American Carnation Culture

By L. L. LAMBORN.

3rd Edition.

AMERICAN

CARNATION CULTURE.

(*Dianthus Caryophyllus Semperflorens.*)

ITS CLASSIFICATION, HISTORY, PROPAGATION, VARIETIES,

CARE, CULTURE, ETC.

—BY—

L. L. LAMBORN,

EX-EDITOR OF OHIO JOURNAL OF FLORI-CULTURE, FLORIST, ETC.

"Flowers are the alphabet of Angels, by which they write on hill and dale mysterious things."

THIRD EDITION.

ALLIANCE, OHIO,
1892.

THE THIRD EDITION OF

American Carnation Culture,

Is Respectfully Inscribed to

H. E. CHITTY, OF PATERSON, N. J.,

A Successful Carnation Grower, a leading contributor to the Carnation Literature of the times, and a friend of the author's efforts to make this work thorough and practical in its character.

Introduction.

THE grace of its form, its wide range of colors, added to its exhilarating fragrance, has brought the Carnation Pink into such commercial importance, that it is estimated 500,000,000 of its bloom are annually sold in America.

In the ratio that public attention is concentrated upon any given species of plant, will the number of its varieties increase, and the best methods be adopted to secure it in the greatest perfection. Out of the multiplicity of kinds, critical public opinion will sanction only the "survival of the fittest kinds."

The Caryophyllus branch of the Dianthus family of plants is now passing through this active phase of its history. There are about 10,000 Florists in America handling from a few, up to 50,000 Carnation plants annually; there are about 200 named varieties of Carnations which are, or recently have been, candidates for public favor. There has been great confusion as to kinds, and as to treatment. In 1886 we published the first work on this genus of plants, confining our labor chiefly to "*Dianthus Caryophyllus Semperflorens*," and so far as this species was concerned, attempted to bring some order out of chaos; our efforts were appreciated, in two years the edition was exhausted and the demand for the work continued. We present the work again, to which is added a list of new and improved kinds, and four additional years of the cultural experience

of American Carnation growers, bringing the work up fully abreast with all the wisdom on this subject to 1890.

Though not a matter of great importance, but to round into completeness the history of this plant we have given the lists of kinds that have claimed public attention in America, and credited them with the names of the parties with whom they originated.

The coming student of Floral History may find in this work some facts rescued from the wasting hand of time.

The amateur cultivator of Carnations will find a certain guide for his efforts.

The inexperienced Florist will see plain directions to secure success.

Experienced Cultivators may find sufficient of interest and profit, to pay them for their perusal of its pages.

L. L. LAMBORN.

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Botanical Parts of a Carnation Flower.

Peduncle,—Stem that bears the flower.
Receptacle,—Upper end of the Peduncle.
Calyx,—Cup that surrounds the Corolla.
Bracts,—Supports arond the base of the Calyx.
Corolla,—The whole of the blossom.
Petals,—A leaf of the blossom.
Stamens,—Male organs in Centre of blossom.
Anthers,—The enlarged ends of the Stamens.
Pollen,—The fertilizing dust on the Anthers.
Filaments,—Stems of the Stamens.
Pestil,—Female organs in centre of blossom.
Stigma,—Enlarged end of the Pestil.
Sygle,—Stem of the Stigma.
Ovary,—Contains the unripe seed.
Ovules,—The unripe seed.
Pericarp,—Seed vessel containing ripe seed.
Valves,—Parts, or sections of the Pericarp.
Seed,—Rudiments of a new plant.

THE CENTURY.

The Magnitude Of
Carnation Culture.

CHAPTER I.

"'Tis my faith that every flower enjoys the air it breathes."

THERE are two classes of persons who will read these pages; one who is a disinterested lover of flowers, and delights to possess and cultivate the most beautiful, symmetrical, fragrant and enduring flower that blooms.

The other class is less sentimental. Their practical enquiry is, what varieties of Carnations will afford the most saleable bloom, and yield the most flowers for the market?

What treatment of the Carnation plant will secure the most profitable results? How can I get my Carnation plants in pots, in the best condition for sale? How can I hybridize, save the seed and secure my chances of obtaining novel and improved varieties, &c.?

These and many other questions of a practical nature, bearing on the cultivation of the Carnation, will, it is hoped, be fully and clearly set forth in the following pages.

The capital and labor invested in Carnation culture has become so great that some authority on the proper routine of the business has become imperative.

As regards the magnitude of this industry, I have no more reliable statistics at hand than those given by John Thorp, President of the Society of American Florists, at Cincinnati, in August 1885, he says:

"There are not less than eight-thousand Florists engaged in the business, either growing plants, or raising cut-flowers for sale. Allowing four hundred feet of glass covered service to each Florist gives us a total of three million two hundred thousand square feet of glass, in other words six hundred and thirty acres.

Calculating that half of the glass structures are used for growing plants, and one-third of the space is actually covered with them, and average the size of pots used at three inches in diameter, and allowing two crops each year, the number of plants would be about forty million.

The remaining half of the glass structures are used for the purpose of growing cut-flowers; the actual number produced is almost incredible.

I can state, however, that during the past season, beginning with November and ending with April, nine large growers of roses sent into New York market, close upon four million of flowers, and when I state, this was not fifty per cent of roses sent to New York alone, the magnitude of Rose growing will be imagined.

The roses grown arround Boston, Philadelphia, Pittsburg, Cleveland, Chicago, Washington and all

other places could not be less than twice as many as produced for New York market.

This would bring up the number of cut roses produced during the past season to twenty-four million.

It would be very safe to multiply the number of Carnation flowers produced in the same time from all sources, by at least five. This would give one hundred and twenty-five million, fabulous as it may seem, I feel that my calculations are rather under, than over the actual number placed on the market. It would, moreover, be safe to state that at least one-fourth as many roses and carnations are annually raised by amateur gentlemen, which represents as much value as if thrown on the market and sold over the counter."

According to the above statements, there were one hundred and sixty-five million Carnation flowers raised from Nov. 1, 1885 to May 1, 1886 under glass.

Granting President Thorp's estimate to be correct, it embraces but six months of the twelve.

There are eight months in the year in which the market demand is about equally active, and the call for Carnation flowers is in nowise extinguished during any part of the year.

The sale of flowers of this plant during the unestimated six months would be half as much as during the six months estimated.

If growers realized twelve dollars per thousand for the bloom, it would make an aggregate of three million of dollars per annum.

This estimate is based on the sale of flowers alone, and does not include the sale of blooming Carnation plants in pots, made annually by eight thousand Florists in this country.

To this growing industry, which now aggregates over three million dollars, in which I have been a practical participant from its infancy, I give, in this work, much wisdom gathered from other growers, as well as my best experience and practice in successful Carnation Culture.

CHAPTER II.

POPULAR CARNATION CULTURE.

I desire in this chapter to clear up some popular errors, and make it plain to every-one, how they can successfully grow the *Dianthus*, which is from two Greek words, signifying the "Divine Flower."

The Carnation is the most popular flower grown, if we may except the Rose, and it is much easier managed than the Rose, with a very little care the success in growing Carnations is assured, this is far from the case with amateur management of the Rose.

It is the greatest mistake to think that Carnations can only be successfuly raised in a Green House–they are not naturally a Green House plant; they are hardy at any temperature above zero, some few varieties are less hardy than others however, but the specie is a native of cold high latitudes.

The plant roots better in a low temperature.

They are easily forced, or compelled to yield their bloom out of their natural season, and their bloom being valuable, is the reason why hundred of acres of glass is devoted to forcing Carnations by heat into flowers.

It is not because it is a tender Green House plant.

The Carnation blooms freely out of doors during August, September and October, and would continue to do so for months, did not frost prevent.

If in this latitude they are properly lifted and put in a six inch pot, they will with little care, bloom on the window sill till the following June.

The greatest difficulty is that the atmosphere of the sitting room is too warm and dry for them, but this is by no means fatal.

Now suppose you try a few Carnations; you send for some young plants in the spring, say April or May, I mean young plants.

It is the nature of the Carnation to live only two years. Large plants that have been carried in bloom through the winter, are more attractive, but worthless, haveing about lived their allotted time. The plants when received are small and will not make much show in a bed and you may feel dissatisfied.

The Carnation bed is to be deeply dug up and enriched with well rotted manure, entirely free from standing water and of upland nature.

As the plants are almost hardy, they may be put out in April or May. If they have been properly hardened off prior to being set out, a smart freeze will not injure them.

Through summer they will push up flower stalks, which should be broken off within five inches of the ground, if the plants are designed for winter flowering; this conserves the vital forces of the plant for its blooming efforts in winter. If it is not designed to lift and pot them in the fall, this topping process should not be done.

The little Carnation plants should be bedded out ten inches apart, each way.

If the biennial nature of the Carnation plant was understood by the people, that is if they but knew it was the character of the plant to live and flourish through but two seasons, and that they must procure young plants every season, the complaint that they can not succeed well with the Carnation would be ended, and the sale of this class of plants would be doubled.

There is no dispute as to the wants of the people for this artistic flower, and there are no plants that bear transportation so well, or that are furnished by Florists at so small a cost to the purchaser.

You are now going to send for some small Carnation plants. You are troubled as to kinds and colors. Accept the classification of colors adopted in this work, which system is adopted in Zirngiebel's list, viz: Crimson, Scarlet, Pink, White, Yellow, White variegated and Yellow variegated.

One dozen different Carnations selected from these classes will comprise the most desirable shades of colors and markings.

You can send for your plants to a firm a thousand miles away, they will arrive safe by mail or express and almost surely grow when they are put out, if planted on arrival, in small pots or in shallow boxes of soil, not over-watered, and protected from too much midday sun for a few days. They will then bear full exposure in moderate weather, after which they may be planted out where they are to remain all summer.

Plants will become more bushy if cut back for a time, but their bloom will be retarded.

If summer flowers are desired only, let the plants be tied to neat stakes as they grow, and buds and flowers will soon appear.

If the grower will be satisfied with later flowers, cut back the young plants until July 1st or after, and thus have several stems instead of one, and each stem will develop nearly as many buds as the single stem.

If desired mainly for winter bloom in the house, they may be cut back until August 1st or after, and at the approach of frost carefully taken up and potted in six-inch pots. These pots should have an inch of drainage in the bottom, to counteract the effects of to much water. Small pieces of pottery, brick or gravel answers well. After a few days shade, they may be placed in any situation in or about the house that is airy and sunny, and yet not exposed to cold winds.

During the Winter they should not be placed in too warm a room, and the foliage should be often thoroughly sprinkled with cold water. This care will prevent the ravages of the red spider, one of the enemies of this class of plants. The soil should not be kept too wet at any time, but if sometimes a little dry, plants will not suffer.

CHAPTER III.

ORIGIN OF PERPETUAL CARNATIONS.

IN another chapter it will be explained how "hybrids" and "crosses" in Carnations are obtained. This chapter has reference to the origin of the *first* hybred perpetual Carnation, by whom produced, and where obtained.

All of this I think is set at rest by that venerable and devoted lover of flowers, Jene Sisley, whose first double white Geranium (Jene Sisley) has spread his name as wide as floral literature is read.

The temperature he indicates as proper in which Carnation cuttings should be struck, is certainly very much too high, but his personal knowledge of the origion of this class of plants establishes facts, which will grow in interest as time goes on.

I quote entire a communication, written by him for, and published in the 14th No. of the American Florist. Sisley says:

"In the "Revue Horticole" of February last, a remarkable article was published on the present state of perpetual Carnations. The writer in the Revue asks:"

"Where and how was the culture of the perpetual Carnation commenced? Who is the Horticulturist and who first applied himself to it? then says: "We do not know."

I think therefore it may interest American Horticulturists and amateurs to be imformed of its history; which I published ten years ago in a paper which had not a wide circulation and in consequence I copy as follows:

"According to several Horticultural writers, the Carnation was cultivated more than 2000 years ago.

But we know no more of what was practiced in those times than in any other science, and as it is only since the beginning of this century that the facts of nature have really been studied, and we can only relate what has lately been practiced.

The perpetual Carnations have been *created* at Lyons.

It was M. Dalmais, gardener to M. Lacene, a celebrated amateur; and founder of the first Horticultural society of that region, who obtained the first really constant blooming Carnation; about forty-six years ago.

He sent it out in 1844 under the name of Atim, the production of artificial fecundation of a so called species; known by the vulgar name of Carnation of Mahon, or of St. Martin, the latter because it was blooming by the middle of November; fecundated by Carnation Bielson

This first gain was successively fecundated by the Flemish Carnations, and about 1846 he obtained a great number of varieties of all colors.

M. Schmitt a distinguished Horticulturist of Lyon, followed M. Dalmais and obtained several fine varieties like Arc en ciel and Etolle Polaire,

which were cultivated for several years, but do not exist now, having been superceded by better varieties.

In 1850 a disease having destroyed his collection, M. Schmitt abandoned their culture.

Soon after Alphonso Alegatiere, the well known propagator undertook the hybridization of Carnations, and in a short time obtained great success, dotted that series with a great many varieties, all particularly dwarf and obtained a very great improvement by creating those with stiff lower stems about 1866.

We can thus say that Alegatiere has *created* a new *species*.

He has also upset the old system of propagation, that of layering, and has proved that propagation by cuttings is the best and most reasonable method and produces the best plants; and thus justified my saying that layering is the infancy of the Horticultural Art.

And he has demonstrated that nothing is easier than propagating Carnations by cuttings.

The best time to strike them, is in January and February and the best mode is to put them in a bench of fine sand, in a span roof house, without bell glasses.

The benches being heated underneath by hot water pipes to 60 or 70 degrees.

The cuttings strike root from three to five weeks.

The sand must be kept moist and the cuttings syringed every day.

They can be placed out in April or May, and will soon make fine plants to bloom in Autum.

Jene Sisley,

Feb. 1886. Monplaiser, Lyons, France.

CHAPTER IV.

HOW NEW VARIETIES OF CARNATIONS ARE OBTAINED.

NEW varieties of Carnations are obtained by hybridization and crossing. A *cross* is the product of sexual fertilization between *two* Pinks of the same *variety*.

D. Hedawigi and *D. Lancinatus*, are two *varieties*.

The seeds of one fecundated with the pollen of the other, might germinate, grow, and blow a Pink different from either of its parents. This would be a cross.

A hybrid is the result of the sexual union of male and female of different *species*.

Dianthus Barbatus is one *species*; Dianthus Plumaris is another *species* of the *genus* Dianthus *order* Digynia, *class* Decandria.

The seeds of an individual member of one of the above *species*, fertilized with the pollen from a member of the other *species*, would produce a *hybrid* Pink; likely to differ from the type of its parents in the ratio that they differ from each other.

As a rule, in both the animal and vegetable kingdoms, sexual unions takes place only between individuals of the same *variety*.

It is by the play of this rule, or law, that *varieties* are indefinitely maintained with unvarying characteristics.

Crossing in nature is not very common; hybridization is extremely rare.

As a rule hybrids are not fertile.

The progeny of the Horse and Ass, Sheep and Goat; Dog and Wolf; Caucasian and African, are sterile so far as reproducing themselves with themselves.

But in a majority of cases, in both Kingdoms, the hybrid will breed with one of the original types back into that type.

Nature revolts at hybridization, and refuses to perpetuate the mongrel race.

Crossing is very common by the intervention of the Florist's art. He further circumvents nature by dexterously avoiding abortive sexual unions to perpetuate his choice hybrid, and indefinitely continues and multiplies it by layers, grafts, and cuttings.

But hybridization is a much more difficult accomplishment.

Gaestner, who is very high authority, says that out of one thousand carefully conducted experiments fecundation was achieved in only two hundred and fifty-nine cases.

In hybridizing, it is necessary to prevent the flower used as the mother, or seed bearer, from being fertilized with its own pollen.

The operator is favored by the fact that the pollen retains its vitality for some time after it is removed from the flower which produced it.

It is probable that with this, as with seeds, the duration of vitality varies in different species; at all

events, it is known that some pollen will keep for weeks, and even months..

The flower selected as the seed bearer, should be the most vigorous plant and taken just as it is about to open, and before any insects can have visited it; the envelopes are carefully opened, or removed, and if a perfect flower, its still unopened stamens are cut away with a delicate pair of scissors, the foreign pollen applied to the stizma with a small brush and the flowers enclosed in a bag of gause to prevent the access of insects, which would probably bring the pollen of some other kind to interfere with the action of the strange pollen.

It is by following the process I have recited that the different varieties of Carnations have been obtained.

The operation is delicate and the chances of obtaining a Carnation better than some existing varieties is less than one in a thousand.

But this should not deter florists and amateurs from seeking to create new varieties of plants of every kind.

It is the most fascinating part of a florist's business to watch a properly fecundated seed from the tiny seed leaves to the mature plant. The developing bud has a center of interest that no other bud can have. Will the flower be double or single, large or small, white, red, yellow, purple? and a dozen other unknown possibilities existing to stimulate interest and curiosity, lies hidden within that calyx.

An Elaborate Greenhouse For Carnations.

CHAPTER V.

BOTANICAL CLASSIFICATION OF CARNATIONS.

Dianthus. From *dios*, divine, and *anthos*, a flower; in reference to the fragrance and the unrivaled neatness of the flowers. *Linn. Decandria-Digynia.* Nat. Ord. *Caryophyllaceæ.*

THE Carnation belongs to a class of plants whose family name is *Caryophyllaceæ* of the genus *Dianthus*, order *Digynia*, class *Decandria*. The *Dianthus* genus of plants includes annual and perennial herbs, with opposite, narrow, often rigid grass-like leaves, the flowers with their parts in fives; the long tubular calyx is five toothed at the apex, and bracked at the base.

The five petals have very long slender stalks, or claws, stamens ten, styles two; the ovary ripening as a one cell seed vessel; open at the apex by four valves and containing numerous seeds which are flat on the back, and of a blackish color.

There are but few of this family which merits the attention of Florists.

The books enumerate about 200 species; none of them natives of America except *D. Repens*, which is found on the coast of Kotzebues Sound, and other high latitudes.

D. Armeria and D. Prolifica, found in the Atlantic states are introduced weeds.

A number of the *genus* are troublesome weeds, as Stelliaria *Media*, the common Chickweed, so well known and troublesome in gardens through the cooler months of Autumn.

The four varieties in which is centred all there is of floral value are:

D. Barbatus,

D. Plumaris,

D. Chinesis,

D. Caryophyllus,

D. Barbatus is better known by the name of "Sweet William," it differs from the other species by forming a flat top cluster, crowned with various colored small flowers. It is a native of Europe.

An improved straim called the Arricular flowered, is very fine, from the distinct markings of the petals, some of the double sorts are rich, and remain in flower a long time.

It is a perennial, but usually treated as a biennial.

Seeds sown in the Spring will produce plants for flowering the following season.

Dianthus Plumaris, is a native of Europe, but naturalized in many other countries.

It has several Botanical and common names, as Pheasant eye Pink, Bunch Pink, Cushion Pink, &c.

It is a low hardy perennial, blooming early in the Summer.

The flowers are of a pale pink color, petals fringed and a pleasant fragrance.

The improved varieties are double white, and double pink.

Dianthus Chinesis, is a biennial, but flowers the first season from seed, and presents a great variety of colors in double and single flowers.

It is very showy, but without fragrance.

Seed saved and sown from D. Barbatus and D. Chinesis, will sport in endless varieties, in both form and color, in a bed containing hundreds of seedlings, there can scarcely be found two alike.

D. Lanciniatus, D. Heddewiggii and D. Diadematus, are sports of D. Chinesis, and are highly prized garden flowers.

The Picotee Pink has the color making the variegation only on the edge of the petals in a broad or narrow band, and if it ramifies toward the center of the flower, it must be connected with the color on the edge.

It is a cross or sport, or hybrid from the type or species mentioned.

The Florists Pinks have the color between the base and edge of the petals, and in the whole flower, it must be in concentric circles. It is the progeny of D. Plumaris.

D. Caryophyllus is found growing wild in the South of Europe.

It is the fragrance of this variety resembling the Clove spice of commerce, that gave the *family* name of *Caryophyllus* to the Pink species of plants.

This has long been a favorite flower, and its cultivation, crossing and hybridization has produced the grand Carnation of to-day.

The Carnation Pink is the highest perfection attained from the wild single D. Caryophyllus.

The Florists cultivation, crossing, and hybridization, has been so successful with this class of plants, that there is little left to be desired.

The range of colors attained is so extended, artistic, the grace of the flower so perfect, its durability so great, and its fragrance so delicious, that the Carnation now takes its stand in the esteem of the lovers of flowers and in commercial importance and value, close beside the Rose.

Dianthus comes from two Greek words *dios*, divine, *anthos*, flower.

The ancients in naming this flower, even in its single undeveloped state, refers to its beauty, color and symmetry.

The Rose receives a high ethical name, the "*Queen of Flowers.*"

The Camelia, the "Rose of Japan," the Chrysanthemum, the "Queen of Autumn."

In grace of form and neatness, the Carnation is the equal of any other flower.

It is unrivaled in the wide variety of its rich tints of scarlet, crimson, rose and orange, in its pencilings of carmine and rose; its blotches and flakes of maroon and black, and in its peculiarly grateful and exhilerating fragrance; it stands without a peer.

The bestowal on this flower of especial favors by nature, is recognized in a language 3000 years old.

If the Pink in its original primative simplicity was worthy the Greek name of *dio-anthos*; the grand evolved Carnation of to-day more than merits to be crowned the

"DIVINE FLOWER."

——"*The Sweetest Smile of Nature.*"——

CHAPTER VI.

PROPAGATING CARNATIONS

PROPAGATION of plants by any process which imitates the methods of nature by which she multiplies her species, cannot be followed by any inherent weakness in the new plant, or its progeny.

Striking Strawberry plants from the joints in the earth, in plunged pots; the division of the roots of the Blackberry; bending the canes of the Raspberry, that the top may touch and root in the earth; sowing seed and making the conditions favorable for germination and rapid growth, are all imitations of Natures methods.

But in the creation of plants, Nature impressed upon the canes, or shoots of many of them, the possibilities under favorable circumstances of throwing out adventitious roots and thus become separate living organisms with all the lineaments of the parent plant.

But Nature never propagated a Carnation by cutting a shoot, or incipient cane from the side of the old plant and bid it take upon itself a separate existence.

A plant focalizes all its vital forces in the perfection of its seed, and in the annuals and biennials, the circle of life is complete when this is done, and the plant dies.

It is for this purpose alone that it lived.

Nature has no green-house sufficiently conventional in which a Carnation cutting will strike root and live.

The conditions under which many kinds will root at all, are so rigid, and exacting, that the ingenuity of man can scarcely achieve the result.

In fact Nature revolts at this mode of multiplication, but it is our only means to pepetuate kinds, and produce quantities.

The Florist complies with Natures exactions and furnishes the conditions, and she reluctantly yields.

If the Florist succeeds in the difficult task, it would be natural to expect a diterioated organism, and weakened life.

To avoid a natural decadence, it is of the first importance to start with a proper cutting, from a healthy plant and maintain for it the most favorable conditions.

The most favorable conditions can be obtained from November to April.

The cutting should be a side shoot from the plant or cane, about three inches long, and show no sings of shooting a flower stem.

The slip can be broken off with the fingers, and put directly in the cutting bed, without the use of a knife, and they will as certainly root as if trimmed and smoothly cut at the end.

The wet clean sand in the cutting bench is smoothed with a trowel and then cut, the trowel being gauged by a strip of lath.

The cuttings are placed in this incision in the sand, which are two inches apart, and the cuttings need not be more than half an inch apart, the sand should be firmed along the line of cuttings with the point of the trowel, and further compacted around the cuttings by a thorough wetting.

When a small number of cuttings are to be struck, a shallow box filled with sand can be used with more convenience than the bench.

There are some advantages in using boxes when the plant is to be extensively propagated, the boxes can be moved around, giving the cuttings new facings to the light and air.

Cuttings of the Carnation can remain in the sand a long time after being rooted.

We have set out the cuttings direct in the field from the sand, and they made good plants by Fall.

But we do not recommend this plan.

An inch of soil in the bottom of the box, and two inches of sand on the top, will afford root food for the cuttings, which would other-wise be weak.

The cuttings should be sprinkled with a fine rose once aday, and they will root in about three weeks.

The temperature should range from 45 to 65 degrees, and good ventilation maintained.

A biennial involves the idea of a period of rest in the activity of the plant's vital forces.

It would seem reasonable in the cultivation of this plant that this natural habit should be respected if the best results are desired.

Mr. John Henderson in his address before the Society of American Florists at Cincinnati, touches significantly on this point in the following language.

"Of late years one of the most annoying diseases attacking plants is that effecting Carnations, and it is undoubtedly caused by working our stock year after year at a high temperature, which weakens the general vitality, and the diseases, be it a fungus or an insect, quickly follows.

In the Fall of 1883, we had a surplus of two varieties of Carnations and, rather than too throw them away we "heeled" them in, in a cold frame, putting straw mats on the glass in extreme weather.

They wintered well, and in March we put in a few hundred cuttings of each; we marked them, and last Winter they were the best plants we had, not one of them dying off, while we lost hundreds of the same kind in our regular stock.

And I firmly believe if this plan were adopted of wintering Carnations that the Carnation disease would disappear.

Another and perhaps more practical way of avoiding the difficulty, we have practised for years, and that is to propagate our stock as early as possible in the Winter, and after they have become established, knocking them out of the pots and putting them in shallow boxes in cold frames.

This gives them some of the needed rest and the good effect is very marked."

A TYPE OF THE WHITE CLASS OF CARNATIONS.

CHAPTER VII.

THE PROPER MOISTURE FOR CARNATIONS.

CARNATION plants are impatient of wet undrained soil, either in the field, on the benches, or in pots. The physical structure of the plant convinces us of this without any knowledge of the fact practically.

Careful experiment has disclosed the fact, that one square foot of leaf surface will, during fair weather, exhale vapor at the rate of one and a quarter ounces daily, at night the rate is one fifth as rapid as during the day, and during rainy weather a perfect equilibrium is restored betweed the exhaling and absorbing forces, and there is no evaporization.

Comparing the narrow rigid grass like leaves of the Carnation, estimate the area of leaf surface with most other plants, and it will be seen the water evaporating capacity of the foliage, and consequently the water absorbing capacity of the roots to be comparatively limited, so what would be sufficient, moisture, or wet, for many other plants would be an excess, and deleterious to the Carnation.

The Carnation likes a moist cool atmosphere, hence they should be sprinkled or sprayed frequently, but not too much moisture about the roots.

The cause of Carnations on benches rotting off at the surface, is caused by too much moisture, in

connection with them being planted in the bench soil *higher* or *deeper* than they were in the soil in which they grew in the field, and by bad quality of bench earth, the latter is fatal, no matter how open for drainage the bench boards are.

If the bench earth is made out of imperfect rotted, or spongy manure, and the Carnation planted too low, it will certainly decay at the root.

The skin or rind of the stalk above and below the surface differs as much as the mucus membrane of the mouth does from the epidermis of the cheek.

Either can be converted and made to discharge the functions of the other under favorable conditions, but if circumstances are unfavorable there will be trouble in both cases, in the transfer of duties.

This decay of the Carnation at the root is not a disease, it is simple mismanagement of the plant.

The drainage of plants in pots must be perfect.

Flat or shallow boxes in which cuttings are transplanted from the cutting bench, should have holes bored in the bottom of each box.

Plants carried in cold frames must have perfect drainage.

Plants lifted from the open ground and planted on benches for winter blooming, should be done after a rain, in cloudy weather if possible, with an unbroken ball of earth adhering to each root, when transplanted they should be sprayed, and the earth only moderately wetted. The soil on the benches should never be permitted to become sodden and sour.

Frequently spraying the Carnations after transplanting as with other plants, discharges a two fold purpose in keeping with the scientific principle before stated.

It does away with the absorbing labor of the roots, which can not for a time be discharged, by the reason of them being ruptured and displaced. Then the evaporization of the sprayed moisture on the foliage absorbs heat as it passes into vapor, which is grateful to the vital forces of the plant.

The sand on the bench in which the cuttings are placed, should be quite wet and the cuttings daily dampened with a fine rose watering pot until they begin to strike root, when both top and bottom moisture can be somewhat reduced.

Wet is very damaging to the bloom of the Carnation.

The bloom should be picked before the bench is watered, and possibly this flower is the only one that is shipped to market, often hundreds of miles distance without the least moisture being allowed about it.

It is impossible to say how often this plant should be watered.

As a rule they should be watered when they need it, and a dry condition of the ground, and the first signs of the plant flagging for moisture, shows they need it.

The conditions are these: that Carnations do not need as much water, or as frequent applications of it as many other plants; that they rapidly recover

themselves after having suffered for the want of water without material injury; that a wet sodden soil is ruinous to the plant; that more harm results from over-watering than from under-watering; that experience as well as the physical anatomy of the plant, points to moderate moisture for the plant, and perfect drainage for the roots.

CHAPTER VIII.

ROUTINE OF CARNATION CULTURE FOR CUT FLOWERS.

CUTTINGS, or rooted plants are obtained in the early Spring months for the stock of Carnations which are to be grown through the Summer for Winter bloom on benches.

If the Florist propagates them himself, he is refered to the chapter on this subject.

The plants should be hardened off in a cold frame, and as soon as all danger of freezing is over, planted out in the open Carnation field.

A moderate freeze would not damage a hardened off Carnation plant, but the danger is, it may not be in this condition.

A perfectly hardy plant is very tender when grown in a high temperature.

It is hard to determine by sight, when it has attained its true resisting nature to cold.

The chances are it is preternaturally tender, if grown in a glass house, even with little fire heat.

