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About the Institute
The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

~~[illegible]~~ Foreword -

No gardener of today can set about the writing of any book on daffodils without knowing immediately his debt to all those who have gone before him. This is most true in this book wherein are set down only such matters as the writer has found in the years of his gardening both in the garden and in the library. Indeed there is no virtue in the writing except as it represents the harvest of his own experience for if one searches through all that has been written in ~~the~~ books and in scattered periodicals he will find most of what is here, ~~[illegible]~~ has been recorded. ¶ The list of books ~~[illegible]~~ given at the end of the text cover most of the sources. There is no adequate way of listing the magazine references. ¶ It is difficult also to estimate the influence of living workers who have contributed by spoken word and friendly letter. The writer's ~~particular~~ gratitude is given to ~~[illegible]~~ Mr. F. Herbert Chapman of Rye England for his friendly advice and especially to Mr Guy L. Wilson of Broughshane, Ireland who has shared so generously his knowledge & his vision.

To many friends in America, to Mr. Sherman R. Duffy, Mr. Sydney B. Mitchell, to Mr John C Wister ~~[illegible]~~ to Miss Mary Bristol + Miss Florence Thompson

who have shared their gardens and their garden experience and to the many garden clubs upon whom have been tried ~~listened to~~ the writer's growing enthusiasms, my thanks are due. To all, my debt is gladly acknowledged. Special thanks must be recorded for the help given by the assistants in the United States Department of Agriculture Library who have helped greatly with daffodils matters in old books and last but not least to Doris King who has insisted that what we have here be set down against the day when newer daffodils and greater knowledge shall require a worthier text.

What you will find then is the harvest of personal experience unless particularly noted and must be valued, it is hoped, more as an inspiration for other personal adventures than as a horticultural pronouncement beyond revision or addition! You are urged, therefore, to know and love the daffodil, which love will bring you more than any book can hope.

CHAPTER I.

Now that the world has come to be so small a place, the gardener profits with the rest of mankind in the wealth of materials at his disposal. He need no longer look to his own immediate countryside for plants to fill his borders and populate his dooryards. Indeed, it is almost breath-taking to consider what may be his if he wishes, and yet how often he grumbles for some desired but as yet unobtained treasure. From the proverbial four corners of the earth and the islands of the sea, are gathered various wild things to become the pampered inhabitants of his domain and from the older civilizations come the heritage of other gardeners, their cherished hybrids and selections, offspring of their vision and their toil.

It should be with reverent heart, then, that one looks at the narcissus of today, that need no longer be hunted as a wild thing to be newly tamed, for it is rather the fruit of many mens' lives and work, bound up with devious and often obscure history even in the last century.

It is not possible to trace with perfect certainty all the steps in the development of this plant that now bids fair to take a serious place among the most cultivated flowers of the world. The legend that gives the plant its name comes down from classical antiquity, so long ago that the modern youth smiles a bit to think of that anguished and conceited lover who pined away from gazing at his own loveliness, to be memorialized in the sweet-scented poet's narcissus that we still cherish. Other allusions of that time give us fragmentary mention that tell of other plants known to the ancients, properly belonging to our modern narcissus, and still others that we

know are merely related.

In the oldest books we find usually some form of the poet's narcissus illustrated under that name, with various pseudonarcissus for its neighbors. These are nearly always the single and double trumpet narcissus of yellow color and such lineaments as to suggest the forerunners of our modern yellow trumpets.

It is not until about the time of Turner and Lobel that we find the group of true narcissus growing into proper order, with many examples of the tazetta group, now known best, and almost solely, by the familiar Paper White of winter forcing, other examples of the trumpet section, various jonquils that we still love in the familiar campanelles, angels tears, and hoop petticoats, still elusive in our gardens, and other strangely named sorts, once believed to be species but later to be proven, by Dean Hubert to be natural hybrids.

It is interesting to the modern gardener to turn the pages of these old herbals and see how even then fashion played its part. About 1600 the varieties of tazetta narcissus outnumbered all the rest in notice. Every variation of shape and hue and doubling are recorded in these exotic plants of heady fragrance that were brought back from Asia Minor to the horticultural centers of Europe. Of dubious hardiness, they profited by the pains needed to keep them in health and won from the gardeners of that time a devotion they may not have merited. In the cold climates of Northern Europe they suffered as they do for us from their habit of growing in midwinter and of flowering at a time no reasonable plant should try to flower with us. Whether the day will come again when enthusiastic gardeners in our own southern and Pacific Coast states will search out these

plants and breed a new race, remains to be seen. At any rate, they are not for the northern gardener, and need not be, for he has mated them with hardier plants and founded another strain that has kept much of their peculiar charm. But of this more hereafter.

In the really old books, those before 1550, therefore, we find little that is strictly comparable with the many plants we know so well. The barest foreshadowings of white trumpets, of Leedsii and Incomparabilis sorts, of triandrus hybrids, may be found, but little more.

The work of Dean Herbert, who busied himself with studies of hybrid plants is the next important episode in the history of the narcissus, although it was not recognized immediately in England. With his keen intuition, he realized that many of the short-cupped forms that we have in such abundance might well be the results of a natural hybridization between the trumpet and the poeticus forms that grew together in many parts of Europe. Setting himself the task of producing these forms artifically, he mated the various pairs he believed to be the original parents and found on rearing the resulting seedlings that his conjectures were correct. After duly recording his findings, he let the matter drop as he was not concerned with garden flowers but merely with facts.

In the haphazard way that the world wags, it was not until (1856) years later that other workers took our flower in hand and mated it with a view to producing new plants that should be garden plants of interest and beauty. There may have been others, but for us have come down chiefly the names of two men _____Leeds and William Backhouse, who worked as amateurs with little thought beyond their own handiwork and probably with no dream of the mighty influence to

be set in motion by their work.

The little gardener of today, the true amateur, in the most explicit sense of that word, might well take heart from the story of Leeds and William Backhouse, the one a cloth merchant and the other a banker, who unwittingly spent their precious leisure for us. From their gardens came many plants that have faded into history, even into hearsay, but also some that are still grown in commercial quantities.

Is it not an amazing thought that Emperor, which we buy casually by the hundred today in all places where such plants are bought and sold, was created in before 1865 at a single bulb which by division alone has become millions and by commerce and exchange has been carried about the temperate earth? For what appalling moralizing this might serve as text!

About the same time, two other patron saints of the narcissus were busying themselves in its behalf, independently at first but later with community of interest. William Bayard Hartland was hunting through the countryside in Ireland and Peter Barr in England for whatever they could find, asking for such history as could be given but insisting upon no more than the flowers themselves. Probably we shall never know the full record of these years, the personal adventures of either man that came to fruit about 1884 in the first daffodil catalog of any importance. As compared to the commercial list of today, or to the even more momentous list of the modern narcissus specialist, how slight those first offerings seem now and yet how freighted with importance they really were, for in them, beside the printed pages, was caught the enthusiasm

and personal fire that was to bring the narcissus out of its minor place among garden flowers until it achieved what derisive gardeners are likely to call a cult.

Perhaps, in a worldly way, the influence of Peter Barr went farther than that of any other person of that time, for although he was chiefly a grower of narcissus and not a creator of new sorts, he was their most ardent champion, and, in season and out, at home and abroad (for his travels took him in time about the world and everywhere) the praise of the narcissus was sung.

He, too, is given credit for having rescued the work of Leeds & Backhouse at the time when ___ died and his collection seemed likely to be lost. He, too, was active in creating that early group of patrons who stood behind the work of the young English rector, George Herbert Engleheart, later to become the leading hybridist of this plant. Through his hands and his nursery, how many of the earliest plants have passed, the foundation of today's garden wealth.

It should not be imagined, of course, that Great Britain alone concerned itself with this plant. The pages of the three Daffodil Yearbooks published by the Royal Horticultural Society in 1913, 1914, and 1915, under the kindly guidance of the late Reverend Joseph Jacob, the later friendly protagonist of the daffodil, give proper recognition of the work of de Graaff, van Waveren, Krelage, Vis and others but whether with entire justice or not, quite probably not, since popular beliefs are often inaccurate, the tradition that the daffodil is essentially British in character has been well established.

There is, therefore, a singular and happy fitness that we in America should be building a national affection for this plant that is not indigenous to our continent but has become so firmly es-

tablished here, even from Colonial times. With what pleasurable thoughts do we see today, coming up from old Virginia and Maryland gardens and plantations, hampers of flowers of daffodils that have long since been forgotten in garden circles, spurius, with its twisted sulfur petals, albicans with its ivory swan's neck flowers, poeticus a plenty, and biflorus, that ancient wild hybrid, finally run to earth in Spain!

Of the years between Engleheart's first work and the present day, what can be said in a little space? Almost nothing that would be adequate without filling too many pages. Let it be enough, then, to say that the stream of daffodils is unending, almost unbroken; that their development covers the lives and endeavors of many individuals, some of worldly importance, some of obscurity, and that as some workers have gone on to other Elysian fields, new workers have appeared to carry on.

The gardener of today stands then with the inheritance of many years, of many loves.

Chapter II.

What is this plant? Whence did it come and how has it established itself so in the garden world? What qualities of permanence have helped it to survive? What forms does it take in its several ancient homes?

Lapsing into the vocabulary of the horticulturist, it is an herbaceous, bulbous plant of the great Amaryllis Family with its center of distribution on the continent of Europe and its outposts on the northern shore of Africa, and through Asia Minor into the Orient in China and in Japan. How far the original limits of

its occurrence have been widened by man, we may never know, but if man has helped, we must set it down to his love of beauty since it offers him no food, either in root or shoot. Unlike the onion, another omnipresent herbaceous bulb, but of the Lily Family (to be sure), it cannot be eaten in safety by either man or beast, due not so much to any active poisonous principles but to the toxic effect of certain crystals found in its sap, sometimes the cause of a sort of skin irritation to some individuals.

Let us imagine, rather, that the ancients as well as we enjoyed its spring bravery, its amazing color, crowding out on the heels of winter, its delicacy of scent and its tolerance of man-made gardens.

As to its survival, no explanation can be complete, perhaps, but the fact that it is a bulb with a short growing season and a robust structure may offer sufficient reason for our purpose. Unlike the lily with its loose scaled and easily broken bulb, or the tulip with its bulb that must be renewed entire each season, the narcissus has a compact bulb with enough vitality to survive if it should be burned over or frozen off, feeding on itself until another and happier spring. Only repeated cultivation, with deep burial, repeated defoliation, or actual cutting to pieces of the bulbs, can vanquish this hardy plant and both ploughing and harrowing are controlled by man and follow his civilization. There is an interesting paper by Marianne Bleier-Krupa that touches on this very point that and among other things shows how the poet's narcissus in the Alps has been driven about and marooned in various isolated stations by man's intrusion with cultivation and mowing.

This very endurance endears the narcissus to the small

gardener who must have in his garden a majority of plants that need not be cosseted with the annual cares of planting and setting. Indeed, in time the gardener comes to a special affection for these long-suffering bulbs that will permit a year or two of neglect in the proper cycle of their cultivation and that will, indeed, continue to live, if not to flower, after many years of abandonment and neglect, awaiting eventual rescue.

As might be expected of any plant that occurs over so great an area, with such varying climates, the narcissus shows many forms.

