

Narcissus

For Garden and Home

H. M. BIEKART



Fig. 1

GOLDEN SPUR NARCISSUS, NATURALIZED

EXTENSION SERVICE
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CONTENTS

Names	4
Principal Source of Stock	4
Classification	4
Description of Types of Narcissus	5
Trumpet Narcissus	5
Incomparabilis Narcissus	7
Barri Narcissus	7
Leedsii Narcissus	9
Triandrus Hybrids	9
Cyclamineus Hybrids	10
Jonquilla Hybrids	10
Tazetta Hybrids	11
Narcissus Poeticus	11
Double Narcissus	12
Botanical Species	13
Ordering and Care Before Planting	13
Outdoor Culture	14
Situations and Uses	14
Planting	14
Care After Planting	15
Time to Plant Outside	16
Soils and Fertilizers	17
Forcing	17
Use as Cut Flowers	17
Varieties for Forcing	19
Measures Preparatory to Forcing	19
Forcing in the Living Room	22
Forcing in the Greenhouse	22
Growing Narcissus in Saucers or Pebbles	23
Treatment After Flowering	24
Pests	24
Diseases	24
Insects	25

Narcissus

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"Daffodils that come before
the swallow dares
And take the winds of March
with beauty."

Shakespeare

The genus *Narcissus* is one of the most charming among the entire range of bulbous plants, and its popularity is growing rapidly since the development of many new varieties which have increased the beauty of the genus and added to its usefulness.

The narcissus is an exceedingly winsome flower. It has a wide range of use and its graceful beauty, great variety of shape, ease of culture, and hardiness have given it a host of staunch admirers. Narcissus are less exacting than tulips in their soil requirements. They will thrive and reproduce well where tulips will not grow. When planted in the garden they will increase in productiveness and will yield more flowers with each succeeding year until the soil becomes depleted. They may need replanting perhaps every five to ten years, and when this is done the best bulbs of those which are dug can be used. Narcissus, by virtue of their beauty, ease of culture, and economy, are almost indispensable in a well-planned garden.

The name "Narcissus" is derived from the story of the youth, Narcissus, in Greek mythology, and in the language of flowers the narcissus is the symbol of self-love and egotism. This youth lay down to drink from a stream and when he saw his own image reflected in the placid water he fell so madly in love with it that he pined away and died. Even after his death, while passing over the River Styx, he leaned over to get a look at himself in the water beneath. The nymphs implored the dryads to raise a funeral pile for the purpose of burning his body, but the body was nowhere to be found. In its place rose a pale and melancholy flower which even now likes to see its image in the water, just as Narcissus did in the placid stream.

The Greeks placed the narcissus upon the coffins of their dead. Sophocles tells us that the goddesses on Olympus were crowned with narcissus which bloomed constantly by being kept moist with the dews which fell from heaven.

Theophrastus Eresius, who lived between 370 and 285 B. C., described the narcissus as the flower with the bare stem and the foliage

of the *Asphodelos*. Linnaeus described seventeen species, and Haworth, who lived in the nineteenth century, classified one hundred and fifty varieties. *Narcissus pseudonarcissus* and related species grow naturally in Central Europe, in the Mediterranean region, and through Asia to China and Japan. Probably twenty-five or thirty species represent the original stock. The names of many species are in the literature, most of them representing hybrids, for the plants have received much attention from fanciers and breeders. In the second half of the nineteenth century a narcissus society was formed in England and the narcissus was the exclusive flower at its annual exhibitions. The Dutch narcissus society, which was formed soon afterwards, chose as one of its principal aims the control of diseases and insects in order to prevent the distribution of these pests into foreign countries.

NAMES

The narcissus commonly is called "daffodil," "jonquil," "narcissus."

The name "narcissus" may be applied to all the species, as it is the correct name of the genus. The common name "daffodil" should be applied only to the sorts which have *Narcissus pseudonarcissus* as one of the parents. The name "jonquil" is incorrect as generally used, as it should apply only to relatives of *Narcissus jonquilla*, a species with smaller bulb, smaller leaves, and smaller but more fragrant flower than the trumpet narcissus. The leaves are onion-like and much darker green than those of the daffodil.