Hence the precaution is so necessary to harden it off, before exposing it to the vicissitudes of the open temperature of the early Spring months.

As soon as the ground can be properly worked, varying from the 20th of April, to the 20th of May, in this latitude, it is made ready for the young plants.

It should be of a clayey nature, well underdrained heavily coated with finely rotted manure, deeply ploughed, thoroughly pulverized with a harrow, evenly rolled, and acurately marked out, both ways, having the crosses for the plants, ten inches apart each way.

Holes are made with a foot dibber in which the plants are firmly planted.

The plants are worked early and frequently during the season, both ways with "Planet" cultivator.

All alleys, or paths through a Carnation field should be avoided.

The weeders should throw the weeds in a box, or basket, provided with temporary feet and handle, and carry them off the field.

Carnations require to be kept free from weeds; this with breaking off the flower shoots as they appear during the season, is all attention they require until the latter part of September.

By this date, the Carnation benches in the house, or houses are prepared for the plants by being filled with soil four inches deep, or if the benches were occupied with Carnations the previous year, it should be turned over, removing the bulbs of the old Carnations, and one-fifth of the soil and replenish with fresh earth to this amount.

The balls of earth adhering to the roots of the plants will deepen the bench soil one inch.

There is danger of having the soil on the benches too rich, and the bottom too light, this will not afford good drainage.

All danger to a good crop of Carnation flowers lies in these two possible errors.

If the soil is to poor, it is easily enriched with bone dust, liquid manure, or fine compost distributed between the rows with the hands.

I would fill the benches with good garden soil.

The benches being ready, and taking the advantage of cool damp weather, the Carnation plants are lifted with a ball of earth adhering to each, which, when planted, will increase the depth of bench earth one inch.

The adhesion of a ball of earth to the roots, cannot be obtained in sandy soil, but fortunately this is not the kind of soil suited to the Carnation.

The operation of lifting is performed with a concave spade, one person using the spade, another seizing the ball as it is raised to the surface, and removing the surplus earth, places it slantingly in a box.

The filled boxes are hauled on a sled to the front, or rear doors of the Carnation house.

The Carnation field should be near the houses.

Five men will lift and transplant 20,000 plants on benches in one week.

Excavations are easily made with the hand in the finely pulvarized soil on the benches, down to the bottom, in which the ball is placed, the point resting on the boards and the soil brought around it and firmly pressed.

The plants on the benches being of medium size should be planted eight inches apart each way, and two inches from the margin of the bench.

All benches in Green-houses should have an air space intervening between the benches and dead wall.

The plants being in place on the benches, should be freely sprayed and the soil moderately dampened.

The doors and ventillators should be left open until required to be closed by severe weather, approching freezing out side.

The plants will not need shading, if lifted after a rain.

The necessary watering, ventillating, temperature, weeding and fumigating, are all there is to attend to, except to pluck the flowers, until the following April, when the power of the sun will be so great that the plant will need shading by strong lime water on the glass.

The lime water may be thrown on the glass with a syringe, or applied with a common white wash brush.

A simple and cheap shading is made by mixing Naptha with a little white lead, so as to give it the color of thin milk and apply it with a syringe.

The intensity of the sun rays *must* be modified without materially lessening the light, if blooming Carnations are to be successfully carried far into the hot months in the house.

The above mentioned means are the best known, and will remove themselves in the Fall after the first frost.

The early blooming kinds when they show signs of exhaustion, their vigor may be renewed by strong liquid manure.

The earlier and later varieties, if watered and shaded, will continue to afford bloom until the first of the following August.

After this the bloom is so scarce, and the demand so light, the plants will not repay further care, and will die and leave the benches in the condition found at the commencement of this chapter.

The best plants for Fall lifting and Winter blooming, are grown from cuttings taken from the plant as soon as the temperature is favorable for them striking, and before there has been much artificial heat applied; and carried until the following Spring in a low temperature.

Carnations can be well carried through the Winter by filling boxes with the lifted plants and placing them in cold frames.

The smallest plants from the field, put in three inch pots and shifted into larger pots in March, will make fine pot plants for the Spring sales.

Plants from the field can be lifted and heeled in, in a cold frame and potted in the Spring.

If planted ten inches apart in a cold frame, and the sides of the frame removed in the Spring, they will bloom early and profusely.

Mice are the greatest enemy to Carnations in cold frames during Winter.

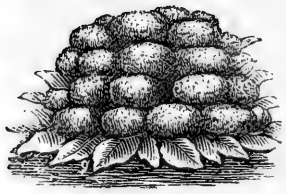
The varieties of Carnations to cultivate, most profitably, for cut flowers depends on the market to be supplied, and adaptability of plants to the soil of the locality.

Our market requires three or four white Carnations to one colored.

It is different from other markets. In a stock of 20,000 housed plants we would have one-half Snowdens, one fourth Henzies and Hendersons, the other fourth would consist of Seawan and Black Knight, crimson; Garfield and Lady Emma, scarlet; Grace Farden and Grace Wilder, pink; Chester Pride and Mrs Carnagie, white-variegated; Sunrise and Butter Cup, yellow-variegated.

With this list we commence shipping flowers, from the houses, on October 1, and continue until the first of the following August.

This stock requires 12,000 square feet of glass and will average fifteen flowers per plant.



CHAPTER IX.

HOW TO PACK AND SHIP CARNATION PLANTS AND THE CUT FLOWERS.

THERE is but one way to ship cut flowers, that is the right way. There is a doubt whether that way is yet discovered. There are many ways of packing; if the right one was known, there would be but one mode.

The field is open to an inventive practical mind.

Carnation flowers are not as difficult to pack for transportation as other flowers.

They differ in this repect, that they are always shipped dry.

Light wooden boxes, of dimensions corresponding in size with the quantity to be shipped; is the best plan.

They are not likely to be crushed and water does not effect them.

The lid should be hung on hinges, and the box have an efficient clasp. Express Companies return these boxes gratutiously.

The number of boxes needed is proportioned to the frequency of shipments and the number of patrons.

A set of boxes will last two seasons.

A box two and a half feet long, by fifteen inches wide and deep, will hold six or seven hundred Carnation flowers.

There should be a light partition in each box equally dividing the space, the pressure of the flowers on each other is thus reduced, and they will open in much better shape

In quite cold weather the boxes can be lined inside with sheet cotton tacked to the bottom, sides and top.

Oiled paper should be between the cotton and the flowers.

With this precaution, it is very rarely that Carnation flowers will be damaged by cold, even if the thermometer should reach 20 degrees below zero.

In warm weather all lining is unnecessary except the oil paper.

In *very* warm weather, and for a long journey, ice wrapped in woollen cloth and securely fastened to the bottom of the box, can be used to great advantage, if the moisture can be kept from coming in contact with the flowers.

Moisture soon discolors and damages Carnation flowers.

The Carnation flower should open and mature on the plant; an *inmature* floweret will soon shrivel, a *matured* one is the most lasting of all flowers.

They should be kept perfectly dry after packing, and thus shipped, at the end of a five hundred mile journey, will open up nicely.

On some varieties of Carnations, the flowers mature in a close cluster of buds, such cannot be picked with a stem, while other kinds have a single flower on a long stem.

Flowers with long stems command 25 to 50 cents per hundred more than those without stems; by reason of the delay and expense of stemming which is avoided.

Flowerets with their calyx torn are valuable; the process of stemming cures largely this defect.

A package of cut flowers should be labeled very legibly.

The shipping tag should bear the date of shipment, this imforms the consignee the length of time the package has been on the road and thus locates the responsibility.

The safe and speedy transportation of flowers often depends on the package being marked with a noticeble tag.

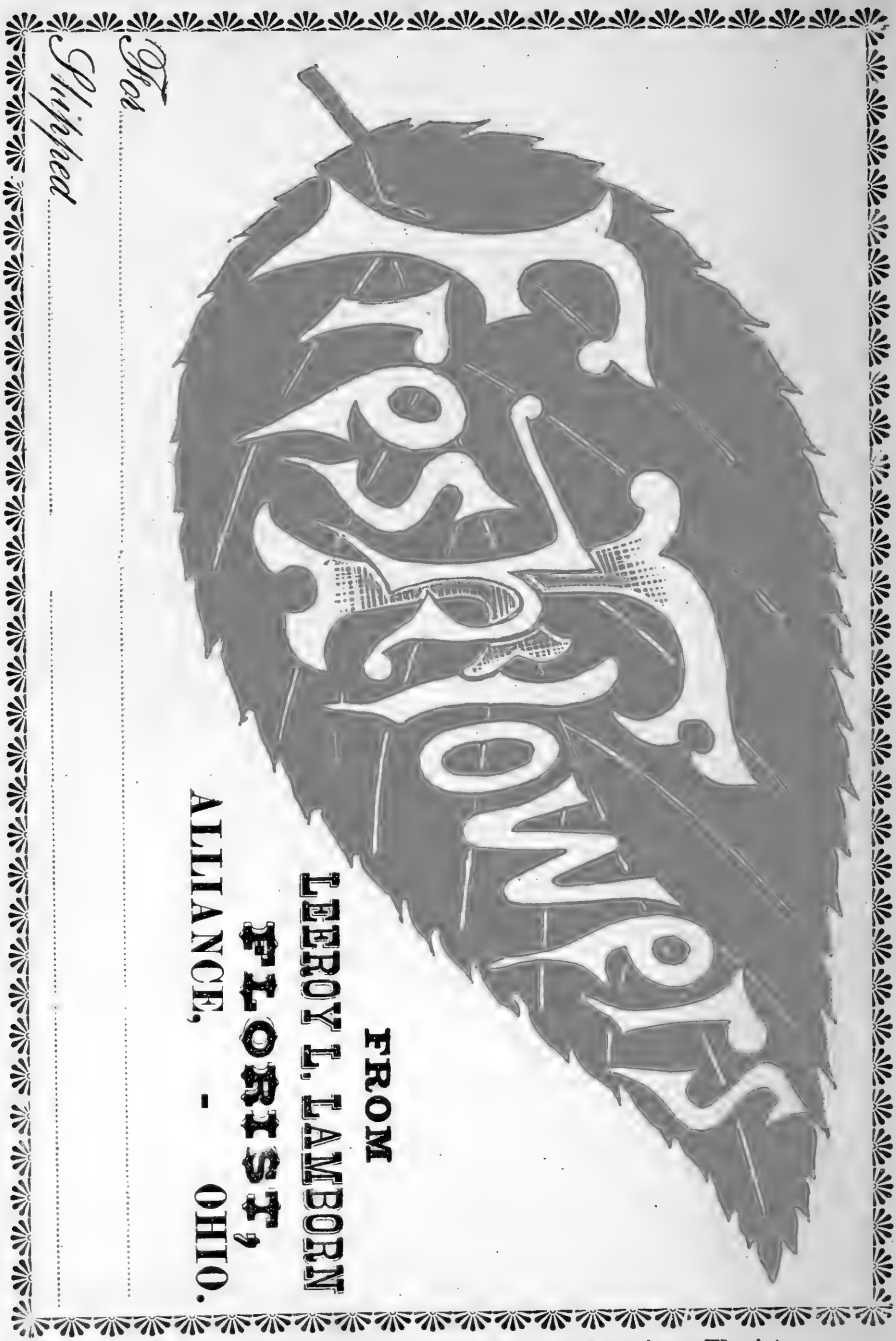
The contents at once becomes known to the Express Agent, its perishable nature is obvious to him, and on many rail roads he is instructed to give such packages special care.

The shipping tags adopted for cut flower packages by the Society of American Florists admirably serves its purpose.

The Society is making arrangements with Express Companies that all packages bearing this tag shall have the care its contents demand.

I have so frequently seen the great advantages of this tag that I deem it proper to give a fac-simile of it on another page, and feel warranted in saying that every shipper of cut flowers should use it.

An Electrotype of the leaf can be cheaply obtained at the office of the *American Florist*, Chicago.



Shipping Label adopted by the Society of American Florists.

With the employes of Express Companies it will soon become the synonym of cut flowers.

Carnation cuttings from the bench are taken up carefully without breaking the terminal parts of the roots which are very tender.

A great deal of sand will adhere to the roots, they are all laid in neat bunches of twenty-five or fifty each, being counted as they are lifted from the sand, some moderately dampened moss is placed around the roots of each bunch, which are then wrapped in paper sufficiently strong not to rupture when dampened by the moisture of the moss.

The paper is folded back over the top of the cuttings so as not to break or crush them.

These bunches should then be placed firmly in a box appropriate in size to the quantity of cuttings desired to be shipped, with the roots toward the end of the box and tops toward each other.

The wrapped roots should be placed on top of each other and never rest on the tops of the cuttings.

The tier of bunches must be firmly and securely confined, in just the position they are placed by additional packing, or cleats placed against them on the inside of the box, fastened by nails driven from the outside of the box.

This plan is for large quantities by express.

Thousands of cuttings in small quantities are now shipped by mail; the same principle must be adopted, put them in a box not easily crushed and have them *immovably* confined in the box.

They will carry if properly packed across the ocean and back again, and then grow.

The past Winter I shipped 2000 cuttings thus packed, to Illinois. By mistake of the Express Company, they were carried to a town of the same name in a different county of the state, and twenty days expired before they could be traced, and reach the consignee, he made the best out of the consignment when received, and one-half of them grew and did well.

In shipping Carnations that have grown in pots, they are knocked out, and the balls carefully wrapped in paper, and confined securely as they are packed in the box; the moss can be omitted unless the distance is very great.

Carnations that have become established in pots are taken from the boxes and treated as cuttings from the bench, for shipment, or as is often desired by the purchaser; they may be shiped in the flats, undisturbed, the tops being protected by lath nailed on the box, around, and over them.

Blooming Carnation plants in pots should be shipped in boxes at least as deep as the pots are high, firmly filling the space between the pots as they are placed in the box with straw, damp moss, sawdust, fine shavings, or any other proper material. They should be so firmly packed that they will not shake or move in handling the box.

The canes of the plants will extend above the sides of the box, and they should be protected by nailing a strip around them sufficiently high above the top of the plants to sustain them from injury.

Most varieties of Carnations now in cultivation need to be staked; this should be done before they are boxed.

The Carnation of the future will have canes stiff enough to support the flowerets without the aid of stakes.

In shipping Carnations from the open ground, they should be taken up with an unbroken ball of earth adhering to the roots, this ball should be wrapped firmly with strong paper, and thoroughly tied and then packed as the pot plants, erect, or inclined in a box high enough to protect the tops of the plants.

There should be three inches of hay or straw in the bottom of the box to break the force of rough handling.

Plants taken from the field in the Fall are designed for Winter blooming, by the purchaser, if the earth is detatched from the roots by being lifted from sandy soil, or breaking the ball if lifted from clayey soil; the life forces of the plant will be much interrupted and its recovery is slow and doubtful.

It is however conceded that sandy soil is not best adapted to the nature of Carnations.

A TYPE OF THE YELLOW-VARIEGATED CLASS OF CARNATIONS.

CHAPTER X.

THE CAUSE OF THE DECADENCE OF OLDER KINDS OF CARNATIONS.

A plant living a *natural* life is surrounded with a sufficient number of varying conditions in nature, bearing upon its perfect developement, that uniform results in obtaining perfect plants of any kind, is far from uniform, even under these most favoring circumstances.

But in a plant living an *artificial* life from its birth to its decay, these conditions are vastly multiplied.

Not only are these besetments greatly augmented, but each one becomes a potent pearl threatening the usefulness, if not the life of the plant.

As a rule the natural mode of propagating plants is by seed; most of the esteemed hybrid plants, are sterile, so these must be continued by cuttings.

This first step is one not in full accord with the laws of nature.

In almost every instance the plant from which the cutting is taken has been artificially handled, therefore there is a lessened probability of perfect health and vigor in the parent plant, hence a probable condition of inherent weakness of the vital forces of the cutting.

The broadening effect of this hereditary taint is a cause of the decline and extinguishment of valuable *varieties* in both Floriculture and Horticulture.

This principle will apply to all *varieties* of Carnations in cultivation in this country.

The principle of deterioration, is often much more active in a particular stock of a variety, in possession of a Florist.

With him the process of decadence has been hastened by less skilful handling, or other favoring circumstances.

The severed Carnation cutting (as well as the cutting of any other plant) faces a trying effort for existence and fruition; full of vicissitudes and danger which human sagacity can scarcely circumvent.

The purity of the sand in which it is placed; proper moisture; temperature; light; ventilation; time of removal from the bench; the soil and drainage in which the cuttings are transplanted; its transfer to the open field; cultivation; again, soil and drainage; cultivation; heading in; time and manner of lifting; again, soil and drainage on the benches, (or in the pots;) temperature, ventilation and fumigation of the houses.

Here are twenty vital conditions which should favorably surround a Carnation, from infancy to old age, to obtain from it the highest results.

Two-thirds of these conditions arise from the artificial life the plant is compelled to live.

Another reason of the decadence of kinds, is the introduction (often) of really superior kinds.

This naturally works neglect, hastens disease and death of the older kinds.

All practical flower growers are well aware that varieties of flowering plants that have long been perpetuated by cuttings lose much of their original vigor and finally fail.

There seems to be a limit to the life of every thing, from the smallest insect, to the largest world.

The finest quality of potatoes cultivated thirty years ago are now scarcely remembered.

The first Carnations that were introduced and which were the wonder of the time are now unknown and a number of kinds far less aged than the first ones introduced, are inervated by time, decrepit with age, yet linger on the benches of some kind and nursing Florist, while they should be in the compost pile, the proper grave for all worthless and senile plants.

In Carnations there should be frequent renewal of native vigor, in the varieties, by the natural pro cess of seed unfoldment.

In the coming future floral occupations will naturally divide and individualize.

Man does all things badly; but a few things well, there is profit and perfection in specialism.

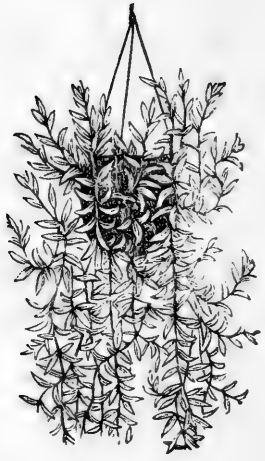
The Floral business of the future will be divided according to the wants, and exigencies of the hour.

There will exist establishments devoted exclussivly to the propagation of new Roses, new Geraniums and new Carnations.

The variety of climate in our almost ocean bound Republic will eventually centralize the growing of certain classes of flowers, in certain sections, in which better flowers can be more cheaply produced.

Proper soil; required humidity; cheaper fuel; brighter sunlight; will be vital factors when prices are forced to the lowest limit.

Rose growing sections, Carnation growing sections, will soon begin to stake out their claims on the nebulous map of American Floriculture.



CHAPTER XI.

THE CULTIVATION OF CARNATIONS FOR SPRING AND AUTUMN SALES IN POTS.

IT is impossible to obtain a good size Carnation plant in the Spring following the rooting of the cutting. The rooted cuttings should be planted in open ground in the Spring, and cultivated through the season.

In the Fall they can be lifted carefully and put in pots according to the size of the plant; varying from three to eight inches.

The larger plants, as soon as they are well established in the pots, are ready for Autumn sales, and if the proper kinds are selected will soon have five to fifty buds and bloom.

The plants that are designed for Spring sale in pots, if they are too forward with their flower stems, may be pinched back, and kept in a cool house, or well protected cold frame through the Winter, and then shifted into a larger pot in March, and the recuring warmth of Spring, will in three or four weeks load them with a profusion of flowers.

By this process, they will make the most desireable, and saleable pot plant offered by the local Florist in the Spring market.

Those who raise Carnations by the thousands, to house for Winter bloom, reserve the weakest

plants from the field, head them back, and crowd them into three inch pots, and when the Spring sales open they make fine five and six inch pot plants.

Some Florists in the Spring, lift from the benches, Carnations that have flowered in heat through the Winter, and pot them for the Spring sales.

These plants will make quite a show of thrift for a short time only, but will entirely fail to give satisfaction to either the buyer or seller.

Early made cuttings can be potted up and forced along, and by late Spring will show a flower stem or two with several buds and bloom, but I have given the only mode to have large and attractive pot-plants of Carnations for the retail market in the Spring.

The white-variegated and yellow-variegated classes, are mostly late bloomers, and afford fancy-full colored flowers, making these classes of Carnations more saleable in pots than the self colored kinds.

This however is a matter of fancy with the purchaser.

The dwarf compact growing varieties that have canes sufficiently stiff to support the flowers and buds without the assistance of stakes are preferable.

Early and free Winter blooming kinds should be chosen for Autumn sales, and late blooming kinds for the Spring trade.

CHAPTER XII.

DISEASES OF CARNATIONS—REMEDIES. INSECTS WHICH TROUBLE CARNATIONS—REMEDIES.

ROOT FUNGUS. This trouble is caused by a microscopic parasite which feeds upon the roots of the Carnation plant. Its presence in a bed of Carnations in the open ground, is easily detected by a paler tint of the plant attacked, from which it will spread to surrounding plants.

A good lens will show the fungus, like cob-webs, over the growing rootlets.

—REMEDY.—

It is best to destroy the diseased plants as soon as detected, and they should never be transplanted on the benches, they rarely or ever fully recover health.

Watering the plants impregnated with aqua-amonia is considered a good remedy.

If the entire stock gets infested with this fungus parasite, it is the least expense to change the entire stock and obtain a fresh supply from another source, and plant them in a different place, out doors, and completely renew the soil on the benches.

—DECAY OF CARNATIONS AT THE ROOTS.—

Many Carnation growers complain that their Carnations after being transplanted on the benches, rot at, or below the surface of the soil, and the plants die.

I have had experience with this trouble and think it should scarcely be called a disease; but rather a mismanagement of the plant.

It is caused by the soil on the benches being of a spongy nature, as from imperfectly rotted manure, this kind of soil will maintain too much humidity around the roots of the plant, that prefers an opposite condition of firmness and dryness

This decay attacks plants illy ventillated, illy lighted and planted *deeper* than they grew in the open field, and so far as my observation goes, none others.

—REMEDY.—

If my observations are correct, the remedy suggests itself.

Firmer soil; good drainage; good light; free ventillation and proper depth of planting.

—APHIS.—

Or green fly is the most common insect pest that infests plants.

The Carnation is not exempt from its attacks.

They subsist upon the juices of the plant by perforating the outer skin and sucking the sap.

Neglect gives them time to multiply into legions and it is hard to destroy them by any means.

The proper and only way is to reach them through their breathing aparatus.

The food upon which they exist is beyond the reach of destroying applications.

—REMEDY.—

Tobacco in any form is quickly fatal to the green fly.

One pound of Tobacco stems steeped in five gallons of water, until the water becomes the color of strong coffee. Apply this with a syringe.

Fumigating by burning slowly dampened Tobacco stems is equally as effectual.

No special quantity need be prescribed as the remedy is not injurious to the plants.

These remedial applications should be applied on the first approach of this pest, as a prevention rather than a cure.

—RED SPIDER.—

This insect will always appear when conditions are favorable; these are a hot and a dry atmosphere continued for some time.

The conditions under which this insect will develope and flourish is as damaging to the Carnation plant as it is favorable to the insect. Red spider shows neglect of the plants.

—REMEDY.—

Reduce the temperature and maintain a moist atmosphere by spraying the plants frequently, and keeping the walks of the house damp.

Spraying plants and *watering* them, are two different things.

Carnation plants like much of the former and dislike too much of the latter.

—CARNATION TWITTER.—

This lively little insect in not generally known.

It is found only in certain sections of the country, and is most likely to infest plants grown in light sandy soil.

It is rarely found in heavy loam, or clayey soil, such as is suited to the health and nature of the Carnation.

It is very poisonous in its attacks on all the varieties of the *Dianthus* class of plants.

The leaves of the plant when attacked by this insect have a curled or frosted appearance, and a color, or tint, resembling the depredations of the Red Spider.

—REMEDY.—

I am not familiar with any effective remedy, happily its attacks are not general, or continous on stocks of Carnations.

—BROWN MOULD.—

The "*Gardeners Chronicle*" says this disease has been very common in some sections in the last few years.

In bad cases whole stocks of Carnations have been destroyed.

The name of the fungus which causes the trouble is "*Helminthosporum Enchiulatum.*"

The appearance of the fungus as it grows on both sides of the leaf, is distinct and may be easily recognized.

The mycelium, or spores of the fungus, the threads of which are very thick cross in a radiating fashion, inside of the leaf, beneath the epidermis.

From the inside of the leaf the frunting threads burst through the outside in a series of black concentric circles, like minute fary rings.

The appearance is of one series of small black circles, within another.

Each circle consists of fruiting threads.

—REMEDY.—

As this fungus vegetates between the two membranes of the leaf, it cannot be reached by any sulphuring process without destroying the leaves of the plants.

The only mode of action known, is to carefully pick and destroy each affected leaf.

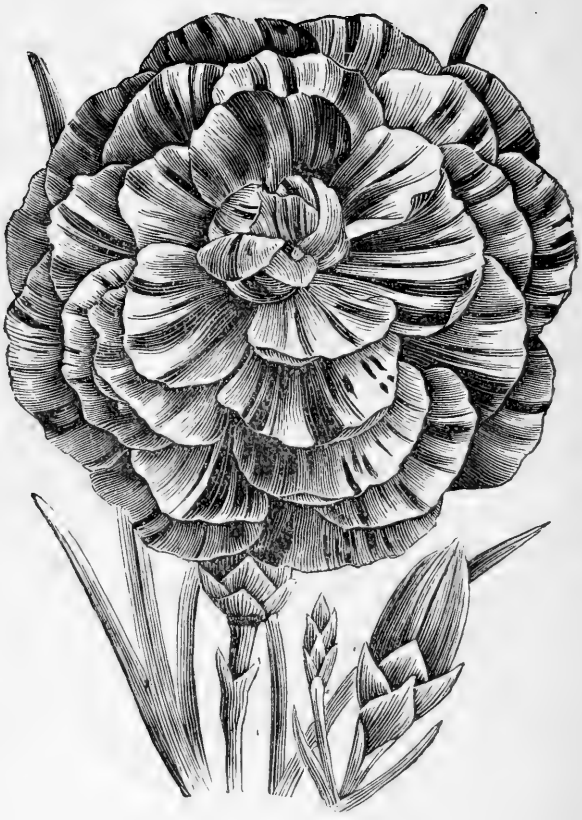
There is no plant in general cultivation as free from disease, insects, or fungoid attacks, as the Carnation.

This condition however is not likely to be enduring.

The Root Fungus and Brown Mould are probably the perils this plant will have to face in the future.

At present, however, as Mr. Tailby in his paper before the Society of American Florists at Philadelphia properly remarks:

"There is little fear from Carnation diseases if you start with healthy cuttings and handle the plants well."



STRIPED CARNATION.

CHAPTER XIII.

CAUSE OF THE CALYX BURSTING. THE IDEAL CARNATION OF THE FUTURE.

NO Carnation that bursts its calyx should, now ask the award of merit. Such a thing is not known in nature, but the Florist by his expertness has run the petals up from *five* to *fifty*, and the strength of the calyx has not kept pace with the multiplication of the petals.

It is curious to notice the means nature adopts to strengthen the calyx which bursts before, or while the petals are unfolding.

At the base of the long tubular calyx, there are bracts, or brackets, giving it great support.

In the non-bursting kinds, nature has increased these bracts to six or more and their points run much further up the calyx than formerly.

The calyx never bursts except between these supports.

These bracts are fully developed at an early stage of the buds growth, to be in time to provide against lesion.

Carnations staked, so the buds and calyx are better strengthened by *light* and *air* do not burst so badly as otherwise.

It is a violence of nature for a flower in its unfoldment to work a lesion of its structure.

Nature abhors an imperfect flower.

There is no fear but what the future Carnation will be perfect in this regard.

The habits of an ideal Carnation plant is one of vigorous, dwarf, or medium size growth, yielding its bloom profusely and continuously (not in crops) from October until the following July, or August, on stems sufficiently stiff and long to support erect the flowerets, and giving the petals perfect calyx support.

The flower must be symmetrical, large, fringed and fragrant.

The grower of Strawberry plants frankly tells his customers the variety suited by its nature to a dry sandy soil; this one to a moist clayey soil; this an early berry a medium and this a late berry.

There is no such system accompanying Carnations offered for sale.

Purchasers are entitled to know all the facts.

They want to know if it comes into bloom, early, or late; the difference between late and early bloomers is about four month.

Does it bloom continuously, or in crops? The difference between crops is about thirty days.

Is it a vigorous, or weak grower? The difference between the two kinds being vital to the Florist or amateur; then its color, fragrance, &c., are of importance.

To the professional Carnation flower grower it is a great question whether it will pay at present prices, to house and properly care for late bloomers.

Early and constant bloomers, have nine months of market supply against five months for the late bloomers.

However, this desparagement between the two classes is some what compensated for by the late ones blooming more profusely after they commence, and producing rather finer flowers which should command a higher price, and this discrepancy in time of blooming can be obviated largely by the time of striking cuttings, heading in, &c.

For a uniform and unbroken market supply, the *continuous* bloomers are preferable to the *crop* bloomers, though the latter largely make up the delay of a partial interval of a few weeks by a greater abundance at one time

Some kinds of Carnations are less restive under root restraint in pots, than others, some will bear a higher forcing temperature than others, some accomodate themselves to a loose sandy soil better than other kinds.

But as a rule, a rich underdrained clayey soil is most congenial to the nature of the plant.

The Carnation adapts itself to new and varying conditions with the readiness of most other plants, yet the honest difference of opinion among Florists as to the relative value and excellencies of varieties is very great.