Abandoning for the present the variations that have arisen from hybridization, either natural or planned, we find possibly seven very distinct forms. Most abundantly are known the types that we now call the poet's narcissus and the trumpet narcissus, both on the continent of Europe and overlapping in range with the poet's narcissus, though however more eastward in extent, common through Italy and Southern France and Spain, and ascending into the Swiss Alps (Tyrol) and across into Western France, and the trumpet narcissus, more common in Spain, extending eastward into the range of the poet's narcissus and northward, even across into Britain.

In Italy and Southern France one finds the true jonquils with their rush-like leaves and clusters of golden-yellow, heavy-scented flowers, extending eastward to Greece and westward into Spain and represented on the northern shore of Africa by their outlying cousins serotinus and elegans etc., also gracilis, tenuoir

Northern Africa also harbors the curious hoop petticoats (N. bulbicodium and its forms) that cross the Mediterranean into

Spain, that particular haven of odd species, most of them sharp variants from, but relatives of, the common trumpet. Here we find the delicate Angels' Tears (N. triandrus), linked in modern daffodil history with the indefatigable Peter Barr who rediscovered it; its beautiful forms, pulchellus and calathinus of even more localized occurrence; and the amazing N. cyclamineus which is a small trumpet orthodox in every respect save for its perianth segments that are laid straight back from the trumpet, giving a curious and unforgettable appearance.

To the east one must turn for the last division of the group, the bunch-flowered tazettas, pushing up with autumn rains and flowering in mid-winter, flowers known to ancient Greece and the Pharaohs and beloved by China and today in Japan.

Among this company, yellow and white are the only colors, save one rare and difficult green-flowered species and the rim of crimson to be found on the edge of the cup of the poet's narcissus.

This, then, was the material to which the garden workers of the past have set their hands, combining and recombining until we have the garden varieties of today, so numerous and so beautiful that the meager beginnings are in fair way of being forgotten. The perfections that have come have been much like those sought for in any program of horticultural improvement, increase of vigor, of hardiness, of size, of perfection of flower, of pattern and color, of variation in form, of season of bloom.

Chapter 3

If one considers the botanical history of a garden flower, and gardeners today are coming to have a deep desire to know their plants from as many angles as possible, one finds as interesting a history as in the study from a gardener's point of view.

In the ancient days, of course, before botany had become botany as we know and use it now, narcissus were only narcissus with long descriptive names that labelled them after a fashion but failed to give the neat documentative labels so dear to the heart of the taxonimist and so useful to the gardener if he will but listen.

Unfinished

CHAPTER 4

Planting.

Two things concern the gardener whenever he sets about the planting of any flower in his garden and these two matters concern him still more vitally whenever he begins to plant in quantity. His first care must be that the plant will thrive, will lead a life of sume fullness; his second should be that his work be so planned that the plants in their living ~~make an effect that is agreeable to him and others.~~ yield as much of beauty as can be managed. There is a great tendency among beginners to think too little about providing food and quarters; there is often a tendency among specialists to over-emphasize feeding and maintenance at the expense of pictorial effect. For the amateur who labors in a small garden and about the fringes of his tiny place, both aspects of this planting game are of vital importance, the first, because he has no space to waste on the ailing or starved, and the second, because he must justify his labors with more than mere cultural successes, the fruit of which might often be bought more cheaply elsewhere.

First, then, let us consider the bill of fare. The narcissus, as has been pointed out before, has a wide range of natural occurrence over Europe, Asia, and a bit of northern Africa and is to be found flourishing in adopted homes both south of the equator and all over North America. As might be guessed from this, it is somewhat tolerant of soils and situations. It belongs to that great company of plants that are admirably suited by what are now known as circumneutral soils, the soils that may be just a little acid or a bit alkaline in their reactions. If one were to push the scale in either direction it is probable that they would more happily tolerate increased acidity than alkalinity. Certainly, in the writer's garden where various but always definite de-

grees of acidity are found, they have given no signs of despondency.

Like other plants that are provided with bulbs or similar adaptations for storage, the narcissus is able to endure some vicissitudes and persist through lean years and fat, through flood and drought, against that millenial time when its life will have the care and tending of an amateur devoted to daffodils. For this reason it will survive with the hasty planting which results from a too implicit belief in "any good garden soil" - a most flexible term which may be swayed to suit the temper and industry of the owner. For this reason, too, it will survive, year after year, where it has exhausted most of the plant food within reach of the roots and where neglectful owners fail to top dress it, much less lift and refeed. Jesting aside, a good garden soil is precisely what the daffodil likes, and this "good" garden soil should be one in which the soil is deep (meaning eighteen inches); porous, so that both soil-moisture and rainwater will move through it swiftly enough that it is never sodden and yet not so quickly that the earth crumbles to dust; and provided with the food that the plants need for their growth and increase.

All of these matters lie within the control of the gardener. If they do not exist naturally in his land he can, by real exertion, bring them about.

Only unbelievable rock strata or hardpan can prevent depth in the soil for high water tables can be drained and lowered and hardpan can be broken so that the soil built up above it will have a chance to normal movements of the soil water through it. It may come finally to a matter of digging, double digging, or trenching which are matters of good gardening rather than narcissus culture.

Suffice it to say that narcissus feed in the soil below their bulbs. There is the place the food must be in greatest abundance and this layer is normally at least ten inches to fourteen inches below the surface of the soil, and if the gardener's enthusiasm will make it a full eighteen inches, so much the better.

The porosity of the soil may be managed in the usual ways. Sandy soils suffer from too great porosity, clay soils from too little. The old and often repeated advise to mix the soil with its opposite element, can be repeated here once more. To the mixture in either case, should be added some material to increase the humus supply since by this the moisture content of the soil is most easily increased. The residue from well decayed manures, leaf soils, vegetable composts, are all suitable for this purpose and if they are available only in limited quantities, it must be urged again that they be placed under the bulbs, in the layer which will surround the roots and not about the bulbs themselves. In heavy soils it will not be enough, however, to make a suitable soil for the planting area. Here one must see to it that this area of perfection does not become a sort of miniature dry well into which water flows but from which it cannot escape freely. Some sort of drainage away from the plot must be provided as water which comes too close to the basal plates of the bulbs for too long periods harms the plates themselves and often injures the roots as well.

The food that is to be given is another matter. For the average gardener, bonemeal and leaf compost make the very best and safest foods. If the planting area is dug out and the soil in

the bottom thoroughly mixed with enough leaf compost so that its complection is conspicuously darkened and then is further fortified with a liberal dusting of ground bone which in turn is well mixed through the food layer, he may rest content that his plants will thrive.

Where the bulbs are grown in rows in the cutting garden or on the edges of the vegetable garden, or better still in a garden of their very own, the soil to be planted should be heavily manured with cow manure in the fall before planting, dug over loosely, planted to early potatoes, given a summer green manure like cow peas, redug in the early fall and then, in the second autumn, planted to the daffodils after a supplementary dusting of bonemeal. Such a program involves the alternate use of two plots of land and is therefore beyond the scope of many gardens. If cow manure, so old that it no longer resembles cow manure but looks like marvellous black soil, is to be had , this may be put as a layer in the bottom of deep trenches in the planting area, covered with four inches of unmixed garden soil and the bulbs set on this. In this way no manure touches the bulbs and ~~the old manure is so spent that it does~~ is done no harm to such roots as grow down into it.

It has been the good fortune of the writer to have cow manure of any sort only once or twice since he has been growing daffodils. Leaf soil and bonemeal have been plentiful and while there is no question that the daffodils grown in the manured trench were a bit finer than the others, the difference was not so great as to be lamented.

Obviously, extensive soil preparations can be given with the greatest ease in areas where the daffodil is grown as a crop. In

the garden borders this cannot be arranged and the bulbs must depend upon the top dressings that are given them in common with the other inhabitants and upon the ground as it is remade from time to time. For the plantations that are made under shrubs or trees or in deep grass, with the intent of simulating natural growths, it is necessary to prepare the soil with as great care as for the special garden trenches, for the flesh is weak and only he who has tried to lift and reset bulbs from naturalized plantings can appreciate the task involved. This is particularly so since, by the time digging is possible, the leaves of the bulbs are rather well dried off and the limits of the plantings are not so clear with the result that many bulbs are either cut or missed and the whole place becomes a scene of general havoc for the remainder of the summer. Because of this and since the bulbs must compete with the roots of trees and woodland herbs for food and moisture, the first preparations should be made with more than good conscience and the site should be given an annual dressing of bonemeal. In rock gardens, narcissus are not much employed as they are too gross for the scale of the garden with the exception of some of the small species. For these, soil which is rich in humus and well supplied with gritty sand a bit of bonemeal will answer all requirements. As a rock garden is, in spite of its pretensions to naturalistic appearance, amost artificial affair, there is no reasonable excuse for not providing proper and adequate food for these narcissus except the inertia of the owner!

Within the group of species and garden varieties, there are some individuals, however, that will not respond to the usual garden treatment with any degree of success. One rarely meets

the gorgeous old yellow trumpet, Maximus, merely because it was so indifferent in its performance as a garden flower. Its preferences for a mild climate, a deep, rich, and moist soil, are rarely satisfied and so the bulbs merely live on as they do in my own garden, yielding an occasional flower of unbelievably rich yellow. Its indifferent behavior is not so lamentable now as once, for other yellow trumpets of that type are to be had with far more stamina, though King Alfred, the most familiar and abundant example, is not a perfect flower in many gardens. Quite aside from the color of its flowers, which to some eyes appear a bit raw, the plant has a way of skipping years in its flowering. The season of 1927 was a case in point, with very few King Alfreds save from newly planted bulbs brought from other localities. Hereabouts, the summer and fall of 1926 were particularly dry and inauspicious for its growth. Some bulbs that I lifted were most indifferent in their development so that this flowerless spring was not a surprise, yet some of these same bulbs which had been divided as much as possible, were lifted in the fall of 1927 and all had developed into splendid round bulbs quite large enough to flower in 1928. The period that year while the bulbs were growing was one in which there was ample rain rather distributed throughout. For that reason it will pay, whenever possible, to plant the bulbs of those trumpet narcissus which are deeply self yellow in a moist part of the garden where the soil will be well drained and warm as well. All the poeticus sorts are helped by a little extra moisture in the soil, though their performance is not so conspicuously affected as the trumpets save in the case of the notorious double poeticus which flowers so late in the season that if not favored with a very moist soil

and some shade will reward you annually with blasted flowers. Akin to the poets are some of the newer Leedsii sorts that resemble them but have little or no color in the cup save the green deep in the throat. There are all likely to be late flowering. Emerald Eye gives blasted flowers in some seasons and Moonbeam less frequently. White Stranger, a seedling from Moonbeam, has been in my garden ~~two~~ several growing seasons now and has never opened its flowers, although the bulbs are lusty in growth and have made excellent increase. This fall it goes to the bottom of the garden slope and will be given two years more in which to redeem its bad behavior, else it goes off into the woods. (Fortunately for it the rainy spring of 1929 has saved its life and brought out its flowers to perfection.) Having all this in mind, Idris, Samaria, Silver Salver and even Silver Plane are all planted in the lower garden with the result that all flowered well and appeared to be happy. ~~Silver Plane~~ Even is comparatively early for this type of flower and so escapes the ill effects of our later heat.

