolours white paint and has a disagreeable smell. Blue water is, therefore, preferable for use under glass. It may be made as follows: 1. Sulphate of copper 1 oz., carbonate of soda 10 oz., liquid ammonia  $7\frac{1}{2}$  fluid oz., water  $5\frac{1}{2}$  gallons. Dissolve the sulphate of copper in  $\frac{1}{2}$  gallon of hot water, in another vessel dissolve the carbonate of soda, mix the two solutions, and when all chemical reaction has ceased add the ammonia and dilute to  $5\frac{1}{2}$  gallons. 2. Ammoniacal solution of copper carbonate: Copper carbonate  $1\frac{1}{4}$  oz., aqua ammonia ( $26^\circ$ ) 15 fluid oz., water 9 gallons. The copper carbonate is first made into a thin paste by adding  $7\frac{1}{2}$  fluid oz. of water. The ammonia water is then slowly added, and a clear, deep blue solution is obtained when diluted to 9 gallons.

Dusting the plants with a powder compounded of 1 lb. of tobacco powder and  $\frac{1}{4}$  oz. of finely powdered sulphate of copper, well mixed, has given good results, alike as regards aphides, thrips, and against fungoid pests. Dust the plants on the under, as well as the upper, surface of the leaves very lightly with the powder every two or three weeks as a preventive.

All diseased leaves should be picked off and burned. By consistently attending to this point the disease does not spread, and there is the advantage that spores or sclerotia are not carried over the winter. This is particularly advisable in the case of outdoor plants, but timely attention to spraying or dusting will prove effective.

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ANIMAL ENEMIES. FIG. 63 (NEXT PAGE).—GOUT OR EELWORM,  
TYLENCHUS DEVASTATRIX.

- A, a diseased Carnation infested by stem eelworm: *a*, the collar of the plant (junction of stem with soil); *b*, the lower part of the leaves (which show large, whitish, or yellowish patches, swollen and contorted)—these are affected with the nematodes; *c*, the upper part of the leaves narrowed and prevented from developing; *d*, the central axis or growing point stationary, the condition of the plant commonly referred to as "fuzzy," a very old term for the swollen and soft nature of the affected plants.
- B, stem eelworms, *Tylenchus devastatrix*, from the infested leaves of A: *e*, male; *f*, female.
- C, ova or so-called eggs of the stem eelworm from a decayed portion of the plant A: *g*, ovum or egg; *h*, cyst or eelworm developing; *i*, eelworm or larva emerging.
- D, a Carnation in the second year affected with rootstem eelworm, *T. obtusus*: *s*, old leaves withered; *k*, grass stunted, weak, and dying back at the tips; *l*, an excrescence on the stem just below the ground, sometimes at the collar and above the surface of the soil, popularly called gout. When thus affected the plants frequently collapse at flowering time; *m*, normal roots.
- E, ova or eggs from the decayed portion of the swelling on the stem of the plant D: *n*, an eelworm developing in the cyst; *o*, wormlet or larva emerging.
- F, rootstem eelworm, *T. obtusus*: *p*, male; *q*, female,

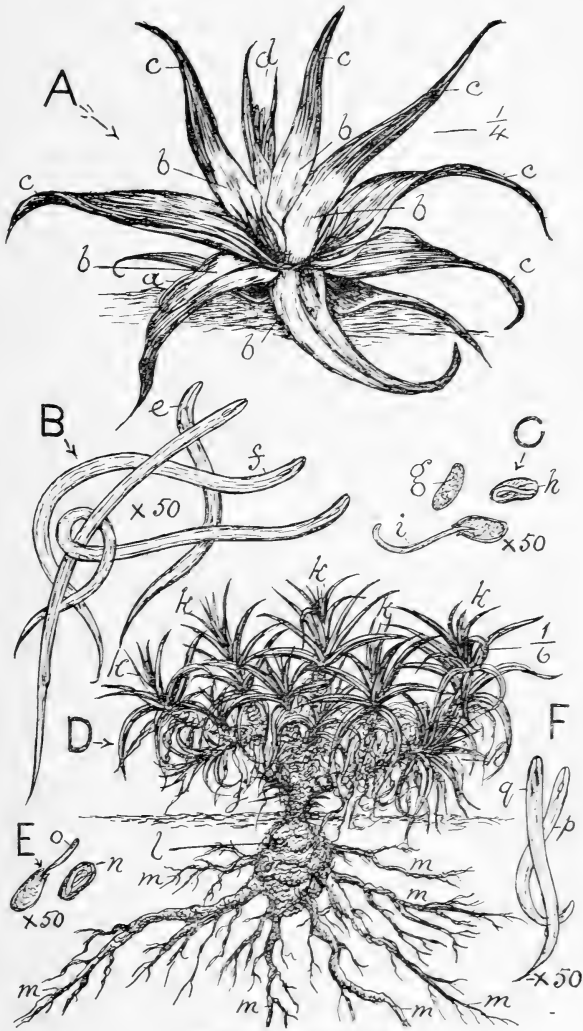


FIG. 63.—See opposite page.