It would be hard to get an agreement of any five Carnation growers of America, on twenty of the best kinds, out of a catalogue list of two hundred.

If knowledge were perfect, on the nature, or habits of each Carnation, and the treatment uniform in view of the same, the estimates of Florists, in different sections of the country would not widely differ on their relative merits.

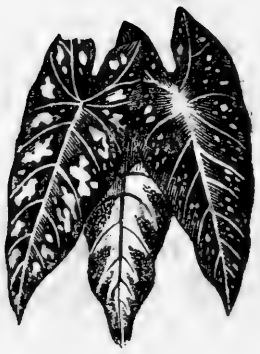
The description of a Carnation offered to the trade, or to the public, should be experimentally true.

The following form will admit of variations to suit the facts, and tersely explain the habits of the plant, and color of the flower.

* * * *

Flowers white, fragrant, and fringed; borne on long stems in profusion.

The plant is a healthy, branching, medium size grower; early and continuous bloomer, adapted to high temperature, heavy soil and bench culture.



CHAPTER XIV.

THE NATURE AND PHYSICAL QUALITIES OF THE CARNATION.

THE Carnation of the future must be a large and perfect flower, it must give perfect calyx support to its petals. The flowers must be on long stems, stand erect, be gratefully fragrant, and beautifully fringed.

The plant must be of a branching, dwarfish habit; a vigorous grower, an early and continuous bloomer.

At the time the seed is fertilized, nature impresses upon the unborn germ, all of its future various physical characteristics.

At that moment it is determined whether the coming plant is to be a late or, early bloomer; its color, its freedom of bloom, its stature, its Winter, or Summer blooming nature, &c., &c.

There are six months difference in the time of blooming, between the earliest and latest kinds of Carnations.

This time may be diminished, or increased, by heading in, temperature, time of propagation, and other treatments.

All Carnations should be classed as *early*, *medium*, and *late* bloomers.

Carnation plants vary in the productiveness of their bloom buds from ten to two hundred.

So they should be classed as *Shy*, *Average*, or *Profuse* bloomers.

As to color, nearly all Carnation flowers range themselves naturally into the *White*, *Yellow*, *Pink*, *Crimson*, *Scarlet*, *White-variegated*, and *Yellow-variegated* classes.

Some Carnations by their nature are more profuse bloomers in *Winter* under glass, others in *Summer*, out of doors.

This fact is important and should attach to a discription of the variety.

The comparative hardiness of Carnations vary from a few degrees below freezing to absolute hardiness.

This should be kept in view.

The stature of Carnations vary from *one* to *three* feet.

They can be classified as *Dwarf*, *Medium* and *Tall* growers.

Some Carnations bloom continuously, others in a succession of crops.

Some Carnations will bloom well, and remain healthy in a higher temperature than the nature of others will long admit of.

Some kinds of Carnations give much better satisfaction under the root restraint of pots, than others.

The natural soil for Carnations is a heavy loam, a few varieties are found to adapt themselves well to a light sandy soil.

Carnations flowers are grown on long stems, or short stems, the latter requires stemming to utilize the flower.

It is useless to make reference to the kinds that burst their calyx, and those which are sickly growers, for these should be at once and forever eliminated from every list.

It is the want of a knowledge of the nature and habits of each particular kind of Carnations, that causes such a diversity of opinion among Florists as to their respective merits.

It might be expected in a work of this kind, for the author to give, in his judgment a list of the best kinds of Carnations.

We have very decided views, as to which are the best in a list of more than one hundred varieties we grow, in view of our soil, temperature, moisture, climate and general management.

The best Winter bloomers are not the best Summer bloomers.

The most profuse bloomers do not produce the largest flowers.

The most attractive and fancy colored, are the shyest bloomers.

The best for bench culture are not as a rule the best for pots.

Any one kind for the above purposes in one locality, is far from being considered the best for the same purpose in another locality.

What is needed is a thorough knowledge of the proper culture of the Carnation plant *generally*, and the habits, or peculiar traits of each variety, *specially*.

Then every grower would be agreed as to which were the best in the list of Carnations, for his purposes.

A professional, or amateur grower, might ask for the best white Carnation; we ask in reply: for hardiness? for Winter blooming? for Summer blooming? for the bench? for pots? for the size of flower? for a profusion of bloom? for fragrance? for beauty of flower?

We would name a *different* Carnation for most of the above purposes.

For general use, under our management, our preferences are stated in Chapter VIII.

CHAPTER XV.

PROFITS OF CARNATION CULTURE.—MEANS TO ATTAIN THE BEST RESULTS.

THERE is no plant that produces as many flowers, or as good ones, as the Carnation. The number on typical plants of floriferous varieties often reach two hundred. The durability of the Carnation flower is remarkable; flowers well matured on the stem, have been kept in a cool temperature, in a good condition twenty days.

Immatured flowers wilt very soon.

Some varieties of Carnations bear flowers more lasting than others; one kind has carried presentable flowers on the parent stem for thirty days.

The best results obtained in raising Carnation flowers, is by devoting houses to them exclusively.

The most convenient form of a house is 16 feet wide, and of any convenient length, heated by hot-water.

The aisles need not be over eighteen inches wide, the three benches will then be wide enough for conveniently picking the bloom.

To maintain healthy Carnation plants through the entire season, the temperature should be about 40 degrees at night, and 10 or 15 degrees higher through the day.

The plants will yield more flowers, and better ones, through the season, than if kept in a higher temperature.

Tall growing Carnations should be staked, and the flowers stems loosely tied, air and light have a better chance around the plant, and to an extent prevents the calyx from bursting.

The commercial demand for white Carnations is greatly in excess of colored ones. White is the ground work of floral designs.

Growing Carnations for cut-flowers, for sale in pots, and plants for stock, constitute three branches of Carnation culture.

The growers of cut-flowers should confine themselves to half a dozen of the best varieties of each class, selected with reference to their adaptability to the locality where the grower lives; early and late blooming qualities of the plants, with reference to succession of bloom.

Some varieties esteemed the best in one locality, are regarded worthless in other sections.

Some kinds of each of the seven classes, are better adapted to pots than other kinds.

The grower after being settled in his purposes, should select a short list adapted to his designs.

It is different with the grower who desires to supply the market with stock.

The habits of this plant are so varied, the tastes and fashions of the people so diverse, to meet which, he must propagate and carry a very large list.

There are about two hundred named Carnations in Europe and America, possessing different degrees of merit.

Ten selected from each class would embrace the really superior kinds.

Many would reduce this estimate to one-half.

But it must be remembered, the list is augmented, by the facts that some are the best in one section and not so good in another, some are Winter bloomers, others are better Summer bloomers, some for pots, others for benches, some are late, and others early bloomers, some are dwarf, others tall growers; some superior for fragrance, and the beauty of the flower varies as does the peoples fancy.

The profit of growing Carnations for cut-flowers depends on the varieties, management of the plants, price of fuel, markets to be reached, &c.

It is safe to estimate that a Carnation plant through the season will average twenty flowers, and ten square feet of glass will cover one hundred plants including aisles, and the price of flowers through the season will average ten dollars per thousand.

Fancy varieties in some markets command Thirty dollars per thousand.

The Standard forcing kinds can be marketed at Twenty-five dollars per thousand during the Holidays.

By refering to "*Practical Floriculture*," published in 1868, I see the colored sorts sold in New York market for Twenty dollars per thousand, and the white at Forty dollars per thousand.

After August 1, prices run down to Five dollars per thousand, and so continue till November.

Some growers ship their blooms to commission houses, and run the range of the market price through the season, others make a season contract, the price to run, uniform between the periods agreed upon.

The importance of market reports of cut-flowers, has been met by the "*American Florist*," a semi-monthly paper published in Chicago and New York.

By this publication, growers can see the ruling prices for their products in Boston, New York, Philadelphia, Chicago, and other places twice a month.

CHAPTER XVI.

CARNATION FLOWERS THE YEAR ROUND — MONTHLY AND REMONENT CARNATION.

EARLY blooming varieties of Carnations will flower well in August, out of doors. Carnation plants under glass need not be abandoned until the latter part of July, if the houses are well shaded.

There is here a period of two months in which Carnation flowers are not abundant.

They fortunately are not in great demand during this time.

To have out door flowers in profusion at this time, care must be taken to strike the plants early in the season, October or November.

Plants from the field wintered in a cold frame will bloom three weeks sooner than cuttings.

A bed of seedlings started in the Fall, from a good strain of seed will produce a large percentage of double flowers and help fill this gap.

The circuit of the whole year will soon be filled with a list of Carnations whose *inherent* nature, it is, to begin unfolding their petals in every month of the year.

The list is complete now between August blooming Snowden, and April blooming Quaker City.

With the appliances of temperature; heading back; shading; selecting the proper varieties, and especially the time of propagating; we can now obtain with an ease that attaches to no other flower, Carnation bloom in profusion every month of the year.

It must be remembered that when late and early blooming varieties are refered too in this work, that they are so according to the accepted time the stock is now propagated.

Hinzies white by this rule is a late blooming Carnation.

If this variety is propagated in October, potted up as it grows, keeping during February and March only in a slow growing condition, planted in the open ground in April, and not headed back, it can be housed the first of October with a profusion of buds and bloom, from which immediate pickings can be made.

This is practical knowledge.

The principle to be observed is the same as in many other plants, viz:

A definite length of time must intervene between the severance of cutting, and the time the plant can attempt to reproduce itself, by flowers and seeds.

This principle applied to other varieties of Carnations would doubtless be as successful in fowarding, or retarding bloom as we know it is with Hinzies white, the Carnation *par excellent.*

Formerly, much more than now, a distinction was made between the *monthly*, and *remonent* varieties of Carnations.

This distinction was very apparent, and necessary years ago.

By hybridizing, and an extensive cross fertilizing this distinction is gradually disappearing.

The races are being unified.

There are however some well marked types of the above classes still in existence.

"*Monthly*" Carnations as they were formerly called, are those that bloom early and continuously, with slight, or partial intervals in the production of their flowers,

"*Remontant*" Carnations, (occasionally called Tree Carnations,) are those that have their season of blooming, generally late.

Types of the *first* class might be Pres. De Graw, Snowden, Grace Wilder, &c.

Types of the *second* class might be Quaker City, Field of Gold, Eureka, &c.

If these two classes are sufficiently dissimilar their progeny might scientifically be called a *Hybrid*, otherwise it would be a *Cross*.

Peter Henderson, Butter Cup, Century, &c., are the result of a cross fertilization of those two races.

The *nature* of the parents is plainly carried into the *nature* of the progeny, in an admixture more or less complete.

The offspring of both parents are later bloomers, while one parent is an earlier bloomer than the other is sometimes.

There is a marked effort at a succession of crops with partial and brief intervals.

The children of these parents are vigorous growers, bearing fine large flowers, apparently healthy and long lived.

If this is a fact it would point to them being the result of a *cross*, rather than that of them being *hybrids*.

This possibly explains the language now used in discribing Carnations, viz:

Early and late blooming crops, or continuous bloomers, &c., &c., which is but another way of refering to the parents, or the parents characteristics in the plant described.

CHAPTER XVII.

ARTIFICIAL AND SELF FECUNDATION OF CARNATION SEED.

ARNATIONS produce, or perfect comparatively few seed. As a rule all double flowers are so at the expense of their powers to multiply by the seed process. The absence of flower feeding insects in green-houses is a great cause of immature seeds in Carnations.

The close contact of the calyx with the seed vessel and the tenacious adherence of the petals causes many seeds to rot from too much moisture.

A seed vessel with its seed fully fertilized and matured, will contain about twenty-five black, or brownish seed.

The time to gather the seed, is when they are found matured.

This may be known by a brownish appearance of the seed vessel.

Seed from a good strain, is worth in the market, $1.00 per hundred seeds.

The first show of merit in a *cross*, or *hybrid*, is not often permanent.

It may advance, or recede twenty per cent before it finds the level of its true existence.

As a rule, I think, they favorably develope rather than retrograde. *Genial* and *generous* culture, is the *second* agency for all large and double flowers.

In the absence of these potential influences, they rapidly deteriorate and don the characteristics of the primative type.

Seed sown as soon as it is gathered germinates much sooner than when it is kept long in a dry state.

Chas. A. Starr's, (a successful grower of seedling Carnations,) mode, is to plant the seed in March, or April in pots, or flats, keeping them moderately warm and moist.

When the second leaf is formed give them plenty of air.

When they are large enough to handle, they are transplanted into pots, and in time, set out in the open ground and treated the same as Carnations from cuttings.

Mr E. Lonsdale in the 19th. No. of the *American Florist* says:

"Experiments with seedling Carnations make a very pleasant pastime, with a possibility of fortune and fame. Few plants are more attractive to the enthusiast, the operations being not only easy, but soon realized on. Those who do not care to be bothered with the details of artificial fecundation should select the best and strongest plants of their favorite varieties and bed out when little attention would be needed. Let them be varieties which flower at the same time, either from habit or by pinching the shoots back, that those which it is desired to cross be in bloom at once, and leave the rest to the insects and the wind. This is asserted by some authorities to be the best way to proceed with

a view to improvement, but if we have an ideal to produce, we must proceed under conditions which we can control.

This is best done in a greenhouse, and the time best suited is from late summer to early spring. After making up your mind what combination of qualities you desire to produce, cast about for the component parts. For constitution, select a free flowering, healthy sort, and make it the seed parent; for color and general contour, one that possesses the desired characteristics and will furnish the necessary amount of pollen. Remove the petals from the flower which is to bear the seed pod, and carefully cut away the calyx, as it will retain moisture and early decay will result. As soon as the seed is ripe, which may be determined by the seed-case assuming a brownish tint, carefully collect and sow at once. If the seed is not covered too deeply it will show signs of growth in from four to six days. The after treatment of the seedlings will suggest itself to all practical growers."

The Carnation bears a perfect flower of stamens pistil and fertilizing pollen.

When a Carnation fertilizes itself with its own pollen, or with pollen brought to it by insects, it is said to be *self-fertilized* in contradistinction to *artificial-fertilization*, which is done by the removal of the anthers, and the application of foreign pollen to the stigma by human agency.

Mr. Starr obtained Buttercup, Duke of Orange, Lady Chattin, Venus and Field of Gold, excellent varieties, from one batch of seed, a mixture of Astoria, La Puratie and Edwardsii.

One of the most noted growers of new varieties of Carnations in America, to obtain unquestioned purity and vigor of the parent type, has imported from Europe a stock of D. Caryophyllus.

With this some of the remote varieties will be bred, and beyond doubt with grand results.

Seedlings stand the Winter well when sown in the Fall.

With a little protection they will flower early the following Spring.

A majority of the seedlings grown, will not be worth saving, some will be single, semi double, and irregular flowering.

They will all be interesting to the vegetable physiologist who studies the play of vitalizing forces which works the varieties of kinds.

In a former chapter some of the natural laws governing crossing and hybridizing, were refered to.

In keeping with these laws, it will be noticed, the most promising varieties of Carnations, of recent introduction, by their dwarf habits, bushy growth, and comparative hardiness, have been bred back toward one of the original types.

It is to Carnations with this kind of a pedigree that growers must look in the future for their most profitable kinds.

The remote hybrids will doubtless continue to posess distinguishing, if not abnormal traits of color, size of buds, and require as they do now, a cæsarian operation to be delivered of their petals.

A CARNATION WITH SERRATED EDGES.*

*In a fringed Carnation the edges of the petals are cut deeper and are more irregular.

CHAPTER XVIII.

COLORS.— CLASSIFICATION OF ALL CARNATIONS BASED ON COLORS.

IN chromatics there is a wide and inviting field for arrangement and systemization. It is for the future to adopt a rational and uniform nomenclature of colors. Chemistry has a splendid system.

Music that lends its entrancing charms to the ear has one; while colors that offers equal pleasures to the eye has comparatively none.

Aside from the primary colors, and a few well understood shades all is chaos.

The only mode known, or adopted to convey intelligence of a shade is by comparing it to some existing substance, that occurs at the instant, to the mind, that bears that shade.

If the person addressed, is familiar with the shade of the *substance* refered to, it gives him a good conception of the shade of color intended to be conveyed by the comparison.

If he has never seen the *thing*, or *substance*, it conveys no idea at all.

The seven prismatic colors, violet, indigo blue, green, yellow, orange and red, are resolvable into three, yellow, red and blue.

All other colors but these three, are compound colors, arising from a mixture of two or more of the prismatic colors.

Black is the negation of all color. *White* is a compound of all the primary colors in certain exact proportions and purity.

By a critical examination of Carnation flowers under a good microscope, it seems that *red*, *white* and *yellow* are the grounds upon which all other shades of colors are painted.

The range of the red class is from maroon to the lightest blush of red.

For popular convenience this range of colors is subdivided into a darker and a lighter class called *crimson* and *scarlet* classes.

The yellow and the ground color of the yellow-variegated classes range from deep orange to light lemon shades.

The white class from a tinge of cream or pink to an absolute purity of the color.

The pink class is one for popular convenience, and ranges from cherry-pink to the lightest blush, from American Wonder to the flesh tint of Mrs. Joliff.

Their is a small but increasing list of Carnations that have distinctive shades known as Rose Lake, or Magenta.

The Century is suffused with this shade, Kaizer William has this color with a violet tinge and especially it is well marked in Fleta Fay Foster.

To avoid too many classes this class is listed with the crimson as properly belonging to the dark shades.

The old and almost obsolete division of Carnation into "self colored," "Flakes" and "Bizzares" should give place to the more rational groupings of red, white and yellow as christian names with surnames expressive of the shade, pencilings, spots and flakes of the particular variety.

That these are the *natural* divisions of Carnations is evidenced by the different qualities attaching to each class in the way of hardening their floresence and vigor of growth.

A shaded Carnation is one in which two or more colors run into each other by insensible gradations.

A flaked Carnation is one in which irregular shaped colorings are impressed upon the petals always running from the base toward its margin.

A penciled Carnation is one in which, fine, straight, narrow colored lines of different length run parallel with the axes of the petal. Oblong dots or spots occur in some varieties.

A Carnation may be flaked, penciled, dotted and shaded, or it may be either.

The variegated kinds range themselves under the two natural classes as the preponderance of the *ground* color might indicate.

Thus, Chester Pride is white with carmine pencilings.

Buttercup is yellow, with vermillion pencilings.

Sunrise is yellow, flaked with bright red.

The pink class is a sub-division of the red class, but to meet popular requirements it is made a separate class.

The seven classes consist of
White,
Scarlet,
Crimson,
Pink,
Yellow,
Yellow-variegated,
White-variegated,

It requires some forcing to get a few varieties into any of these classes, but nineteen-twentieths of all pass there naturally.

No Carnation of a blue color has yet been produced.

Natural laws may bar this result. Miranda is a rich plumb color.

This color is a mixture of carmine and blue.

Much latitude must be allowed in the description of the colors of flowers.

The shadings of a flower on the same plant varies in different ages of its existence, and under different management.

The human eye varies in its impressibility to colors from acuteness, to color blindness.

Two persons with equally susceptible eyes to colors, will rarely describe a compound color the same way.

CHAPTER XIX.

THE VARIETIES OF CARNATIONS GROWN FOR THE MARKETS OF THE UNITED STATES.

I give in the following chapter, the kinds of Carnations grown for cut-flowers, and flower-plants for the principal markets of this country. Also the prices now ruling for *short* and *long* stem flowers, to growers.

Also the proportion of white flowers required by the markets relative to all other colors.

It will be noticed the flowers of the Carnation of the future must be borne on long stems.

Where two correspondents, from the same point mentions the same kind, the duplication of names are omitted.

One-half of all the Carnation flowers sold in the United States are white.

The mode of cutting with *long* stems is wonderfully increasing the demand for other colors.

The facilities for stemming a flower are not at hand, or is a knowledge of the mode possessed, by the average purchaser.

So a flower without a stem cannot be readily utilized.

Flower merchants deal in a perishable commodity, and are entitled, (if they buy *out-right*) to a broad margin of profit.

New York quotations of same date, generally say: "Carnations, (to growers) $1.00 to $2 00, per hundred," and retail at, from 50 to 75 cents per doz.

The question might arise whether there is a proper division of profits between the grower and merchant.

As to houses that deal in flowers on Commission, I know of no law to protect the consignor but the honesty of the consignee.

The statements of correspondents (only a portion of which are given) show the varieties of Carnations *chiefly* grown in this country.

This establishes the kinds most in demand, and the kinds most profitable to grow *only* of the *profusely* introduced sorts.

To the *scarcer* varieties that are rapidly coming into popular favor this system of inquiry works great injustice.

Many Carnation growers say in their letters: "We will grow extensively as soon as we can obtain the quantity of stock."

The Century, Grace Fardon, Dawn, Rosalind, American Wonder, Scarlet Gem, Robert Craig, Andalousie, Seawan, Sunrise, Buttercup, Field of Gold, Alegatiere, Quaker City, Mille Carle, John McCullough, Pres. Garfield, Jeannette, La Puritie, (white) Anna Webb, Chas. Henderson, Grace Wilder, Laura, Mrs. Joliff, Chester Pride, Rose Hill, Victor, Mrs. Garfield, Mrs. E. Hippard, Mrs. A. Rolker, Joseph Perkins, J. J. Harrison, ect., ect.

Another lesson taught by this system of inquiry, which extended from the Atlantic to the

Pacific, and from Maine to Lousiana, is the surprising narrow belt in the United States in which Carnations can be grown with the greatest success.

It is evident the Carnation growing belt of America and Europe lies between degrees 38 and 45, north latitude.

Very few, if any of the *genera* of the order of caryophyllaceæ are found south of the temperate zone.

The home of the whole order seems to be in the North.

Lychnis, Stellaria, Cerastium Vulgatum, &c., are found in Canada, Siberia and Labrador.

The Botanical division of the life of the roots of plants into annuals, biennials and perennials, is greatly modified by cultivation and climate.

Wheat is an annual if sowed in the Spring, it becomes a biennial if sown in the Fall.

The Narsturtion is a perennial shrub in South America, in the North it is a distinctive annual.

The tendency of all perennial plants of the tropics, when brought into a zone sharply marked by the seasons, or well defined periods of *rest* and *activity* of vegetable life, is to assume biennial, or annual habits.

The Carnation is a well defined biennial.

It is its nature for its roots to live two years, or through *one* period of rest, or dormant existence, to perfect its seed, and for its roots to die the second season.

This plant, though a native of the temperate zone, may have this nature greatly modified in its own natural clime.

Artificial manipulation and green-house influences compels it to assume both annual and perennial habits.

Many members of this order of plants, are perennials, even the parents of the Carnation race are perennials.

The names of the originators of the improved varieties of Carnations, are affixed, in the catalogue.

This determines the locality in which sorts have had their origin.

It is reasonable to suppose that a new kind of improved beauty of flower, or habit of a plant would *only* be obtained in a latitude, soil, and under circumstances *most* congenial to the nature of this plant.

The new race of perpetual Carnations, Jene Sisley says, originated in Lyons, France.

The most successful growers of Carnations, as well as the originators of new and improved kinds, must ever be confined to a very narrow strip of the earths surface.

Soil, light, humidity and isothermal agencies *within* this limited belt will also be great factors of influences *for*, or *against* this plant.

This is strongly illustrated by W. C. Wilson's letter, of Long Island, N. Y.

Mr. Wilson has long been a practical and successful florist.

After enumerating a long list of Carnations grown for the New York market, he says:

"There are many other kinds grown. Some do well in one spot, while others do not.

Our growers have to look for those sorts that do the best in their particular locality."

This condition of things must be referable chiefly to the soil.

No other influence could work this result in a section as limited as New York City and its suburbs.

It also may refer to a fact that some *sorts* of Carnations by their nature are adapted to certain sorts of soil.

The soil of Long Island and vicinity sections, doubtless largely predominates in silex, and other loose ocean formed materials, and cannot geologically, be generally a good Carnation growing section.

There are two localities not more than twenty miles apart, at one point Carnations are raised with great success, at the other point their culture is almost a failure.

At the the successful place the soil is a cold argillaceous nature at the other it is a loose warm sandy loam.

The firm micaceous soil of eastern Pennyslvania has proven to be well adapted to growing Carnations successfully.

Carnations do extremely well through Northern Ohio, where the excessive heat of Summer is modified by the chain of Lakes on the north, in localities where the soil predominates in enriched alumina.

Does the fine web-like roots of the Carnation feed on the elements found in a clayey soil? or does

the plant require the compactness this kind of soil gives around its roots? or is the cold nature of this soil congenial to its nature?

Possibly it is all *three* of those factors combined that works the general good result.

These are merely the first dottings on the map which will eventually clearly outline the Carnation growing sections of America.

TYPE OF A CRIMSON CARNATION.

CHAPTER XX.

Chapter XX, in the 1st and 2d editions, contained the correspondence from growers, showing the varieties of carnations cultivated in the United States in 1885. Its only value now would be to show the mutation in cultivated varieties that is constantly going on.

SOLID BEDS.

I append an abridged article from the pen of A. M. Herr, Pa., who is the pioneer representative of the Solid Bed system for carnations.

"I have a plant of houses, that in their results has given great satisfaction. It consists of eight houses, each 9x100 feet on the ridge and furrow plan, the gutter plates rest upon the posts, but there is no partition between the houses, and the beds are on a level with the ground floor, and are of the natural soil without any labor spent on them except to manure them for planting. The houses run north and south, and the carnations are planted in beds three feet wide, and are heated with pipes supported by the posts on which rests the gutter plates, the span being so short no posts are needed to support the roof. Solid Beds are preferable for many varieties of carnations on the ground of economy, and the season's results are better in both flowers and

plants. The drainage of these beds, however, must be very thorough. Some kinds of carnations are better adapted to this mode of culture than other kinds. Carnations disposed to burst their calyxes will do so more on solid beds than on raised benches, and carnations with the habit of producing side buds will turn out more short stem flowers on solid beds.

The varieties I find best adapted to solid beds are Grace Wilder, Silver Spray, Henzie, Lizzie McGowen, Fred Dorner, Anna Webb, Mrs. Mangold, J. F. Freeman, Portia Hector, Day Break and Christmas, and there are doubtless others I have not tried that would do equally well. J. J. Harrison, L. L. Lamborn, E. G. Hill, Geneva Buttercup and Chester Pride do better on raised benches."

C. W. Ward, N. Y. "We like solid beds for some varieties, and raised benches for other kinds, Henzie, Portia, Chester Pride and Garfield do well with us in solid beds."

H. E. Chitty, N. J. "I tried solid beds in three houses in 1886, the plants grew with extraordinary vigor, but produced but few flowers until after the holidays when they did some better. I have no desire to test solid beds again."

Wm. Nicholson, Mass. "I grow over half of my stock in solid beds; benches do better in the winter, solid beds better in the spring and summer months; by negligence in *under* watering, benches suffer the most, while neglect in *over* watering beds suffer the most. All things considering I see but little difference."

R. T. Lombard, Mass. "I grow carnations in solid beds and on raised benches, and I would discard raised benches entirely if my houses were constructed so I could. I get the best results from solid beds."

J. L. Dillon, Pa. "We have used solid beds for carnations for years, planting the smaller growing varieties, as Lamborn, Wilder and Swayne, on raised benches, and find that Henzie, Edwardsii, Mrs. F. Mangold and all strong growing kinds succeed well on solid beds. As to productiveness of bloom we have not seen any difference. Solid beds or benches is all a matter of convenience and expense."

Alex McBride, N. Y. "I think solid beds are better than raised benches for carnations, provided they are well drained."

Joseph Renard, Pa. "My experience with solid beds and raised benches for carnations is this: during November, December, January, Feburary and March, raised benches are better in every particular; but before and after these months, solid beds are preferable; they retain moisture, do away with a great deal of work, and are more beneficial to the plants."

Many other experiences and opinions have been obtained from growers on this question, only the most pertinent have been introduced. Messrs Renard and Nicholson sum up the whole question, omitting giving prominence to the point; the grower's crop of bloom is not as completely under his control in solid beds, as it is in raised benches. The crop cannot be forced so

well, if it was desired to have it early, or at stated intervals.

Supt. Porter, of the Census Bureau, says; there are in the United States 4691 floral establishments embracing 38,823.347 feet of glass, equaling 891 acres of land. They give employment to 16847 males and 1958 females and pay annually $1,160.152 for fuel. The value of their yearly output of plants amounts to $12,036.477, and the value of cut flowers they sell is $14,-175.328.

There was but one commercial florist in America in 1800,—3 more by 1820,—8 more by 1830,—25 more by 1840,—45 more by 1850,—96 more by 1860, and in 1890 a total of 4690.

Within the carnation growing sections of America the excessive hot weather of July and August is very predjudicial to the growth of carnations. A northern inclination of the carnation field would materially modify the bad effects of the heat.

DEAR SIR:—"We would be pleased to know why carnation L. L. Lamborn will not open its buds with us. They but half open, then hang together and rot." Webb Bros., Corfu, N. Y.

All varieties are incipient species and have distinctive habits of their own. The flower of the carnation in question is up to the maximum size, and of unequaled purity of color from the moment its petals unfold until they die.

This carnation has defective strength of stem, and is on the *annual* side of the cultivated groupe of Biennial Carnations, as is Snowden, one of its parents. It should never be propagated until March or April for winter blooming. If it is propagated early, the plant being small, and are early bloomer, it becomes exhausted; so that by the time the short dark days of late winter set in, the flowers will not unfold to the feeble stimulus of the heat and light then offered.

No variety has the terminal ends of the petals overlapping themselves as this has. From spraying, or condensation of greenhouse moisture, the outside petals decay and lock the inside ones in their adhesive embrace.