The amount of moisture in the soil apparently affects the amount of bloom one gets from his bulbs, the length of stems, and the size of the bulbs produced. This last does not ~~interest~~ concern the home gardener, only the dealer, for customers like to buy large bulbs even if they know that small, firm bulbs may have as great vigor and will produce as many and as fine flowers as larger bulbs. The home gardener, however, wants as many flowers as possible and with as long stems as he may. A fairly even supply of rain throughout the year should insure a full blooming from bulbs that have reached flowering age. If a great drought comes on in late summer and early autumn, occasional waterings will fatten the bulbs by making food more

available and so produce more flowers. The time when extra water is needed for stems is, of course, the early growing season. I have never been able to equal the records of stem length published in the British descriptions but came nearest it this last season when we had a cold slow spring with enough rain and drizzle to make a poor counterfeit of the British weather. This, abetted by several copious waterings, produced stems of very fine dimensions but still far from the "walking sticks" which are often held as measures abroad. There is, of course, a great difference in the normal length of stem that each variety will produce and there is a cultural balance between the length of stems and the size of the flowers that should not be passed for the best effects either in the garden or in the house, so the gardener must use his discretion in the amount of supplementing of the natural precipitation that he brings about. Generally speaking, the more robust the flower, the greater height the stem should have. A fairly familiar example of a want of this is the Giant Leedsii, Her Grace, which carries a lovely flower on miserably short stems. Many of the white trumpet varieties once offered suffered from this defect but the time is soon coming when they will all be abandoned for new sorts, larger, taller, and far more white.

Little has been done in the way of studying the effect of fertilizers by the writer, save as detailed in the preparation of the soil, and the annual top dressing of established and fairly permanent plantings with bonemeal. It is the practice of some growers to use a top dressing of manure in the fall, raking it off in the spring before the growths push through. This is probably safe, even desirable, but carries an element of risk so genuine that I should never try it.

Various experiments have been carried on by the British, especially with varieties grown under field culture for the production of cut flowers for the market trade. Their findings were published first (1925) as a leaflet of the Cornwall Education Committee and later appeared (1929) as Chapter XXXV in "Daffodil Growing" by Albert F. Calvert. The experiments reported on by H. W. Abbiss, Horticultural Superintendent, Cornwall County Council, involved a limited number of varieties, Ornatus, Golden Spur, and Emperor. The fertilizers used were not identical for each variety, but showed that there was the greatest increase in bulb weight after one year for the variety Ornatus with a fertilization of 11 cwts. bonemeal per A.; for Golden Spur with 7 cwts. of Peruvian guano. After two years Ornatus gave the greatest weight increase from a mixture of 6 cwt. complete manure and 30 cwt. lime, while for Emperor, under the same conditions, a dressing of 29 cwt. lime per A. tied the highest weight of bulbs produced with the dressing of 7 cwt. complete manure. The complete manure in all cases consisted of 2½ cwt. Peruvian guano, 2½ cwt. 30% superphosphate, 1½ cwt. sulphate of potash, 3 cwt. basic slag (applied separately).

As the experimenters were interested both in bulb and flower production, the results were examined as to the proportion of types of bulbs produced, mother, round, and chip, and the best readings were found to be those from the complete manure as far as bulb production was concerned but slightly better from the flower standpoint in the plots fertilized with complete manure and kainit, and dissolved raw bone and kainit.

The experiment with nitrogenous dressings in the spring indicated that light dressings of nitrate of soda or ammonium sulphate, up to 1 cwt. per A., applied just at flowering, will give longer stems and better colored flowers, but that amounts above that reduce bulb production.

In any case, the American grower should proceed with the same caution in making his own experiments until he has learned just what results are best under his conditions.

Where narcissus are grown in quantity under field conditions, which sometimes happens in the amateur's cutting garden, it is difficult to know just what to do with the plot to prevent the growth of weeds after the foliage has ripened. In my own case this has been solved by the planting of cowpeas. As soon as the foliage has commenced to be flabby, the bulbs, planted in rows, are given their last cultivation with a scuffle hoe. The leaves are then laid so that they fall in the line rather than across the spaces, and cow peas are sown rather sparingly between the rows of bulbs. The seeds come up quickly in warm weather, and there is no value in planting them until the weather is warm. They make a great mass of foliage and allow few weeds to reach the light and air. As soon as they are frosted they may be cut down with a scythe and the tops left as a loose mulch through the winter. The broad, rather thin leaves disintegrate very quickly and add only an inconsiderable amount of humus to the top soil, but the stalks and coarse petioles do not decay quickly and must be raked off as of course nothing can be dug in without hurting the bulbs. The chief value of the crop is as a weed preventitive but some nitrogen is left in the soil by the root bacteria.

As the plants come through the soil, the top layers should be kept in good tilth to facilitate the absorption of all the rain that falls and to prevent its loss by evaporation.

In the flower border there is no need for such a scheme for the other plants in the border serve in the stead of the cow peas. The only caution required in the border is that the narcissus be not surrounded too closely by plants with too greedy roots. The

overshading by other plants that works such havoc with flower bud formation in iris does not seem to affect narcissus, but the bulbs must not be overplanted with deep-rooted annuals nor crowded by rampant perennials.

As to how the bulbs should be arranged to best advantage in the design of the planting, very little can be said more than rather irritating generalizations. Like other bulbs, they may be bedded in solid display, dotted through the borders in clumps of various sizes, planted in great sweeps or even armies in open wood or meadow, or used as lines in the edges of formal garden plots. I have no use for this last, and much prefer the stiff tulip for such purposes, chiefly because the narcissus carries its flowers at various angles to the stem and has, therefore, back, front, and profiles to be taken into account. The tulip, which one considers mostly from its regular silhouette, is a much better unit of design for such a treatment as it will appear relatively the same from all points of view, whereas the narcissus that prefers to turn its face more or less uniformly toward the sun will give ugly views from certain points. In addition it makes too great a mass of foliage after flowering, foliage which must be preserved if the bulb is to make its best growth. I can offer no defense for not liking beds of daffodils. They give me no thrill and yet a field of daffodils, even one of a commercial sort, is an unbelievably moving sight. From a practical point of view, the chief objection to such bedding is that the bulbs have to be lifted and heeled into temporary quarters to ripen off, in order that the bed may be quickly filled with other flowering plants. As for clumps in borders, that is another matter. Here, there is but one caution as far as planting

is concerned, and that is, do not make all the clumps of the same size unless the border is extremely formal. In the matter of combining varieties, the arrangement of sequences, and the like, much might be said; but this depends largely upon what you have to work with and so differs in each garden. On general principles, the varieties which are strongly yellow in effect are more striking than the whites, as these are distinctly chilly in frosty April, and the red-cupped varieties are too easily spoiled by the sunlight. The same sort of advice must follow in the design of planting areas in woods or fields. Above all, avoid all suggestion of rows and never have all the clumps the same size. This sounds very easy and obvious but on chilly autumn days when feet grow both cold and sleepy and hands numb, there is a fatal tendency to avoid the making of the small holes to harbor the solitary bulb or the pair, that should fringe the borders of the larger drifts. The larger planting areas should be so arranged, in relation to any paths that pass through them, so that they almost parallel the path or at most give pleasant oblique lines but rarely a right angle. If one has a choice in the matter, such plantings look better on slopes above the path so that one looks up a little into the faces of the flowers. In a small bit of woods, where I have daffodils that have outlived their interest in the garden, there is such a planting on a south slope. Here, between the slender dogwoods, are hundreds of bulbs with flowers that turn their faces toward the sun. The result is that those above the path are in full view while those below it show their backs, not unbeautiful as the sun shines through the translucent petals, but not so shining as their higher neighbors.

Here, as in the borders, there is much room for variation in the choice of varieties. As I have confessed before, my own small woodland planting is an overflow from the garden and is not a sure criterion of taste in such matters. There White Lady, Lucifer, Barri conspicuus, Autocrat, Figaro, Emperor, Sir Watkin, Minnie Hume, Mrs. Langtry, Empress, and even Elvira have lived for years without relifting; making small increase to be sure, but flowering annually. There is a sort of unity obtained from the fact that Emperor and Barri conspicuus are the two most numerous varieties and as they follow one another in opening, there is no great conflict in effect. In the poorer soil, Emperor comes smaller than in the garden and possibly a little more regularly formed; but the more graceful flowers are certainly the sorts with the smaller cups.

Planting:

For flowers.

For garden effect - Rockeries - Borders.

For naturalistic effects.

Requirements for special sorts.

Late flowering - poeticus and close derivatives - moisture

Note --- Moonbeam, White Stranger, Emerald Eye, etc.

Effect of extra moisture on flowering.

Amount

Length of stem.

Size of bulbs (value in commercial culture)

Fertilizers.

Experiments with fertilizers (chiefly British)

Cover crops - Field and Border.

If one were tempted to color schemes -

Prospector, King Alfred, Monarch, Moonlight.

Chap. V.

Difficulties — Basal rot — Lesser + Major Daff-flies — Yellow stripe — mites — nematode —

not written.

CHAPTER 6

Propagation.

For every plant the gardener grows, arises sooner or later the question of propagation and each plant must be examined to discover which of the time-honored practices is most suited to its health and habits. To be sure this business of propagation is usually left to the nurserymen but it often happens that the amateur is concerned with it in small ways either for increasing his own plantings or for getting plants to share with friends. Of the artificial methods of increase that men have devised for the multiplication of some plants, there is no possible use here; for budding and grafting, the making of cuttings and layers, are all reserved for woody or somewhat woody plants. Only the natural practices of seeding and division remain. The former is not much used for narcissus except to secure new varieties and for the increase of species but the latter is the common practice.

Because it is the usual method of propagation, let us have it first and leave the raising of seedlings until later, reversing the order for the sake of the advantage that it will give in a more reasonable transition to the discussion of hybridization which inevitably involves the rearing of seedlings.

Under ordinary circumstances, the amateur is not particularly concerned with mass production of plants he grows. There are, however, many plants in which the natural increase is of such a nature, and often of such volume, that he must understand it and handle the plants very much asddoes the commercial grower. Narcissus come in this group.

A brief discussion of the structure of the bulb will assist in understanding the nature of its increase. A dormant bulb as purchased from the dealer or as dug from the garden, will show at its top the remains of one or more leaf clusters and in many cases the dried tip of last year's flowering stalk which is neatly articulated. Over the body of the bulb are various layers of brown, dried, membranous coverings which are easily detached until inner layers of firm white flesh are exposed. At the base is a hard, disc-like body from which hang down the vestiges of last year's roots, and about which are the scars both of former roots and former coverings. This is known as the "basal plate" while the dormant shoots at the top are called "noses".

Morphologically the narcissus bulb is known as a "tunicated" bulb, that is, one in which the coats overlap one another closely and form a solid bulb.

This and other bulbs represent storage modifications of normal plants. The basal plate is all that remains of the stem and the overlapping bulb scales are modified leaves or leaf bases. The growing point of a simple bulb, one which has not yet started to divide, is, of course, in the center so that new scales, concentrically arranged about it, are constantly formed from the center and the outermost layers are pressed out until they die and are shed as thin skins. Branching, though not obvious in this type of plant, follows the same general scheme as in a typical plant. In the latter there are buds in the axils of the leaves which may or may not develop into shoots. The same is true for the narcissus. On the basal plate, the stem of this plant, there are buds which

form at the base of each scale. Some of these start to develop concentric circles of scale about themselves, the growing center pushing upward until a new "nose" appears at the top of the old bulb. At first this is the only indication of the new growth within but eventually this new shoot develops enough strength to burst the outermost covers of the old bulb and show as an offset still attached to the old basal plate. This takes several years to come about and the offset is often strong enough to produce a flower before it has separated itself from the old central parent bulb. In many cases even more than one such side shoot may reach flowering size before division of the outer coats. The flowers are apparently produced from the center of the growing points and are terminal or nearly so;but this is difficult to determine as the development of the secondary growths disturbs the arrangement of the bulbs so that the original positions do not show clearly. When growth has continued enough so that one or more offsets have burst the outer bulb coats and have developed adequate coats of their own, the old bulb is in a state to divide. If this is not done artificially, it will occur naturally as can be determined by lifting any old bulb that has long been neglected in the ground and has increased. On lifting it will fall apart into many separate bulbs, often pressed out of shape and poor in condition like those shown in the illustration. It is to hasten this division that is the aim of the gardener.