**IV.—Carnation Macroscope.**

This pest forms pale spots, often in large patches, on the leaves and stems of Carnations, which look as if they had been scorched. Frequently the tops of the leaves become pale in colour, sometimes almost white, then shrivel and die back. The flower buds do not open, or else they develop the petals very indifferently. The spots are irregularly scattered, and the extent of the discoloration is due to the mycelium of the fungus being widely diffused in the tissues. On these patches of disease small black spots appear sooner or later, alike on the stems and both surfaces of the leaves. These are the fruits of the fungus, which spring from the mycelium in the tissues of the stem or leaves, bursting through the cuticle, and ultimately becoming scattered. The clusters of threads bear the conidia, which are large and pale olive brown, subcylindrical, pear shaped, irregular, divided transversely from four to ten times, each division being again subdivided by longitudinal partitions into somewhat cubical cells, in a muriform manner. Each cell of the conidium is capable of germination. Later in the season minute numerous black sclerotia are embedded in the dead, diseased parts. These act as resting spores, and reproduce the disease the following spring.

It is possible that the disease commences as a saprophyte on parts of the leaves that have been cut back in layering, these decaying more or less and becoming buried in the soil in transplanting. From this saprophytic mode of life it passes to a parasitic. It is all important that all portions of diseased plants should be destroyed, and the plants kept perfectly free from all dead and decayed parts. If this is attended to, and the parts are burned, there will be little danger of the disease spreading.

Spraying with a solution of potassium sulphide or of ammonical copper carbonate is quite effectual, if practised at intervals of a fortnight or three weeks as a preventive. Culturally the same conditions as advised for spot should be attended to, damp and decaying matter being favourable to the fungus.

**V.—Gout or Eelworm.**

This disease was long known to Carnation growers as "fuzzy," from the lower part of the leaves being swollen and the upper part attenuated and green, while the basal portion had a whitish or yellowish appearance. The growth of Carnations being arrested, the central part remaining stationary, was by old practitioners regarded as due to too rich, sodden, and sour soil, with imperfect drainage. The remedies applied were usually lime, soot, and salt, the diseased plants being cleared away and burnt. About 1880, the Rev. M. J. Berkeley found that the fuzziness was infested, if not caused, by nematoid worms, and this has been confirmed by subsequent investigations.

An affected plant is readily detected by the large whitish or livid patches that appear on the leaves, usually at the base, growth being



arrested, and the basal part swollen and contorted. On examining a portion of the diseased leaf, especially where decay has set in, eelworms are found, and in further putrefaction the ova or eggs with young wormlets or larvae are discovered. With the decay of the plant or part diseased the young wormlets pass into the soil, and live upon decayed or organic matter. Infection, therefore, is from the soil, possibly not attacking plants where the soil and other conditions are favourable for healthy growth. The eelworm usually associated with fuzzy Carnations is the stem eelworm, *Tylenchus devastatrix*.

In many cases the foliage is not affected other than by impoverishment, but the stem at the collar and more or less downwards is considerably enlarged and swollen. In this nodosity, mostly cellular tissue somewhat decayed, may be found nematoid worms of a much shorter and blunter conformation than those usually found in diseased leaves above ground. These are rootstem eelworm, *T. obtusus*. In some cases the much longer and narrower stem eelworm cuts off the supplies of nourishment, and the plant sooner or later collapses.

Burning the affected plants is the only means of extirpating eelworm. Infested plants, whether fuzzy or "gouty," are not curable, for the nematodes are lodged in the tissues. In the soil the pests are readily destroyed by caustic substances such as lime, and also by dressings of kainit, the latter being used with basic cinder phosphate. The materials for potting should be in a thoroughly sweetened condition.

#### VI.—The Carnation Maggot (*Hylemyia nigrescens*).

This pest is one of the most troublesome and destructive foes of the Carnation. It attacks all varieties, though some are freer from it than others. The worst affected outdoors are the common Clove and seedlings, also gross layers, and indoors *Souvenir de la Malmaison*, likewise rose Flakes and pink and purple Bizarres. The younger and softer the growth, whether due to the habit of the variety or to gross culture, the more likely is the plant to be selected by the Carnation fly for depositing its eggs; hence the disease is mainly observable in seedlings or layers, and after the plant has attained a certain age it appears to enjoy a comparative immunity from attack.

The fly resembles a house fly in general appearance, but is smaller. It is two winged, grey or blackish; the back is indistinctly striped, the abdomen hairy. It sometimes deposits the eggs in the leaves, raising a whitish brown patch like a blister; and in such cases the affected parts have merely to be cut off, making sure that the maggot is in the part, and destroyed. But in some cases the eggs are deposited in the axils of the leaves, or on the stem, and the maggot is developed there without previous warning, and the heart of the plant is eaten out before the presence of the enemy is detected. This is indicated by the centre of the plant or shoot having a pallid, sickly appearance; after a time the heart drops completely out. In

most cases of leaf attack, careful attention will enable the grower to detect signs of the maggot in time to pick it out with a needle. In many instances the maggot eludes all vigilance till the mischief is done ; it does not always kill the plant, but a plant with its centre eaten out is spoiled for flowering. The maggot is to be found at all seasons, but principally in the autumn and winter, and is most prevalent in cold, moist seasons.

In the case of leaf infection the maggot works its way down under the outer skin of the leaf from the blister-like spot before named, eating and leaving a whitish brown track down the leaf. If the crown leaves of the plant or shoot be given a slight pull when the maggot has eaten out the centre of the stem, they will usually come away in the fingers. In that case the shoot must be taken off at its first joint, and if sound the maggot is in the point pinched off, but if the stem has a small hole in it the maggot has passed on and must be followed. This can be done with a knife, cutting the stem open and killing the maggot ; the plant, though crippled, may live. When the attack is in the crown leaves of the main or side shoots the plant must be pinched back until the maggot is found. Two sometimes work together, so that when one maggot is extracted it is well to make sure that another is not left. Sometimes the maggot can be got out without breaking off the main shoot.