Wm. Swayne, the originator of this variety, says that he gets the best results from cuttings taken in March.

The versatilities of this and all other varieties, I think, is fully explained by general principles in Chapter XXVIII.

Mr. E. G. Hill, of Ind., from personal observations in a recent tour of Europe, and the British Isles, says, "Go where you will, cloves, pinks and carnations are seen in fragrant profusion on every hand. The finer strains are classified as Bizarres,, Flakes, Fancies and Selfs; and sections or types as the Malmaison, Marguirete etc.

The continuance and multiplication of choice varieties is universally done by layering the shoots in pots. The largest flowers produced by any variety of the Dianthus family is the by Malmai-

son type. Mr. Hill heard of flowers that reached six inches in diameter.

A March number of the "Florist's Exchange" gave an electro type impression of a European variety measuring $4\frac{3}{8}$ inches in diameter. An esteemed variety at Erfurt is the Germania; but neither it or the Marguirete class has been a great success in this country.

The method of culture of these border varieties in Europe is to start the seed under glass, and when two inches high transplant at proper distances apart and give careful cultivation, where they bloom the second season.

These classes of the Dianthus family of plants are carefully crossed by hand fertilization, and when cultivated with the greatest care, marvelous progress has been made in their development in the old country during the last few years.

The same disability seems to attend the importation of these classes into this country that is attached to the perpetual carnations.

America must raise her own Bizarres, Flakes and Fancies, and there is certainly an inviting and profitable field for effort in this direction.

The last few years have seen but few originations, or importations, of these types of carnations in America, and in those, the improvements have not been signally marked.

Eastern Queen, Snow Flake, Morning Cloak, Hermine, Hispancus, Varabilis, Abottsford, Crimson Bell, La Favourite, Pheasant's Eye, and a few others are all we can add to the list found on page

CHAPTER XXI.

HARDY SCOTCH PINKS —DIFFERENCE BETWEEN THEM AND CARNATIONS.

MOST Carnations are hardy *above* zero. Most pinks are hardy at any ordinary degree *below* zero. Pinks have a more dwarfed growth than Carnations.

They rarely attain a height greater than one foot, and grow in large tufts from a foot to eighteen inches in diameter.

The foliage of Pinks is more profuse, the leaves narrower, and more grasslike than is found in Carnations.

Their ordinary time of blooming is different from the Carnation. June is their usual flowering time.

The beautiful lacings, shadings and bandings of Pinks are different from the markings seen in Carnations.

The markings in Pinks are usually transverse on the petals, while in Carnations they are parallel with the axis of the petals.

The petals of Pinks are deeper and more generally fringed, and the fragrance of the flower is more powerful than is found in Carnations.

These and other general differences between these two classes of plants are far from being invariable.

The mentioned characteristics of the two classes shade down to nothing on the confines of a close relationship.

They run into each other by insensible gradations.

Pinks are the parents of Carnations. Some valuable Carnations recently introduced have many of the traits of their parents, as Quaker City, etc.

The Carnation that may be introduced in the future, and the ones that will come to stay, will be those that contain most of the *pure*, *rich*, *distinctive* blood of their parents.

Nature abhors a hybrid as it does a vacuum, and decrees against them diseases and extinction.

Nature's most perfect mechanism is a flower, and she revolts at an *imperfect* one.

A Carnation that has to rupture the calyx to unfold its petals is a monstrosity.

Good taste will soon consign the unnatural product to the compost pile.

The dwarf habits, profusion of bloom, on short stems, and the entirely hardy nature of pinks, make them valuable for summer boquets, for the greenhouse, window garden, and especially for cemetery decoration.

In some sections they are used and esteemed, as a border for a bed, containing other plants.

The attention of Florists, and lovers of flowers, has been indifferently directed to Pinks.

The new and vastly improved kinds now being introduced, will likely make this different in the near future.

It is now a question, if some members of the Pink family will not compare favorably, with *some* of their more aristocratic Carnation cousins for forcing purposes.

Pinks can be propagated by cuttings, layers, or division of the clumps of roots.

It should be by cuttings, if they are designed for pots, or sale.

The clumps should be divided and re-set every two years.

There is no difference in the treatment of the cuttings from that recommended for Carnations.

D. Barbatus, (Syn. Sweet William &c.)

D. Plumarius, (Syn. Garden Pink, Florists Pink, Bunch Pink, Cushion Pink, Phesant-eye Pink, D. Hortensius.)

D. Chinesius, (Syn. China Pink) D. Diadematus, D. Lancinatus and D. Headewigii, are sports of this variety. This sort sports to such an extent that in a large bed of seedlings it is hard to find two alike.

D. Caryophyllus, (Syn. Carnation, Clove Pink, Clove Gilly Flower.) This variety is belived to be parent of the Tree, or ever blooming Carnation. These kind are easily propagated by seed. The *better* kinds must be perpetuated by cuttings or division of the roots.

The terms Hardy Pinks, Sweet May Pinks, Scotch Pinks, Picotees, Hybrid Perpetual Pinks, are applied indiscriminately to the improved progeny of the above kinds, not including the Carnation proper.

These have distinctive differences, which are particularized in Chapter V. and are the Eden parents of all our Pinks, as well as Carnations.

Our list embraces the kinds having the best habits, and the widest range of colors.

Mr. Chas. T. Starr, who has given much attention to this class of plants, writes me as follows:

"Scotch Pinks flower like perpetual Roses, but one real crop a year, but stand out well in this latitude (the Alba Fimbriata, or White Fringe,) without any protection.

The others are better with a slight covering of brush and leaves.

Some varieties, such as Esther, Brunette, Juliet, and Alfred Harrington bloom in the late summer, or fall.

Commencing with small plants, set out in April, a foot apart each way, giving ordinary garden culture same as beets, or onions, kept well hoed and soil mellow.

They soon form large clumps, or stools six inches or more in diameter by the first of November following.

I leave them out in the open ground to this date, or until the ground is slightly frozen, as I find I can do but little propagating (to have healthy plants) without this freezing, before taking off the cuttings.

I then remove them and set close together in a cold frame, or a bed on the ground in a southern exposure, covered by a frame of 6x3 foot glass; here they remain until January, at which time I cut up what I want for propagation, putting them in the cutting bench the same as Carnations; grow them in

two and a half inch pots all summer, and in October following, put them out in cold frames, or keep dormant for mailing the following spring; such plants will bloom that spring and can be mailed any distance with perfect safety.

For amateur flowering, grow them into clumps as before stated, take them up in October, plant into beds where wanted to bloom, say eight inches apart, set a cold-frame over them, or protect with brush and litter, or ever-green boughs, which should be removed early in the spring.

They will repay you in May and June with a mass of clove scented beautiful blooms, such as can not be obtained on any other flowering plant.

The new variety "*Snow*," is pure white and as large and double as any Carnation, and bloomed very profusely for me last spring, florits 2¼ inches in diameter. It is a great addition to the white flowering variety, though it bursts badly.

Lord Lyons is the finest red or dark one, and Pumila next.

Laura Wilmore, Alfred Harrington and Brunette, are the best, of the variegated, or dark centered varieties.

They are all worthy of a place in every flower garden, being so hardy; and would be much more generally grown, especially at the north, if their treatment was more generally understood.

They can be winter flowered the same as Sweet Violets, but will do but little good in a warm dry atmosphere such as is too often found in green-houses and living rooms, which is the bane of successfully flowering the whole Dianthus family.

Forty to sixty-five degrees, occasionally higher in day time, with a moist atmosphere, will insure their successful cultivation."

I append a catalogue of the best named varieties of Pinks now in cultivation.

—CATALOGUE OF PINKS.—

Anne Boleyn, dark rose, crimson maroon center, forces well.

Alfred Harrington.

Atola, violet rose, crimson center.

Alba Fimbriata, white, fringed, a good winter bloomer.

Betrace, pure white, early, forces well.

Brunette.

Claude.

Cerus, rosy violet.

Dianthus Hybridus Multiflorus, foliage of pink, flowers like a Carnation.

Dianthus Querteri, large crimson flowers, continuous summer bloomer.

Defiance.

Etna.

Esther.

Earl of Carlisle.

Grenadin, scarlet, like a dwarf Carnation.

Imogen, pale straw color, crimson margin.

Juliet, white ground, flaked red and pink.

Jules Ferry, white, wine purple center.

Jean Sisley, large, rose, shaded crimson, very fragrant.

Laura Wilmore.

Lord Lyons, crimson, laced with rose.

Minerva, blush, with amaranth center.

Mrs. Stephen.

Mrs. Potiphar.

Napoleon III, rich crimson, profuse bloomer.

Oracle, white, crimson center.

Prince Arthur.

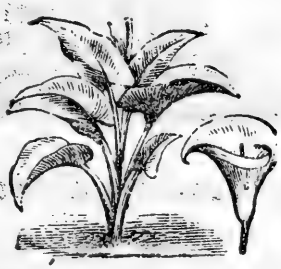
Pumila.

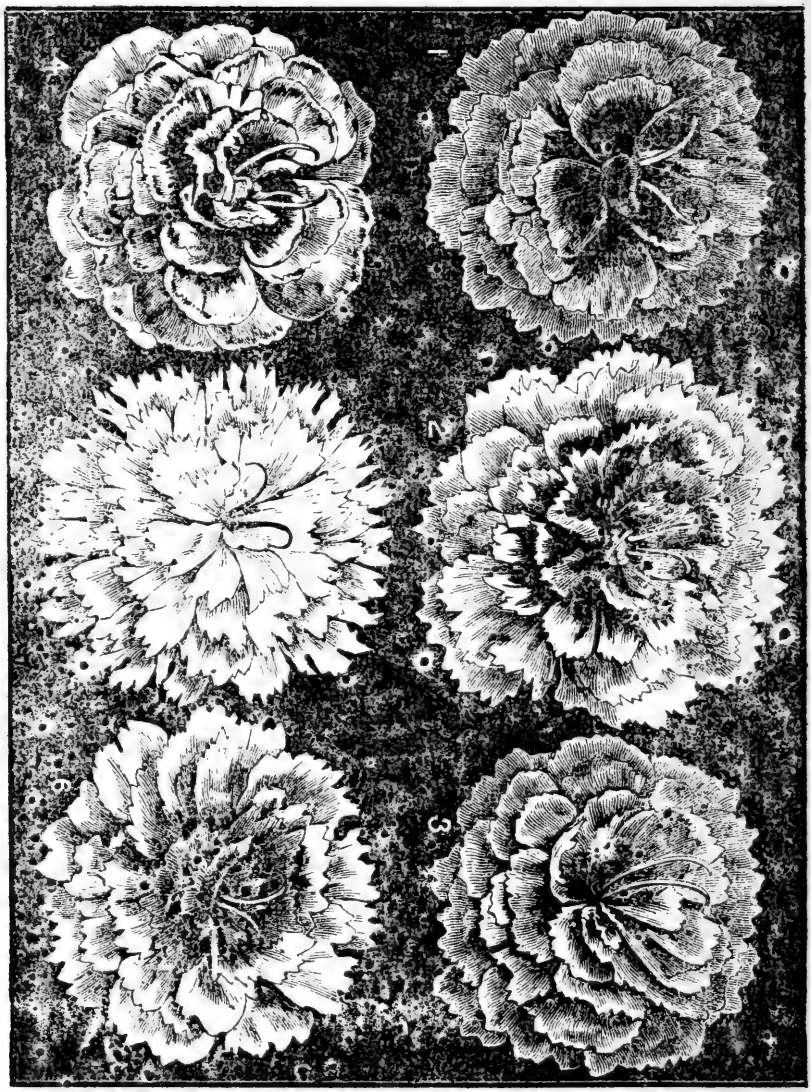
Stanislaus, violet rose, deep crimson center.

Snow, (Syn. Mrs. Sinkins,) flowers large, best white, blooms at Easter.

Viola, bright lemon, pink and red margin.

Valentine, opaque white, bright pink stripes.





Type of the Flowers of Scotch Pinks.

No. 1 – Lord Lyons.
" 2 – Brunette.
" 3 – Pumila.
No. 4 – Alfred Harrington.
" 5 – Alba Fimbriata.
" 6 – Prince Arthur.

CHAPTER XXII.

TOMATOES IN CONNECTION WITH BENCH CARNATIONS.

BY WM. SWAYNE, KENNETT SQUARE, PA.*

I have practiced the following plan of growing Tomatoes, as a succession crop with Carnations for the past two seasons and found it to pay well; in no way as I can see, interfering with the growth of the Carnations, but, to the contrary, if not planted too closely, a decided advantage to them in the hot summer months.

We commence operations by sowing the seed from December first to tenth. There is nothing gained by sowing sooner, as plants would become too large, interfering with Carnation plants before the time when that shading is really needed. We pick out in shallow trays when second leaf appears, avoiding crowding in every instance. When they have become good stocky plants and growing freely, pot in three inch pots, shift as often as needed until a six inch pot is reached; these to economize space are set on south side of benches, where they get plenty of light, in houses where they are to grow, until they are well filled with roots; never allow them to become too much pot bound.

When this stage is reached, (about February first,) they are placed where they are to fruit.

Our plan is to lift two or three Carnation plants every four feet on *north* side of bench as much as practicable, thus the Carnations get the advantage of all the sun needed until the Tomatoes are well grown, by which time hot weather reaches us and the shade given by the Tomatoes is really a positive advantage to the blooming Carnation plants.

The depth of soil on our benches is from five to six inches, and we make no difference in treatment of Tomatoes than for Carnations; in fact we take the best possible care of Carnations, and allow the Tomatoes to take care of themselves.

They do best in a good, rich, somewhat sandy soil; one house we grow Peter Henderson Carnation which requires a heavier soil.

In it I find the fruit a trifle later in maturing and not quite so smooth and fair, but heavy.

The most important part in growing Tomatoes successfully, is the pruning of the vines; this we commence as soon as the first blossom bud appears, or as soon as the leading shoot above the blossom can be got at to pinch out, leaving one leaf only above the blossom.

The next shoot that comes out below the bunch of buds is allowed to grow until it develops buds, when it too is pruned, exactly as the first, and so on until three or four sets of fruit branches are produced, or less if they get too tall for the houses, keeping off all suckers and side shoots.

After we get as much fruit set as we think will mature before out door fruit ripens and the leaves commence to throw out suckers, which they will do, I have found it advantageous to cut away some of the lower, riper leaves and keep all leading shoots off, thus throwing all the strength of the vine into the fruit.

Vines on the north bench are set about twelve inches from the back which are tied to strong stakes.

When they reach the glass, are trained up the rafters by suspending wires, after the form of vines in cold graperies, until the required height is attained.

When middle benches are wide, say six feet, two rows can be planted; each row about ten inches from the sides; these I prefer to stake with long stakes reaching to the rafters and secured either by wire running along and fastened with little staples, or else by a small one to the rafter for each pole and securely tied so as not to have them falling around when full of fruit.

The plants should never be set closer than three and one-half feet; four feet is better; after they have been pinched off at the second blossom, two or three of the lower leaves can be taken off, which will let more air around the Carnation plants.

Carnations continue to flower well up into July, grown with tomatoes, two or three weeks later than on benches where no tomatoes are grown.

Tomatoes grown in a house have to be fertilized artificially, which should be regularly done at east every other day.

I use a small camel hair brush at first, and after they get to producing buds freely, merely go over and give the blossom stalks a little jar with a small stick or with the hand; this distributes the pollen sufficiently to do the work.

The Tomato is a perfect blossom itself, but in a house there is no wind to shake the vines enough to produce the effect of fertilizing.

Do not depend on the bees to do the work, during warm days in early summer. I have seen hundreds of bees amoung the other flowers, but have the first one yet to see on a tomato blossom.

The fruit with us commenees to ripen the latter part of April and continues until tomatoes come in from out doors.

Plants for the year 1885, averaged eleven pounds per vine, average price for season 17⅞ cents per pound; fruit was sent in the hands of a commission man going to market twice a week. No doubt if it had been sent direct to some fancy fruit dealer, they would have done much better.

The variety used was the "Mayflower," a medium sized fruit, very productive and nearly always perfect, and do not seem to run so much to vine as many other varieties.

Some growers near me use Trophy and other varieties but I think the Mayflower surpasses them all for productiveness, and a medium size tomato seems to sell better than the very large ones.

While no doubt tomatoes would do much better with a night temperature of 65 degrees, and would

produce fruit earlier, &c., yet we find they grow well at fifty degrees and take a place as a second crop, which goes a good way toward keeping down expenses.

Thus I am satisfied in my own mind that they are not only a profitable crop to grow themselves, but you can grow Carnations longer by growing them together.

There are some rules, however, that must be closely followed to insure success.

In houses running North and South the principle of setting is immaterial.

First, Not to sow seed before dates mentioned above.

Second, Never for once neglect in any way to fertilize at least every other day.

Third, Prune promptly, and never allow suckers to grow. Plants left to themselves would soon overrun every thing, for they grow more luxuriantly in a green-house than out doors.

Fourth, Stake at once as soon as planted. and remember in pruning never to leave more than three or four sets of blossoms, and give air as you would Carnations if the tomatoes were not there.

* I have had no experience raising Tomatoes in connection with bench Carnations.

I visited Mr. Swayne's houses in June, 1886, and the condition, and appearance of both Tomatoes and Carnations, seemed to fully justify all the statements made in this plainly written chapter.

I am so confident of Tomatoes being a practical and profitable addition to Carnation growing, that I design to generally grow them this season on the Carnation benches.

This chapter is strictly german to the subject matter of this treatise, and so far as I know, Mr. Swayne's article is the first that has been published on this subject. (*Ed.*)

The above old cut is of a group of three Carnations, natural size, made fourteen years ago.

Edwardsii, La Puritie (red,) and La Puritie (variegated.) It forcibly illustrates the feature of development, which so wonderfully attaches to this class of plants.

CHAPTER XXIII.

ANALYSIS OF THE CARNATION CATALOGUE AND OTHER ITEMS.

THE following Catalogue of Carnations is arranged alphabetically, and embraces all the varieties of merit of European and American origin.

The "*classes*" are separated with as much accuracy as it has been possible for me to obtain.

In each of these seven classes there are *three* natural divisions; viz: the "Old," "Scarce" and "New" Sorts.

The "Old Class" are those which are profusely introduced, and many of them are the kinds now chiefly and generally cultivated.

These are designated with the letter "O."

The SCARCE class have been before the public for two or three years, but as a rule, not yet sufficient in quantity to be grown extensively for cut flowers.

It requires from six to eight years to generally and profusely introduce a new Carnation, so that it can go on the benches by the tens of thousands.

This class is marked with a letter "S."

A few of the "New" class were offered in 1886, and others will be in 1887, and some not till the spring of 1888.

This list embraces nearly thirty varieties.

I have had the pleasure of seeing some of these plants and many of the Flowers.

They are of promising merit and a few of them extraordinarily so.

This class is marked with the letter "N."

If Jean Sisley is correct, the history of the *ever-blooming section* of Carnations does not reach back over thirty years.

Even this brief period of time has sadly obscured the origin of the first introduced varieties.

The first kinds of merit, as winter bloomers that have at all maintained themselves, were probably introduced *about* 1868.

They were La Puritie, Pres. DeGraw and Edwardsii.

Some of my correspondents have been quite firm in the opinion that they were introduced from Europe.

The weight of the testimony is that they are to the manor born.

Astoria is doubtless the first yellow variegated kind of merit.

It is not material about dates of introduction, only as a matter of accurate and interesting history.

The electrotype on page 125, was ordered executed by Chas. T. Starr, fourteen years ago.

It represents the natural size at that time, the two La Purities and Edwardsii.

This old electrotype is interesting, as showing the possibility of improvement in the size of the flowers in existing kinds.

Edwardsii has been long and continuously grown in America, in widely different localities, and under very diverse management.

These circumstances may have worked localy some change in the habit of the plant, and character of the flower.

This doubtless is the reason of its many aliases as seen in the catalogue.

Edwardsii is still a variety of some merit.

Thos. Seal, a veteran grower for the Philadelphia market, says: It is his first choice of all the whites for winter bloom.

Another Florist nnder the name of Peerless, says: It is the best white summer bloomer.

None of its various synonyms, even if they had a different origin, show essential difference in fact.

The four old kinds mentioned are certainly the parents, or grand parents of most all the American varieties now in cultivation.

They are all still cultivated to some extent and in a few instances *preferred* to all others.

Waiving the question of a decadence of vigor, it is the general opinion, the introduction of superior kinds is fast relegating them to the rear.

The description of kinds in the catalogue is very brief.

Strong adjectives and all the rhetoric of the catalogues is purposely avoided.

The novice in Carnation growing is doubtless bewildered at the relative prices of Carnation plants, as found in catalogues.

The known standard kinds are quoted the lowest.

The scarce, new, and possibly less worthy kinds are quoted the highest.

The solution is, there is an ample stock on hand of the standard sorts to propagate from.

Florists as a rule buy new varieties sparingly, because they are high priced, and often prove unmeritorious.

The Carnation plant is peculiar in that it seems to revolt at man's dictatorship over a comparison of the relative merits of the family.

The varieties one person succeeds with, another person will fail with.

It bounds a man's knowledge of its individual worth with the modest, unassuming words "*under my management.*"

This may be explained to an extent, on the grounds of short and imperfect trial tests.

Experience proves that a Carnation should not be condemned on a short trial.

Some of the new and most promising kinds speedily fail to justify expectations, while several of the most valued kinds, now grown, were cultivated for years before they vindicated their just merits.

What constitutes *long* and *short* stem Carnation flowers is very indefinite.

All the flowers can be cut with long stems at the sacrifice of a large number of unopened buds.

Many varieties have their buds in a close cluster, and full blown flowers can not be plucked with long stems, without sacrificing the whole cluster.

Other kinds bear their flowers on a peduncle, or flower stem, varying from *one* to *six* inches long.

These can be cut with a stem without destroying other buds, or at least so many other buds.

There are but few kinds but what there is some loss of buds, if cut with long stems.

The average increased price for long stem flowers is about double that for short stems.

This augmented value is supposed to be compensation for the trouble of stemming, and loss of undeveloped buds.

There are a few in the catalogue, (in my opinion) comparatively worthless; a few have not desirable colors; a few are so shy of their bloom as to be unprofitable; a few burst so badly that the petals hang down the flower stalk, while the rest are imprisoned in the calyx. Even these have their friends, and I could not expunge them from a general list.

As a matter of merited recognition I have given the names in small caps, in the list, of the person with whom the varieties originated.

On this point in some cases there have been conflicting opinions of correspondents.

And in some other cases it might be a matter of speculation as to who is entitled to the *merit*, the man (or bee) that cross-fertilized the seed, or the man that bought the seed and grew the plant.

The old question which is the mother, the hen that *laid* the egg, or the hen that *hatched* the chick?

Carnation flowers in California are prized very highly.

It is the nature of the plant in that climate to put on perennial habits.

To maintain their usual profusion of bloom, new plants must be started every year.

Dianthus Hybridus Multifloris, and Dianthus Querteri, listed in the Scotch Pink catalogue, are of German origin.

I have been unable to ascertain their parentage, but they are very dissimilar in habits to the rest of the list. They will not bear indoor treatment.

Much complaint is made by Carnation growers about damage done Carnations on benches by rats and mice.

An effective remedy is to rear a Cat in the Carnation houses.

Those who grow Carnations for cut-flowers should not overdo the matter by filling their house, or houses with a great number of varieties.

Get the *best* adapted to the locality, and keep the range of selections within the proper limits.

A *few* standard kinds are much better than *many*, for market purposes.

Leave a large list of varieties to those who propagate for the general *plant* market, which is another branch of the business

I have labored assiduously to gather all the information possible on the history of the Carnation plant.

I believe the increasing demand for this flower will make such knowledge vitally interesting in the future.

Whatever my success has been in this regard, it will be garnered data subject to verification and use by future writers. I have had nothing of this kind to assist me.

I am satisfied, with the assistance of friends, to have rescued from oblivion as much as I have, relative to this important plant.

CATALOGUE OF THE

WHITE CLASS OF CARNATIONS.

Edwardsii. (A. EDWARDS.) [O.] (Syn. Boule de Neige, Louis Zeiller, Peerless, Avalanche, Snow Ball, White Perfection, Snow White.) Vigorous habits, perfect flower, fair winter and summer bloomer.

Fisher's Early White. (FISHER.) [S.] Healthy habit, early, flower perfect, large and fringed.

Henzie's White. (HENZIE.) [O.] Fine tall grower, matured flower very large and white, rather late.

John R. Murdock. (SIMMONS.) [S.] Extra habit, large flower, good bloomer.

Jeannette. (THORPE.) [S.] Strong grower, free bloomer, firm petals, seedling of Peter Henderson.

La Puritie. (CARLE FRANCE.) [N.] Healthy branching habit, long stems, very free early bloomer.

L. L. Lamborn. (SWAYNE.) [N.] Plant dwarf, early free continuous bloomer, long stems, does not burst, parents Henderson and Snowden.

Lady Maude. (EDWARDS.) [S.] Good grower, large flowers.

Mille Carle. (CARLE, FRANCE.) [N.] Healthy branching, average size, habit free, early, very symmetrical flower.

Mary Anderson. (SIMMONS.) [S.] Standard size grower, very large flowers.

Pres. Degraw. (ZEILLER.) [O.] (Syn. Flat Bush.) Habits dwarf, stem weak, average size flower, early, fringed, one of the oldest.

Peter Henderson. (CHARLTON.) [O.] Vigorous healthy grower, medium, early, shell-like petals, flowers large, do not burst, standard sort, likes stiff soil.

Queen of Whites. (ENGLISH ORIGIN.) [O.] Standard size plant, average merit as a winter bloomer.

Quaker City. (BANYARD.) [S.] Very dwarf and compact habit, extra free bloomer, but late in February and March.

Secretary Hunt. (SIMMONS.) [S.] Compact habit, free bloomer, large flower.

Snow Ball. (BRETMYRE.) [O.] Average grower and bloomer, seedling of Degraw and much like it.

Snowden. (HENDERSON.) [O.] Dwarf branching grower, very early, extra free bloomer, average size flower, good calyx support.

Sea Foam. (HALLOCK.) [S.] Medium size grower, large flowers, double, fine texture, and fragrant.

Snow-Bound. (CONRAD.) [N.] Dwarf grower, free early bloomer.

William Swayne. (SWAYNE) [N.] Parents Snowden and Henderson, plant a healthy standard grower, early and perpetual bloomer, long stems, perfect calyx support, flowers large and very double.

CATALOGUE OF THE SCARLET CLASS OF CARNATIONS.

Alegatiere. (ALEGATIERE, FRANCE.) [N.] Dwarf and very healthy habit, large flowers on long stems, perpetual bloomer, fine shade of scarlet; acres of this sort raised for the Paris market.

B. A. Elliott. (SIMMONS.) [S.] Healthy branching grower, continuous but not a free bloomer, very large flowers, vermilion scarlet.

Brilliant. [O.] Bright scarlet, fragrant, fair grower.

Defiance. [O.] Scarlet Carnation, esteemed for outdoor flowering.

Edmons. [O.] Healthy, bright scarlet, quite fragrant.

Florence Fisher. (FISHER.) [N.] Good healthy grower, scarlet salmon, fragrant.

Fire Brand. (REID.) [O.] Gross healthy grower, moderate bloomer, deep red.

Gauntlet. [S.] Strong grower, abundant bloomer, light shade carmine.

Grenadine. (EUROPE.) [S.] Intense scarlet.

Harry Palmer. (PALMER.) [N.] Large, good grower, shell-shaped petals, fine scarlet.

John McCullough. (SIMMONS.) [S.] Good grower, large flowers, brilliant scarlet.

James Y. Murkland. (THORPE.) [S.] Flower very large, perfect shape, deeply fringed, moderately free bloomer, brilliant scarlet.

Lady Emma (STARR.) [O.] Dwarf, compact habit, flowers profusely, good scarlet.

La Purity. (red.) (ZEILLER.) [O.] Healthy, medium size grower, very free bloomer, one of the first sorts introduced.

Logan. (GRAHAM.) [N.] Good grower, flowers large, light red.

Portia. (THORPE.) [O.] (Syn. Fred. Johnson.) Vigorous constitution, flowers medium size, freely produced, intense bright scarlet.

Pres. Garfield. (BRETMYRE.) [O.] Strong compact grower, quite free, perfect flower, one of the best for pots, English vermillion.

Philadelphia. (KICHNOR.) [S.] (Syn. Metior.) Tall straight grower, branching style, very free, bright scarlet.

Robert Craig. (MC CALLAM.) [S.] Very neat branching, healthy grower, profuse bloomer. fine shade of scarlet.

Seacaucus. (HUDSON, CO., N. Y.) [O.] A light shade of carmine.

Scarlet Gem. (GRAHAM.) [O.] Dwarf vigorous habit, free flowering, rich dazzling scarlet.

Secretary Windom. (SIMMONS.) [S.] Free grower, constant bloomer, brilliant scarlet.

The Century. (STARR.) [S.] Remarkable healthy grower, medium height, full double, rich fragrance, glowing carmine, suffused with a magenta shading.

Whittier. (SIMMONS.) [S.] Bright vermillion scarlet. buds of great size, liable to burst.

Waverly. (SCOTT.) [O.] Large bright red.

Vixen. (STARR.) [O.] Large bright red.

CRIMSON CLASS OF CARNATIONS.

Anna Webb. (FISHER.) [N.] Medium size, branching habit, very free, perpetual bloomer.

Bonny Doon. (HENDERSON.) [O.] Bright magenta.

Black Knight. (THORPE.) [O.] Standard size plant, long stems, fragrant, deep crimson.