No means has been discovered to induce the formation of side bulbs except the use of the best practices of cultivation. If the bulbs are kept in vigorous health they will increase naturally. The question becomes then, how often may the bulbs be lifted and

divided. This is a matter of experience and experiment. The consensus of opinion at present seems to be that narcissus raised for the production of bulbs should be treated as a two-year crop. Under this system all bulbs are lifted every other year and such side bulbs as can be removed when the bulbs are dried, are separated and replanted for growing on into full-sized bulbs and the others sold or replanted as desired. In the case of very new and rare sorts the offsets are sometimes separated from the large bulbs by cutting through the basal plate with a very sharp knife. This is a dangerous practice for the beginner, however, as if pursued too diligently it is likely to affect the health and vigor of the stock.

In the home garden no such routine need be observed. Usually lifting the bulbs every third year will be sufficient and in many cases the work may be delayed until a fourth year if the ground is very fertile. The essential thing to be remembered is that the bulbs should be thoroughly dried as described in See page ? before any attempt is made to separate them and that they should be divided only as much as can be easily accomplished by pulling the bulbs apart with the hands.

It is obvious that the increase of such a plant as this is inevitably much slower than the increase of plants which may be artificially multiplied. The lily, which produces bulbils along its stem and which can be pulled to pieces, giving a bulb from each parent bulb scale, will soon produce a stock. The rose which can be cut into many buds, each of which, inserted on a growing stock, will give a whole new plant, each of which in

turn will give as many more, will soon produce a multitude of plants. The plant that abundantly produces seed that will reproduce its parent closely in all characteristics, far outstrips any other individual in multiplication. But the narcissus is a precious thing which must be waited for and this is the thought that the amateur must remember when he reads of the seemingly terrible prices that are asked for novelties, prices which represent not only the investments of the originator in parent bulbs, many of them expensive, but investments in time, the original years of seedling rearing, and then the slow increase of the stock of the selected seedling.

As an aside at this point, it may be recorded that the late Rev. Joseph Jacob pointed out that excessive multiplication of stock often resulted in a weakening of the bulbs which showed in poor growth and in an affection of the leaves commonly known as "yellow stripe". Certainly this does not appear in many bulbs and once present, apparently cannot be eradicated. In the writer's garden this has appeared in the following sorts: Czarina, Weardale Perfection, Mermaid, White Queen, Venetia, Irish Pearl Herod, Princeps

In each case it showed immediately the spring after purchase. In no case has it spread about nor are all members of the stock of the variety equally affected. The bulbs of Weardale Perfection have been the worst, with the possible exception of the Giant Leedsii, Czarina.

The leaves look as if faintly variegated with yellow. The surface of the leaf on close examination appears to be blistered as if with tiny pustules. These in time brown as if withered. This may also appear on the flower stalks. The bulbs, on digging, are ~~usually are~~ generally of poor quality, dirty-brown in color and of small size though usually firm and sound. I have experimented by moving the bulbs about into various soils and situations but have never succeeded in making a cure; although the symptoms have lessened when the bulbs ~~are~~ were planted in a rather poor, dry place. Whatever the difficulty, the bulbs rarely die and flowering continues almost abundantly as in others.

The digging of bulbs for harvest or division may safely commence as soon as the foliage has turned yellow to half its length. By this time the roots will have finished their active spring growth. In the garden, digging should be managed in whatever way is most convenient, u ually a digging fork proving the most satisfactory tool. The tops should not be pulled off as the bulbs are dug but should be allowed to dry naturally as should, also, the roots that are attached to the bases.

The freshly dug bulbs may lie in the garden for a short time if the sun is not hot. Then the loose earth should be shaken from them before they are carried into an open cool shed for drying. Wherever they are put, they must be evenly spread in shallow layers until they are entirely dry. If this is not done, the pile will heat and the bulbs be ruined. In some cases the bulbs actually decay, in others the flower buds within are spoiled. For the home grower, a shed or cellar will answer all purposes providing neither are damp. The bulbs should be examined frequently and turned if

necessary to insure even drying.

The actual time of digging will depend somewhat upon the season and the variety. Usually the end of June is time for most of the work to be finished in the winter's garden near Washington, D. C., but this season, 1930, when our spring was long and cool ~~with many rains~~, the foliage of a conspicuous number of varieties remained green far longer than usual so that some sorts could not be dug until well into July.

By August in ordinary seasons, the bulbs will be ready for a preliminary cleaning. This is a tiresome and dirty operation. One must handle every bulb, remove such dried coats as come off ~~easily~~ freely and the dried roots. If the offsets come off easily they may be pulled apart now but I prefer to leave this until just before planting time as the basal plates are even drier then and will break apart with less difficulty. Whatever the routine, it should all be completed before September because then the poeticus varieties should be replanted. They should be followed as soon as possible by all the rest getting in the poeticus-like Leedsii and Barrii varieties and the white trumpets before the others. In this way the bulbs will have ample time to make an ample root growth before the advent of cold weather.

At the time of the cleaning before planting, the bulbs should be sorted in order to have the flowering-sized bulbs together where they will make a uniform effect and the smaller bulbs in inconspicuous places or in nursery rows for growing on. In my own garden where the bulbs are grown in nursery rows for breeding purposes and cut-

ting, the largest bulbs are planted together and the smaller ones at the end of the same row. This spoils the effect at blossoming time, but as no special display is aimed at, there is no matter.

If the number of bulbs to be handled annually is large, it may pay the amateur to build a small shed for their curing and summer storage. He can then have as well the commercial type of trays, with legs, which fit above one another and pile up leaving spaces between each tray to insure aeration. This, with an adequate number of windows in the building, will insure safe curing.

As has been said before, the poeticus varieties must be attended to first and hurried back into the ground before there is any sign of softening of the bulbs. The white trumpets and some of the Giant Leedsii sorts are also impatient of long periods of storage. If there are any very small bulbs, either seedlings or offsets, they, too, should be returned to the soil as rapidly as possible, because they have not as many protective coats as more mature bulbs and so shrivel quickly.

From all this, one may see that the business is simple enough. After one has lived through it several seasons, it will fall into a routine of itself, fitting well the hand and skill of the gardener.

If one is raising flowers of the finest quality, lifting, dividing, and resetting should occur after two full growing seasons. If one is not interested in superlative flowers, three or even four seasons may pass before lifting is imperative. In plantations where the bulbs are practically naturalized, as in open woodland or

grassy meadows, they may remain much longer, especially if planted deeply in well prepared soil, for there the increase is relatively slow. In order to save oneself labor, different groups of narcissus can be lifted each year so that the burden of an entire collection need not be considered at once.

In replanting, always allow room for the development of the offsets or under-sized old bulbs. This will result in better bulbs at the next digging and better flowers meantime.

The rate of increase and the normal size of flowering bulbs varies somewhat according to the variety and greatly according to the type. In my own garden, the poeticus varieties and their allies, the small Leedsii and Barrii sorts, increase most rapidly, some almost too rapidly for comfort. Nearly all make admirable increase, indeed only one sort, Morning Glory, has grown indifferently and has behaved so much like the old Maximus as to make one wonder if that sort gave it both its gorgeous color and uncertain temper. Whatever the sort, give it ample room between the bulbs from the three inches for poets and their kin to the eight inches required by a trumpet or some of the newer Leedsii and Incomparabilis sorts that make huge bulbs, large enough to shelter any trumpet. Bear this in mind even when replanting old, crowded bulbs, starved and misshapen, for in one season in good soil they will be restored in the most astonishing way.

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Nearly every person who has raised [redacted] the ordinary perennials successfully from seed can grow narcissus as

well, if he will accept the routine of their cultivation. There is such a schedule for every plant but most do not require so great patience as this.

As has been said, the seed is ready, usually, in June and must be gathered carefully as it ripens since the seed capsules quickly dry out, burst, and drop the large shining, black seed on the ground. This is a calamity if the seed of the seed is resulting from a cross, and, except for species, little chance seed is worth sowing. Indeed, it is much safer to pick the capsule with a good stem attached as soon as there is the least sign of maturity, usually indicated by a yellowing of the pod; put it, stem end up, in a glass or box so that when the ripening is finished, the seed will fall into the container. This will make a wonderful and curious array on the table in the garden house or work shed, but a very precious one to the worker, who will impatiently await the dropping of the seed to count the number of chances he may have from each combination! During all this time of harvest, the greatest care must be given to the safekeeping of the labels, because there is nothing more irritating than an excellent seedling with a lost pedigree.

There is some difference of opinion as to how the seed should be handled after they are ripe but all growers are agreed that the seed must not be dried out before planting. The penalty for this is a year's delay in germination, a real punishment since so many years are required before flowering under the best conditions. The seed are perfectly hardy and may be sown directly out of doors in a soil rich in vegetable humus and in a location where the soil can be kept at a uniform degree of moisture. They should be covered

at least one inch and protected by a light mulch after freezing to prevent the heaving which accompanies thawing. If there is careful attention to prompt planting, several weeks delay being the limit, and to the uniformity of the moisture content of the soil, almost complete germination will follow the next spring.

In the rather brief experience of the writer, a somewhat different routine has been followed. Living in a region where the summers are often intensely hot and dry, and where the soil is naturally deficient in humus, the fundamental practice already outlined seemed unlikely to give favorable results. Furthermore, the seed resulting from each cross were often few in number, in some cases, unfortunately, only one, which of course assumed a possible value far greater than it merited. In order to insure the safety of each lot, and to give the best possible care, the seed were planted in pots of carefully prepared soil. These were half sunk in the earth in a deep frame located where they could not be forgotten, and watered as needed throughout the summer to keep them moist but not wet. Sash were not put over the frame until November. Germination commenced during January, with the first slender green leaves showing as soon as the sun's heat tempered the freezing weather.

The first year produces only a single slender leaf which is round and not flattened as in the mature plant. It grows rapidly and commences to ripen off a little earlier than the leaves of the mature bulbs outside. During the dormant season, the pots should be watered just as before germination and the frame shaded somewhat to prevent baking. One season's work here was almost obliterated because the sash were closed one cold Friday and not opened until Sunday. As the day between

had been unbelievably hot, the delicate leaves were dried to hay and many tiny bulbs perished. In the attempts to rescue this lot of seedlings, watering was continued much longer than usual during the summer and many of the few survivors kept green until late summer and reappeared the following spring much stronger than their fellows. The pots are left, undisturbed, in the frames during the second winter, protected only as before. The second spring will often show the germination of whatever seed failed to germinate the first year and a stronger growth of the one year olds. In many cases these now carry two leaves, flattened as narcissus leaves should be. Several English texts indicate that these plants "while still green" should be transplanted to their first garden positions, even in the place where they are to flower if there is room to maintain an area large enough to allow such immediate spacing. Through no lack of desire or effort, the writer has been unable to accomplish this successfully, for the bulbs so handled are smaller and weaker than those which are allowed to dry off normally in the pots, sifted from the soil and planted while dormant. Dormant in this case is a relative term for the roots of the baby bulbs are much more fleshy than those of mature bulbs and do not dry out as much in the summer. If it is possible, the bulbs should be planted into the seedling beds as they are shaken from the soil in the pots. If there must be any delay, each lot of bulbs should be wrapped in a parcel with a little loose soil about them and kept cool until planted.