The wise plan is to carefully watch the plants for the maggot, operating directly the blister spot and whitish brown track are seen, so as to extract the maggot before it gets from the leaf to the main stem. Superficial glances are no use—every plant and every shoot must be carefully observed, even when no track is seen on the leaf,

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ANIMAL ENEMIES. FIG. 64 (NEXT PAGE).—THE CARNATION MAGGOT.

- G, a seedling Carnation affected with maggot : *r*, leaves normal and healthy ; *s*, side shoots not usually affected until some stem is formed ; *t*, an infected leaf, showing the track of the maggot downward in the tissue and eating out the stem, the upper part being readily pulled out with the fingers ; *u*, the central axis or growing point, which may easily be pulled out when the maggot has eaten the stem through ; if left it turns yellow and withers, the plant loses its central stem and growth above the maggot attack.
- H, a shoot of Malmaison Carnation affected with maggot : *v*, stem ; *w*, leaves not affected ; *x*, central growth stationary, but quite green and normal. A leaf in the early stage of infection : *y*, the point where the egg is laid on or in the leaf ; *z*, the tunnel made in the leaf tissue by the maggot ; *a*, the point where it must be extracted with a needle before reaching the stem. A leaf in a later stage of infection and with the maggot in the stem : *b*, the point where the egg was deposited ; *c*, the tunnel made by the maggot in eating its way to the stem ; *d*, the maggot in the stem—it has eaten out the heart, and the upper part of the shoot can be readily pulled out at the joint below *e*.
- I, the Carnation fly, *Hylemyia nigrescens* : *f*, the perfect insect ; *g*, the larva or maggot ; *h*, the pupa, all shown of the natural size and also magnified.

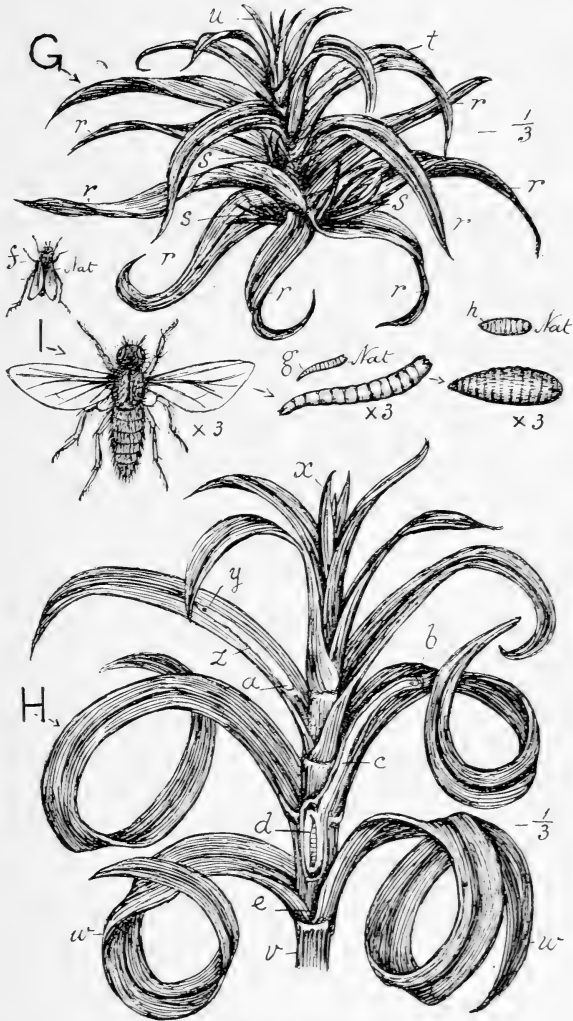


FIG. 64.—See opposite page.

giving the points of the shoots a gentle pull. The latter step often detects the presence of the enemy when no external sign is visible. When plants are found to be infested they should be gone over daily, and the maggots extracted. A lens is useful, as the pests are so small as to be scarcely visible while in the leaf.

The maggot, which is yellowish white, varies in size from  $\frac{1}{20}$  to  $\frac{1}{3}$  inch in length; it is legless, pointed at the head end, and blunt at the tail. When full fed the maggot leaves the plant to change to a pupa in the earth, somewhat oval in shape, thickest at the head end, of a medium shade of brown, and with the spiracles still projecting, and two little knobs at the tip of the tail. From the pupa the fly emerges in about a month. Outdoors the maggot ceases feeding in April or May, and in the latter month it leaves the plant to turn to a pupa, and by the end of May has changed to a complete pupa or so called chrysalid, the fly emerging at the end of June or beginning of July. Under glass the maggot is found at almost all seasons.

### VII.—Wireworms.

The larvae or grubs of the beetles known under the popular names of skipjack or click beetle are well known enemies of Carnations. The most hurtful species are *Elater* (*Agriotes*) *lineatus*, *E. obscurus*, and *E. sputator*. The most common is the first named.

The beetles are harmless, but the damage done by the larvae or grubs is immense. In the larval stage they remain in the ground for a period of from three to five years, and are often found in turfy loam, vegetable earth, and dung, in one or other of which they are probably introduced to Carnations, especially in the case of those grown in pots and in beds of prepared compost. The larva of the common click beetle is about 1 inch in length when full grown, and of a clear brownish yellow colour. Its skin is smooth, tough, and hard, and feels between the finger and thumb like a piece of wire; hence the name wireworm.