Bryant (SIMMONS.) [S.] Free bloomer, soft lake, with dark stripes.

Baltic. [O.] Dark maroon.

Brussels. (STARR.) [S.] Strong bushy style, very double, free, cherry red with broad stripes of maroon.

Clifton Fisher. (FISHER.) [N.] Very large, dark crimson.

Crimson King. (WHITE) [O.] Robust, standard height, free, deep crimson.

Col. Wilder. (THORPE.) [S.] Fine habit, free, perfect shape, large, vivid red, flaked with black.

Cardinal. (FISHER.) [S.] Strong tall habit, flowers very large, deep maroon with spots of white.

Darkness. (O.) Crimson maroon.

E. G. Hill. (THORPE.) [S.] Fine shade of scarlet, and style extra, early and free, long stems.

Fleta Fay Foster. (OBERLY.) [N.] Medium branchy, healthy, perpetual, free, never bursts, magenta suffused with violet.

Ferdinand Mangold. (SIMNONS.) [S.] Free, continuous, long stems, very large, dark red shaded with maroon.

Henrietta. [O.] Dark red.

Hugh Graham. (GRAHAM.) [N.] Good grower, flowers large, dark scarlet.

Kaizer William. (KOTELBETZ.) [S.] Violet purple, magenta shadings.

Kate. [S.] Dark flesh color, fragrant.

King of the Crimsons. (WHITE.) [O.] Dark rich shade of crimson, produced in profusion.

Louis Lenoir. (ZEILLER.) [S.] Dark maroon.

Lowell. (SIMMONS.) [S.] Rich deep purple, crimson shaded with violet, very large.

Miranda. (THORPE.) [S.] Strong grower, free bloomer, rich plum color.

Mrs. Keene. (VETCH, ENGLAND.) [N.] Very large flowers, shy bloomer.

Orient. (FISHER.) [N.] Crimson.

Othello. [S.] Good habit, free bloomer, crimson.

Purple Crown. [O.] Maroon shaded purple.

Seawan. (JEFFRYS.) [S.] Dwarf, compact, healthy, fine habit, good calyx support, deep crimson, fine for pots.

Secretary Kirkwood. (SIMMONS) [S.] Large, form good, deep brilliant crimson.

Topsy. (STARR.) [S.] Deep velvet maroon, petals like shells.

Vesuvius. (HENDERSON) [O.] (Syn. Starr.) Large flowers, dark crimson.

Whipper-In. (VETCH, ENGLAND.) [N.] Large flowers, scarlet and black.

W. W. Coles. (THORPE.) [N.] Long stems, free bloomer, very early, light scarlet, good habit.

PINK CLASS OF CARNATIONS.

American Wonder. (HIPPARD.) [S.] Dwarf bushy growth, strong long flower stems, large perfect flowers, freely produced,

Albany. [O.] Carmine pink.

Beauty. (HILL.) [O.] Rose mottled with carmine and red.

Chas. Henderson. (THORPE.) [S.] Free grower, large flowers, light carmine rose.

Chas. Summer. (BOCK.) [O.] (Syn. Bock's Seedling.) Rank habit, large, flowers finely fringed, fragrant, bright pink.

Dawn. (STARR.) [S.] Dwarf, early and profuse, deep rose centre shaded with white.

Fawn. [N.] Delicate pink.

Florence Bevis. (GRAHAM.) [N.] Good grower, large, flowers fringed, light pink.

Grace Fardon. (SIMMONS.) [S.] Vigorous grower, average size flower, tree bloomer, pure rich pink.

Grace Wilder. (TAILBY.) [S.] Good standard grower, ordinarily free, fine rose pink.

James Perkins. (SIMMONS.) [S.] Quite free habit, good size flowers, unusually fragrant, continuous bloomer, pure soft rose.

Longfellow. (SIMMONS.) [S.] Healthy and free bloomer, flowers large, soft salmon rose.

Lulu. (HENDERSON.) [S.] Light pink.

Lady Chattin. (STARR.) [S.] Parents La Puritie and Astoria, rosy carmine, striped and flaked with crimson and maroon.

Laura. (VETCH, ENGLAND.) [N.] Light salmon, very large and free.

Le Favori. (LA CONDIE, FRANCE.) [N.] A very free variety, hard to propagate.

Mrs. A. Rolker. (THORPE.) [S] Fair grower, pale flesh tint, deeply fringed.

Mrs. Mangold. (THORPE.) [S.] Fine free habit, large flowers, soft salmon.

Mrs. Garfield. (BRETMYRE.) [S.] Broad foliage, very robust, rich shade of Chinese pink.

May Queen. (THORPE.) [S.] Tall grower, large flowers, broad petals, deep pink.

Mrs. McKenzie. (HENDERSON. [S.] Rose color, finely fringed.

Mad. Chassons. (ALEGATIERE, FRANCE.) [S.] Deep rose.

Mrs. Joliff. (GEO. JOLIFF, ENGLAND.) [O.] Standard size plant, early, fair size flower, delicate flesh tint.

Petunia. (THORPE.) [S.] Large flower, rich lavender rose, mottled with white, deeply fringed.

Princess Louise. (TAILBY.) [O.] Rose pink, flowers extra large.

Rose Hill. (BALLENDOZ. [S.] (Syn. Rosedale.) Dwarf habit, very profuse bloomer, a shade darker than Grace Wilder.

Rosy Morn. (HENDERSON.) [S.] Salmon pink.

Rosalind. (THORPE.) [S.] An extra tall habit, long stems, quite free, a lively shade of pink.

Shellflower. (HENDERSON.) [O.] A beautiful shade of delicate rose.

Star of the West. [O.] Deep pink.

Springfield. (MULLER.) [O.] Light pink striped, fine grower and bloomer.

Victor. (PAGE.) [N.] (Syn. Page's Seedling.) Average size, very free.

YELLOW CLASS OF CARNATIONS.

Andalousie. (EUROPE.) [N.] Large flowers, freely produced, upright branching habit, sulphur yellow, deeply fringed, fragrant, medium early.

Bell Halladay. (EUROPE.) [S.] Quite late in blooming.

Field of Gold. (STARR.) [S.] Parents Astoria and Edwardsii, small good yellow flower, quite late, Feb. and March.

Pride of Penshurst. (EUROPE.) [N.] Stocky habit, late, a variety of great expectations.

Yellow Queen. (EUROPE.) [S.] Late bloomer.

Yellow-Variegated Class of Carnations.

Astoria. (WILLSON.) [O.] Good grower, yellow striped carmine; this is one of the oldest, if not the oldest, yellow-variegated Carnations in America, and is one of the parents of some of the finest kinds.

Astoria Bertine. [O.] Fair grower, orange yellow, mottled crimson.

American Florist. (STARR.) [N.] Very healthy grower, medium height, profuse bloomer, long stems, flowers large and full, yellow flaked carmine.

Buttercup. (STARR.) [S.] Robust grower, free bloomer, medium size plant, long stems, parents–Astoria and La Puritie, pencled deep lemon yellow, sparingly carmine.

Columbia. (THORPE.) [N.] Healthy, long stems, perfect calyx support, early, rosy salmon, dashed bright scarlet, fringed and robust.

Dolly Varden. (HENDERSON.) [O.] Vigorous habit, free bloomer, buff striped crimson and maroon.

De Fontana. [O.] Orange striped crimson.

Duke of Orange. (STARR.) [O.] Fair habit, late bloomer, productive, striped orange, edged carmine, Parents–Astoria and Edwardsii.

Emerson. (SIMMONS.) [S.] Salmon, striped vermillion.

Farragut. [S.] Carmine and yellow neatly laced, edged purple and maroon.

Fancy. (STARR.) [S.] Fine habit, scarlet shaded yellow, striped with crimson.

Glory of Venice. [O.] Orange and rose.

Ida May. (CONRAD.) [S.] Excellent habit, rich creamy yellow, marble and splashed with carmine and pink.

James B. Kidd. (SIMMONS. [S.] Branching nature, flowers large, cream colored, marked purple, vermillion.

Jean Sisley. (ALEGATIERE, FRANCE.) [N.] Vigorous, fine habit, large flowers buff, ground with scarlet stripes.

James Madison. [O.] Yellow striped, carmine.

Little Beauty. (STARR.) [S.] Rich yellow, dotted and edged with rose.

Lydia. (STARR.) [O.] Tall grower, flowers very large and double, with intense clove fragrance, orange yellow.

Mons. Gambetta. (ZEILLER.) [O.] Fair grower, orange, and yellow variegated,

Mrs. E. Hippard. (THORPE.) [S.] Dwarf habit, free, medium size flower, perfect shape, orange shaded and penciled with crimson.

Poe. (SIMMONS.) [S.] Cream specked with purple.

R. R. Parker. (STARR.) [N.] Dwarf compact habit, free, large double, peach-blow flaked with carmine.

Secretary Lincoln. (SIMMONS.) [S.] Solferino, shaded purple and violet, large, flaked with crimson.

Sun-Rise. (KICHNOR.) [S.] Good habit, free, long stems, orange.

Sun-Set. (HIPPARD.) [N.] Yellow and scarlet, fringed, strong habit, flowers very large.

Sensation. (THORPE.) [S.] Perfect form, crimson yellow, pink and white.

Venus. (STARR.) [S.] Light canary yellow, slight stripes of carmine, parents—Astoria and Edwardsii.

White-Variegated Class of Carnations.

American Banner. [N.] Striped with carmine and white, white ground, edged and spotted with crimson.

Avondale. (STARR.) [S.] Free, white, edged with purple and maroon.

A. C. Fitzpatric. (SIMMONS.) [S.] Free, branching habit, dwarf, healthy grower, pure white, and crimson-variegated.

Bayard Taylor. (STARR.) [S.] Large, white and crimson-variegated.

Clara Morris. (SIMMONS.) [S.] Model flower, pure white, edge petals margined crimson.

Chester Pride. (J. EDWARDS.) [O.] Never bursts, winter bloomer, free, white penciled rosy carmine.

Calico. (STARR.) [S.] Creamy white, terra-cotta and crimson, edged white.

Eureka. (STARR.) [S.] Dwarf, white, edged and striped peach-blow.

Fairy Princess. (THORPE.) [S.] Large, pure white, penciled with purple and crimson.

Fascination. [O.] Large, full, pure white, blotch with rosy scarlet.

Geo. Washington. (ZEILLER.) [O.] White ground, dotted cherry red.

Hinsdale. (ALLEN.) [O.] (Syn. Allen's Degraw.) White, striped with pink.

Holmes. (SIMMONS.) [S.] Free, perfect flower, pure white, sprinkled with rose.

J. J. Harrison. (SIMMONS.) [S.] (Syn. Pink of Perfection.) Vigorous, healthy habit, flower fair size, free, does not burst, fragrant, long stems, satin white, marked shaded pink.

La Excellent. (STARR.) [O.] Pure white, carmine edge.

Lillian. (STARR.) [O.] Vigorous grower, small flower, white, striped deep crimson.

La Puritie-var. (HENDERSON) [O.] Healthy, free, a sport of La Puritie [red.]

Mrs. H. C. Frick. (SIMMONS.) [S.] Unhealthy, white, slightly variegated with purple crimson.

Maude. (STARR.) [S.] Strong grower, white with slight penciling of carmine.

Margery. [O.] Strong standard grower, white, striped with vermillion.

Mary Darce. [O.] White, tinged with pink.

Mrs. W. A. Harris. (THORPE.) [S.] Good habit, large fine shape flower, fragrant.

Not Named. (SHAKEL.) [N.] White, marbled rosy pink.

Philadelphia-Var. (STARR.) [S.] Early, long stems, white, heavily edged with crimson.

Secretary McVeigh. (SIMMONS.) [S.] (Syn. Chas. J. Clark.) Large, white, shaded rose.

Secretary James. (SIMMONS.) [S.] (Syn. Mrs. Carson.) White, striped scarlet.

Secretary Blaine. (SIMMONS.) [S.] (Syn. Mrs. Carnagie.) White with rosy pink stripes, will burst.

Uncle Sam. (TEMPLE.) [N.] White, striped with light pink.

Var-La Belle. (STARR.) [S.] White, penciled rosy carmine.

W. H. Brower. [N.] Delicately penciled scarlet.

—The disease of Carnations called Brown-mould is of English origin; its first manifestation in America has been seen on the Pride of Penshurst, a variety of recent importation.

—A marked difference exists among varieties of Carnations in *promising* and *performing* their yield of bloom; some sorts remain in bud a long time, others bloom as soon as their buds are developed.

—Pips is the name given to Carnation cutttings of incipient canes; after they show a joint, they make tall unsightly plants. The *lowest healthy* side shoots of the flower stems make stocky, symmetrical plants, always branching low, but do not bloom as soon as the former.

—Mythology says the Carnation sprang from the blood of rival lovers, and the poetical language of the flower has been "Disdain."

To modern Carnations is given a symbolical language of warmer and more generous sentiments according to their color.

White — Purity.
Scarlet — Dignity.
Crimson — Ardent Love.
Pink — Acceptance.
Yellow — False, light as air.
White-Variegated — Friendship only.
Yellow-Variegated — Refusal.

—It is the nature of the roots of biennial plants the *first* season to provide within themselves a store of nourishment and all necessary *germs*, for full flowering and free fructification the *second* season. The amount of root growth, the second season, is quite limited, and the juices are not directed in cre-

ating *new* flower germs, or increasing the *store* of nourishment, but are used for the *immediate* living wants of the plant.

It is on this principle that the blooming *capacity* of a Carnation in *winter*, is determined in the field during *summer*; favorable conditions the first season settles all, and the *soil* is the largest factor, in my opinion, with this plant. Cuttings from the same bench grown through summer in improper soil will be worthless for winter bloom, while those planted in proper soil will bloom profusely.

—A flower is a transformed leafy branch. All its organs are natural green leaves, which have undergone a peculiar change. All changes in flowers are but modified forms of their tissues, their tissues being modified forms of the leaves on the parent branch.

Excessive plant nourishment, and conditions favoring its assimilation, is the key that unlocks all the mystery there is, in the unfoldment of new and better flowers.

Plethora of plant food converts green leaves into bracts, bracts into sepals, sepals into petals, petals into stamins and swells the doubleness of the corrolla. The process of this modification is from the circumference toward the pistil, the central female organ. This law is not uniform in its operations. It is the conversion of the organs of generation into petals that causes double flowers to be barren of seed, the germs of new plants.

The pistil is formed of a folded welded leaf. Natural conditions, quality and quantity of food, will in time reduce all highly improved flowers to a single, or to their natural type. The reverse is evolv-

ing now, and will continually in the future new and improved specimens in the floral world, and the ultimate limit of these transformations is beyond the conceptions of man.

EPILOGUE.

I am done. I entered the Temple of Dianthus, and the little that I learned is written here. I leave the book, for what it is worth, an offering on the Altar.

I love the Divine flower. It has been loved in the past. Its fame began in the morning of the yester-days. Three thousand years ago it shook its fragrance from *only* five petals, and Greece, the land of language and of learning, exclaimed Dio-anthos! *

It will live and grow in esteem, as long as men homage at the shrine of beauty and of fragrance.

The soul's strong affinities for this flower make it equally appropriate to the smiles of youth, or to the wrinkles of age; to the loneliness of the sick room; to seasons of pleasure, or to seasons of sorrow; to the gayties of the festal hour, or to lighten the shadows to the silent beyond.

It is enduring. Its comely symmetry makes it the sweetest "Smile of Nature;" its wide range of beauteous colors an illuminated "Letter in the Alphabet of Angels." While its weird perfume is the epitome of all mystery, and makes it a Sisyphus Flower, which mind will roll forever upward toward the Great Unknowable.

It is not haughty, but simple and genial. It is not Queenly, but plainly democratic.

In the young world's sunrise, it doubtless was a denizen of the Tropics. It has been a Pilgrim, and anchored near its Plymouth Rock. Earth's mutations made for it a home in the north. There it lives—ever-blooming as the flowers of the south, plainly grand, and defiantly beautiful. Its fragrance is of the gums and spices that are in the drowsy air of the isles of ocean, while its adorned corrolla shows the color wealth of all the zones

Various flowers have shouldered for the world's applause. The Tulip, Dahlia and Camelia have waxed and waned. The Rose now has the people's smiles. This is fame, but how unstable? It is hailed the "Queen of Flowers." "Her Majesty." "Bennet." "Bride" and "Beauty;" new born heirs of greater promise, for a time, have stayed her tottering throne, but coronets are made of smiles and exile is but a frown.

Dianthus is the coming flower. Its salvos are heard among the to-morrows. It contains imprisoned with its mystic life force the flow of wonderful evolvement. Its marvelous nature ever responds to the magic touch of the Florist's art. It is ever abreast with the progress of the ages. Thirty years ago a new and nobler race came trooping into light. Every year new specimens of greater excellence make an advance in its mighty march of grandeur; to-day fifty rain-bow petals nestle around its anthers. Its other name is Evolution.

When will these transformations of increasing beauty cease? When the Dynasty of Rosaceæ is deposed, and Caryophyllaceæ, sits, transfigured, on the Throne of Flora, as the world's first love.

*Divine Flower.

The exact size of "**SEA GULL**" that took the Silver Flagon Prize. at Madison Square Exhibition, in New York, in the fall of 1891.

CHAPTER. XXV.

ROOTING CUTTINGS.

EXPERIENCE has reduced itself to this maxim, viz: A *good* Carnation cutting is in inverse ratio to a developed peduncle, cuttings should be rooted at a temperature, so low, that it would require three weeks, or more, to do it. They can be rooted from Oct. 1st. until April 1st., and it is well there is a wide range of time, for a stock, productive of flowers, however ample, will not afford a large yield of good cuttings at any one time. If a plant or stock of plants yields a profusion of cuttings they must be correspondingly unproductive of bloom, and the cuttings will partake of this fault. Cuttings are taken *secondary* to the crop of bloom, if it is desirable to propagate more largely they must be *primary* and the plants disbudded. Cuttings before striking, or immediately afterwards, with developed flower stems, are comparatively worthless. The best cuttings are obtained from the base of the least forced plants. Cuttings should be taken chiefly in December and January. Wm. Swayne says he gets the best results when struck in March. Chetty says he obtained good results and early field bloom from Henzie, struck in October. Henderson says incalculable damage is done to Carnations by striking them in a high temperature.

Early stuck cuttings, kept growing by carrying them foward into three and four inch pots will materially advance the time of bloom, and thereby popularize Carnations as bedding plants for spring sales.

FERTILIZERS.

Further experience confirms the necessity of avoiding all manure in the field, or on the benches unless it is most

thoroughly rotted; partially decomposed manure is positively injurious to Carnations.

Lime, Ground Bone, and well rotted manure are the best fertilizers for the field, for the benches Bone and manure water. Thorp thinks the benched plants should be stimulated with manure water at the time the heaviest crops of bloom are making their drafts on the life forces of the plants.

Alfred Whittle and William Brinker, successful Carnation growers, recommend ashes from wood and burnt sods as valuable fertilizers for the benches. Mr. Brinker avers as an experience that wood ashes have the noticeable effect of intensifying the respective colors of Carnation flowers. Foreign agents, it has long been known, has marked effect upon the color of flowers, as is especially seen in the Hydrangea bloom.

FIELD SOIL FOR CARNATIONS.

should be of a clayey nature, well enriched and pulverized, with a porous sub-soil or underdrained. For the roots of Carnations to *"ramble,"* as one writer puts it, in a rich sandy soil is to induce that condition of development described under the head of "LARGE PLANTS" which above all things is to be avoided.

TEMPERATURE FOR CARNATIONS.

For continuous bloom and healthy plants on the benches from October until July, the night temperature should be about 45 degrees and the day temperature some 20 degrees higher. The Florist may be enabled to realize more out of his crop, if he can obtain the bulk of the bloom earlier in the season, or on stated occasions, when both the day and night temperature can be raised some twenty degrees, but any temperature materially higher than the ones first mentioned, will be at the expense of the season's run of bloom. It is however true that it is the nature of some varieties to revel in a temperature that would be positively injurious to other kinds.

But the artificial conditions of plant life are so easily varied, and slight variations so telling in results, that two Florists side by side and aiming at a common treatment for their respective houses would hardly reach precisely the same condition of crop, and no treatise however accurate and particular in detail, can supplement a want of exacting care and a high degree of discriminating intelligence on the part of the Florist.

ROTATING CARNATIONS.

If trouble besets a Carnation crop on ground in which they have been repeatedly grown, suspicion is aroused that a repetition of the crop on the same soil may be the cause.

This is often important to the Forist, not but there are ample lands to rotate the small area of land required for this crop, but it may not be in condition, or under his control, or quite remote from his glass.

Rotating crops is a rational and well established practice in Agriculture, and every Physiological and Chemical principle relating to plant life makes the theory and practice equally applicable to Horticulture. But the comparative small space of land required to summer grow this crop makes it possible, annually, to quite fully restore all the elements taken from the ground by the crop, if we knew what they were. Lime is believed to be one of the chief ingredients most largely exhausted by a Carnation crop, and must be artificially supplied, in case of continuous culture. Two cases are reported where Carnations have been continuously grown on the same ground on which Lime was used, for ten consecutive years without disease or apparent deterioration of the plants. The Carnation industry is comparatively new. The Author bought of the first four Carnations catalogued for sale in America, so it is not strange if there are varying theories and practices in their culture, but there can be

but *one* set of continuous conditions best suited to their health and highest floressence, to know and supply these conditions is perfect Carnation culture, hitherward an intelligent experience tends.

HEADING-IN CARNATIONS.

All the heading-in or "pruning" a Carnation plant needs is to pinch off the bud, between the thumb and fore-finger, when the stem lifts it well above the foliage. This rule applies to Carnations in all conditions whether in the cutting bench, boxes, pots, or field, if in the field it should be done with reference to the time the bloom of the plant can be utilized, it is considered, that disbudding plants in the field delays much further bloom about twenty days.

By delaying heading-in, until this time, the least damage will be done the plant, and lateral branches are sooner obtained. A Carnation plant from a proper cutting is not hasty in showing a bud, if the peduncle runs quickly up, crowned with a bud, you have a worthless plant from a bastard cutting. From the "cradle to the grave," no Carnation plant should be mutilated by cutting off its branches, pulling out the heart of the main, stem or leaf pruning, and if practiced is simply criminal plant surgery.

There are but two reasons for ever wantonly wounding the smallest leaf of a Carnation plant, viz: to induce laterals, and conserve vital force. It is the gluctin, sugar, starch, &c., elaborated by the vital chemistry of the plant and deposited in the ovules, or seed (food for embryo plants) that is exhaustive of its vital forces, it is not the petal, or corolla, or any other botanical part of the bud or flower, for they are all modified leaves of the plant and to an extent perform healthful functions in the plant's economy.

The marvellous flowering capacity of the double flowering plants of to-day is owing to their being largely unproductive

of seeds, and therefore vital force is conserved. Secondary to cut bloom, I have never been able to obtain an ounce of good seed, in a season, from twenty thousand Carnation plants.

The Carnation grower need not be frightened at the appearance of a few buds on his field plants, and that they will fritter away all their blooming energies. Henzie is being restored to confidence as a profitable blooming variety by a system of treatment first recommended by us four years ago, viz: that it should never be disbudded in the field.

Cutting off the leaves, pulling out the hearts of the stems of the small plants has precisely the same effect on the plant as cutting off a proportional quantity of their roots.

There is a perfect equilibrium in the absorbing capacity of a plant *below* the ground surface, and its exhaling capacity *above* the ground surface. The destruction of half of its lungs or exhaling organs discharges from service half of its feeding or absorbing organs.

Every Florist knows he can carry the plants from which he cuts his stock, *back* into smaller pots. A plant or tree, top pruned can be equally artificially root pruned and if it is not so done nature will do it, to preserve the balance.

Wonderful miniature fruit and forest trees are grown by the Chinese by a system of root pruning, the top geometrically proportioning its littleness to the pruned roots, so will the roots precisely proportion themselves to the pruned top.

In annuals and perennials, the damage arising from the distinction of the balance between *top* and *bottom*, is by their natures more easily repaired than their case with biennials.

The roots of biennials perform a different or an additional duty than do the roots of the other classes, viz: the storage in the system of the plants all the elements required for its full fruition the following season.

In the two first classes the stimulus of perpetuating of spiece is *immediate*, in the other *continuous*, and in the last class its hope is with the *coming season.*

The Carnation is a biennial, its life in the field is the first year of its existence, its life under glass corresponds with its second season, or winter, its intervening dormant state is dispensed with, and its life forces made to act continuously by the witchery of the Florist's art.

When it is understood how vital and laborious are the functions of the roots of a biennial the *first* season, it will be very clear how the least interference with them by top pruning must be irreparable, damaging to their best state the second season, and with Carnations that are on the benches.

LARGE PLANTS.

The floressence of all plants is in inverse ratio to the life forces being expended on a rank growth of foliage and stems. Experience now points a preference for a medium sized plant with good roots, fine form and well ripened shoots, as a model Carnation plant, which when transferred to the bench will yield the most bloom. The great desire *has* been to have *large* plants for lifting, this is changed; size is not the measure of a plant's flowering capacity. A large succulent growing Carnation in the field, if successfully transplanted will be a rampant grower on the bench, occupying the room of several medium size plants with ripened shoots. In the ratio that a Carnation has a large and watery growth of stems and leaves will it be barren of flowers. Many say their Carnations look large and healthy but do not bloom well. Snowden the most prolific bloomer commonly, is often complained of.

Thos. Seal says "a whole bed may become barren in time, by taking cuttings indiscriminately, a portion from plants

that have no flowers, such plants grow enormously, and produce many cuttings all of which will prove unproductive, productive parents produce but few cuttings, this way in a few years the whole stock will become unproductive of anything but foliage and stems."

An unnatural growth of stems and foliage is followed by a loss of power to continue the specie by seeding, and is a disease, as is an unusual deposit of fatty matter, and consequent barrenness in an animal.

EARLY LIFTING.

The best average experience of American growers is epitomized in the following words of a correspondent: "I favor lifting from the 1st. to 15th. of September and prefer dry weather for it. I find plants take better lifted in dry weather, they seem to stand more in need of the water given them when planted on benches, and wilt less than those taken from wet soil and blight less, make finer flowers and bloom longer and better." The philosophy of early lifting and from a dry soil is, that in the cool wet weather of fall Carnations make a rapid succulent growth, after this growth when planted on drained benches and subjected to a dryer and warmer atmosphere of the house, the plant must receive a greater shock than would have occurred had it been lifted before this rank fall growth had been made.

All plants lifted in early fall have better ripened shoots, and a less watery nature, the balance of exhaling and absorbing forces is less disturbed by such lifting, and if lifted from a dry soil the plants might be said to be *thirsty* and will rapidly *drink* the water given them, and the absorbing force will predominate, therefore less wilting, blasting buds, an easier transition to their new conditions, better flowers and longer life, because of less violence to the constitution of the plant.

One grower writes: "Early lifting obviates the dying of the leaves around the base of the plant, a source of annoyance with some varieties."

It would be narrow to state a specific time for lifting in the widely varied climate of America. The rule for *"early lifting"* is as distensible as the climate. It is before the life activities of the plant are *materially* increased by that cool damp weather of fall, common to all sections.

LIFTING WITHOUT EARTH

to the roots is established by experience as practical and successful. It is a wonderful labor saving innovation on old methods. Carnations should be lifted with the least possible damage to the roots, and planted quickly after being lifted, (if the dry weather system is adopted.)

It is the nature of Carnation roots to tenaciously adhere to particles of earth which is quite sufficient. This mode reduces the labor of lifting and carrying Carnations, one-half over the old "ball to the root system." And at the end of the Carnation season in turning the earth on the benches the old balls have to be picked and carried out, in handling twenty thousand plants they amounted to wagon loads. J. C. Chambers of Penna. says: "When plants have been growing in a soil of a clayish nature, special care should be taken to lift with as little dirt as possible, balls of this kind of earth will become hard on the bench, interfere with watering and damage the plant. From loamy soil I experience no advantage in retaining dirt with the roots." Brown of Michigan, and Swayne of Pennsylvania, lift carefully without balls and stand the plants in tubs in which there is water, and they are thus conveyed, or carried to the houses for replanting; when planted they should be well wet and shaded for six or eight days. The leaves of a plant do not absorb moisture

as is supposed, but shade and moisture stops exhalations by closing the stomata or mouths of exhaling vesels in the leaves. Whiting is suitable for this purpose and will shade till the first rain, or it can be made more adhesive by adding lime-water.

DEPTH OF BENCH SOIL.

The depth of bench soil now used in growing Carnations varies among growers from $2\frac{1}{2}$ to 8 inches. It should not exceed 4 inches in depth, and some critical growers of this flower say 3 inches is the best depth. All earth on the benches more than sufficient to obtain the best possible crop results is a useless handling of dirt, and weighting of benches. Advocates of deep bench soil say it saves water, and watering, and secures a more uniform root moisture.

Advocates of shallow bench earth reply Carnations, nor other plants, want a *uniform* root moisture, but a moisture alternating with dryness, if it saves water it is at the expense of the health of the plants, it is indusive of a sour and soggy condition of the earth, at which the Carnation sensitively revolts.

It is the cause of what is known as "root rot," Carnations root but little after being benched, and but little soil is required; absolute control is obtained over the degree of bench moisture, and if more *freguent* watering is required, it is an evidence the plants are actively responding to their best artificial conditions.

There is no doubt by avoiding all unnecessary bench earth secures conditions, and a course of treatment in full harmony with the *nature* of the Carnation and the evolvement of its highest floral possibilities.

GLADIOLI WITH CARNATIONS.