Their appearance varies greatly. The seedlings from trumpet varieties are much larger and differently built from the seedlings of poets. The latter are always smaller and show the indications of the slender neck which at maturity is so apparent in many poeticus varieties; all those perhaps which have not been affected by the blood of the old poeticus poetarum. The seedlings of the small Leedsii and Barii types show much the same character but the seedlings from Giant Leedsii and Incomparabilis sorts betray their trumpet heritage in their larger bulbs. These last are interesting in that during the first years they have a bulb shape that would indicate a downward growth as shown in the illustration, not as in "tulip droppers" but with the same general result.

The bed which is to receive these two year bulbs, should be prepared with all the care that is given to the choisest varieties and in a similar fashion. Here it is even more necessary that the drainage be perfect and the situation level, or nearly so. Any planting arrangement which is most convenient for the grower should be the plan adopted, whether in rows or in beds. Whatever the method chosen, there should be enough room between the bulbs of each cross that there is no question as to their limits, even if the record stake be lost.

As for all such plantings, it is absolutely necessary to have a plan of the plantings as well as labels in the field. The writer has used 8 inch plant labels marked with ordinary waterproof ink. These, of course, are heaved during the winter thaws but are easily and repeatedly pushed back into place and are remarkably permanent as well as cheap. Other more permanent labels are valuable

but need not be discussed here, except for the remark that records are a vital part of the breeder's work and must be safeguarded at considerable inconvenience and with considerable rather boresome labor.

The bulbs should be planted at moderate depths, two inches or more of soil above their tops, according to their size, erring always to deeper rather than shallower planting.

The ground above them should be kept free of weeds and in fair cultivation until late fall. When the first frosts have come a light mulch of clean straw or branches may be laid over all and not removed until spring.

After these first two years of rather laborious routine, the work is less difficult and the bulbs grow on more rapidly. The number and character of their leaves comes more nearly to approximate that of maturity, but even so there remain three to four years of patient cultivation and waiting before the blooms appear.

If, for any reason, the original planting was crowded, the bulbs should be lifted carefully at the end of the fourth spring and replanted. The only danger in this procedure is that some may be missed in digging. If the record stake, however, shows the number and the plan of the planting, shows the order none should be lost. After this lifting they should be replanted promptly, although there is not need for the immediate resetting of the first move.

When the flowering commences, one enters the most trying time of all since some basis of selection and elimination must be reached. This is not the place to discuss the characteristics which distinguish a desirable plant, but mention should be made here

that the breeder and seedling raiser must acquire a stony heart and destroy utterly and completely all the bulbs whose flowers do not come up to the high standard he has set for himself. If this is not done, the annual crop of seedlings soon becomes so great a mass of material that its care is impossible.

CHAPTER 7

Hybridization.

The practice of hybridization is, of course, outside the activity of most gardeners, but its accomplishement is mechanically easy and an understanding of the process gives the gardener a more intelligent appreciation of the vast labors what have already been performed in his behalf by the daffodil breeders of the past.

It is essential at once to understand the structure of the flower. Choose first a trumpet variety. There is a central trumpet at the outer base of which are attached six perianth segments. You notice that these are really in two sets of three and are so inserted on the trumpet. Below the trumpet, at the base of the flower, is a small green body, more or less wrapped about by the papery sheath from which the flower has emerged, which if cut through will show three compartments and the undeveloped ovules or seeds. This is the ovary which develops into the seed capsule after fertilization and the witheringof the flower. Within the trumpet are six stamens which are attached to it near the base and a central pistil which is attached to the upper surface of the ovary. The stamens are composed of two parts, the stalk-like filament and the anther at the upper end. This anther is divided into two parts or cells, which split longitudinally and expose the ripe pollen grains within. The pistil is also two-parted with a long style and a terminal stigma. This stigma is the surface to which pollen must be applied if fertilization is to be accomplished and seed formed. When the flower first

Line Drawing

opens, it is undeveloped but within several hours, if the weather be warm, its three liplike lobes will have spread apart and its surface be covered with a fluid which holds the pollen in place until it has germinated and sent down the pollen tube through the style where it eventually reaches the undeveloped ovule in the ovary. Through this tube passes the nucleus of the pollen grain until it meets and fuses with the nucleus in the ovule, forming the new nucleus which will determine the plant characters of the developing seed.

The poeticus varieties resemble the trumpet sorts in general plan and number of their parts but differ in arrangement. Here there is a long tube between the ovary and the point where the perianth segments are inserted and the crown which corresponds to the trumpet is greatly reduced in size and is often more or less flattened against the face of the perianth. Within the flower it will be seen that the stamens have much shorter filaments than in the trumpet kinds and that they are attached near the top of the perianth tube and not at the base. Furthermore three alternate ones have shorter filaments than their fellows and are inserted higher on the tube than the others. The anthers, however, are all on one level when the flower opens, showing extended beyond the pistil. As they ripen to shed their pollen, they contract and bring their pollen bearing faces down to the level of the stigma. It is for this reason that the poeticus sorts and their allies must have their anthers removed very early in order to prevent self-fertilization.

The mass of intermediate hybrid forms, Incomparabilis,

Leedsii, Barrii, Poetaz, and the like, show various compromises between these extremes, the variations appearing conspicuously in the proportional lengths of the crown and perianth tube and in the length and insertion of the stamens. The examination of various flowers will show the actual structure very clearly.

Line drawing?

In mating the plants, one should have a very clear idea of what he desires. Almost all types of crosses may be secured between the several groups . The results of the combinations very commonly appear as averages of the characters ofthe parents, but a large group of seedlings resulting from one cross show the usual groups which resemble the parents as well as the strongly intermediate group.

The classification of the forms of narcissus in use is that given by The Royal Horticultural Society of Great Britain. It was first formulated in 1908 and revised later by a committee appointed in 1909. Various additions have been made since that time, usually by the division of the large type group into one or more subclasses. It must be remembered that it is a horticultural and not a botanical classification. Its groups are based largely upon the structure of the flowers and the dimension of their parts. Other groups are determined by the colors involved. This last factor is the one which has already given some trouble and is likely to give more as interbreeding continues.

The classification of The Royal Horticultural Society follows:

DIVISION 1. -- Trumpet Daffodils.

Distinguishing character -- Trumpet or crown as long as or longer than the perianth segments.

(a) Varieties with yellow or lemon-colored trumpets,

and perianths of the same color or lighter (but not white).

(b) Varieties with white trumpet and perianth.

(c) Bi-color varieties, i.e., those having a white or whitish perianth and a trumpet colored yellow, lemon, or primrose, etc.

DIVISION 2 - Incomparabilis.

Distinguishing character -- Cup or crown not less than one-third but less than equal to the length of the perianth segments.

(a) Yellow shades with or without red coloring on the cup.

(b) Bi-color varieties with white or whitish perianth, and self yellow, red-stained, or red cup.

DIVISION 3 - Barrii (Incorporating Burbidgei).

Distinguishing character -- Cup or crown less than one third the length of the perianth segments.

(a) Yellow shades with or without red coloring on the cup.

(b) Bi-color varieties with white or whitish perianth and self yellow, red-stained, or red cup.

DIVISION 4 - Leedsii.

Distinguishing character -- Perianth white, and cup or crown white, cream, or pale citron, sometimes tinged with pink or apricot.

(a) Cup or crown not less than one third but less than equal to the length of the perianth segments.

(b) Cup or crown less than one third the length of the perianth segments.

DIVISION 5 - Triandrus Hybrids.

All varieties obviously containing N. triandrus blood, such as Queen of Spain, Earl Grey, Eleanor Berkeley, Moonstone and Agnes Harvey.

(a) Cup or crown not less than one third but less than equal to the length of the perianth segments.

(b) Cup or crown less than one third the length of the perianth segments.

DIVISION 6 - Cyclamineus Hybrids.

DIVISION 7 - Jonquilla Hybrids.

All varieties of N. Jonquilla parentage, such as Buttercup, odorus, etc.

DIVISION 8 - Tazetta and Tazetta Hybrids.

To include N. tridymus, poetaz varieties, the Dutch varieties of Polyanthus Narcissus, N. biflorus, N. Muzart, and N. intermedius.

DIVISION 9 - Poeticus varieties.

DIVISION 10 - Double varieties.

DIVISION 11 - Various.

To include N. bulbicodium, N. cyclamineus, N. triandrus, N. juncifolius, N. gracilis, N. Jonquilla, N. tazetta (sp.), N. viridiflorus, etc.

For the average garden, the commercial varieties that fall into groups 1, 2, 3, 4, 7, 8, and 9 are the most useful. More and more sorts that must be classified in groups 5 and 7 are being offered each year. Those of group 7 are usually good garden plants; the others are happy in some gardens and less happy in others.

The beginner will want to know what is likely to happen in actual crossing. By examining the results of recorded crosses, fairly safe predictions can be made. If trumpets are crossed with trumpets, only trumpets will result, providing the parents have a pure line of trumpet ancestry. If they have some admixture of Giant Leedsii or Giant Incomparabilis blood, however, flowers of these types may appear among the progeny. The predictions for color are more difficult. Yellow is usually dominant over lack of color, and color is more persistent in the trumpet than in the perianth. This appears less in the case of self yellows like King Alfred or Maximus than in the two-toned yellows like Emperor or Cleopatra.

There are cases on record, however, where white trumpets have resulted from crosses involving both yellow and white parents. Usually there is no record here of the numerical percent of whites from the total number of seedlings resulting.

(Get examples of this if possible)

Yellow or bicolor trumpets crossed with poets give Incomparabilis while white trumpets crossed with poets would give small Leedsii forms. These in turn, crossed again with poets, will give the class known as Barrii. There are also forms appearing, now tentatively classed in some catalogs as "Flat-Crowned Leedsii" which look very much as if they too had come from such a cross. Tazettas crossed with poets, and vice versa have given the group known as Poetaz while trumpets crossed with tazettas give the group, now little grown, of Tridymus forms.

There are small groups of hybrids in which N. jonquilla or N. triandrus have figured as one of the parents. The former usually bestows a peculiarly characteristic smoothness to its seedlings and a distinct and clear quality of yellow. The latter gives flowers with a distinctly nodding habit, and a delightful quality of white or lemon yellow. When triandrus pollen is used on trumpets, trumpet progeny may result, as in the wild hybrid, Queen of Spain; when crossed on Leedsii types, smaller Leedsii-like flowers are produced as in the old and still beautiful Agnes Harvey or the newer Venetia. In later years more sorts are appearing which seem to be secondary crosses, i.e., crosses in which a triandrus hybrid has been used as a pollen parent rather than the species itself. These plants are distinctly more amenable to cultivation than the first crosses.

Other examples of this secondary crossing, in which hybrids

are used as parents, are the so-called Giant Leedsii and Giant Incomparabilis which are increasingly numerous and desirable. These result as a rule from the crossing of trumpets and ordinary Leedsii and Incomparabilis varieties. They have been produced especially in the breeding for white trumpets.