It often happens that the wireworm attacks recently planted layers or even whilst they are rooting, taking advantage of the callus

#### ANIMAL ENEMIES. FIG. 65 (NEXT PAGE).—WIREWORM.

- J, a young plant infested by wireworm: *i*, root system quite clear; *j*, stem; *k*, collar; *l*, the upper leaves puny and stunted and the top gradually dwindling; *m*, hole in the stem at the top of the slit made in tonguing the layer; *n*, portion of stem sliced off; *o*, tunnel made by the wireworm; *p*, wireworm *in situ*.
- K, a young plant established in a bed and attacked by wireworm: *q*, roots; *r*, stem; *s*, collar; *t*, side shoots or grass; *u*, central growth not developed; *v*, points where roots have been eaten through; *w*, roots gnawed and injured; *x*, a wireworm eating at the roots and passing between the woody tissue and the bark; *y*, a wireworm eating into the stem just below the collar.
- L, Click or skipjack beetle, *Elater*, syn. *Agriotes*, *lineatus*: *z*, an adult, natural size and magnified; *a*, larva, called wireworm; *b*, pupa.

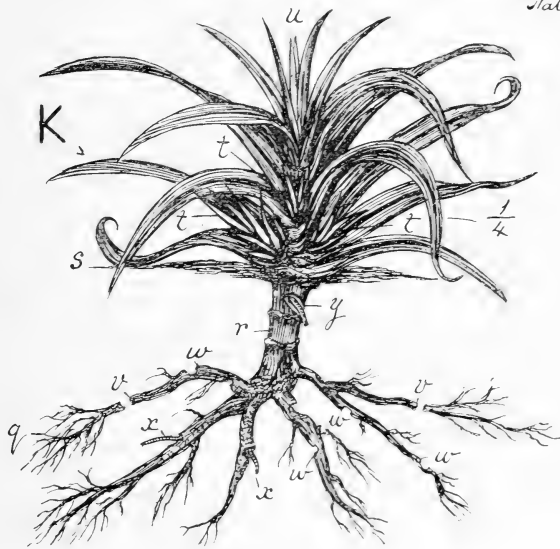
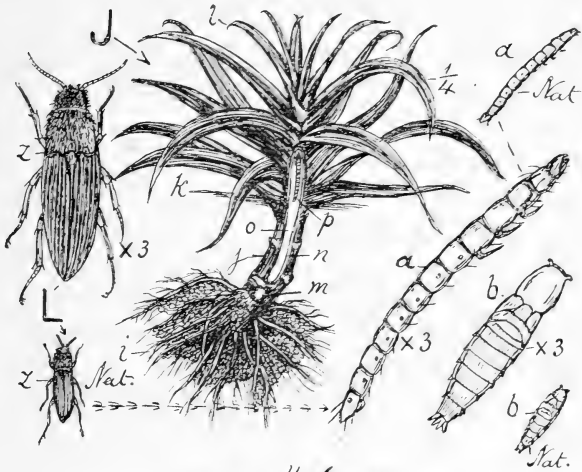


FIG. 65.—See opposite page.

and eating its way through this into the stem, so that plants transplanted or potted up in late summer may contain wireworms in their stems. Such plants dwindle in spring when they should be growing, and finally die. In other cases the wireworm does not commence its attacks until the plants are well established in pots or beds, and for a time may be content with gnawing the roots. Anon it attacks the stem, usually immediately below the surface of the ground, eating a hole into the centre, and then working downwards or upwards, sometimes to a considerable height into the stem. Of this the grower is not aware until the plant ceases growing or shrivels up, and then to his great annoyance and loss the wireworm is found in the stem. Vengeance may be taken on the culprit, but it is too late to save the plant.

The treatment for wireworm is wholly preventive. Where there is a suspicion of it the ground should be dressed with rape meal, 7 lb. per rod, 4 oz. per square yard, before planting in autumn or spring, leaving the stuff on the surface or very lightly pointing it in. The wireworm will come up to feed on the rape meal. In two or three days after applying it, dress the ground with mustard dross (the refuse from mustard mills), 14 oz. per rod or  $\frac{1}{2}$  oz. per square yard, and lightly point it into the soil. The ground may be forked over before applying the mustard dross, and any unearthed wireworms despatched. It is advisable to allow a month or six weeks to elapse after dressing with mustard dross before planting Carnations or Ficotees.

If wireworms show themselves in a bed of Carnations, place pieces of Carrot on the end of pointed sticks, bury the baits 2 or 3 inches under ground, and examine them daily; the wireworms will be found feeding on the Carrot baits, and can be destroyed. Pieces of oil cake about 2 inches square, with a skewer thrust into each, and inserted in the ground, make better baits even than Carrot, but the soil immediately surrounding the linseed cake bait should be closely scrutinised for the wireworms. Mustard dross may also be used to check wireworm infection in planted out beds, not using more than  $\frac{1}{4}$  oz. per square yard, and not applying it over the plants.

Badly infested land should be dressed in autumn with gas lime (fresh, not stale),  $\frac{1}{2}$  cwt. per rod, 1 $\frac{3}{4}$  lb. per square yard, leaving it on the surface a month or six weeks before digging it in. If applied in autumn and the ground is forked over once or twice before planting

ANIMAL ENEMIES. FIG. 66 (NEXT PAGE).—APHIDES OR GREEN FLY.