PRINCIPAL SOURCE OF STOCK

A large portion of the narcissus sold by seedsmen and florists in the United States was formerly imported directly from the Netherlands, annual importations exceeding two million dollars in value. Since the Federal Horticultural Board established a quarantine a virtual embargo exists, and now it is with the greatest difficulty that varieties can be imported for propagation. In addition to the general restrictions there has been imposed a quarantine on interstate shipment of narcissus bulbs, compelling the sterilization of all bulbs because of eelworms and the two bulb flies.

The United States is somewhat prepared to meet the demand for bulbs because of the stocks grown during the past few years in California, Oregon, Washington and other states. It has been proved that certain American grown varieties are just as good as those imported from Europe.

CLASSIFICATION

The Royal Horticultural Society of England arranged in 1910 a classification of the narcissus into eleven divisions. Most of the lists of narcissus of any pretension are now compiled with its recom-

mendations. In this classification the tubular central part of the flower is called the trumpet, crown, or cup. The perianth segments form the corolla from which the trumpet, crown, or cup rises. The following description of types of narcissus is arranged according to this classification.

DESCRIPTION OF TYPES OF NARCISSUS

I. Trumpet Narcissus

In the trumpet narcissus the trumpet or crown is as long as or longer than the perianth segments. There are three types of long trumpets: namely, yellow, white, and bicolor. The type is originated from *Narcissus pseudonarcissus*. Most of the trumpet narcissus are vigorous growers with broad, bluish-green leaves. Some, however, like the *N. minimus*, are dwarf. The long trumpet narcissus make ideal material for garden decoration, cut flowers, and forcing.

TYPE A, TRUMPET AND PERIANTH YELLOW.—One of the most popular of this group, the Golden Spur, was discovered in 1885 on the private estate of the Prince von Wiedt, Wassenaar, Holland. Henry Irving, another popular variety, was found at Warmond, Holland. The large number of the new varieties have originated from seed as a result of breeding. The well-known King Alfred, which originated as a cross between *N. maximus* and another yellow trumpet, has become the parent of a very large number of varieties of trumpet narcissus. The progress during the last ten years in obtaining better varieties through breeding has been remarkable. Some good varieties are:

Glory of Leiden, Van Waveren's Giant, Emperor, Majestic, Monarch, Glory of Haarlem, Apotheose, Golden Rider, Frans Hals.

TYPE B, TRUMPET AND PERIANTH WHITE.—The number of varieties in this group is much smaller than that in the yellow trumpet because of the fact that Mme. de Graaff was the only variety of prominence until 1911. With the advent of Mrs. Ernst H. Krelage in 1911 a variety of very great merit was added to the group. During the first years the bulbs of this variety retailed for about \$225 each and even now they are sold for about \$10 apiece. Some other good varieties are:

Medea, White Knight, Emperor, White Minimus, and Adelaide. Very attractive for planting among shrubbery or in the lawn are: Wm. Goldring, white drooping flower; Albicans, white drooping flower; W. P. Milner, cream color, dwarf; Lady Somerset, pure white, tall.

TYPE C, BICOLOR TRUMPETS.—All the varieties in this group have a white perianth and a yellow trumpet, except a few in which the

trumpet is soft pink, but the time may be near when there will be a trumpet narcissus with an orange-red trumpet and a white perianth. As in the yellow trumpets, some members of this group were found wild, like the well-known variety Princeps. It is a very important group because of such varieties as Empress, Bicolor Victoria, and Horsfieldt, which are grown in great numbers. Bicolor Victoria is



Fig. 2

TRUMPET NARCISSUS

GOLDEN SPUR

SPRING GLORY

an ideal forcer, and Horsfieldt, which is not so easy to grow, is the most beautiful. A few of the best varieties are:

Glory of Noordwijk, Weardale Perfection, Mme. Plemp, Mrs. John Hoog, and Albertine. Apricot and Pink Pearl are small but interesting because of the apricot color in the trumpet. Good varieties for forcing are: Phlynee, Spring Glory, Glory of Sassenheim, and Rosa Lynd.