As to what other types of flowers may in time arise through the various combinations, it is not safe to make either too dogmatic or too sanguine predictions. Certainly the narcissus has not yet yielded up all the possibilities of form and color. The varieties, Mitylene and White Sentinel have recently been introduced with considerable acclaim as a new type of flower. In coloring they are distinctly Leedsii sorts, but in style they resemble the older Incomparabilis sorts which had a wide and flaring crown and not the short trumpet type. A similar style of flower is to be had in Incomparabilis in the older Dingo and the still older Princess Mary. The appearance of pink in the trumpet section plays no havoc in the classification as there is a convenient Bicolor Section to receive them, but it is mentioned in several of the reports of The Midland Daffodil Society that dissenting voices have been raised over the classification of some of the pinkish Leedsii sorts, especially those with small crowns and a frill of poeticus like color. For the beginner these distinctions are alarming and confusing, but eventually one will come to a sensitive appreciation of the differences which originally may have seemed infinitesmal.

It will be seen from all this that the possibility for combinations is great. For example, one may have two seedlings represent-

ng four original parents, all different. If these two are mated, the progeny may represent the blood of all four ancestors in some factors. If two such seedlings in turn are mated, the influences are doubled. To be sure there is no mathematical adding up of characters, for some counterbalance or overrule others, but years of skilful manipulations and acute observation will develop a knowledge in the worker that often comes perilously close to what the cut and dried observer would call instinct and the romantically inclined observer, inspiration!

It certainly is necessary above all to determine some ideal of perfection which can be set as the not impossible goal of one's labors. To do this, one should see as many varieties as possible, and study them critically but sympathetically until their character is thoroughly understood. Only in this way can one arrive at the place where he can weigh their relative faults and merits, or even determine what constitute faults or virtues!

There are certain features which are obviously undesirable. Poor health or lack of vigor, short flower stems, and poor flower substance immediately rule out a plant. Streaky color which disfigures the perianth segments of so many plants, particularly such sorts as Van Waveren's Giant, Robert Sydenham, Oliver Cromwell, and their kin, may not be objectionable to the beginner, but soon becomes distasteful to the amateur. Matters of proportion, carriage, symmetry, and the like have to be studied long and carefully before one's native appreciation becomes good taste.

There is a lamentable tendency in American horticulture to hunt for the "best" variety or the "best six or ten varieties" of

any plant. If one might read the lists offered with the word "favorite" substituted for the word "best", he might have more confidence in them, for very few people, in judging flowers, are able to dissociate their personal prejudices from a consideration of the flowers in the abstract. Coupled with this, there is a common lack of recognition that all varieties cannot be compared with one another. Among narcissus, for example, all trumpets cannot be compared with one another, even all yellow trumpets cannot be compared and one "best" variety chosen. If they all bloomed at an identical season, the variations in color, shape, and carriage are too great to admit one standard. The self yellows, of which King Alfred and Golden Spur may be chosen as familiar examples, are now numerous. The old yellows, of which Emperor is the common example, are utterly different, almost yellow bi-colors as compared to King Alfred. The pale lemon selfs, like Moonlight or Endor, are still different, but as yet are not numerous enough to require serious attention. Color disposed of briefly, examine form. Who is to say that the shape of the trumpet in King Alfred is better or worse than that of Mrs. Robert Sydenham; that pointed, shovel-shaped perianth segments are better than rounded ones; or that a flat perianth is always better than one that shows a delicate regular twist? Again, must the delightful drooping carriage of the oldest white trumpets entirely disappear before the upward looking trumpets of today? Personally I feel almost as keen pleasure at the sight of old William Goldring as of Beersheba, but the pleasures are utterly different and I should not choose to

forego

lose either. I feel much the same way about many other variations and for that reason I do not care to go on record for any "best" list of varieties of narcissus or any other flower!

Such lists are of transitory value at best. In plants where the vegetative methods of propagation is as slow as in narcissus, incredibly slow as compared to roses, many varieties which appear in novelty lists are truly displaced by better sorts before there is stock enough to offer them to the general public.

In his delightful book, "Daffodils", the late Rev. Joseph Jacob listed a group of varieties he would have chosen then (1910), if quite unhampered by costs. He estimated that the list would then have cost about £ 200 for a single bulb of each sort. I remember with what wonder I read it. Bernardino, Challenger, Countess of Stamford, Conqueror, Empire, Golden Jubilee, Hypatia, Masterpiece, Princess Juliana, Seville, Tennyson, White Star. Now in ~~1927~~ 1930 I have many bulbs of Bernardino, Challenger, Masterpiece, and Seville and they cost no fortune. Countess of Stamford, I have never seen and do not find in current lists. Conqueror is fine but rarely offered now. Empire I have but do not value greatly, a remark which applies equally to Princess Juliana. Golden Jubilee, Hypatia, Tennyson, and White Star, I do not have and White Star, which now costs about fifty cents a bulb, is the only one I mean to pursue.

Were I to choose a list of the varieties I enjoy most today, it might be overtaken even more swiftly by the flood of new sorts as I do not begin to keep abreast the current work of the British hybridizers as did the author of the other list.

This has brought us rather far from the starting point of this chapter, but the progression is entirely logical and right, for after hybridization comes selection, an operation of as great importance as hybridization and one calling for even greater judgment and taste. They are separate and yet so intimately related that one cannot well do without the other.

As to the actual operation of pollenation, little need be said. The flower which is to bear the seed must have the anthers removed before there is the least opportunity for the pollen to shed. If the pollen is valuable, the unopened anthers can be removed at the latest possible moment before opening, forced open by a gentle pressure of the fingers and the pollen used at once or stored in a dessicator. This is a covered laboratory dish, in which is a chamber filled with calcium chloride, which absorbs any excess moisture in the air, opening into the chamber where the pollen is to be stored. A similar vessel can be improvised in any dish which may be tightly closed and which has a sufficiently wide mouth to make its use easy. A small dish of the calcium chloride may be set in it, taking a little care to see that it is not tipped over. As the salt absorbs water, it will need changing, but this will not be frequently. With such storage the pollen of narcissus may be kept in viable condition at least two weeks, which is of advantage in crossing early pollen on midseason varieties.

Line Drawing

The pistil of the de-anthered or emaculated flower is ready to receive pollen within several hours of the opening of the flower unless the weather is very cold. If it is examined under a hand lens and seen to be fully developed as shown in

figure 4?, the pollen may be applied.

Here methods vary. The traditional practice involved the camel's hair brush. This is dampened slightly, dipped in the pollen, and carried to the pistil to be pollinated, where the pollen is rubbed off. Care must be taken that all pollen is removed from the brush after each cross or the validity of subsequent crosses can be questioned. In most cases there is no need for bagging the flower either after emasculation or after pollination, for when the anthers are removed, the pollen-eating insects which are more numerous than the nectar-seeking insects, lose all interest in the flowers. If one were making crosses to determine genetic problems, however, bags would be necessary to preclude any chance of error or accident.

After a cross is made, the flower should be tagged with the record of the cross and an entry made in a notebook under date. In my own work, I have also made some general notes on the weather, not only for the day but for the night preceding.

It is quite useless to make crosses in the rain, as the pollen, if wet, bursts and does not accomplish its purpose.

If possible, the day should be mild to warm and the actual operation be confined to freshly opened flowers, but as one has no control over the weather and little more over the opening of blooms, he must manage as best he can and may come off fairly well in the face of all prohibitions. There does not seem to be any time during a mild day when the stigma is most receptive, but the time between ten in the morning, when all the nip of the frosty night has been melted away, and three in the afternoon, when the sun has begun to withdraw his shining, might be

chosen as better than the rest of the day. But as I said before, one may manage in spite of it all. My own work has to be crowded in between fairly regular office hours with only an occasional day off if the choicest group of flowers open midweek.

In making the crosses, I have found it easier to my hand, to use a soft lead pencil, not too sharply pointed, instead of a brush. One can soon become skilful in scooping the pollen upon its point and applying it without loss by a turn of the wrist to the stigmatic surface. If the pollen is uncommonly dry, as it may be if old, the point of the pencil can be moistened on the lips enough to make the pollen adhere. With a little practice one can transfer the pollen very neatly and then tap it gently till it spreads over the surface. Care must be used that the stigma is not bruised, so that deft movements and a light touch are vital.

As to the type of record tag, opinions vary. I use a slip of firm paper on which the number is written in soft lead pencil, folded then so that the writing is inside, and pinned about the stem with the crease of the fold up to shed the rain. This lasts perfectly through all weathers till the harvest of the seed. The number is recorded in a notebook as the cross is made.

Such a notebook is of intense interest later, as it gives a chronological record of the year's work and if weather entires are made, some consolation perhaps for various failures which need explanation. In addition to the chronological entires already described, I recast the list as soon as crossing is over, in alphabetical order, that I may see the actual performance of each named

sort. Although not recorded in each year's work, I have also sorted over the crosses, according to the pollen parents, to gain some suggestion as to whether or not the pollen may not be at fault. From all such sorting, one gathers considerable information for his own particular garden and manner of working, data which is not always in agreement with reports from elsewhere. If the notebook is large enough, the remainder of its pages can be given over, one page to each cross, for the entry years later of the flowering of each set of seedlings. Such record keeping is indeed a labor and often as great a weariness of the flesh as the walking to and fro involved in making the pollinations. In July when the seed are shelled out and the precious number entered; in the following March when the number of germinations can be added; in the following March when the tardy germinations are added; and then in the more distant future when the total number of flowers are recorded, there are moments when the dull and tiresome pages become unbelievably valuable.

CHAPTER 8

Flowers for Cutting.

Aside from the beauties of the narcissus in the garden in the early days of the year, the delight to be had from gathering them generously for use indoors is not to be measured. I have always remembered with considerable sympathy, the wail of one gardener who inveighed against the frequent advice to use drifts of this plant, battallions of that, long sweeps of another, a few thousand of the next, and so on; claiming very justly that such planting, though indisputably lovely, was not always within the means nor the physical accomplishment of the small gardener. Daffodils were the one exception, for this gardener as I, had hosts of them, the fruit of many years dividing and redividing.

It is from such plantations that generous bouquets of daffodils may be gathered to fill the uncertain days of spring with a light nearly as gay as the sunlight itself.

When one is gathering flowers for huge bowls and vases, possibly no special care in the choice of flowers need be exercised save to see that the flowers themselves are fresh and perfect, but when one is picking flowers that are to be shown in exhibitions, ~~it is a matter that calls for~~ must be given more attention. After one has gathered and watched the unfolding of the flowers for a show and seen the improvements that come to them from a little care and attention, he soon comes to prefer such care for all the daffodils that are to be picked.

With the exception of a few varieties, to be noted later, the finest flowers are to be had if the blossoms are gathered just after the petals have burst through the papery sheath that covers them. By this time the stalks will have reached nearly

their full development and can have been helped a bit by watering if needed, several days before the cutting. The buds should be put into water in vessels which are rather deep so that most of the stem is immersed. These containers should be kept in some place where the temperatures will be about the same as outside, differing chiefly in the protection offered against storm and frost. While narcissus flowers will endure extraordinary punishment from frost, so that they lie on their faces, quite stiff and brittle with the freezing, and yet revive, flowers which do not have to undergo this, show a texture that is much more smooth and clear and a color less often disfigured by tints or traces of green where no red green should be. This is particularly true of some of the earliest yellow trumpets. All this is not so much trouble as it sounds, for the buds are easily gathered and put into pails of water which may be kept in a cool cellar or garden house. They should have light but not sunlight and fresh water regularly, with a bit of the stem cut off from time to time to allow free absorption of the water. Under no circumstances should they be taken from this storage place into a very hot room if they are wanted for decoration, for the change in temperature will have the same effect that shows in the garden when, after a frosty night, the April sun makes midday warm to discomfort. The petals will droop and the life of the bloom be sharply curtailed. If they must go into a warm place, it should be by degrees.