- M, a plant in a 6-inch pot stunted and dwarfed by a bad attack of Aphides: *c*, young grass infested; *d*, central leaves curled and completely checked in growth by Aphides.
- N, an attack on the flower buds and the points of the grass: *e*, flower buds covered with green fly; *f*, points infested, stunted, coated with excretions, and weakened.
- O, green fly: *g*, wingless viviparous female; *h*, winged viviparous female.

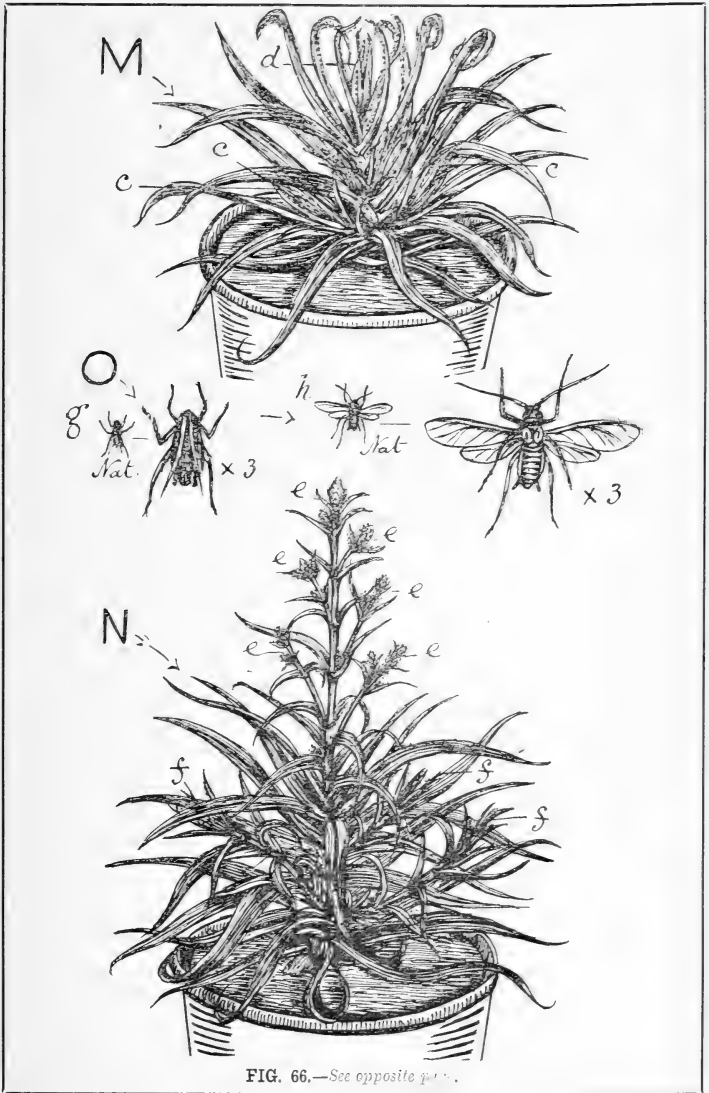


FIG. 66.—See opposite page.

in spring, the soil will usually be freed from the pest, and probably also from Carnation fly pupae.

The potting soil should be thoroughly examined before use. The wireworms are easily detected if it is turned over. Always remember that the materials for forming compost cannot be too thoroughly rotted, sweet, and wholesome.

### Aphides or Green Fly.

The green fly that infests Carnations bears a close resemblance to, if it is not identical with, the corn aphid, dolphin, or plantlouse (*Aphis* or *Siphonophora granaria*). The insects are of small size, green, very soft, and easily crushed with the fingers. They cluster on the ends of the young growths in great numbers, causing considerable injury by drawing away the sap, and thus not only exhausting the strength of the plant, but also effecting much damage to the tissues by means of the many minute punctures. In this way, together with the exudations and excretions, known as "honey-dew," deposited on the foliage and clogging the respiratory organs, the whole plant is rendered unhealthy. Even slight attacks cripple the growth and give rise to the condition known as "stigmanose," sometimes, especially under moist conditions of atmosphere and sluggish root action, resulting in decay and accompanying bacteria. Stigmanose is declared by some mycologists to be identical with the trouble known as "bacteriosis of Carnations," but this occurs in the British Islands apart from previous infestation by aphides.

The aphid is said to deposit eggs on the leaves of the Carnations in late summer or autumn, and these are hatched with the warmth of spring, but the aphides are often found on Carnations in late summer and autumn, especially on the Trees, and unless destroyed they increase with marvellous rapidity, viviparously. The grower must keep a sharp lookout, and whenever an aphid is seen promptly take steps to kill it.

Under glass the aphides are readily destroyed by vaporisation with nicotine compound, operating on two or three consecutive calm evenings and having the grass dry. A solution of quassia extract and other insecticides is also fatal to the aphides, if the plants are dipped into it.

### ANIMAL ENEMIES. FIG. 67 (NEXT PAGE).—THRIPS.

P, a plant which has not developed its flower buds properly on account of the attacks of thrips: *i*, grass with white marks on the leaves due to the punctures of insects, and black dots due to excrement matter, the growth is weakly and stunted; *j*, buds that have been entered by insects as soon as the calyx parted at the apex, and much damage done to the unfolding petals, which have been prevented from developing further; *k*, flowers that have at first a whitened, streaky appearance in the petals, afterwards turning brown and dying without expanding properly, due to the attack of thrips.

Q, thrips (*Heliothrips haemorrhoidalis*): *l*, larva; *m*, perfect insect.