II. Incomparabilis Narcissus

The incomparabilis or halfskirt is the first group of these narcissus which have a trumpet only one-third to one-half the length of the perianth. This group is the result of crossings between the trumpet narcissus and the poet's narcissus. There are two subdivisions, those with a yellow perianth and those with a white perianth. The trumpets of both divisions are yellow orange, some being almost red. The incomparabilis varieties are difficult to surpass for naturalization purposes. They truly possess a dancing, graceful beauty and will take the gloom away from an otherwise somber spot or corner. As cut flowers they deserve a hearty recommendation. Some of the best varieties with a yellow perianth are:

Gloria Mundi, Beauty, C. J. Blackhouse, Croesus, Helios, Lady Arnott, Lucinius, Lioba, Red Cross, and Golden Frilled.

Varieties with a pure white or cream-white perianth are much more numerous. Some of the best are:

Lucifer, Will Scarlet, Princess Mary, Queen Sophie, Bedouin, Bernardino, Great Warley, Pedestal, Tara Ranee, Imperium, and Invincible. This last variety bears probably the most imposing flower in the entire narcissus family. It has a pure white perianth and a very broad, yellow trumpet with an orange edge.

III. Barri Narcissus

The Barri group deserves as much popularity as the incomparabilis and is adapted to the same purposes. In this group the cup or crown is less than one-third the length of the perianth segments. There are two subdivisions, those with a yellow perianth and those with a white perianth.

The following are some of the best yellow varieties:

Conspicuous, which is the oldest and is still very attractive, with a clear yellow perianth and short trumpet with a brilliant orange-red edge; Firebrand, which has a sulfur-yellow perianth with, as a strong contrast, a fiery red trumpet; Brilliancy, which flowers very early and is one of the best new varieties, having a large yellow perianth and a clear yellow trumpet with an orange-red edge; Blood Orange; and Coeur de Lion.