There are times, however, when one wishes to hurry a flower into opening to have it for exhibition or for pollinating some earlier variety. In such instances the cut bud can be

carried into a warm room where it will be considerably quickened. Here its development of the petals may not be quite so fine as by the slower process, but the pollen will be as perfect.

In varieties in which there are various colors in the cups, this practice of opening the flowers indoors leads to the greatest increase of beauty. The only exceptions, curiously enough, seem to be in some of the newer trumpet sorts that show a trace or flush of pink. For the bicolor trumpet, Rosary, it is advised that the flower be allowed to come to its full development on the plant in order to secure the full color. I have flowered this sort twice and each year its lovely trumpet slowly has shown that exquisite suffusion of pink that makes its final hue a singularly warm and glowing pinkish buff. The variety Suda is even more pink in color and the newer Riva, as yet unseen, is said to be even more dependent on the sunlight for its tinting. For the pink trumpet, Mrs. R. O. Backhouse, I have only the words of

All the sorts with red in the cups are greatly improved by opening indoors as there the color is not drained out by the brilliant sunlight. Indeed, for general effect in the garden, most of the more brilliant sorts are quite useless, unless one can find a situation where they are shaded by many passing shadows, so that they have ample light without having to endure continued exposure. Inside, whether in the solid red-eyed types like Dragoon, Firetail, Seville, Dosoris, Sunstar, Magician, and their fellows, or those varieties with tinted or banded cups like Challenger, Midas, Queen of Hearts

or the like, the red colors which are by no means the same as those to be seen in salvia or even in tomatoes, all have a clarity and luminosity that is most delightful. Even the poeticus varieties in which the red seems to be less affected by the light, are helped so that inside the tender gradations in tone and suffusion of color which alone serve to differentiate many of the named poets, become a feast for eye and fancy.

If one is so fortunate as to have a garden house where the cut flowers can be stored, and added to from day to day, he is in position to choose exactly the right flowers for showing in exhibitions. It is a source of constant astonishment that most gardeners do not stop to consider at what moment their flowers are at their very peak of beauty. In shows one sees flowers which are so immature as to appear almost green in quality if not in color. This is true in every type and is not limited to the varieties with colored cups. How often yellow trumpets are shown in which the yellow colors are uneven from frost and immaturity, or even from old age in such varieties of uneven pigmentation as Van Waveren's Giant. What raw looking flowers of the so-called white trumpets like the old Mme. de Graaff are presented for consideration. Even such flowers as Mrs. Krelage, Callirhoe and Nevis, in which the color is smooth enough from the very beginning, although not characteristic, turn to a uniform pale tinting that is far more beautiful as they reach their heyday. If the flowers are left in the garden to pass through this change before cutting, they will have been subject to the alternate temperatures of days and nights in the uncertain April weather and their life cycle will have been shortened

by the alternate heat and cold, and at times by the beating of rain or wind. Inside, if kept cool, they will have a much longer span of loveliness and will not have spent their time before coming into their full beauty, so that almost faded flowers need not be shown but fresh flowers in prime condition.

If then, you have flowers in the pink of condition to take to the show, a little care in the arrangement of the blooms in the glasses so that they face the front at agreeable angles, a leaf or two of the proper type, when leaves are permitted, and a bit of moss to hold the blooms firmly in the mouth of the glass, will go far to helping win the approval of the judges.

To attempt to discuss the arrangement of any sort of flowers when cut, is to enter at once into a perilous country where everyone, moved by his or her background of taste and experience, feels quite beyond the reach of advice from others. Of this I am convinced from the discussions I have heard at various flower shows and from the feelings which I, too, cherish for my own contrivings. Nevertheless, secure for the time, behind the printed page, I venture to record some of my own adventurings in the matter with the thought that they may serve at least as points of attack or departure for the pleased or infuriated reader!

For the flower that is gathered to be admired singly, there are two types of vase, the one with a slender mouth, the other with a wide surface of water. For the first, choose a vessel with a mouth so slender that the flower stalk and leaves are held erect in somewhat the same position as when growing and above all things choose leaves of the correct type. For varieties that have broad leaves, the trumpets, Giant Leedsiis, and Incomparabilis types,

use broad leaves; for poets, Barriis, Leedsiis and such, use narrow leaves and preserve the scale of the plan in all its original design. For the flat container with its water surface, it is vital that the leaves be added to the flowering stalk and that they be correct in their character and arrangement about the stem. This is a type of arrangement inherited from certain schools of the Japanese floral art, and should show the fundamental basis of that art, even if other details and symbols are omitted.

To my notion, there are but two things that the occidental gardener must remember and know: first, the essential habit and growth of his material; second, the two-dimensional quality of his composition. The Japanese artist refuses to use any plant, the habit of which he does not know, and further declares quite arbitrarily that many plants are not suitable for use in the floral decorations. The narcissus is used, but it is not any of our more northern forms but the tender Narcissus tazetta which we know in such plants as the Paper White or the Chinese Sacred Lily. Without thought for the health of the bulb, the Japanese gardener cuts off the entire top of his plant, almost at the very top of the bulb, with flower stalk and leaves held together as they grew by the basal sheaths. In this way the illusion of growth is easily accomplished.

This care to preserve the character of the entire plant is not given due regard in our own country, where, if flowers of any sort or kind are thrust into an erect position, in a flower holder set in a flat dish, the result too often is called a Japanese arrangement.

The preservation of the two-dimensional character of the arrangement is rarely observed. The occidental forgets that the Japanese composition is placed inside a recess, so that it is seen only from the front. It is for this reason that the Japanese have developed such elaborate rules for the position of the flower heads and for the crossings and parallelism of the stems, factors in design which relate chiefly to flat surfaces, and to asymmetrical balances.

While the occidental home may have flowers set at times in niche-like positions, more frequently they are placed where at least three sides of the bouquet are visible. For such positions, a Japanese treatment is not suitable and a pseudo-Japanese treatment invites all the difficulties of any other hybrid art expression.

Because the narcissus is a flower with a delightful profile entirely different from its full face, I prefer to have them in great bowls so set that I may walk about them enjoying each angle and curve in their arching necks, their starry perianths, their fluted cups and trumpets; to augment their gold and ivory loveliness with grape hyacinth and wild blue phlox or a sprig of heuchera or crimson brown polyanthus. The temptation is great to go on, frankly admitting an unorthodox fondness for three dimensional compositions both symmetrical and asymmetrical in plan, for masses which are dependent upon their very solidity and silhouette for success as well as for arrangements which depend upon lineal qualities and spot decoration, because while the claims of the Japanese plan are valid, they are less akin to my living, to my inherited instincts and habits, all matters not to be valued over dearly perhaps, but at least to be defended for their merits against all comers.

Flowers for cutting

Time to gather

Whites
Red cups
Pink trumpets
General sorts

Effect of early cutting on opening indoors.

Compare notes on the alpine houses.

Value of all this in exhibition work.

Watering of bulbs before opening of flowers in dry seasons.

CHAPTER

If one attempts to write out for the unseen reader his pleasures in daffodils, he is both frightened at his temerity and his task, since he betrays immediately his inadequacy and something of his innermost self that is rarely brought to words; and yet there is no other way to set down something of the delights that have been his.

There are, of course, first those peculiarly personal pleasures that relate to experience long past, delights intensified and made potent too often perhaps by the false glamor that time and affection bestow on the beloved. For myself, in spite of the joys that have come since, there comes first that story of an adventurous ride taken years ago by my mother and grandmother to a deserted Maryland farm where the old garden, long overgrown, was being turned into cultivated land again without thought of any former occupancy. From it were to be rescued bulbs of the old poet's narcissus. The story of the drive back to their small city garden, laden with the precious bulbs, through thunderstorm and shower, holds no significance now, either of danger or romance, but never do I gather the sheaves of blossoms from our own late Pheasants Eye narcissus, but my mind travels back, reliving that day in which I had no share. The pungent fragrance evokes memories that are inherited, not really known.

And so it must be for many others who have in their gardens bulbs from days long past.

Think for the moment of the gardens of the earliest colonial days in Virginia and Maryland where daffodils once flourished. What testimony of life in the mother country must have flowered in many

gardens each March, each April, when after winters of true discontent, when philosophy had offered, perhaps, cold comfort for the experience of pioneering, the daffodils pushed up their brave spears and disclosed their fluttering gold that could not be spent for bread or clothing. Think, too, of the secret, almost shameful joy that must have come to many a heart to see so prodigal a luxury flowering without fear that it need give place to corn or to potatoes!

I have them from Maryland, from Virginia, from Kentucky, from Arkansas. By what hands have they travelled?

These old plants are still growing today, overlooked again and not fully cherished in the face of newer sorts that show so much more of bodily perfection; and yet in my own garden are many of these first plants, none to be sure going back to gardens to which I may lay claim, but speaking to me always of those before, whose debtor I am, and comforting me a bit when some new, costly treasure opens its exquisite loveliness, with the thought thay my hard-purchased extravagance may in times to come, too be treasured as are they.

Then, ~~too~~, there is their time of springing. In old borders, as one goes poking about in mid-winter on a warm January afternoon that brings false hopes of spring, how their serried ranks protest of life, ready for the first assurance of warmth.

Only the true northerner, perhaps, can know the very keenest smart of pleasure at the breaking of winter; but even here, where winter is at first almost a respite from summer, the last taunts of February and early March are a trial to the spirit that is eased by these first pushing shoots to a more certain joy than all the precarious earlier flowers that come, for daffodils are indifferent to these last storms and are

not caught short like some other plants that are winter-flowering only if the weather be kind. On they come and even if laid low by frosts night after night, unfold their flowers with Spartan beauty. They give a curious sense of the certainty of spring's return and the full flood of life to follow.

Their color, too, is peculiarly fitting to the season. Our northern landscape, filled with warm browns and colder grays, patterns of branches set off by deep green of conifers and darker greens of broadleafed shrubs, filled with the blue and purple shadows of the winter, is touched with a new light. Even before the delicate auras of yellow greens and flesh have covered deciduous tree and shrub, the armies of daffodils have sent up their sheaves of leaves and let loose a sunshine to match or to outshine the day.

How yellow they are! And how many yellows they are! And thanks to their delicate substance, how luminously yellow they often are!

Do you, as a gardener, watch your flowers with an eye to the qualities of their color? Are you content to think their colors in your mind and arrange them by the rules of thumb that do make for what we label harmony? If only this is your pleasure, dedicate the coming spring to a drunkenness of pleasure in color. Forget for the moment, if you dare, the pressing business that sometimes makes the spring a nightmare of labor, and feast your eye on daffodils.

Watch the green spears push through the green and oyster white sheaths. See their blue-green and yellow-green leaves yield tyeir flower stalks cupped with the precious envelope that hides the

flower. See the thin membranous green envelope broken by the green flower within. Watch this opague, folded thing turn to gold, to sulphur, to white, as its green stains drain out in the sunbight. Then too watch the changes in color that come as its petals unfold themselves and set free the inner trumpet. As I have said before, there is a moment of peculiar lovliness for each flower when its color is just right, a time that is as difficult to explain in words as so many right things are and yet discovered surely if your eye is discerning.