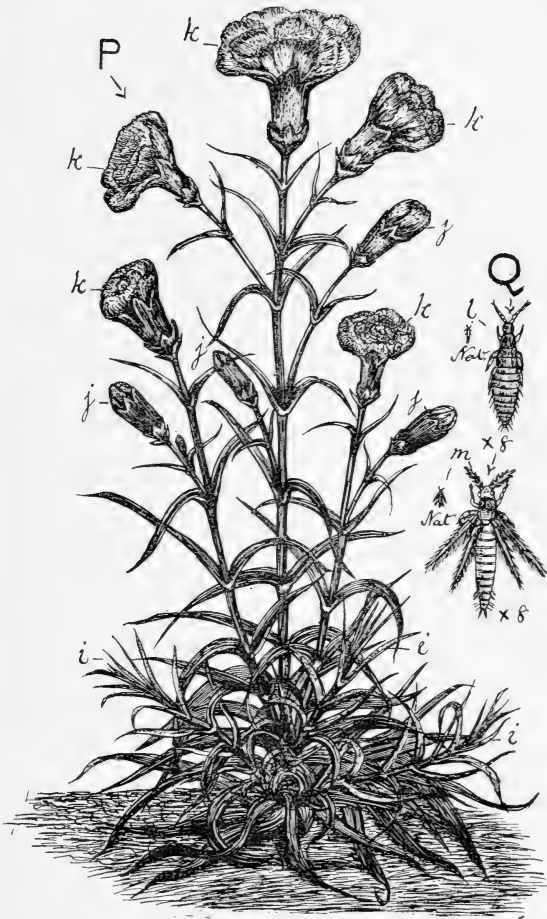


FIG. 67.—See opposite page.

### Thrips.

The small lively insects known as thrips, also as "thunder" and "black flies," belong to the section of the order Neuroptera named Thripidae, and are familiar to Carnation growers as very destructive to his plants, both outdoors and under glass. The thrips undergoes an incomplete metamorphosis, the larva being like the adult, with the exception of the absence of wings and certain peculiarities of colour. The adults are nearly always black, and have long, narrow, equal, veinless wings, fringed on each side with long hair, and laid horizontally along the back when at rest. They fly or "jump" about in large numbers, and attack the leaves and flowers of the plants, sucking out the juices, and often causing much loss.

There are several species, but that usually attacking Carnations under glass is *Heliothrips haemorrhoidalis*; it is present in heated structures throughout the whole year. Outdoors the species that attacks the Carnations in summer is *Thrips minutissima*, which cripples both the foliage and flowers. The insect finds its way from the young growths, which it turns almost white by sucking out the juices, to the flower buds, and even sucks at the tender calyx, causing whitish marks, and as soon as the calyx segments open it enters the flower buds and feeds upon the developing petals. In hot seasons, if the plants are neglected, the thrips become so numerous in a partially expanded bloom that they may be shaken out in scores and are easily seen on a sheet of white paper, though not more than  $\frac{1}{16}$  inch in length. They completely ruin the expanding blooms.

Drought or poverty is the cause of thrips infection. The proper way, therefore, to avoid attacks is to duly supply the plants in beds and borders with proper supplies of water and liquid nourishment, and syringe them daily when in the bud state, especially when the plants are grown on dry soils in hot positions. In case of attack, the plants may be dusted with tobacco powder when wet, or as this is somewhat unsightly the plants may be sprayed with a boiled decoction of White Hellebore, 1 oz. to 1 gallon of water. This is a certain remedy, but it must be applied before the thrips get into the flower buds.

In the case of plants under glass, or those grown in pots that can be taken indoors, vaporisation with nicotine compound on two or three consecutive evenings (not when the sun shines) will destroy the pests. Many will leave the flowers, settle on the stages or floor, remain there until the smoke or vapour has cleared, and then return to the plants. It is well, therefore, to have the benches and floor wet, but there must not be any water on the foliage or flowers.

### Other Pests.

*The frog hopper*, which covers itself with a white froth ("cuckoo spit"), should be crushed.

*Rabbits* must be kept out by wiring.

*Slugs* are reduced by applying lime water at night; or they may be trapped with heaps of brewers' grains.

## Chapter XI.—Selections of Varieties.

PERPLEXITY waits upon the amateur who undertakes the task of choosing a small collection of Carnations and Picotees from the catalogues. Long columns of names stretch before him, most of them unfamiliar. Here and there one strikes his eye which he thinks that he has admired somewhere; his fingers search for his pencil to mark it, and then doubt assails him—it was another name after all. Perhaps he recalls a visit to a show, and some names jotted down into a notebook. Where is that book? Not in his pocket, of course; not in the drawer where it ought to be. There is an eager search. Joy! It is found. And then, with the names before him, he realises that it is garden varieties he wants, and someone has told him (or he has read it) that the exhibition varieties are not reliable out of doors.

But, after all, is the average professional in much better case? Is he a reliable adviser? Does he keep himself up to date? It has to be remembered that florists' flowers are so highly specialised in these days, and novelties are introduced in such numbers every year, that one needs the brain and purse of a Chancellor of the Exchequer to cope with the latest developments of all the popular plants. It is safe to say that there are many horticulturists to whom *W. P. Milner* is still the best white Carnation, and *Pride of Penshurst* the best yellow. And these people would be very deeply offended if you smiled at their ignorance. Have they not been gardening for forty years, and so forth?