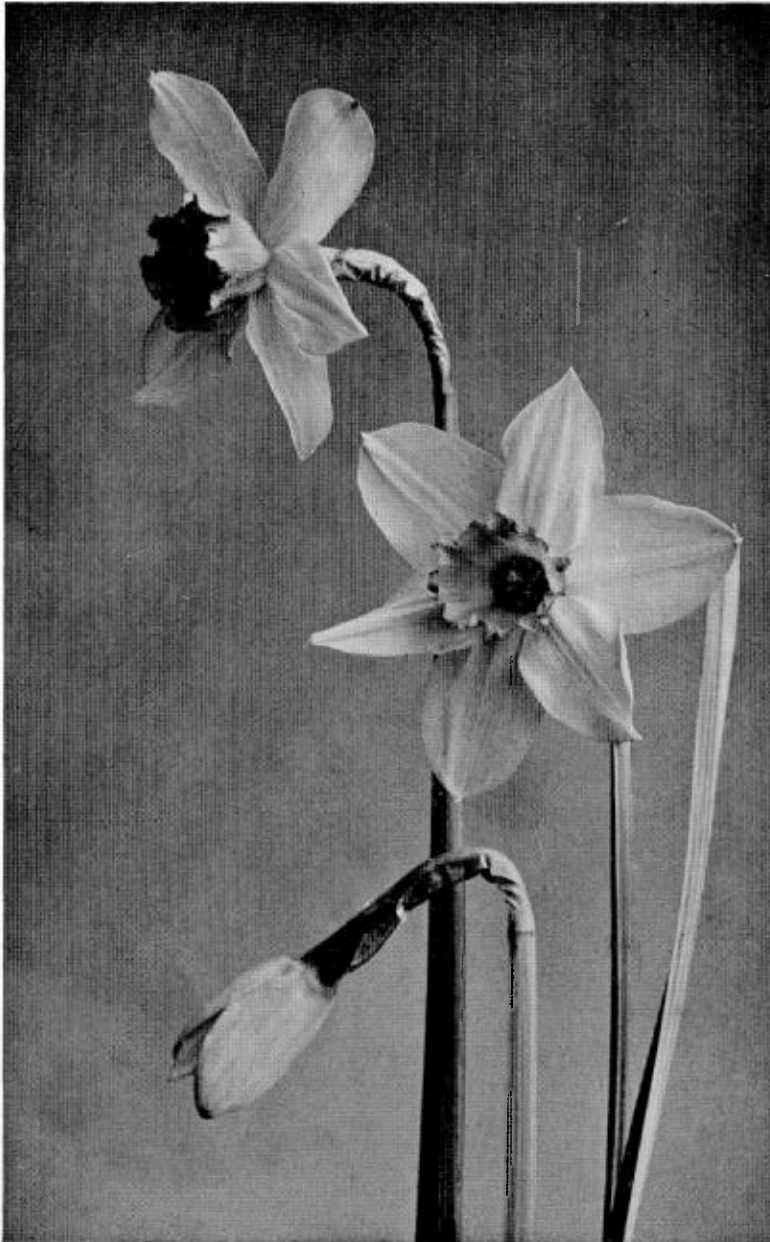


Fig. 3

INCOMPARABILIS NARCISSUS

The number of varieties with a white perianth is much larger. Some of the best of the older ones are:

Flora Wilson, Maurice Vilmorin, Dorothy E. Wemyss, and Seagull. The latter has an apricot-pink trumpet. In the newer varieties of this group are some of surpassing beauty. Among the best are: King George II, with an orange-edged, light yellow trumpet; Isis, more than three inches across; Masterpiece, which has a clear red trumpet; Red Chief, with a deep red trumpet; and Nobility, Expectation, Bonfire, Graziella, Charm, Cossack, Sheba, and Winsome.

IV. Leedsii Narcissus

All the members of the Leedsii group have a white or cream-colored perianth, whereas the crown is pale cream or pale citron, sometimes tinged with apricot or pink. In some varieties the crown attains such dimensions that the name "trumpet" would be appropriate. This group is equal in beauty and nobility of form to the incomparabilis and Barri types. The Leedsii varieties are extremely graceful and strongly suggest an orchid or a lily. All of them have a cream-white or pure white perianth. The progress through breeding in this group has been astonishing. In Haarlem as many as twenty Leedsii varieties have received certificates of merit in a recent year.

The old varieties have rather small and somewhat drooping flowers. Some of them, such as Mrs. Langtry, Amabilis, and Minnie Hume, may still be recommended for naturalization. A slight drooping is still present in such varieties as Mrs. Cato Hoog, which has a white trumpet and an undulating and saw-toothed edge, and Holbein, which is more than four inches across and has a lemon-yellow trumpet. Mount Erebus has a very noble form; Kingdom, Epicure, and Stolberg received certificates in 1914. Some of the best later introductions are:

Empire, Clio, Queen of the North, Professor Westerdijk, Her Grace, Lord Kitchener, Patrician, White City, and White Emblem.

V. Triandrus Hybrids

To the triandrus group belong the hybrids of the species *N. triandrus*, but *N. triandrus* itself is placed in another group. They are rather dwarf but sometimes carry large flowers with long trumpets. The triandrus hybrids include a relatively small number of varieties. The oldest one, Queen of Spain, originated in Spain where it was found wild. It is a rather dwarf grower with a butter-yellow flower.

The variety *Thalia* has pure white flowers and is a good forcer. *Gertrude* is lemon yellow with a rather long trumpet.

A large number of these triandrus hybrids are grown in England, of which the best are:

Agnes Harvey, with white perianth and apricot-colored trumpet; *Madonna*, pure white; *Alope*, with a light yellow perianth; *Primrose*



Fig. 4 POETAZ NARCISSUS, ELVIRA

Gem, with a primrose-yellow color; and *Cingalee*, four inches across and with a soft yellow trumpet.

VI. Cyclamineus Hybrids

The cyclamineus group is represented only by hybrids. Since the perianth segments are abruptly replaced they resemble a cyclamen. As far as the writer knows, there are no *N. cyclamineus* hybrids offered to the trade.