Carnation growers look to the cut flowers of their benches for their profits, anything that will increase the

product of their bench is a matter of interest to them. The new hybred Gladioli bulbs force well, and can be interspersed through a bed of Carnations on a middle bench, and will produce magnificent spikes of very salable flowers without visibly interfering with the Carnation crop.

HEATING CARNATION HOUSES.

The whole matter of heating by Steam or Hot Water, as to economy and covenience, has crystalized itself, with me, into this: Hot water heating is the cheapest and best up to a certain area of glass, beyond which Steam is preferable and the most economical.

The amount of glass surface that constitutes the passing point from Hot Water to Steam is not so definitely determined. W. R. Shelmire of Avondale Pa., says: "We use a water back made of inch pipe in our flues which runs double for 16 feet through the brick flue near the furnace, and connects at the other end of the house with a small tank. A coil is placed in the flue which can have as many turns as is thought best and the returns run directly from the water tank to the bottom of the water back in the flue; with this arrangement I have no inclination to change to Water or Steam. I heat houses 70 feet long, furnace at one end, perfectly, the temperature at both ends about the same."

We could name several very successful Carnation growers who use cold style flues, and with them meet all the requirements of a perfect crop of bloom.

Houses 16 to 18 feet wide and of convenient length, are decidedly the best for Carnations, and contrary to theory in proportion to the surface obtained, much more economically heated.

SHIPPING.

Neat Baskets of all sizes are now so cheaply procured, that many Carnation shippers are substituting them for

boxes. The Baskets are lined and the contents covered with firm paper, the latter snugly tied around the basket with the Florist's name on the top. It is claimed the lightness, neatness and convenience of the package secures for it greater care in transit than a box would get. If the handling conveniences of Baskets at both ends of the route is added, they are certainly a valuable substitute for boxes, except in long distances and great danger from cold.

AMATEUR CARNATION GROWERS

should obtain *early* stuck cuttings of *early* blooming kinds, and plant them out *early* in the spring, a foot apart each way, cultivate and water well, and they will begin to bloom in June. Before frost lift carefully into well drained pots, keep them cool and shaded for a week, and they will continue to bloom through the winter.

NEW CARNATIONS.

When they reach the level of their true existence are modified from the Seedling Plants for better or worse, I think more frequently for the better.

WIRE

the whole length of the bench can be neatly used in lieu of stakes, and against the rafters over side benches to prevent the buds from freezing to the glass.

BULBLETS

of the Calla can be grown to blooming size just under and along the edges of Carnation benches, very close to the pipes, without inconvenience; also some varieties of Ferns and Begonias.

CARNATION FLOWERS

can be obtained under adverse circumstances and by unnecessary methods. But the Grower that has come to stay seeks the finest results, by the neatest, least laborious and most inexpensive methods.

PRICE OF CARNATION FLOWERS.

The price of Carnation flowers has been advancing for the last three years. The maximum and minimum wholesale rates for 1889-90 has been $20 to $50 per M.

A general complaint of a fruitful crop exists this season, a larger per cent, than usual, of plants have died on the benches, and a reduced floressence of those that have lived. A very general correspondence inviting opinions as to the cause, has elicited the belief that it is owing to a wet season and insufficient underdraining in the field.

DIANTHUS.

The first Dianthus flowers were of a flesh color, hence the name "Carnation" was given them, meaning "flesh color." Were it possible to change the custom, a prettier and more proper name for both plant and flower would be Dianthus Plant, Dianthus Cuttings, Crimson, White or Pink Dianthus Flowers, etc.

LIST OF NEW CARNATIONS

Since the Spring of 1886, in addition to the list commencing on page 133.

WHITE CLASS.

King Dianthus. (CREIGHTON.) Large pure white, very full and fragrant, of great promise, (not on the market until spring of 1892.)

Puritan. (WOOD BROS.) White, early, good Bloomer of promising merit.

White Gem. (BUXTON,) Large white on long stems, fringed, a vigorous grower.

Silver Spray. (SIMMONS.) White, early and free bloomer, good size, branching habit.

The Bride. (YALBY.) White, fringed and fragrant, good habit, early and continuous bloomer.

White Coronet. (CREIGHTON.) Great substance and good habit.

Fishkill. (WOOD BROS.) White of unequaled purity, long stems.

Mrs. Fisher. (FISHER.) Large white.

Mrs. Harrison. (DORNER.) White, of good substance.

SCARLET CLASS.

Mrs. B. Harrison. (LARKIN.) Scarlet, mottled with maroon, long stems.

Lucia. [TIMME.] Type of Garfield.

Unique. [DILLON.] A sport from "Lydia flower." Large, on long stems, never bursts. Color, Dark magneta, shaded and streaked with Carmine and light Pink. Free Bloomer, strong and vigorous.

PINK CLASS.

Marggie Lamborn. An intensified "Dawn," base of petals, a deep carmine shading to a pure white.

Grace Darling. [CHAMBERS.] Good habit, long stems, early and profuse bloomer, exquisite pink color.

W. E. Roland. [CRAIG.] Pink color, profuse late bloomer.

Tidal Wave. [FISHER.] Cherry pink, good size, compact, vigorous habit.

Morning Ray. [LARKIN.] Dazzling pink, early bloomer and good habit.

Christiana. [STARR.] Pink color, darker than Wilder.

W. F. Dreer. [STARR.] Strong grower, a beautiful large carmine pink.

Fred Creighton. [CREIGHTON.] Large, does not burst, a pure pink shade as Wilder.

Peach Blossom. [CREIGHTON.] Color bright peach blossom.

Ben. Hur. (DORNER.) Blush pink.

Maiden Blush. (WOOD BROS.) White ground suffused with pink.

Iantha. (BURROW.) Of Joliff and Mangold shade, but larger and fuller.

YELLOW CLASS.

Cora Collins. (BRINKER.) Pure lemon yellow, as large and full as the Henzie, of which it is a sport, and has all its qualities.

Starlight. (HANCOCK.) Light yellow, large on long stems, free and early.

J. B. Taquier. (IMPORTED, ZINGIEBEL.) Yellow on long stems, dwarf, healthy habit.

Golden Gate. (STARR.) Deep yellow, free, full and double, a good grower.

CRIMSON CLASS.

Coronet. (CREIGHTON.) Crimson, large, free and fringed, early and continuous.

Elmont. (KIRK.) Large rich crimson, free and vigorous grower.

Pride of Kennett. (SWAYNE.) Fine form, large, rich crimson, good grower.

Lady Rachel. (LARKIN.) Dark saffroned, long stems, early and vigorous.

Miss E. L. Taplin. (BURROW.) Velvet crimson, blooms large, strong grower.

Freeman. (STARR.) Violet crimson, very sweet scented.

WHITE-VARIEGATED CLASS.

Amy. (LARKIN.) White, slightly edged with carmine, long stems, vigorous grower.

Volunteer. (KIRK.) White, striped with rose, fringed, compact grower.

YELLOW-VARIEGATED CLASS.

Eastern Queen. (WOOD BROS.) Of the "Sunrise" type, shade lighter, considered better by the originators.

Motor. (STARR.) Orange and carmine, mottled.

The following are swinging around the circle: Mrs. Keen, McKenzie, Silver Lake, Germania, Mrs. Holmes, Mable, Orient, Maud Grainger, West End, Clifton, McGowan, Geneva, Charmer, Delicata, Maggie, etc.

All imported Carnations can be looked on with distrust, they have not held their own with native kind. Such excellence is now attained with home varieties that it is hard to break the record. There is money and a name for the man that will do it.

The new Carnations without a sponsor can safely be let alone, as being without distinctive merit. The multiplicity of Carnations is confusing to both the Amateur and Professional grower. None should be regarded as meritorious, at least without the name of the originator as a guarantee for its merits. Even with this assurance second and third rate

Carnations are foisted, innocently, on the market to the detriment of purchasers.

The superiority of no new Carnation can be determined only by close and actual growing comparison with the best existing standard kinds of its class. This test not being in the reach of the originators of seedlings they are apt to innocently and vainly think that their respective bantlings are the best in the world. We have grown 200 different varieties of Carnations for comparative purposes, and receive the bloom of most of the new seedlings, and have destroyed fond hopes by returning a vastly superior bloom of the same class of an existing standard kind.

In this work we have listed about all the named Carnations that have ever appeared in America. From *three* to *six* of each of the seven classes would embrace the leading varieties now cultivated.

CHAPTER XXVI.

LIFE IN CELLS.

OUT of ten men, nine are satisfied with the *proximate* fact that a Carnation grows and blooms; the tenth asks how and why. He wants to know the *remote* cause.

It is for the "How" and "Why" man I write this chapter.

The origin and essence of *Life* has ever eluded the philosophy of the past, and modern scientists have abandoned as useless a search after this hidden mystery, and confine themselves to studying the phenomena of Life.

There is no spontaniety in Life, it is always dependent on antecedent Life, and sprang from a common original germ, and its existence is coeval with the creative fiat. All Life is related, and its essence is the same, whether found in the simplest and weakest vegetable form, or in the highest and most complex animal organisms, its structural range is from the mould on an old shoe, to the brain of a god-like Webster.

Life admits of no evolution, it is as perfect in the protoplasm as in the highest concrete, but its methods are to evolve the most perfect complex structural form, out of the simplest cells.

It is an attribute of Life to ever strive, in vegetable and animal organizations to reach the composite and the perfect by the gateway of the simple and the plain. Life is the co-relative of Death, two mighty forces ever playing a startling drama, with the globe's surface for a theatre.

Life building, organizing and combining elements: Death seeking to destroy, disorganize and dissolve them.

In these contests Life yields first its weakest structures, and retreating to its strongest organisms, survives in the finest to live and strongest to beget.

It is impossible to develop an embryo plant in a seed without the conduct of the pollen or male element, or propagate Life in any of its multitudinous forms of existence without the correlation of sexes.

When an ovule, or unripened seed is fertilized, a new cell is formed in it of spherical shape, unless modified by lateral pressure.

It is about the one thousandth of an inch in diameter and filled with protoplasm, a protean compound, the walls of the cell is a corbo-hydrate.

The male and female forces meet on the stigma of the flower, which conveys through its filaments to this cell in the seed the marvelous in effects as fecundation.

Life's first home in the new plant is in this primal microscopic cell. This cell is an embryo plant of itself containing the forces of *nutrition*, *growth* and *reproduction*.

Moisture and warmth are essential to germination, which is the growth of that cell in that seed, the seed lobes swell by the absorption of moisture and the sugar and dextrine of which they are composed is dissolved by the water into liquid nourishment for the cell, this food entering the cell by transfusion through its permeable walls.

This prime cell, instinct with Life, thus enforced with food, is enabled to start new cells outside of, but adhering to its walls, it reproduces by imparting to each new cell thus formed the power to vivify each other new cell having birth adjacent to these walls, and the growth of the embryo plant is the result of the multiplication of that primitive cell, and

the rapid geometrical increase of cells, each animated with the occult essence of reproductive Life, is the method of a plant's unfoldment.

The aggregation of cells forms cellular tissue, as is found in the pulpy portions of the leaf and soft parts of the plant.

The woody part of a plant was primarily cellular tissue, but its need of a stiffening support, compressed the cell walls against each other and they hardened into wood from a diminished flow of sap.

The human mind can form no conception of Life only through its manifestations in vegetable and animal economies. It can be known only as the presiding genus of organisms; the divinity of structures, beyond its phenomena human inquiry can never reach.

It is a law of Life for primitive cell growth to first outline the organ most concerned in the structure's existence.

In a plant this is the leaf, the apparent complex organs of an adult plant are but modifications of this primal mould, the roots, stem, calyx, petals, stamens and pestils are but differentiated leaves.

Superficially a plant is a complex organism, profoundly, it is very simple.

Cell births are most active in the parts of the plant concerned in the perpetuation of its Life, the radix and plumile are the first to lengthen in germination and capilliary tubes for sap circulation through them are formed by the breaking down of intervening cell walls.

Until the plant can draw crude sap from the earth, and elaborate it, with its leaves, it is fed with the digested food in the cotyledons, stored there by the supreme effort of the parent plant to bridge the chasm between, what to it, is the hither and thither world.

Life is in the cells and its law is through these units.

A law of Life is structural betterment, and when a plane of betterment is reached, to maintain it through the law of *like* begetments.

Life springing from primal germ has a *common* relationship, notwithstanding its present multiplications, and seemingly diverse manifestations.

All *varieties* in the animal and vegetable kingdoms, are but different planes of organized progress, order, genera and classes are only different *degrees* of plant divelopment, which may become so different and fixed that they will not even cross with each other.

Life cells are ever multiplying in the protoplasm of the world's womb, and starting through the eternities on their unrolling race. The Carnation as a product of the immeasurable past, its strain of Life after billions of years and billions of structural improvements may perfect a nerve home for an intelligence, *ascent* is the law, but *descent* will occur with unfavorable environments.

Through countless ages Life has been multiplying organs and perfecting tissues, when successive planes of excellence have been reached there has followed the phenomena of growth, reproduction, sensibility, will, memory and wisdom.

The highest known structural perfectibility is the human brain, though this wondrous organism a new *entity* is made manifest.

It has taken ages of Life effort to evolve the brain, its cell structure comprises the gathered betterments of all cycles of time, it is monumentally majestic as the present culmination of God's grand method of physical unfoldment, through this structure the Soul phenomena is studied. It is there enthroned, striving for an eden-felicity, aspiring to immortality and grasping in its sweep of thought the universe of matter and of mind.

Life and Soul are distinct *entities*, each as perfect at creations, dawn as they are to day, but the measure of their manifestations is in the ratio of the perfectibility of the *structure;* for untold ages of the world's being, the *latter* was so *low* that Soul was not manifest at all. Structural perfection will continue in the mighty future to *thin* the partition between this and the other world, until confines are broken down and the dividing waters are ever shadowed by going and "returning sails."

A plant absorbs and exhales and through these processes growth by cells is evolved.

All plants absorb food from the earth in liquid form, the iron, sulphur, sodium, lime, etc, found in the plant are held in solution in the water that comes in contact with its roots, the ash or inorganic parts of a plant is from 1 to 8 per cent of its weight, while the volatile or organic parts amount to from 92 to 99 per cent.

A vegetable burned resolves itself into air excepting its ash, showing it is chiefly composed of compounds of oxygen, hydrogen, carbon and nitrogen.

The crude alimentary elements are carried from the roots, through the stem of the plant by capilliary tubes, or cell transfusion, to the leaves to be elaborated by these organs and adapted to cell growth.

The leaf of a plant consists of a skeleton or woody frame work to maintain expanse of surface, intervening is a soft cellular tissue, on the cuticle, of which there are innumerable stomata, or mouths, which correspond to the opening to the lungs of an animal. It is estimated that the number of stomata is 30,000 to a square inch of leaf surface.

Through these mouths an immense quantity of watery vapor and gases are exhaled, carbonic acid gas of the air

enters through these openings, and is decomposed by chloryphie or leaf green, and the carbon fixed in the structure and the oxygen set free and exhaled, this process is the reverse of what takes place in animals; with them oxygen is appropriated by the lungs and carbonic acid gas set free.

A man requires 250 square feet of air per hour, to furnish him a supply of oxygen, a plant a proportionate amount to supply it with carbonic acid gas.

The air cells in the lungs of a man, over the walls of which his blood is distributed for aireation, forms a superficial area of 1400 square feet, while the juices or sap of a plant is spread over the walls of cells, fifty times greater than the apparent leaf surface.

Sunlight opens the stomata or pores in the leaf of a plant, darkness and moisture closes them, warmth and darkness promotes evaporation, while cold and moisture check it.

Leaves never absorb water, but water sprinkled over a flagging plant closes the stomata, and stops evaporation and the plant revives by its system being filled with sap absorbed by the roots, so, darkness closes these doors, and in the morning plants are bright and tinged with juices; darkness is fatal to the formation of the green color, this chloryphie in the cuticle of the leaf discharges an important function in fixing carbon, and it requires sun light to do it, artificial light has no effect.

A plant has no heart to pump a circulation through its system, the transmission of juices throughout its economy is effected by chemical and mechanical forces independent, *directly*, of Life.

The evaporation of sap from the leaf surface in proportion as the exhaustion of the air behind the circulation if perfect it represents a draining force from the roots of fifteen

pounds to the square inch. Capillary attraction uses flues or ascend small tubes independent of an atmospheric pressure. Endosmoses and exosmoses transfers fluids from one sack or cell to another cell or sack, through their permeable walls and equalizes the density of the contents of all the cells into a homogenous constancy.

It is a law of Life to divert active cell growth to repair a creation or fortify against dissolution. A Carnation cutting (or any other cutting) embeds hundreds of cells, each pervaded with Life, the cutting is planted in wet *sand* to hold it upright, and retain moisture and is free from damaging impurities. The cutting is shaded and sprayed, to close the stomata, and stop evaporation, the cut surface is soon covered with caloused cells, which build one on the end of the other, and are thus rapidly elongated into roots.

When growth is reached in an annual or biennial plant Life begins to feel impending death, cell growth becomes active to continue specie, and is directed to floressence and seeding.

The abortive efforts of double flowers to vitalize seed increases venereal activities and multiplies a succession of bloom.

Health in an animal is physical unconsciousness, in a plant it is the active correlation of Life and nature's forces.

Some of nature's forces are as follows:

It is heat and warmth that awake the dormant life in a seed, it is warmth that converts, and water that dissolves the sugar and gluten in the cottynons of Life's first food. Heat, attraction and transfusion circulate Life's juices.

Warmth and light stir Life's pulses to activity. Darkness and moisture quiet them to rest.

Air elaborates Life's blood. Chemical laws decompose carbonic acid gas and fixes the carbon in the plant and eliminates the oxygen.

Nature dissolves the minerals in water, heat turns that water into vapor, and lime, iron iodine etc, is lodged as sedamentary bones in the plant's system.

Dryness flattens the cells into a woody support for the plant.

Bees vitalize the ovules by dusting the stigma with pollen from the anthers.

Sunlight hues the petals and paints the leaves.

So in the economy of a plant, Life performs but an essential little, but its health is the active and natural response of these two forces.

Benches start at the nodes, or joints, at which points circulation by cell transfusion must be rapid and confused from diverging currents, this complexity of inter cell communion differntly compounds the chemical sensitizing elements of the petals of the flower of the branch, and the sun will paint another color from the flower of the lenial parent stem. When this branch is propagated from, and the color becomes permanent, it is called a "SPORT."

The petals of all plants are *pure white* when they receive their sensitizing bath of nitrates, in the dark closet of the calyx, which at the proper *moment* opens its valves and exposes them to the camera of the sun, and they are *instantly* colored. Shaded, flaked, or penciled as life's forces have distributed and combined in them. the sensitive chemical agents to respond to mystic sunlight.

When plant life buds a love ditty, nature photographs a flower.

This inquiry into some of the phenomena of Life has been on a line of vegetable organization of which the Carnation is a type. The Carnation is a *biennial*, which signifies its natural Life embraces *two* seasons with an intervening period of winter rest.

Annuals, *Biennials* and *Perennials* are convertable plant characters by climatic influences.

When the character of a *Biennial* is well defined and unmodified by manipulation, Life in it makes no effort to propagate itself the first season, but Life's forces are almost intelligently at work for this end, the second season, its labors are to ripen and mature a structural organization to withstand the low temperature of winter and fully prepare it for the responsibilities of paternity, this is chiefly done by storing its cellular system and interstitial places with all the food elements, in a concentrated form, for fructification, when its winter is over.

An hibernating animal, before its winter sleep, grows enormously fat by the deposit of surplus adipose matter in its cellular tissue, which is taken up by a system of absorbing vessels to meet the needs of the animal, and it comes out poor in the spring.

A Biennial is a hibernating plant, its cells are filled (in season) with starch, sugar dextrine, gluten, etc, in a solidified form before its dormant period. and when possessed of *firmness* thus given, it is said to be a "ripened plant." This surplus nutriment is gradually dissolved by the watery circulation of the plant as its needs require, and is the chief support of floressence in Carnations on the benches.

A high temperature in a Carnation house increases evaporation from the leaves and hastens the circulation, and this store of nutriment is more quickly dissolved and consumed, and such plants fail in floressence sooner in the season than if they had been subjected to a lower temperature.

A watery growth in a Carnation dissolves and diverts cell deposit to growth, hence a succulent Carnation plant goes into winter quarters without this reserve food force for flowers, and is comparatively worthless.

Biennials excel annuals or perennials in profusion of bloom and the doubleness of their corollas.

A Carnation plant that yields 100 blooms of 50 petals, each averaging ½ inch of surface, will cell weave in a single season, sixteen square feet of petal canvas, all perfumed and sensitized by Life's photogrophy, and ready to be painted by nature's Raphael, with sunbeams from his brush,

Some mysterious features relating to cultivating the Carnation is explained by its Biennial character.

A Carnation plant can be lifted in the fall, full of buds, without earth to the roots, and if treated properly will not flag or even blast its buds, while with favoring conditions and all skill a *perennial* rose cannot be so lifted without dropping its foliage and sulking for a couple of months, nor can *annuals* be successfully lifted under the same conditions.

It is because the Carnation is a biennial, the life's labor of the plant, for the year is about over, its duties are chiefly performed, life's activities are lessening and the coma of its winter is fast coming on, its system is a store house filled with all the rich and elaborated materials necessary to fructify its seed and propagate its species the following season.

A man lives and yearns for immortality, a plant grows and blooms to shun oblivion; this is the only *end* and *aim* of any plant's existence.

A flower is the heat of a plant's passion, it paints its colors and distills its nectar to cajole the Bees to revelry. and dust its stigma with the pollen of love, that it may beget new Life, and live *again* in vital seeds. To fructify, is to enact creation's wonder; it rounds the cycle of a plant's existence, and the flower dies to a sensuous melody intoned by humming wings.

Some *believe* plant Life in its home of cells, can feel a rudimentary thrill of pleasure, *"that it enjoys the air it breathes"* and the *"meanest insect dies familiar with the sense of grief."*

A Carnation will sustain itself in two inches of bench earth and yield grand floral results, it is so, chiefly because it is a biennial, the wealth of its being was gathered, the first season of its existence, the heavy duties of its roots have been performed, they do not further grow, nor need much soil, little is left for them to do but to drink the nourishing wine of plant life and sustain a circulation electric with amarous activities.

It has pigments for colors, gums for odors, corollas for canvass, and magic sunlight for pencils; its system is a workshop, its Life an Angelo, mixing perfumes and painting glories.

CHAPTER XXVII.

THE NATIONAL FLOWER.

ALL Nationalities have their Divinities of Sentiment, their Flags, their Flowers and National Anthems; dumb Deities but whose pantomimic oratory stir the pulse like the blast of a bugle, and make the air electric with patriotic feeling.

America has her Starry Banner, Soaring Eagle, National Hymn, but has not yet chosen her Symbol Flower.

This Flower should be comparatively hardy, of easy cultivation, of lasting qualities when cut, and easily produced and acquired in all parts of the country of which it is emblematic. It should be a Flower whose fragrance and grace of form would gratify the *highest* taste, to awaken *deepest* sentiments of love for native land and home.

It should be a Flower suited to general decoration and to personal adornment, and the varieties of which would afford different pronounced colors, that political parties, processions, societies, delegations and clubs might be easily distinguished by the chosen color of their *Boutonieres.*

It should be a Flower that could be readily and profusely obtained on all National or State occasions, or whenever it was desirable to suggest the sentiments of Patriotism.

It should be a Flower reverential in name and democratic in its associations with the past, and one that reaches its grandest unfoldments in the land that selects it as a Symbol.

It should be a Flower whose range of colors would weave into expressive emblems of a people patriotism, and of their joys, or sorrows.

In the wide range of Floral Candidates, none has been suggested that will compare with the Flowers of the Dianthus genera of plants, in possessing these qualifications.

Dianthus Barbatus, or Sweet William, is a perennial, crowned with a flat top cluster of flowers of various colors.

Dianthus Plumaris, Pheasant eye Pink, Bunch Pink, Cushion Pink, &c., is a hardy perennial, blooming early in the season, flowers pink and white; single and double.

Dianthus Chinesus, is a biennial, but flowers the first season from seed, affording double and single flowers of a variety of colors. D. Heddiwiggi, D. Lancinatus, D. Diadematus, D. Quertii, Florist's Pinks, Picotee Pinks and Scotch Pinks are sports of the two foregoing kinds.

Dianthus Caryophyllus. or clove scented Pink, is the parent of the grand Carnation of to-day.

Here are annuals, biennials and perennials of easy propagation by seed or division of roots, yielding their bloom from the Atlantic to the Pacific, from the Lakes to the Gulf and universally esteemed by the American people.

The Carnation Pink is the typical flower of the class to symbolize a Nation's Sentiments. Dianthus is derived from the Greek word *Dio*, (divine;) *anthus*, (flower:) its name associates it with a form of Government that approaches nearest to the divine ideal. Dianthus in History is coeval with the first efforts for free government in Greece. Mythology says Dianthus sprang from the blood of rival lovers. Jeane Sisley says the matchless specie of Carnations of today originated with Allegatiere about the close of our civil war. Practical license might almost permit us to say they sprang from the blood of rival brothers. Carnations

are practically the manor born, no imported plant lives in America only long enough to prove its inferiority to native kinds.

Joliff whose paternity is doubted, is excelled by Mrs. Mangold; none of the imported yellows compare with Buttercup. We have sent Carnation plants to Lyons, France, where Sisley says they originated. America is the climatic home of the Carnation as England is of the Pansy. Referring to pages 4 and 160 of this work, electrotypes taken from life, will show the wonderful evolvement of this flower, in twenty years under the fostering influence of American environments. It is a flower that has seven classes of colors, White, Pink, Scarlet, Crimson, Yellow, Yellow-Variegated and White-Variegated.

It is of the most lasting nature when cut, and whose size, form, and wealth of colors marvellously adapts it to personal adornment, civic decorations, or martial displays, and by its aggregation the most expressive designs can be made illustrative of a people's joy or of their sorrow.

It is the Floral cosmopolite of the Republic, obtainable in large quantities every day in the year. Hundreds of acres of glass are devoted to raising this flower in mid-winter to gratify the people's adoration for it. It is tacitly the National flower today, it has been elected by a people's love, and is waiting to be crowned as the Symbol of a people's feeling.

In the days of Leonidas, the Washington of Greece, Dianthus had but five petals; it has kept pace with the tread of free Government, now within the union of its unbroken Calyx more than forty loyal flower-leaves of state are happy around their federal anthers. A friend of mine visiting Palestine, brought me a Cyclamen bulb from Jerusalem, a little earth from Calvary, and a phial of water from Jordan,

as the bulb grew how marvellously *near* did it bring the memories of the Son of Mary.

Mind is moved by the simplest agencies. An old Flag was lowered at Fort Sumpter and with the lightning flash of thought, there rolled on the sea of human mind a wave of passion and of patriotism that broke among a million graves.

The apotheoses of Dianthus as the National Flower, well shroud it with the romance of symbolism. Its form and color will possess the power as no other flower would to stir in the mind strong emotions of love for native land, while the sorcery of its perfume will relight dim visions of the loyal past that lingers in the weird twilight of memory.

It will be the embodiment of the spirits of '76, and grown in the soil gathered from the graves of Patriots and the battlefields for Liberty.

Its corolla will be an illuminied metaphor of the 4th. of July, glowing with rainbow promises of the rights of man and freighted with the sacred memories of Mt. Vernon; its form will be a living censer swinging its perfume around the Altars of a Liberty born at Yorktown, and a Union Saved at Appomattox.

CHAPTER XXVIII.

CAUSE AND CURE OF THE VERSATILE HABITS OF CARNATIONS.

VERSATILE HABITS.

Classes, Orders, Genera and Species, of the Botanies are but different planes of plant development. Species may be slightly varied by cultivation, but their distinctive features will not be wholly lost.

Races, varieties, and variations, are differences which exist in species. Races are *striking* differences in a species, and may be propagated by seed. Varieties are a less important distinction than Races and can only be continued by cuttings. Variations are still of a slighter difference occasioned by heredity, climate, soil, moisture, etc.

Occasionally a new and an advanced specimen of plant life steps to the front of the old ranks and becomes the parent of a new species.

Alegatiere nearly forty years ago by hybridization created a new species of carnation possessing qualities differing from either of its parents. This species was a new coinage, fresh from the mint, bearing the devise of a new being, with the mark of biennialism impressed upon its nature.

It was born amid the rigors common to the fortieth degree of north latitude, and possessed comparatively a hardy nature, profuse blooming habit, a range of colors, and a fragrance of corolla, scarcely equalled by any flower that blooms on earth.

After forty years of existence amid unnatural environments and the artificial manipulations of man; this new species of plants has become versatile in its habits, and its culture variable and uncertain.

Some varieties will do well for a time and then fail in the same hands. Some seasons certain kinds will bloom

early and profusely, then flower late and sparsely. Nine growers will fail with Buttercup and the tenth man will succeed to perfection; a particular kind in one grower's hands flowers continually; in another grower's charge it will bloom in crops. Edwardsii and De Graw are still esteemed valuable sorts by some good growers, while with many they are abandoned as worthless; a few have given up the culture of carnations, being unable to further succeed with them. A correspondent in the "American Florist" says, Milander and Stilow, are neighboring florists, growing cut flowers at Niles Center, for the Chicago market. Milander grows Henzie to perfection, while Stilow cannot grow it with success, and Stilow grows Garfield well, and Milander cannot. Correspondents in Floral Journals have become feelingly animated and sarcastic in affirming and denying the merits and demerits of the same variety.