There are grades even among specialists. No. 1 admits the soft impeachment of being a Carnation lover, displays with pride a well-grown collection of plants, and, when asked for a selection, names varieties which prove to have an average age of eight or ten years. No. 2 receives you in the same brotherly spirit, but pooh-poohs the list in your notebook, and suggests a series of alterations, which seem highly satisfactory until you encounter No. 3, who (being perchance one of the very foremost band of introducers) is able to show you still further improvements—nay, even sorts which are not yet in the catalogues.

All this has its element of humour; but it is baffling to the beginner, who is quite likely to finish up a round of inquiries in a state of bewilderment as complete as that of a youth who tries to choose a machine at a great bicycle show.

Let us see if we can give any assistance in the task of choosing sorts, taking one section at a time.

**For the Garden.**

We have not many Mrs. John Laing Roses among our Carnations, that is, varieties which are equally good for the garden and the show. What suits one purpose may not suit another. The very best garden Carnations the writer has ever had are Henry Falkland and Hildegarde, but he has seen better in the prize stands. Here is a selection of good sorts, in their colours :

<i>Dark Crimson or Maroon.</i>	<i>Salmon Pink.</i>
Mephisto.	Bomba.
Black Prince.	<i>Rose.</i>
Agnes Sorrel.	Lady Hermione.
<i>White.</i>	Mary Hambro.
Hildegarde.	Asphodel.
Sir Galahad.	<i>Crimson.</i>
Trojan.	Gil Polo.
<i>Pink.</i>	<i>Terracotta.</i>
Bridegroom.	Francis Samuelson.
Lady Carrington.	<i>Yellow.</i>
<i>Heliotrope.</i>	Cecilia.
Capuchin.	Daffodil.
<i>Scarlet.</i>	<i>Apricot.</i>
Barras.	Sir R. Waldie Griffith.
Etna.	Mrs. R. C. Cartwright.
<i>Yellow Ground.</i>	<i>Peach.</i>
Henry Falkland.	Lady Nina Balfour.

Selfs dominate this list, and indeed they are far superior to Flakes, Bizarres, and Picotees for garden effect. The Yellow Ground Fancies are also good for outdoors, and those named below for exhibition may be chosen in addition to Henry Falkland.

**For Exhibition.**

In making a selection for show purposes we have to choose varieties which, under special cultivation, will produce flowers of good size and form. Mere vigour of constitution is not enough, valuable as it is out of doors. The sorts may be classified in their various sections.

<i>Scarlet Bizarres.</i>	<i>Pink and Purple Bizarres.</i>
Robert Houlgrave.	Wm. Skirving.
Robert Lord.	Sarah Payne.
Admiral Curzon.	Mrs. Barlow.
George.	H. K. Mayor.
<i>Crimson Bizarres.</i>	<i>Purple Flakes.</i>
Rifleman.	James Douglas.
Master Fred.	George Melville.
J. D. Hextall.	Gordon Lewis.
J. S. Hedderley.	Martin Rowan.
<i>Scarlet Flakes.</i>	<i>Rose Flakes.</i>
Sportsman.	Thalia.
John Wormald.	Mrs. Rowan.
Alisemond.	Rob Roy.
Guardsman.	Crista-Galli.

Those Selfs previously named as garden varieties may be grown, also

Anne Boleyn, salmon.	John Pope, rose.
Benbow, buff.	Loveliness, salmon pink.
Copperhead, apricot.	Much the Miller, white.
Ensign, blush.	Seagull, blush.
Herbert J. Cutbush, scarlet.	

*Yellow Ground Fancies.*

Amphion.	Hidalgo.
Brodick.	Horsa.
Charles Martel.	Ivo Sebright.
Falca.	Pagan.

*White Ground Fancies.*

Dalgetty.  
Millie.

*White Ground Picotees.*

*Purple Edge.*

<i>Red Edge.</i>	Amy Robsart.
Brunette.	Calypso.
Ganymede.	Lavinia.
Isabel Lakin.	Mrs. Openshaw.
Mrs. Gorton.	Muriel.
Thomas Lakin.	Zerlina.
Violet Douglas.	

*Rose or Scarlet Edge.*

Clio.
Fortrose.
Liddington's Favourite.
Little Phil.
W. H. Johnson.
Morna.
Myra.

*Yellow Ground Picotees.*

Abbot.	Lucy Glitters.
Alcinous.	Mrs. Walter Heriot.
Childe Harold.	Rabelais.
Gertrude.	The Pilgrim.
Gronow.	

**Malmaisons.**

Duchess of Westminster, rose, salmon shaded.	Mrs. Trelawny, salmon.
Lady Ulrica, dark rose.	Princess of Wales, pink.
Lord Rosebery, rosy red.	Souvenir de la Malmaison, blush.
Lord Welby, dark crimson.	The Queen, orange yellow.
Mercia, salmon.	Thora, white.
Mrs. Martin Smith, rosy pink.	Yaller Gal, yellow.

**Tree or Perpetual.**

C. A. Dana, pink.	Miss Jolliffe, pink.
Deutsche Brant, white.	Mrs. Leopold de Rothschild (Mdile. Thérèse Franco), pink.
Duchess Consuelo, yellow.	Mrs. S. J. Brooks, white.
Duchess of Devonshire, crushed strawberry.	Uriah Pike, maroon.
Flora Hill, white.	Winter Cheer, scarlet.
Lady Carlisle, pink.	W. Robinson, scarlet.