This pleasurable search will bring some disappointments too, for the eye once opened to the delicate nuance of color, finds that some moments of perfection never arrive in some flowers and that varieties once accepted with pleasure never delight again.

The difficulty comes most often in the relation between color and substance of petal tissue. You will find that there are two sets of color pleasures; those that are found in petals that are so firm that they reflect light, and those that are delicate enough to let light through and glow with it. In each are to be found the same hues.

In spite of repetition, it is difficult to set down just what is meant. Even if one resorts to examples, the case cannot be surely stated; but two extremes might be mentioned. Recall the intense golds of such flowers as Golden Spur, King Alfrid, or the campanelles. In each case the petal is firm and opague, but not dull, reflecting to the eye the fullest yellowness it carries. Think again of the glistening whiteness of the last poet's narcissus, never equalled in any other flower, a whiteness that is almost bluish

in its clarity. Here again the petal is firm and glistening. Examples in which the gold is equally deep in hue but accompanied by a transparency of tissue, are more difficult to find but the principle may be illustrated in such plants as Van Waveren's Giant in which the perianth segments are thin and the trumpet opague and slightly dulled. Gorgeous as this flower often is, it does not fill the eye as do the others because the light escapes through its petals and is muddied and absorbed in its trumpet. Examples of thin whites are to be found among the oldest trumpets, thin and glistening as in old moschatus, thin and dull as in the once treasured and always cherished Madame de Graaff, that venerable parent of many splendid children.

In quite another connection Guy L. Wilson once pointed out this quality in Weardale Perfection, a pale yellow bicolor that is neither luminous nor glistening, but gives back the velvety milky color that comes from some enamels. And so examples might be multiplied to no special end, since finally it must always remain a matter of one's own vision.

Perhaps it is as much to escape these difficulties of color that breeders have tended to build up petal substance, but here there are other factors involved that complicate the issue. A word of warning might be recorded that in the search for glistening colors and substance, other milder compensating pleasures may be lost.

But to return to color for itself, watch again the relation of yellow to yellow in the same flower. Here one has most often a contrast between the perianth segments and the trumpet or the cup,

with the greater intensity of pigment in the latter. Observe the mild contrasts that appear even in the so-called yellow selfs and the so-called whites!

There was a time when the yellow trumpets, for which Emperor may serve as an example, out numbered by far the yellow trumpets, of which King Alfred may be cited. Though essentially yellow throughout, the first are not the same yellow and give a very different appearance from the latter. And as time goes on and breeders have been busy, these two groups have been increased by examples in which the relative comparison between trumpet and perianth has been kept and yet the intensities have been altered. This is particularly true of such pale yellow flowers as Moonlight and Endor in which the yellow is uniform throughout but no longer golden. Some of these pale colors are of unbelievable delicacy. On the other hand, presumably from the search for white trumpets, there have resulted many flowers called white that, under garden conditions, are pale bicolors, as opposed to the older conception of bicolor in which the perianth was white and the trumpet golden or as nearly golden as might be.

The venerable Madame de Graaff, so long the white trumpet in gardens, is a case in point. On opening the poor lady has a distinctly lemon-yellow trumpet that "goes off" to ivory-white before she fades, to quote the jargon of the trade. In striking contrast is White Knight, almost as ancient but of a whiteness far more pure, with a trumpet that loses its lemon tint almost at once, giving a fine flower, but still not one as purely or immediately white as the new Beersheba, that is pure white by the evening of her first day.

Between Madame de Graaff and Beersheba are a goodly company of exquisite flowers, very often listed as whites, that might better be called bicolor whites if one were permitted such levity. Among them are many plants of singular beauty that should be treasured for that beauty and not upbraided for a lack of crystalline whiteness.

I still remember the pang of disappointment when White Emperor unfolded its first flowers. For all their lovliness, they were not valued because they were not white. Now it is one of the most cherished plants in the garden because of its own peculiar beauty. The perianth is white and of a singularly enamel-like smoothness and the lemon tinted trumpet does fade to a warm white that is not ivory but looks more as if the vaguest film of pure lemon were still over it, the same lovliness that Mrs. Ernst Krelage shows and the newer Nevis.

Turning from colors related to yellow, see what is to be seen in regard to red as furnished from our poet's narcissus. Here our observation is complicated by pattern but that can be set aside arbitrarily for the moment.

To most beholders, all the many varieties of this Section look very much alike, and indeed in the garden they are much alike except those sorts in which the whole eye is more or less suffused with the red pigment. If you will take, however, a goodly number of these sorts and hold them eye to eye, you will be amazed at the variety of the reds in their ribbon edges; reds dulled slightly to crimson, reds turning toward scarlet, diluted towards rose and even salmon.

Then observe how these hues are modified, accented, and diversified by the lemons and greens and wire edges of whites that

accompany them, if you have patience for such myopic delights.

If you have not, turn quickly to their heritages, given to their progeny the Barris and Incomparabilis sorts without number and, in these later days, even to Leedsii sorts that are losing their once pristine colorings. But here again pattern plays a complicating role that is best touched upon hereafter with only the comment that from this tiny ribbon of color is coming slowly but surely the galaxy of salmon, peach, apricot, and buff - as well as the bloody scarlets, oranges, and crimsons that are one of the triumphs of the breeder's art.

Abandoning then the obvious delights of color, let us go back once more to our springing plant and search out the delights of form that will bring us back again to flowering and to pattern.

Because our gardening has its roots so firmly planted in the practices of horticulture and of flowering and fruiting, we have too often passed over the transient beauties of growth with eyes set only for that final time. Whether or not delights in smaller minor matters are the secondary, minor compensations that one learns to look for in plants that have not come to successful flowering, some other gardener may say. If they are part and parcel of the pleasures that old age brings to the reminiscent mind after the intricacies of cultivation are successfully mastered, I do not venture to suggest, but they are pleasures not to be dispised, whatever their philosophic explanation.

One of the points that the Japanese stress so vigorously in their appreciation of plants is the character of the plant itself as opposed to the character of the flower dissociated from

the plant that bore it, and it is this thought, perhaps, that causes them so often to choose for their arrangements materials that seem strange to us, who set so great a store in flowering.

If we think of narcissus, we usually, if not always, think of the flower alone, frequently cut and far away from its parent stalk. Is there in its plant a beauty we have overlooked?

Examine the pushing leaf clusters. How firmly they rise, leaf against leaf, braced to pierce the earth's crust. What a thrust of power they suggest as they rise. If you will look at your plants in the border, it will delight your eye to sense this vigor and then to see how delicately the leaves release this force when the initial thrust is finished, falling back right and left to allow the flowerstalk to rise to its revelation. Among the many garden sorts there is great dissimilarity in this final movement from the trumpet sorts on the one hand, that bend back their leaves very little to release the flower, to such sorts as the old Mary Magdelaine de Graaff in which the leaves turn back into fan-like cockades on either side of the blossom stalk, recalling the flattened renderings on ancient tapestries. Then, as the life cycle is fulfilled, watch how the fattened and full grown leaves loose their vigor and fall flabbily to earth again, drained of their stores of food for next year's flowering.

Note, too, in passing, the growth movements of the flower itself. As the stalk rises, the ensheathed bud is vertical on its axis, at one in line with lines of leaf and stem. Then as flowering approaches, see how the flowers through the bursting sheaths turn over until they make a flight of oblique lines cutting across the upstanding leaves, a beautiful pattern of cross movements. And finally, if you raise seedlings, watch how the flowers, after fad-

ing, are again reared into a vertical position so that the precious seeds will not be immediately spilled when the capsule splits open.

This movement of the flower up to the moment of blossoming is of interest to the gardener as it is bound up with the character of many sorts. Possibly it gives a character that is often overlooked or undervalued by breeders with their eye set on that perfect flower that is to look you fairly in the face when on the exhibition table.

In some wild forms, conspicuously some of the old white trumpets, in the triandrus sorts, and the hoop petticoats, the flower at its maturity has bent its head until it is really a pendant thing with a drooping face like any fuschia.

It is interesting to observe the changes in flower balance that accompanied these positions. In the old white trumpets, the perianth segments do not stand away from the trumpet but twist about it, almost secondary in importance and making in effect one bell-shaped whole. This is carried further with the hoop petticoats which are mostly wide-flaring trumpets with mere ribbons of perianth flouncing over the petticoat. Not so the triandrus. Here the perianth has reflexed so that the trumpet hangs down fully revealed.

Some of these characters still are found in modern hybrids but not often. Are we not missing legitimate narcissus forms of singular charm and grace? Might not something be forgiven even the much used and much maligned Will Scarlett, with its rowdy reflexing perianth, if some one could keep its reflexing perianth and yet smooth it into a more symmetrical spiral?

Of the flower forms, the actual relation of part to part, how much can be said? The very structure of the blossom gives one

a series of threes, a relationship of triangles and circles that are singularly lovely. In whatever way the blossom be considered, there remains this underlying motif, in which their triumphs first the triangle and then the circle, two geometric forms in which man finds pleasures often difficult to name. Observe the interplay of emphasis for special parts in different forms and how, through all, one still feels the strong central axis with the radial relation to the parts, whether they be obvious, as in the starry forms, in twisted perianths as in the old Swan's Neck daffodils, or less obvious in the modern exhibition flowers of almost artificially perfected symmetry and proportion.

And now, again, to pattern in relation both to color and form. How vivid a central motive is given so many forms, circular forms reinforced with color against triangular or circular settings.

The color patterns are basically related to concentric circles. in poeticus the central spot of green, half hidden by the knob of stamens, surrounded often by a wide band of citron or lemon yellow, and bordered often by a tiny line of white and then a band of scarlet.

What juggling has been accomplished by careful selection. Among the poets themselves, see how the spot of green has been spread out as in Roeburn or the yellow has been overrun by scarlet as in Kestrel, and even in such examples as Ace of Diamonds or Minuet, how the scarlet has claimed the whole eye irrevocably. Observe, also, what has happened in the derivatives of the poeticus section. Observe in the small Leedsii group, of which Moonbeam and Silver Salver are examples, how all color is suppressed, leaving almost a white poeticus with a deep green tube glowing in the heart; how in Fairy Circle and Mystic, all the color is gone save a pinkish yellow

ribbon edge to recall the red ribbon of poeticus; how in Barris like the old Challenger, the scarlet ribbon has been widened on its yell ow ground or in the Incomparabilis, Prince Fushimi, we have a broader ribbon of peachy yellow on a white ground. The end is not yet, but I spare you more lest I prove too ardent an advocate and spoil your own discoveries in this field.

There remain, moreover, the pleasures for the gardener nose, even more difficult to point out with words. The most obvious perfumes of course are those to be found among the poets and the tazettas, utterly different and yet both strongly marked. Almost as distinct is that from the tribe of jonquils in their original more than in their hybrid forms, with a very climax in the difficult and almost unobtainable serotinus and elegans. At the other extreme, are the curious and indefinable scents of the yellow trumpets, vague yet keen scents that must be caught fleetingly much like the scent of forsythia or witch hazel. Some of the white trumpets are better dowered, as in the delicate Vanilla, valuable almost solely for its fragrance. And then the great company of garden hybrids in which one finds various essences of trumpet and of poeticus perfume, according as one ancestor triumphs over the other.

What more need one say? Color, perfume, pattern, form, substance, association - every delight for sense and mind, pleasure for the moment and delight for flight of fancy await the gardener who dare pause from gardening.