Carnation plants may be diseased, or inherently and constitutionally weak, cuttings taken from such parents, by heredity, will partake of the nature of the parents, but this is not versatility. There are plenty of varieties of unquestioned health and vital stamina.

The Ben Davis apple flourishes in Kansas, Missouri and Southern Illinois; the Baldwin in Michigan, Northern New York and Ohio. This is not versatility of this species of fruit, but the two kinds of apples are adapted by nature to the degrees of mean annual temperature of the two latitudes.

It is the nature of Snowden, as treated, to bloom in August, of Quaker City to bloom on the bench in April, for Eureka and Field of Gold to bloom late and give but a single crop of flowers, for sea shell to bloom in the field and almost refuse to do so under glass; these are varieties of species so decreed by nature the moment the seed from which they sprung were vitalized, and are not versatilities.

The distinction should be clearly kept in mind that varieties of species with any inherent natural peculiarity they may possess are in no sense a "versatility" of that species.

There are late and early, red and yellow, long and flat shaped apples, these are varieties of the species.

There are early and late, red and white, long and short stemmed carnations, these are varieties and not versatilities of the species; but in the natural play of the fructifying forces, within the boundry of the race, the limit toward annualism was touch in Snowden and perennialism in Henzie.

THE CAUSE OF VERSATILE HABITS.

The only end and aim of any plant existence is to perpetuate and multiply itself. Annuals do this in a single vegetating season and die; Biennials accomplish this result in two growing seasons, with an intervening winter. Perennials are slow in the line of reproduction, and many years elapse before they fill the purpose of their creation. Biennials doubtless were once perennials, and forced by the worlds geological changes to perform the object of their life in a lessened period of time, and unable to reach it as an annual;they adapted themselves to the climate conditions of the Temperate Zone and crowded the effort of years into two seasons Biennials have the simplified organs and functions of an hibernating animal, to all intents and purposes biennials are hibernating plants. An hibernating animal fills its cellular tissue with fat; an elaborated and condensed nourishment for its winter food, which is slowly consumed during its torpid life.

Biennial plants act on precisely the same principle. In addition to their growth they store their cells and interstitial spaces of stem, roots and leaves,with rich protean compounds, to perfect their bloom and mature their seed the following season. So complete and full is this supply that little is required of life's function thereafter but a condition of health, and a watery circulation to dissolve and distribute through their systems this stored and concentrated plant food. A biennial cabbage, if its roots are cut off and the stalk set in water in the spring, will bloom and mature seed from the elements stored in the stalk the previous season. If an hibernating animal, after its system is filled with fat, winter food, was transported to a winterless climate; the supply of fat would be exhausted in the continued exercises of life, and the animal would sport its hibernating character into one of perennial activity.

A biennial carnation, after its system is stored with condensed protean food to carry it through a sluggish winter life and active after fructifying season, is transported from the field to a winterless greenhouse; its life forces continue active, even quickened by the stimulus of the heat and moisture. It expends its garnered nutriment in a profuse floresence and dies at the close of biennial life, or sports its character into a flowerless perennial.

H. Vick, an energetic and an experimenting florist of this city, took Henzie's cuttings, treated them as usual, lifted and benched in the fall. They afforded the usual winter crop of bloom, Vick thought he would carry the large bench of plants through the following summer and winter, and it was treated to that end. The plants looked healthy and vigorous, and gave much promise all the time, but few flowers any of the time; they were thrown out in the spring perfect specimens of health, and a notable instance of a winterless greenhouse transmuting a florescent biennial into a flowerless perennial.

Annuals, Biennials,and Perennials,are convertable plant characters. Plants have belts, zones and isothermal lines which afford them their natural environments, and within which their characters are firmly fixed; but plants taken north or south of their climatic home, or artificially conditioned at home, readily sport their character; adapting themselves to their new surroundings, if taken south of their natural zone, biennials sport into perennials. The annual Nasturtion of the north is a perennial shrub in South America. Biennials moved north run into annuals, in remote artic lands they are so intensely annual that they germinate, grow and perfect seed in six weeks; there being eleven month of wintry night between the vegetating seasons.

Carnations along and north of the thirty-ninth degree of north latitude in Europe and America are biennials.

The following propositions cannot be seriously disputed. Plants moved north or south of their natural habitations sport their true type of character.

The type of change of a biennial if moved south, is into that of a perennial; such a change is characterized by vigor of growth and general loss of floresence.

Greenhouse treatment of a biennial is in effect the same on it, as a removal of it south of its native zone.

The decrease of the floresence of a biennial is in the ratio of completeness of the transformation of its character into a perennial.

The value of carnations depends on maintaining for them their true biennial type of character. A cause most frequently assigned for the versatile habits of carnations is that they run out, and give different results in different stages of their decadence. That they become often comparatively worthless is true, but another cause must be discovered than age, through the imaginary devitalizing process of propagation by cuttings.

Peter Henderson held that "there is no degeneracy of life force in continual propagation by cuttings." There may be by grafting; for then there is a conflict of dissimilar life currents in varieties.

All fluctuation in crops of carnation bloom results from a warped or deflected character of the plant. Carnation plants with their true character well maintained do not degenerate in vigor, size or quantity of flowers, but improve in all these respects. Growers of seedlings know that often several years elapse before they reach the level of their best estate, and the change is mostly in the direction of improvement. A few of the standard sorts cultivated today were years in maturing qualities that forced them to the front.

Mr. F. Dorner, in his address on carnations at the Toronto Convention (1891), deplores the versatility of carnation and alleges the cause to be "the perpetuity of growth and bloom through cuttings, and the cure; to grow all plants from seed, for the life of a carnation is but six years, and seedlings will produce twice as many flowers as the old kinds."

As to the age and usefulness of carnation plants, and their floresence as compared with seedlings, Mr. D's statements are true if the plants have transformed their character; but not so, if they have maintained their true biennial type. From a wholesale list of carnations issued, 1892, containing seventy varieties, the cream of the kinds now cultivated; as near as I could estimate, their ages were five, ten, fifteen and twenty years, and about one-fourth in each

class. Nothing but an increased size of flower, and floresence could keep a twenty year old carnation contesting supremacy with the grand new seedlings of today.

Degeneracy means loss of vigor, decay. No such a condition exists in carnation plants that have become worthless through a modified type of character; on the contrary they are marvelous specimens of vigor and luxuriant growth, they have lost their flowering habit and gained growing stamina.

Thomas Seal, a close observer and a veteran ex-grower says, "a whole bed of carnations may become barren in time by taking cuttings indiscriminately, a portion from plants that have no flowers, such plants grow enormously and produce many cuttings, all of which will prove unproductive; while productive parents produce but few cuttings. In this way a whole stock will in a few years become unproductive of anything but foliage and stems."

Edwardsii and De Graw are the grandparents of all the carnations in America. For the increase in the size of flowers that twenty years of cultural improvement has wrought in these kinds; see the first electro type of carnation flowers on this continent, life size, on page 125, and compare with the fine florwers these kinds produce today. The pure biennial type of character of these old kinds has been well maintained in the hands of a few good growers, so the cause of versatility does not arise from age, or degeneracy through continual propagation by cuttings.

The continuity of life is the same in a seedling as in a cutting, there is even more degeneracy in the former than in the latter. The law of hereditary weakness asserts itself stronger in animal and vegetable coition and conception, than in any other act; not more than one seedling in five hundred has equal merit with its parents and not one in a thousand superior merit. Out of all the seedlings ever raised in America not over two hundred have distinctive merit.

New life, fresh vigor and great floresence does not exclusively attach to seedlings. Carnations may perennialize and lose their character to flower, freely but never lose except by disease, life vigor.

Plants seed and produce the best progeny when surrounded by their truest natural conditions. The seed of a true biennial carnation,—others will not seed—will produce a plant of pure natural type. From this fact springs the idea they that possess fresh vigor.

Nature never adopts a degenerating process in the continuance of species; but writes Excelsior on every arch that spans the world of life. The Zoophyte Kingdom, and all unicellular life, is continued by division of self.

In the ratio that carnation plants are of a large and succulent growth will they be barren of flowers, and this is just the ratio of their convertion into perennials. If their true biennial type of character is well maintained, they become more florescent, and evolve larger flowers, by proper culture.

Mr. Dorner said, "seedling plants about which I was in doubt as to throw away, on furthur testing came out on top." Thus progress attaches after plant development, and does not all center in the abstract act of fecundation.

The law of development is stamped by nature on the character of carnations, and exercises its force on old varieties as well as new seedlings.

By reason of unnatural green house methods, carnations are continually oscillating between inducing and resisting forces,—for and against—true and false types of character. Their parents were perennials and their susceptability is naturally great to any influence that would drift them toward perennialism.

At the Buffalo Convention of the American Carnation Society, Feb. 1892, E. Swayne said, that he would like to have it explained why several thousand Snowdens that he had refused to bloom, grew extravagantly. Mr. Scott said he had a similar experience, his plants became bushy trees with scarcely a single flower on them.

The plants in question had simply sported their biennial plant character; under green house methods they had perennilized. Flowers, seed, procreation, death, are all ignored by a biennial when it clothes itself in the vestments of perpetual life.

The law governing these plants Goethe has enunciated as controling life in organisms, endorsed by Darwin; viz:,

"In order to expend on one side, nature has to economize on the other side."

Fruit and flowers gain in size and quality, for this expense nature saves her force; by blasting their seed. In a cow that gives much milk; for this, nature economizes by refusing to deposit fat.

In carnations plants of preternatural growth and vigor, nature frugally stops the costly expense of bloom.

There is but little versatility in the growth or life forces of carnation plants; it is their *reproductive* nature, that is so susceptable to the slight maligna influences, that is complained of.

GOETHE'S LAW.

"It was Goethe whose inspired genius first lighted upon the bottom fact of botany, namely; that each plant has but two parts—leaf and stem. The reproductive portions—pistil, petal, stigma, calyx and corolla—are only modified leaves. The flower is only a leaf modified for reproductive purposes."

In the world of life Nature never creates new organs,but adapts old ones to new necessities. The first step Nature takes to convert a biennial carnation into a perennial is to stop modifying green leaves into the botanical parts of flowers. This done, the plant takes on perpetual life, with little necessity to bloom, or reproduce its species. Plants that live the longest beget the least; the giant oak that lives centuries annually drops but few small acorns.

There are two controling activities in every plant and animal; viz: "to live" and "to beget;" to live that they may beget. These two forces are based upon the reproductive germ cells and the adventitious cells in the organism. In the equipoise of these two forces there is perfect health. The dominancy of the life force is at the expense of the power to beget. All animals that are fleshy through excess of life activities are passionateless and barren. All carnation plants that excell in luxuriant foliage are barren of flowers; while plants productive of flowers are correspondingly barren of leaves; for they have been modified into pistils, petals, stigmas, etc. Slight causes are sufficient to arrest the modification of leaves. The latter stages of a carnation's transformation of character is

easily detected by the eye, the early stages much less so, but ranges from the interruption of the production of a single flower to absolute barrenness. Under all circumstances the redundency of leaves is in the inverse ratio to the productiveness of bloom.

The Eden fiend that beguiles carnations from their high estate with the promise of perennial life does it thro' excess of heat, rich soil, and moisture.

Goethe's law is universal, and applies to plants in every zone. Any unnatural condition, or disturbance of the balance of life's forces is adequate to arrest the transition of leaves into flowers. Carnations surrounded by false environments must be very sensitive to scores of small and unnoticed influences, rendering them capricious in their habits. It is those unseen causes that has shrouded their versatility in such mysterious wonderment.

The Botanical department of Cornell University has tested the cultivation of plants and flowers under the influence of the electric light.

The first effect was the enormous increased rate of growth in stems and foliage; but when it came to seed, fruit and flowers the matter was very different. The plants that grew by daylight were away ahead in all the attributes of virility, and in every instance the reproductive powers of the plants were strongly and prejudically affected; flowers, fruit and seed were all sacrificed to mere foliage and rapidity of increase of general size.

To secure uniform results in growing carnations, the well established laws of plant life must be regarded, viz.:

"Artificial conditions should conform as near as possible to natural environments."

"The highest possibility in plant unfoldment is supplemental, and must be made along the line of character nature stamped upon the plant."

If it is natural for a plant, demanding for its best development a mean annual temperature of fifty degrees, to profusely modify its leaves into flowers; it must be unnatural for it to do the same thing when subjected to a mean annual temperature of 75 degrees.

Chas. Starr, whose name will ever be familiarly associated with the early history of carnation growing in America, wrote to me a few days before the fatal illness which terminated his life (Dec. 24, 91,): "Buttercup is doing better with me than it has for years, caused I think by more robust and natural treatment given to the plants and cuttings of this variety."

If the continuance of stock was divorced from forced flowering plants on the benches and a natural method of treatment adopted in keeping with the foregoing laws; within two years all preternatural sensitiveness of carnations to occult causes, inducing versatility, would be removed and a grand step taken in the direction of uniform results from varieties.

E. Lonsdale says: "a friend writes me that with him Mrs. Fisher produces four times as many flowers as Lizze McGowen, now with me the first is worthless, while the latter behaves well." This illustrates how speedily carnations contract depraved habits; when it is remembered three years ago these sportive dames kissed their mother nature in the arms of maternity, and robed in white, knelt at the shrine of virtue, as they entered the gates of their lustrous and inconstant lives.

TEMPERATURE.

No law is better settled in Geographical Botany than the following:

"A certain mean annual temperature is required by each particular species of plants for their development, and their highest estate will admit of but a slight variation in the number of degrees of the temperature required."

Plants are not affected by large temporary fluctuations in temperature, but are very sensitive to any material deviations in the mean annual temperature. The wine grape will admit of but 9 degrees; sugar cane and Plantain tree of but 4, and the cotton plant of but 5 degrees of variation.

Through all the vegetable kingdom an increase or decrease of a few degrees of mean annual temperature outlines new zones, and fills them with a different flora.

A case illustrating the extreme sensitiveness of plant nature to variation of temperature and required conditions, is a species of Origanum discovered on a single rock in the island of Armogos in the Graecian Archipelago, by Tournefort, in 1700; eighty years afterwards the plant was found in the same island, and on the same rock, and no where else in the world, which means no other spot had the same mean temperature and other co-existing conditions as existed on that rock.

It is not strange that carnations subjected to fluctuations of mean annual temperature as wide as those of the Temperate and Torrid zones should be versatile in their habits.

The carnation belt so far as it is developed does not embrace more than five degrees north of the 39 degree of latitude, and is much better defined on its southern, than on its northern border, proving the sensitiveness of this species of plants to lateral climatic influences. I mean by this belt a zone of land four or five hundred miles wide, extending from the Atlantic to the Pacific oceans, and possibly belting the globe, and not a *"Spot."*

No seedling carnation of any merit has yet originated south of the 39 degree, Carnation Peter Henderson was sent out by a firm of Louisville, Ky., but was originated by Carleton in Ohio, no plant of advanced merit is likely to originate only where the most favorable environments for the species exist.

The frailities of carnations is most easily reached through the seductive flattery of heat, they yield their virtues to the amorous embrace of perennial warmth, and become capricious and inconstant wantons, the phylactic charm against their sportive nature, and all their maladies is the annual mean frigidity of the fortieth degree of north latitude; except when on the bench and being forced for flowers.

Biennials are distinct from annuals and perennials, in the profusion of their bloom, the first seasons growth is spent in gathering force for the final efforts to perpetuate themselves. The Agave, Banana and all fruits and flowers that die after parturition are marvelous in their last extravagant efforts to continue themselves.

Two vegetating seasons are the span of life allotted to biennial carnation plants and the best evidence that they

have lived unspotted and uusporting lives is for them then to die. For biennials to live beyond their time means a corrupted nature, to die means a new birth.

Mythology says that the twins Pollux and Castor were granted by fate with but one immortality, so they lived and died alternately every year. There is but one immortality for carnations, the reciprocal succession of life and death, in parents and progeny, such are the amazing processes of nature; yesterday the plant was in the vigor of its sun fed glory, today it is in its shroud of painted petals, throwing kisses of incense to an admiring world as it gaily enters the gates of another life. Death is nature's signet on its rounded being, a new biennial consecration at the alter of creations wonders. A fresh baptism in perfumed irridiscence behind the jasper walls that hide all human sight.

BENCHING MATURE PLANTS.

An unquestioned law in Vegetable Physiology is:

"Each species of plants requires a certain number of days to complete its course of vegetation and growth, and the mean temperature multiplied by the number of days gives the sum of heat the plant requires for its development if the mean temperature is lowered the number of days must be increased, if increased the number of days must be diminished."

Soils, latitude, bodies of water, isotherms, etc., are large natural agencies in controling the mean annual temperature of the seasons in various localities.

Carnations are planted in the field as soon as the ground can be prepared in the spring, not because the plants need a long season; but because the cool moist weather of spring is favorable for the plants taking root. Biennials do not require a long season to perfect ripening of the plants. In estimating the length of the season for a carnation plant, it must be remembered that the rooted cutting, when set out starts with at least two months of season, as compared with growth from seed.

Geo. Hancock, Mich., says, "I struck cuttings late in May and planted directly in the field from the cutting

bench in June, and on Nov. 1st, they were bushy plants well covered with buds."

The average length of field life of carnation plants is four months; if two months more are added to them by reason of them being rooted cuttings, it would make six months growth to reach puberty, or the dominancy of the reproductive forces of the plants. Soil, seasons and varieties are however factors not counted in this estimate. The effect of the *length* of season on plant life is governed by the above law.

If carnation plants are permitted to remain in the field long after they are ripened (this expression is used for the want of a more expressive one) and an open vegetating season continues, they are quite sure to take a second growth; stem and leaves will grow wonderfully, and will be weak and watery; in doing this there is a rapid consumption of the protean compounds laid up in the plant's system for fructification on the biennial plan of nature and they loose their capacity to bloom and seed, and take decisive initiative steps into perennialism. The growth that carnation plants make on the benches is entirely different, and like that they would take on the second season of their life, if left in the field. Mature plants of pure biennial type, when benched, seem to have but one purpose; that is the production of flowers, the womb of seeds, embryonic carnation plants

Thos. Mewan announced a law of plant life years ago:

"Nature always makes an effort to reproduce the plant in proportion to its danger of death."

Often fruits and flowers in order to yield their bloom have to feel the fear of death by scarification, top or root pruning. Be the shock to the constitution of the lifted carnation little or great, it is the turning point of its utility to man. The abstract act of lifting and replanting a carnation plant is the most salutary thing done to it during its life. It is a substitute for its coma of cold, and spans the winter of its life; it was born only to bloom and seed, to lift it from its earth attachments is an alarm of a wasted life, and it makes immediate efforts to fill the purpose of its being.

The act of transplanting from the field to the benches starts all the new impulses of a second season's growth.

It is to the plant a pulse of danger, life hibernating in its citadel of cells has felt the warning of impending death, annihilation has rung a warning bell, and frighted with a season's wealth of petals and of perfume, the carnation plants faces fate; offering possibly two hundred fragrant flowers in a short season for immortality, and smothered in perfume and pavillioned in flowers, dies in its wild, wierd and mysterious efforts to live again in vital seeds. The periods during which carnation plants produce the most bloom are after they are lifted and before their biennial death.

A ripened biennial carnation plant is one that has grown its season, elaborated its juices, and crystallized their compounds. It is the puberty of the plant, the period of between growth and reproduction, the hour between yesterday and tomorrow. Its stems are firm and compact, its nodes are solid and almost woody, its leaves are tough and leathery, the stems and foliage are erect and self supporting, there is little sap in its circulation, it has stopped growing, and is hardened for the snows and blasts of winter. It is then it should be lifted if the soil is dust, the thermometer 90 degrees and without a particle of dirt to the roots, and put on the bench, or in a pot, and with a little moisture and shade the plant will scarcely flag. It had rounded the vegetating period of its first season's life, and its functions of life were torpid, heretofore it had lived but to grow, hereafter it will live but to reproduce

Mr. Orr of Ottawa, Ill, says, "I lift my carnations in August without any dirt to the roots; last season I lost but one plant out of 1150."

If lifting is done before or after the ripened stage of the plant, both will be successful, if done with greater care. Upon the ripened conditions of plants turns all the questions of late and early lifting, lifting with or without balls of earth to the roots, successful and unsuccessful lifting, early and late blooming of the benched plants. If a plant is not ripened when lifted, it has to continue its growth to the reproductive period of its life, which would cause it to bloom later. Upon the perfected condition of the field plants at the time of lifting turns largely the question of the depth of bench soil and the utility of solid beds for carnations. If the plants are not ripe they need much

more bench soil from which to draw nourishment to complete their biennial maturity, if they are over ripe and started on a perennial growth, they need deep bench earth, possibly solid beds, to sustain their preternatural condition.

A properly ripened plant on the bench needs but little earth to sustain a healthy circulation, with it nature reenacts the marvel of the marriage feast, green leaves smile in flowers, as water "blushed in wine."

These laws are as invariable as the decrees of nature; to disregard them versatility of habits ensues, to regard them reduces carnation culture to almost an exact science.

CUTTINGS.

Carnation cuttings are now taken during the months of November, December, January, Febuary and March, from benched plants, which have been forced for flowers from one to five months; such cutting must have in their nature the germs of perennialism and versatility. The grower starts the cuttings in high heat and roots them in ten to fifteen days, then grows them in pots or flats in greenhouse temperature until the first of May. Carnations, it must be remembered, are by nature low temperature plants,and 75 degress of top and bottom heat poured on the cuttings at the moments of time they are establishing a new and independent plant existence must be highly pernicious in maintaining for them their true type of hardy plant character.

Peter Henderson said, "I am convinced more injury is done carnations by rooting them in a high temperature than from any other one cause."

But now that cuttings are taken from highly forced plants, a high temperature for the cutting bench is not only effectual, but necessary to their speedy and successful rooting.

Cuttings to perpetuate pure biennial blood can best be obtained from model plants with the best marks of fall ripenings, carried on the dry side, in cold frames, or cold houses, and rooted with little heat in not less than four weeks time.

Joshua Ladley of Pa. exhibited cuttings rooted well, at a little over 36 degrees, before the Chester County Carnation Society. After being rooted they should be carried

at a low temperature, as there is quite a winter growth in all biennial plants at any temperature above that which produces death.

The time of taking the cuttings has everything to do with the early and late maturity of field plants, also the whole question of disbudding in the field. A carnation's life properly measured will not have to be pinched back in the field. If such a thing is needed the cuttings have been taken too early and the flowering resources of the plants prematurely exhausted by such mismanagement.

All carnations, as to time of blooming, marshal themselves between early Snowden and late Henzie. There are four months difference by nature, in the time of these two kinds blooming, and there should be just that difference in the length of their lives prior to Oct. 1, or the desired blooming period, in order that both may start at once in the race of bloom. This law applies to every carnation in cultivation; as to their time of blooming, every grower can estimate within ten days when any variety will bloom. It is as unfortunate for winter bloom, to strike early kinds too early, as it is for the late kinds to strike too late.

For summer flowering, Mr. Lombard states that he strikes his cuttings in August for the following summer's bloom, and they will commence to flower in June. In France the cutttngs as started in July and August, without bottom heat, and carried through the winter in cold frames; the result of this routine is pure biennial blood, great constancy of habit and magnificent floral results. Life lives in cells, in a single cell in a seed with power to multiply new cells. In a cutting life exists in many cells already formed, with a power to further multiply them. Surround a seed or a cutting with natural environments and both will widen, and strengthen their fortifications of life, by healthy cell growth, and strain toward perfection under the ever acting law of structural betterment.

In multiplying by cuttings, heredity transmits merit or demerit; the cutting partakes of the exact normal, or abnormal condition of the parent plant at the moment it is taken, which conditions becomes not only fixed, but often emphasized in the rooted cutting.

Versatilities of carnations arises from the character of

the cuttings, and the place on the flowering stem from which they are taken.

Two cuttings taken from different parts of the same cane of the same plant will produce different results, if treated exactly alike. If two *proper* cuttings are taken from the same cane, one *early*, the other *late* in the season; or if one is rooted in a *high*, and the other in a *low* temperature, or if carried after being rooted in a *proper*, or *improper* heat; or if subjected to the *right* and the other to a *wrong* kind of field soil; in each instance there will be different results.

If two *proper* cuttings are taken from the same plant, one *before* it is forced, and the other *after* the plant is forced; or *before*, or *after* the plant has perennalized; in each instance there will be a different result in the character and quality of the crop of bloom.

Yet in the light of years of experience, observation, and botanical science, I assert that there is not an agricultural, nor horticultural product, freer from versatility, or one that will give a more uniform and bounteous crop than a carnation plant, if properly treated.

SEEDLINGS.

"The best in the way of seedling carnations must be close along the line of character nature stamped upon the species."

The Henzie carnation was born in Detroit in 1877 from the seed of a plant that had remained out, unprotected the previous winter, (the seed of which came from Germany.) No carnation was ever born on the continent with as strong an individualized character as Henzie; it is a good white when matured, and all sporting of shades of color comes from corrupt stock, deficient heat, or excess of moisture. It is the Napoleon of American carnations.

It may have seen its Australitz, met its Waterloo, and be sailing toward its St. Helena, but in a quarter of a century from now there will be growers, who at the name of Henzie will shout "*Vive le Empereur.*"

Fred Creighton, one of the best pink carnations of the *precise shade*, I understand, is from the seed pod of a parent that never felt the subtle sorcery of artificial heat.

Nature interdicts carnations that have sported their character from seedling, thereby continuing a mongrel race. They are sterile out of nature's abhorrence to mongrelism. So when they do seed they must be close on the line of their true nature, and the products of their seed are fresh warm specimens from the womb of the biennial nature of the species.

The fabled Antæus renewed his strength whenever he kissed his mother earth. Both flora and fauna refuse to perpetuate their species at home or abroad unless surrounded by natural conditions. In new seedling carnations we have the assurance that they were warmed to life by the vestal fire that nature burns upon the alter of Dianthus.

Nature protests against in-breeding, both in the animal and vegetable worlds. In plants this is done by maturing the stamens and pestils, male and female organs of generation, in the same flower at different times. Carnations belong to that class of plants (*proterandrous*) which ripen their pistils before the stamens mature. There is no difference between Hermorphroditic fertilization and propagation by cuttings. In both cases there are a continuence of the *same* plasm and primordiel cell. In cross fertiiization there is a union, by fission in the ovules, of the germ cells of two varieties. This sexual union is the nucleus of a new compound entity and life force, dissimilar from either parent, and may be an improvement on them. Propagation by cuttings is not devtalizing, while reproduction by seed is rejuvenating. Old varieties will steadily improve by proper culture, while new varieties will lead them in the race of evolution.

If not another seedling was procured in America for the next ten years, the present stock in that time, by the force of selection and the "natural method of treatment," would yield ten per cent better flowers than they do today.

If the carnation world in lieu of centering all its skill and energy on the production of seedlings, would divide its efforts in maintaining the health and true type of character of the many superb existing kinds, greater progress would be made in carnation culture.

Darwin on the "Origon of Species" earnestly insists hat varieties are incipient species, or species are de-

veloped varieties. If no decadence attaches, the persistent varieties of carnations of today may develop into future species with all attaching qualities. The Alegatiere variety of forty years ago is the parent of the double clove scented *species* of carnations of today.

POLLENIZATION.

Whether the production of seedling carnations, by any process of fertilization, is along defined lines and methodical sequences is not known.

If so, these laws are so imperfectly understood, the result in obtaining meritorious seedlings has all the force and effect of accident. Such laws are within the scope of human inquiry, but the curtain behind which nature starts a new life will never be lifted.

It is known that the occult forces at play in generation,in determining a yellow color in a carnation, also has heretofore worked a late and shy blooming habit, and frequently a weak constitution, and an indisposition to succeed under glass. This disposition exists in yellow carnations in Europe as well as in this country. Seven out of the fourteen yellow carnations that have been grown in this country were imported, and have been attended with all the accompanying disabilities of such.

A strong individualized and successfull winter blooming yellow carnation does not now exist, unless it is found in Golden Triumph.

In artificial fecundation all guess work should be ignored in regard to parents. In plants, the stamens are the male, and the pistils the female organs of generation. The pollen dust produced by the first has to be gathered and applied to the stigma of the latter by hand, this done, open the bud to be fertilized cut, away the green anthers, apply the dust, then close and closely tie the bud in fine tissue to prevent all possible contact with strange pollen, and if the seeds mature you have absolute assurance they are a cross of designated parents. What mystery there is about it is independent of this simple method.

There are many theories as to the sourse of parentage from which the best seedlings can be obtained. Chas. Starr says,"use old Edwardsii and De Graw for parents,and fertilize them with the pollen from flowers of a foreign color, and the product will be a better race." Another cor-

respondent says he obtains the best seedlings by using the the pollen from the single varieties of carnation.

J. Lenton, Piru City, Cal., says: "I have grown thousands of seedlings from seed artificially and self fertilized. I have this year one acre of seedlings. The percentage of extra fine ones is very small. I choose the most healthy plants for parents and pinch off all buds but those fertilized. I know of no rules governing the production of colors. I have got a color darker than Crimson King from White Henzie. Carnations seed but little, some varieties not at all; their organs of generation are dwarfed and imperfect. The fact they do not seed profusely is largely in their favor as blooming plants. It is not the flower that exhausts a plant but the rich albuminous compounds deposited in the seed that saps its vigor. The abortive attempts of carnations to seed is at once followed by fresh efforts to succeed; hence in carnations, as in all other non-seeding double flowers, the marvelous size and succession of corollas.

STOCK PLANTS.