**American Varieties.**

Alpine Glow, salmon.	Mrs. Theodore Roosevelt, cerise.
Enchantress, blush.	Mrs. T. W. Lawson, pink.
Flamingo, scarlet.	President, dark crimson.
Lady Bountiful, white.	

**Pinks.***Garden Varieties.*

Anne Boleyn, rosy purple.  
 Ernest Ladhams, blush.  
 Her Majesty, white.  
 Mrs. Sinkins, white.  
 Mrs. Waite, white, rose centre.  
 Paddington, rose.

*Show Varieties.*

Boiard.  
 Empress of India.  
 Harry Hooper.  
 James Thurstan.  
 Mrs. Dark.  
 Modesty.

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## Chapter XII.—Marguerite Carnations.

THE Marguerite or Margaret Carnation came as a great boon to those amateurs who are unable to give the time necessary for specialisation. These folk would fain have in their greenhouses and gardens the best forms of the florists' Carnation, grown up to the highest standard of excellence met with at the principal shows. But they have learned from painful experience that skilful, constant, and regular attention, as well as some amount of money, are required in order to gain this end. In particular were they disillusioned by the beautiful but fickle Malmaison. Repeated failures showed that it was not for them.

The Marguerite Carnation has none of the fads of its queenly sister. It is a free and healthy grower, needs no special watchfulness and care, and blooms profusely in a few months from the time of sowing the seed. In fact, it is just as amenable to annual treatment as the well-known Indian Pink. It resulted from a cross between the latter and a florists' Carnation. The flowers come with a fair percentage of doubles in a good strain, are prettily fringed (the lover of American Carnations will not regard this as a defect, even if old-fashioned florists will), and are pleasantly scented.

Seed may be purchased at prices varying from a penny to a shilling a packet. February is a good month to sow in the greenhouse. The seed may be sprinkled thinly in a pot, pan, or box, in a moist mixture of loam, leaf mould and sand, and covered with a square of glass shaded with brown paper until germination takes place. When the seedlings come through substitute white paper for brown, and admit air. In a few days expose them to the full light. If the soil becomes dry it can be moistened without disturbing the plants by dipping the receptacle up to the brim in a tub of water. When the seedlings threaten to become crowded prick them off about

3 inches apart in another pan or box, and when they touch each other put them singly into 4-inch pots, afterwards transferring them to 6-inch. Drain the pots well and use a compost similar to that recommended for florists' Carnations. A simpler mixture would do in an emergency.

The plants may be stood out of doors on ashes for the summer, and placed in the greenhouse in autumn. They will bloom for a considerable period—indeed, well into the winter. For late blooming an April sowing may be made.

Some cultivators simplify the treatment by putting strong plants out for the summer, much in the same way as they do Arum Lilies and Solanums, and lifting them in the autumn. This saves trouble in preparing composts, potting, and watering. Nor do the plants suffer; on the contrary, they make finer specimens, as a rule, than when grown throughout in pots.

Carnation Grenadin is a pretty and useful thing that may be grown from seed in much the same way as the Marguerite Carnations.

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## Chapter XIII.—Pinks.

To describe all the plants grown in gardens under the name of Pinks would mean giving a long list of members of the great genus *Dianthus*, to which such popular flowers as the Carnation, Sweet William, and Pink belong. For instance, there is the Indian Pink, *D. Chinensis*; the Cheddar Pink, *D. caesius*; the Maiden Pink, *D. deltoides*; and the Feathered Pink or Pheasant's Eye, *D. plumarius*. To deal with these would be outside the scope of the present work. All that can be done is to devote a few words to the Border and Laced Pinks.

Conjecture has been very busy with the origin of these pretty and most lovable flowers. It is probable that, like the Hybrid Perpetual Roses, they are the result of several flower amours. However that may be, they have now settled down into one or two well marked types, and, as the cross fertilisers are not working actively on them, the number of changes is very small.

In our selection of Border Pinks we saw that two of the best whites were Mrs. Sinkins and Her Majesty, and that Ernest Ladhams, Anne Boleyn, Paddington, and Mrs. Waite were good coloured varieties. All these are extremely free flowering, and may be grown with advantage in the smallest garden. They are also very useful for pots.

Propagation may be effected in a variety of ways. The plants are easily raised from seed ; they may be propagated by division, and in the case of the more vigorous sorts, such as Anne Boleyn, they may even be layered, like Carnations. Perhaps, however, the commonest method of increasing them is by what are termed pipings, which are nothing more nor less than young growing shoots pulled out of their sockets with a sharp jerk. These may be inserted in sandy soil in the open ground, but it is wise to give them the protection of a bellglass, handlight, or glass covered box, if possible. June is a suitable month. They may be planted out for the winter, and make beautiful edgings to walks.

If it is desired to get winter bloom of Mrs. Sinkins or some other favourite variety, sturdy tufts may be lifted and put into 5-inch pots about the end of September. After a month or six weeks in a frame they may be put into the greenhouse and brought gently on into bloom. Hard forcing is a mistake.

When young, bushy, floriferous plants of Pinks are so easily produced it is a pity to see old, straggling specimens so often.

The Laced Pink is a beautiful old flower, but the development of the Carnation has almost crushed it out of existence. It has been completely overshadowed by its more imposing sister. A small selection of sorts has been given, and it may be said that they are not only pretty and sweet, but completely hardy. They are best propagated by pipings in June, and planted out in September.





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# BOOKS FOR LOVERS OF NATURE.

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