Carnation plants are lifted from the field, where nature has accorded them 100 degrees, their highest extreme annual temperature, taken into the house and given an average winter temperature of 65 degress, thus making a mean annual temperature of 75 degrees; within 9 degrees of the mean temperature of the equator,the highest on earth. Cuttings are taken from the plants and rooted at a high top and bottom heat and thus is the cycle completed of a routine that has contrived for thirty years.

Carnations are the marvel of the world's flora. It is not strange they are versatile in their habits, but it is strange they flower in quantity at all.

The late John Henderson of L. I., stated at the convention of A. F., at Cincinnati, "In the fall of 1883 we had a surplus of two varieties of carnations; we healed them in in cold frames, they wintered well. In March, we took cuttings from them, and last winter they made the best plants for bloom we had, not one of them died, while we lost hundreds of others." Nothing is as sanitary to a 40th latitude biennial plant, or so confirms its character and consecrates it to the religion of its nature; as a baptism of frigidity.

The routine of Carnation Culture is destined to differentiate into winter blooming plants, stock and spring blooming plants.

The first will be selected from the field, benched and subjected to such temperature as the grower's market demands; high, if he wants his crop early; lower, if he desires it continuously through the season. These plants will be used for blooming purposes only, and in no wise for cuttings. They will yield *more* and better flowers; more because each cutting taken means two flowers lost.

Mr. Lombard, at the Philadelphia convention said, "taking cuttings from blossoming plants makes them burst their calyxes; this pressing process throws to much life vigor in the remaining buds."

Stock and spring blooming plants will be benched or potted and carried in cold frames or cold houses at a temperature barely above freezing; a little of this will do no harm, they will slowly grow in any temperature above that which causes death.

From these plants all cuttings will be taken for the coming season's stock. They will be used for spring sales in pots, and early out door summer bloom, and will yield the seed and cuttings from which will grow the ideal carnations of the future.

The renewal, or exchange of a grower's stock, frequntly, is very beneficial, and is so recognized in Agriculture. Persistency of conditions is interrupted and other environments are substituted which promotes productiveness of bloom. If stock becomes non-productive, or partially so, can it be restored to its biennial type of character? The substitution of rigid natural conditions for artificial ones, will in time certainly restore varieties to their true estate ,and if there is only a moderate deflection of character it will be reached as soon as there is a sanitary equipoise of the life and reproductive forces in the plant.

MOISTURE.

"The quantity of moisture a plant requires or its development is in ratio to the area of its leaf surface." The broad and capacious leaf surface of the Banana,etc., indicates the quantity of water their nature requires. The foliage of plants in this regard is an unfailing index.

Careful experiments have determined that one square foot of leaf surface exhales 1 1-4 ounces of vapor daily, and 1-5 less during the night; while in rainy weather a perfect equilebrium is established between the absorbing and exhaling forces of the plant.

The comparatively few and narrow grass like leaves of carnations show the leaf surface of this plant to be very small, and the absorbing capacity of the roots to be correspondingly small. They then have the ability to appropriate but a limited amount of moisture, and a slight excess would be damaging to their health. Physically, and botanically, carnations are dry weather plants; they revolt at an excess of water in diseases on the bench, and perennialism in the field.

In the winter of 1889-90 the carnation crop in this country was a partial failure; there were many diseased and defective plants and a decreased floresence in those that were apparently healthy. The previous summer had been unusually wet; excess of moisture during field life was the cause, there was deficient underdraining of carnation plants in retentive soils. Gravelly or sandy subsoils, that season grew the best plants. Mr. Herr, of Pa , says: "rich soil, excess of moisture and heat, favors calyx rupturing and disease in carnations."

Some growers are now planting carnations on ridges in the field. The only conceivable advantage of which is; it affords a better surface drainage from the roots of the plants during field life, which in a wet season would be a great advantage.

Excess of moisture destroys the balance between the life, and reproductive forces of the plants, stops the modification of leaves into flowers by stimulating a plethora of habit.

J. Lenton, of Cal., says: "Carnations here bloom the best in the dry season; they all go to leaves and stems in the wet season."

SOIL.

Growers plant carnations in such soil as surrounds their houses, all succeed to an extent; hence there are many kinds of soils. Plants are fastened to the spot and can make no choice of food only from what is there offered. If

they cannot get what their nature requires they take the next best thing.

The stimulus of surplus nutriment abrogates the law of procreation. A plant with redundant vital activity refuses to convert its leaves into flowers, as a fat animal looses its desire to cohabit, and its power to conceive, flowers are the heat of a plant's passion and is analgous with ardor in an animal.

Carnations require a compact tenaceous soil; a loose black soil will maintain 8 degrees higher temperature throughout the season, for the roots and plants than will a congenial soil; but it does not contain the elements required by the plant's nature. In such a soil they develop stems and leaves and run into perennialism in a single season. Clay soil may be a rich soil, for one species of plants and a quartzose soil full of humus may be a poor soil for the same species, for their proper development.

A. W. Orr, of Ill., says, "I have grown my carnations in the same bench earth for five years. I have dressed a few with well rotted cow manure, the effect was; the latter grew much faster in leaves and stems and yielded less flowers."

The number of flowers a carnation plant will yield is in *inverse* ratio to the excess of foliage it may have, and the excess of foliage, is in *direct* ratio to the surplus nutriment, warmth, and moisture given it. On the benches or in pots, excess of plant food is qualified by the limited quantity of soil. Carnations with their life forces disturbed in the field cannot fully recover themselves on the benches.

Benjamin Grey reports he "has raised carnations in solid beds for ten consecutive years with good results without renewing the soil, using cow manure as a fertilizer."

Mr. L. Wight said at the Philadelphia convention; "there is one quality the soil must have and that is adhesiveness."

VENTILATION.

Deficiency of fresh air in carnation houses is a mistake in to which growers instinctively fall. They are practical people and desire to grow speedily and husband as large a crop of flowers as possible. They read that cold draughts of

air will mildew roses and check the growth of other plants and become morbidly impressed with the tender nature of carnations.

A man requires 250 cubic feet of air every hour to furnish him with a healthy supply of oxygen; a plant requires a proportionate amount to supply it with its needed amount of carbonic gas.

The blood in a man is distributed over 1400 feet of cell walls to secure its proper aeration; in a carnation plant the circulating juices are distributed over the cell walls in its foliage fifty times greater than its apparent leaf surface, in order to perfect its contact with the carbonaceous elements of the air. The foliage of all plants require moisture in the ratio that their roots dislike water; dry weather plants are aproximately air plants. The ventilation of carnation houses is a hundred per cent better in the fall and spring months than in mid winter, which is doubtless a great factor in the productiveness of bloom at those periods,as is shown by Winterstatter's tables.

ADAPTATION BY SELECTION.

One of the versatile habits of carnations is to bloom in crops, and the same variety in other hands, and localities, to bloom continuously. This peculiarity is mostly monopolized by Henzie. If Henzie has both of these habits; one must be an acquired habit. It is the cropping habit that is natural to Henzie; because this is common to perennials and not to biennials, and Henzie has the strongest natural impress of the former class of plants of any carnation in cultivation. The continuously blooming habit is an "adapted" or acquired habit, and whenever it does not so bloom; the law has not been enforced on the stock and it asserts its natural habit. Henzie is a very late blooming kind by nature; this defect is overcome by striking its cuttings very early, thus increasing the sum of heat required for its development by augmenting the number of the days of its existence.

If Henzie could propagate itself by seed, it would scarcely round the period of its biennial existence in two short vegetating seasons; hence it is adapted to the longer seasons on the southern limit of the carnation belt.

Notwithstanding the disposition of old kinds to improve under culture, all that are in existence today will eventu-

ally be relegated to the rear by better and grander evolvements of the future. Through the processes of generation the qualities of betterment are worked more rapidly than by the processes of selections by cultivation, though the law is enforced in both processes.

If size is to be the measure of merit in a carnation flower, we have seen twenty years of culture swell the corolla Edwardsii from 1 1-2 to 2 1-2 inches in diameter, while the process of generation from the same parentage has developed Sea Gull and Pearl whose flowers frequently reach 3 1-2 inches in diameter.

Large carnation flowers will always be an object of interest, but the best esthetic taste will never demand flowers, whose beauty is so wonderfully augmented by grouping, much larger than those now produced. Under the law of adaptation by selection carnations are undergoing many changes. There is less disposition in recent carnations to burst their calyxes than formerly; originators are breeding away from this defect. There is less disposition in carnations to yield their bloom in crops than there was years back. There is an increasing demand for long stemmed carnation flowers, and there is an increasing disposition in carnation plants to yield them. Plants produce more long stemmed flowers as their season under glass progresses; the drawing of the glass and the whole trend of green house influence is in the direction of long stemmed flowers. The tables on the productiveness of bloom show the ratio of increase of long stem flowers as the season closes.

It is perfectly natural that new seedlings would adapt themselves to generations of ancestral pressure of this kind, and produce long stemmed flowers, Orient, Pomona, Lamborn, Delight and Argosy, produce almost terminal single stem flowers stooling up from the crown of the plant, and are the legitimate progeny of the law of adaptation by selection.

All new seedlings are now described with more truth than formerly *"Constant bloomers, long stems, and do not burst."*

The demand for carnation in France is during the summer and fall; in America during winter and spring, directly opposite seasons of the year. By adaptation the carnations

of both countries yield their crops for the period of edmand, and these habits are now so fixed that imported or exported carnations are for a time worthless. All carnations had a common parentage.

Mr. Hatfield in "Garden and Forest" imported English Carnations and subjected them to the same treatment as American carnations, but did not find one worth perpetuating. It would take years to change habits as it has taken years to form these habits.

Wm. Falconer, on a visit to the botanical gardens, D. C., says he noticed a stout branching tree-like plant four feet high of "*Ficus Repens;*" so secured from that thread-like vine in twenty years time by Prof. Smith.

Nature never creates a new organ, but adapts old ones to new conditions. "Goldwaithe's Geographical Magazine" says the banana is an evolved tropical lily, from which nature has eliminated all seed and in lieu thereof has substituted offsets by shoots, as the means of its perpetuation.

Years of cultivation by adaptation has largely eliminated mature seed from carnation flowers and in exchange for the exhaustive proteine compounds deposited in them, the plant yields a redundant bloom and its existence is easily continued by cuttings.

French growers strike their cuttings early in the fall; when rooted are planted close in cold frames and thus carried through the winter till the setting out season, after which they bloom early and yield fine crops of magnificent bloom. Acres are thus cultivated to supply the Paris market. This process of propagation and cultivation does away with artificial heat; secures the proper mean temperature and maintains their true biennial type of character. Carle, the largest carnation grower in the world, embraces hundreds of varieties in his catalogue but not one in twenty is recommended as a winter bloomer; while in America not one in twenty of the listed kinds is recommended for summer blooming.

Mr. Joseph Tailby, of Mass., is of the opinion that "the American Carnation as it is, is the result of adaptation by selection and acclimatization."

It is certain either the blooming habit of the French or American Carnation is an acquired one and obtained

through adaptation by selection, and the natural habit certainly rests with the French carnation.

The power and influence of the law of adaptation, by selection and heredity may not be fully understood. German biologists would claim the Golden Rule is but the accumulated experience of man, transmitted with constantly increasing emphasis through the aeons of past time, an ethic of the ages, which each succeeding century has etched a little deeper on man's nature, until now it has become a permanent moral law; a physical practise transmuted by adaptation and heredity into a moral attrabute.

The disposition of birds to fly from a coming winter to a genial clime is but the transmitted necessities of cycles of time on bird nature, until now it has become a permanent instinct in birds; a climatic condition transformed into an intuition.

That the modifying influence of man on the little five petaled Dianthus,ever since Pythagoris wrote on the flora of Greece,has been to improve it in size,beauty and fragrance. It has exercised a constantly increasing force on its being until now an evolving betterment is a law of its nature.

To foster these results the law of the survival of the fittest, to transmit the *law, instinct,* and *habit,* survived. Men who did not know the law were hung, birds that had no vestage of the instinct died, carnations that showed no impress of the habit were cast out.

The concise language of S. Lenton relative to carnations in California is here given. "I live in Piru City, Ventura Co.,California; my locality is 800 feet above sea level. The extremes of annual heat is 80 and 20 degrees above zero; it rarely freezes, never in the day time; the rainy season is from October to April, the dry season April to October. Carnation plants grow best in the wet season, but flower best in the dry season. I have plants this date, Feb 10, '92, in full bloom in the open ground. A carnation seedling with care will bloom in six months, and all the year thereafter, best in April and May; least in July and August, they bloom better in poor than in rich ground, in rich soil they grow to be big plants but no flowers. I think a good plant will yield in a season 500 flowers, they bloom much more profusely here than in the east especially seedlings. I have had much experience with carnations in the east as

well as here. I do not know how long a plant would live here, I have several kinds three years old, and are still vigorous and three or four feet in diameter. Eastern carnations do well here, most varieties seed very freely as Chester Pride, Silver Spray, Crimson King, E. G. Hill, Henzie, and other kinds, my seed is grown in open ground, the seed I grow is superior to any I can buy, I began to grow seedlings several years ago, I have grown many thousand and have a full acre of them this year; the number of choice kinds obtained are very small compared with the large number grown. I have now 42 extra varieties. 18 of which I think are superior to any ever raised in America. Carnation plants are much used here for yard decorations and are constantly increasing in public favor, but the flowers only bring 40 cents per hundred in the cities, the rose has the lead in popularity here. I start my cuttings under glass using manure for what little heat I need, I think there will be no difficulty about California carnations doing well in the east, eastern carnations do well here, there is probably no place on the continent they seed as freely as they do here which I think is evidence of virility and purity of species. I have named one of my best seedlings Dr. Lamborn, after the author of Carnation Culture, and hope it will do as well east as it does west of the Sierra Nevada mountains."

CONCLUSION.

With me there is no principle better settled in the cosmogony of the world's flora than that varieties are parents of species.

A life lease of ages is given by nature to every *variety* of carnation, in its natural state, subject only to the law of the survival of the fittest. The life and health of carnations, if naturally conditioned, though artificially manipulated, would be as persistent as they would be in a state of nature. Propagation by cuttings works no decadence in the life force of a variety.

The life of blooming usefulness of a carnation plant is often but a few years.

If these facts are admitted, it is conclusive that it is unnatural treatment that modifies the character of carnation

plants and check them so quickly off of the roster of usefulness? The only remedy are methods of conditions, in harmony with the character nature has impressed upon their species.

REGISTERED LIST OF CARNATIONS ORIGINATED SINCE THE SPRING OF 1889.

FOR ALL VARIETIES ORIGINATED AND CULTIVATED IN AMERICA PRIOR TO 1889 SEE PAGES 133 AND 164, RESPECTIVELY OF THIS WORK.

PINK CLASS OF CARNATIONS.

Adelade—Lenton.
Angelus—Shelmire.
Annie Wiegand—Dorner.
Argosay—Starr.
Aurora—Swayne.
Avalanch—Lenton.
Brewster—Starr.
Betrace—Shelmire.
Beauty of Oxford—Schneider.
Cherry Lips—Dorner.
Christine—Hill.
Chastity—Starr.
Doranda—Lombard.
Dorothy—Shelmire.
Daybreak—Simmons.
E. Lonsdale—Dorner.
Edna Craig—Hill.
Evylin—Smith.
Grace Battles—Lonsdale.
Gypsy Queen—Hill.
Hellen Galvin—Wight.
H. E. Chitty—Dorner.
Jennie Parker—Lenton.
Mable—Lenton.
Mrs. Coldflesh—Coldflesh.
Mrs. L. Fawcett—Fawcett.
Mrs. L. Fancourt—Fancourt.
Mrs. A. Hunt—Hill.
Mrs. Hitt—Hill.
Mrs. E. Reynolds—Dorner.
Mm Diaz Albertine—Dorner.
Majesty—Lenton.
Mary—Lenton.
Nellie Lewis—Lewis.
Old Rose—McGowen.
Oona—Lenton.
Princess—Wight.
Pendleton—Swanye.
Rosemary—Starr.
Richmond—Dorner.
Salmon Queen—Hill.
Sea Shell—Esler.
Spartan—Dorner.
Thos. Cartledge—Swayne.
Tendress—Miller.
Wm. Scott—Dorner.
West End—Jennings.
W. N. Rudd—Hill.
Welcome—Dorner.

YELLOW VARIEGATED CLASS OF CARNATIONS.

Blizzard—Starr.
Cæsar—Shelmire.
E. V. Lowe—McGowen.
Goldsmith—Lenton.
Nellie Bly—Shelmire
Hesper—Wight.
Louise Porsch—McGowen.
Mrs. H.M.Stanley—Shelmire.
Pride of Essex—McGowen.
Sunflower—Lenton.

WHITE CLASS OF CARNATIONS.

Blanch—Dorner.
Catharine Paul—Imported.
Delight—Dorner.
Daisy—Jennings.
Excelsior—Brinton.
Edleweis—Shelmire.
Florence Van Reyper—Esex Floral Co.
Geo. Hancock—Dorner.
Lady Fair—Starr.
Lizzie McGowen—McGowen.
Ohio—Paddoc.
Pearl—Pennock.
Piru—Lenton.
Snow Bird—Jennings.
Silver Lake—Taylor.
Sea Gull—Hill.
White Wilder—Pesenecker.
Wanderer, Larkins.
White Wings—Jennings.
White Dove—Hill.
Waneta—Chambers.
White Cap—Lenton.
White Beauty—Fawcett.

SCARLET CLASS OF CARNATIONS.

Attraction—Hill.
Constancy—Starr.
Fred Dorner—Dorner.
Florence—Fisher.
Hoosier—Dorner.
Hector—Lombard.
Lasandria—Starr.
Lavina—Lenton.
Mary—Lenton.
New Jersey—McGowen.
Paradise—Lenton.
Romance—Lenton.
Red Cross—Hill.
Rob Roy—Creighton.
Scarlet Ray—Ward.
Weatherwood—Creighton.

CRIMSON CLASS OF CARNATIONS.

Alexander—Lenton.
Buster—Lenton.
Creole—Dorner.
Iago—McGowen.
Lee Roy—Lenton.
Pupura—Starr.
Pomona—Starr.
Purple Beauty—McGowen.
Sambo—Essele.
Sane Meto—Hill.
Village Maid—Creighton.
Wide-Awake—Lenton.

CLASS OF WHITE VARIEGATED CARNATIONS.

American Flag—Bergman.
Banner—Fawcett.
Catharine Storris—McGowen.
Delaware—Brinton.
Evangeline—Lenton.
Fair Rosamond—Hancock.
Gen. Custer—Shelmire.
Geneva—Dorner.
Ideal—Lenton.
Indiana—Dorner.
Lady Martha—Brenton.
Lora, Lenton.
Lessetta—Lenton.
May Flower—Jennings.
Oddity—Brenton.
Orange Blossoms—Jennings.
Patti—Shelmire.
Paxton—Fisher.
Ramond—Lenton.
Zebra—Ward.

YELLOW CLASS OF CARNATIONS.

Amy Phipps—Simmons.
Golden Triumph—Lombard.

This work furnishes a registered list of all the carnations of any merit ever grown or cultivated in America, all other lists

are copied from this work. Quite a number in the list are credited, properly, with the name of the party who purchased the original stock. All the original stock of carnations were imported, some of the kinds reaching back thirty years. A few in the above list will not be in the market for two or three years and are of unusual promise. The classification by color and with the name of the originator, is considered a surer index of merit than any stereotyped description.

PRODUCTIVENESS OF BLOOM.

R. W. Winterstater's (Ohio) Scientific record of the bloom cut from four varieties of Carnations from Oct. 17, '90 to June, 27, '91.

WILLIAM SWAYNE.

Cut in	Short Stems	Long Stems	Total
October, after 17th.	196	161	357
November,	1585	983	2568
December,	693	1394	2087
January,	400	790	1190
February,	400	485	885
March,	485	745	1230
April,	705	925	1630
May	575	1550	2125
June to 27th.	2325	1050	2375
	7164	8063	15447

Number of plants, 530; Square feet of bench, 308; Plants per square foot, 1.7; Blooms per plant, 30.8; Blooms per square foot, 51.77. 2300 cuttings were taken from these plants.

SILVER SPRAY.

Cut in	Short Stems	Long Stems	Total
October, after 17th.	140	320	460
November,	90	734	824
December,	247	760	1007
January,		705	705
February,		1230	1230
March,		1030	1030
April,		375	375
May		1550	1550
June to 27th.	575	700	1275
	1052	7404	8456

Number of plants, 332; Square feet of bench, 227.5; number plants per square foot, 1.4; Blooms per plant, 25.46; Blooms per square foot, 37,16.

2200 cuttings were taken from these plants.

BUTTERCUP.

Cut in	Short Stems	Long Stems	Total
October, after 17th.		130	130
November,	275	535	710
December,	380	411	791
January,	325	497	822
February,	445	535	980
March,	386	1175	2561
April,	520	1275	1795
May,	800	3825	4625
June to 8th.		375	375
	3151	8758	11909

Number of plants, 550; Square feet of bench, 320; Plants per square foot, 1.7; Blooms per plant, 21.47; Blooms per square foot, 36.9. 4300 cuttings were taken from these plants.

TIDAL WAVE.

Cut in	Short Stems	Long Stems	Total
October, after 17th.	57	234	291
November,	115	567	682
December,	227	419	647
January,	215	421	636
February.	515	960	1475
March,	610	1475	2085
April,	660	3725	4385
May,	90	2000	2090
June to 27th.		575	475
	2490	10376	12897

Number of plants, 600; Square feet of bench, 294; Plants per square foot, 2.07; Blooms per plant, 21.44; Blooms per square foot, 43.76.

3150 cuttings were taken from these plants.

The above plants were grown in a night temperatnre of from 45 to 55 degrees; an average day temperature some 20 degrees higher.

Counting cutting, Mr. W's plants would each average 36½ florets for the time of record and 4½ per month.

R. T. LOMBARD, MASS.—"I cut from just 700 plants of Hector in a solid bed, from Oct. 13, 1890 to June 1 , 1891, 53700 marketable flowers, nearly 76 5-7 flowers per plant and from the same plants I took 2000 cuttings;" equaling 5.7 flowers per plant, total flowers per plant, 83 2-10."

W. R. SHELMIRE, Pa.—"Taking my stock together, each plant averages 18 flowers and as many cuttings during the season;" equivalent to 54 flowers per plant.

S. LENTON, California.—"I think a good plant here will yield in a season 500 bloom. I counted today (Jan. 4, '92) 172 blooms and buds on Majesty. Avalanche had 107, and all the others of my 18 seedlings ranged between these two extremes."

H. E. CHITTY, N. J.—"I cut 10,000 blooms and 3500 cuttings from 3500 Lamborn carnation plants up to Jan. 1, 1891, mostly on long stems. They were under an area of 801 square feet of glass." One cutting would hardly destroy two flowers of this variety, while with kinds that yield axillary buds, as Snowden, it would cause the loss of more than two flowers.

DEWITT BROS., Pa., make the following report through the "Florist:" 1330 Henzie plants from Nov. 1, 91, to Feb. 1, 92, produced 16218 flowers; making 12½ flowers per plant for three months, or a little over 4 florets per month for each plant.

Two collections of Grace Wilder plants in different houses, aggregating 2390 plants, from Sept. 1, '91, to Feb. 1, '92, yielded 23453 flowers. Averaging nearly 10 florets per plant for the ninty days, or 3 1-10 florets per month for each plant. The 3720 plants occupied 2319 square feet of bench room. They further said all the plants were in full blooming vigor on Feb. 1, 1892; they took no cuttings off the plants until after the first of the year, and then from but 3 to 5 cuttings from the most vigorous plants, and also that it is damaging to the quantity of holiday bloom of plants to take cuttings earlier,

J. G. BURROWS, N. Y.—"I have a house 84x10 set with 970 Lamborn carnation plants; from Sept. 15 to Jan. 15, '92, I picked 13257 flowers, two thirds on long stems." No report of the cuttings taken. Averages 30 florets per plant, 40 florets per superficial foot room, and 1½ plant per foot." No variety is as small, or as terminal in its buds and bloom as this, and would bear to be set much closer.

J. C. HOAG, Ohio,—"From 1100 plants up to Jan. 1, 1892, I cut 8575 long and short stem bloom."

GEORGE SMITH, Vermont.—"I cut 15000 flowers from 800 Grace Wilder plants in one season." No report of cuttings taken, averaging near 20 florets per plant.

E. SWAYNE, Pa.—"I cut 190 flowers from a single plant of "Aurora" during the season of 1890-91."

WM. NICHOLSON, Mass.—"From Sept. 1, '90 to Sept. 1, '91, one house of 1700 plants yielded me 121250 marketable flowers, beside about 10000 cuttings. The varieties were Anna Webb, Mrs. Mangold, Mrs. Fisher, Century, Tidal Wave, Wilder, Portia, etc." This is for a very long season, and on the basis of estimates averages 83 flowers per plant. "This same house filled with 1800 Hectors and the other improved plants up to Jan. 1, 1892, has yielded me 30000 bloom.".

B. W. ORR, Illinois,—"I have just counted, Feb. 10, '92, 75 buds and bloom on an average plant of Tendress; last winter one plant had 125 buds and bloom on at one time."

JOSEPH RENARD, Pa.—"I have kept this record: 400 superficial feet of bench filled with Portia from Oct. 1, to Jan 1, 1892 yielded 17250 flowers;—from 160 feet of bench room planted with J. J. Harrison, I cut 8025 bloom. I also took from the three benches in that time 35000 cuttings."

This would average, without cuttings 60 Portia flowers, 50 Silver Spray flowers and 50 J. J. Harrison florets per foot of bench surface. This estimate is for half the season and the cuttings not estimated; surface yield must not be confounded with plant yield.

A sworn statement of C. Akhurst, foreman for H. E. Chitty, N. J. says: in Nov. and Dec. 1891, and in January 27 days of Feb. 1892, I cut off of 3840 Lizzie McGowen plants, 60550 flowers and during the same time took off the same plants 50000 cuttings. The plants occupied 1100 feet of bench surface. Not estimating the loss from the cuttings it would average about 16 flowers per plant for nearly half the season, or at the rate of 4 flowers per plant per month, and 55½ florets per square foot of bench room or 111 flowers per foot of bench room for the season. (This latter seems a ltttle high and I may have mistaken the figures.) Adding the cuttings to the florets it would make 26 florets per plant for the time, or 52 for the season, or 7½ flowers per month and 3½ plants per square foot of bench room. Thousands of men are engaged and much capital invested in growing carnations, notwithstanding there never has been a standard of what constitutes a crop of bloom. A farmer knows how many bushels of wheat or corn constitutes a full crop. Carnation growers have never known how many florets per plant or superficial foot of bench room they should receive for a full crop. Growers have been harvesting their crop of flowers with seeming satisfaction; at the same time not knowing that they were only receiving half the capabilities of the plants. Plants range in sterility of bloom from the loss of a single flower to absolute barrenness.

Mr. Winterstatter's tabulation of bloom is very complete. The other reports are defective. The cuttings taken from a plant is a factor to be considered under the present system of treatment. Mr. Wight stated at the Philadelphia convention of the American Carnation Society that in "some varieties every cutting taken cost him ten cents in bloom sacrificed;" some of the reports are for a part of the season only, and no cuttings mentioned. The best deductions I can make from the foregoing, and other records not quoted is; 49 florets per plant for the season, 5 per month, 75 per foot bench room, and many varieties counted in the estimate.

"AMERICAN FLAG." The most distinctly marked Stripe Carnation in cultivation. A sport of Portia, and originated with Bergman, of N. J.

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NEW SEEDLING CARNATIONS!

Of '89, '90 and '91.

Lavinia—Large Scarlet, very double flowers on long stems, thrifty grower, very fragrant.
Ramoa—Dark red, striped with white strong grower, flowers on long stems. very fragrant.
Sunflower—Yellow, striped with red, dwarf, strong plants, free bloomer.
Buster—Dark red, flowers very large, freely produced, healthy plants.
Piru—White; strong grower, flowers on long stout stems, inclined to be dwarf. very fragrant.
Adelaide—Satiny pink; very large double bloom.
Goldsmith—Color, a rich yellow, the edges striped with red, flowers of large size, long stout stems, vigorous growers and free.
Marvel—Color, a dark pink, shaded with cream, flowers on long stems, healthy grower, very fragrant.
Jennie Parker—Dark pink, changing with age to a pale pink; free bloomer. healthy grower, very fragrant.
Ideal—White edges, striped with red; free bloomer, vigorous grower.
Majesty—A rich dark pink, very double, thrifty grower, very fragrant.
Wide-awake—Dark red, strong flower, free bloomer.
Evangeline—White, striped with red, free bloomer, healthy grower.
Paradise—Bright red, flowers on long stout stems, free bloomer, strong grower, very fragrant.
Oona—Dark rich pink, large, free bloomer, strong healthy grower, fragrant.
White Cap—Pure white, large blooms, very double, strong healthy grower, free bloomer, very fragrant.
Avalanche—Dark pink, free bloomer, thrifty grower, very fragrant.
Romance—Large, bright red, thrifty grower, free bloomer, very fragrant.

Each plant 25 cents, whole collection, $3.00.

Leroy—Rich deep red, vigorous grower.
Mary—Deep scarlet, free bloomer.
Alexandria—Dark red, large, strong grower.
Lessetta—White, striped with red, very fragrant.
Lora—White, striped with red, stout, long stems.
Mabel—Rich pink, free and fragrant.

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These Carnations have been carefully selected from thousands of seedings. If you want larger Carnations which are not in this list, I have them three or four inches in diameter. Send for them.

S. LENTON, Carnation Grower, Piru City, Ventura County, California.

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