VII. Jonquilla Hybrids

The jonquilla hybrids are typified by a very pleasing fragrance and almost round, onion-like, dark green foliage. From two to four flowers are born on one flower stem. *Narcissus odorus*, one of the oldest jonquilla hybrids, is found wild in many places. It is a hybrid

of the true jonquilla and a trumpet narcissus. Strong bulbs produce four dark yellow flowers on one flower stem. Some of the best varieties are:

N. odorus rugulosus maximus, deep yellow; *N. odorus giganteus*, with large yellow flowers on strong stems; *N. odorus rugulosus*, Orange Queen, of deep yellow color; *General Pershing*, with a perfectly modeled deep yellow flower; *Sweet Nancy* and *Golden Sceptre*, both of which are about three inches across, the former being a light yellow, the latter a deep, glossy yellow.

VIII. Tazetta Hybrids

The tazetta hybrids are the so-called bunch-flowered narcissus or polyanthus narcissus. The numerous forms of *N. tazetta* are extremely variable but they are all recognizable by the many small crowned flowers and the broad leaves. Sometimes eighteen flowers are bunched on one stem. The well-known paperwhites (*N. totus albus*) and the yellow *Grand Soleil d'Or* belong to this group. A few good varieties are:

Bezelman Major, white with a yellow trumpet; *Grand Monarque*, white with a lemon-yellow trumpet; *Grand Primo*, white; *Maestro*, white, with an orange trumpet; *White Pearl*, pure white; *Queen of the Netherlands*, white, with a pure yellow trumpet; *Soleil Brilliant*, golden yellow with an orange trumpet. The Chinese Sacred Lily, which is an extremely easy forcer, belongs in this group.

The poetaz varieties constitute an important type of bunch-flowered narcissus. They originated in Holland from a cross between *N. poeticus* and *N. Tazetta* and they were given a name which is composed of the first letters of the botanical names of both parents. The purpose of this breeding was to obtain a group which would not suffer so much from frost, which would be easier to grow, and which would be not so strongly fragrant. The results were all that could be desired. The plants are easier of cultivation, their fragrance is not too strong, and they are hardy and just as easily forced. Some of the best varieties in this poetaz group are:

Admiration, lemon yellow with an orange cup; *Albert Vis*, white with an orange cup; *Alsace*, white with a yellow cup, very popular as a forcer; *Jaune a Merveille*, yellow with a yellow cup; *Orange Cup*; and *Orient*.

IX. Narcissus Poeticus

The Poet's Narcissus is beloved throughout the world. It is also called "Pheasant's Eye" because of the pure, glistening white perianth and the small cup with a dark red edge. The flowers have a pure



Fig. 5

POET'S NARCISSUS

white perianth, and their cup is flat and usually yellow with a dark red edge. They are of rare beauty, sweetly scented, and exceedingly pleasing as a cut flower in a small, slender vase. In the lawn or among shrubbery they are delightful. The varieties in this group differ only in color and size of cup. Some of the best varieties are:

Ornatus, a very good forcer; King Edward VII, large; Glory of Lisse, an improvement over the Ornatus; Caedmon, large flower having a cup with a dark red edge; Aglavaine, with a pure red cup; Horace, one of the prettiest with a dark red-edged cup; Juliette, very free flowering.

X. Double Narcissus

The double narcissus is much admired by some people, but others do not care for it. The best known is the double von Sion (*N.*

telamonius plenus). This variety is an ideal forcer and well adapted to naturalization.

Queen Ann's Daffodil or *N. capax plenus* is about six inches high and a fine subject for the rock garden. *N. albus plenus odoratus* is the double *poeticus*, pure white and greatly resembling a gardenia; Orange Phoenix (Bacon and Eggs), white with orange; Primrose Phoenix, pure yellow; Apricot Phoenix, cream color with apricot pink; Volcano, soft yellow with brilliant orange; The Pearl, cream white, dainty; Holland's Glory, a sport of the trumpet narcissus, Emperor, with camelia-like flowers. Old varieties which are still to be recommended are the double jonquils, such as *N. odoratus plenus*, yellow; *N. odoratus rugulosus plenus*, tall, deep yellow; *N. jonquilla flore pleno*, very fragrant. Daphne is a recent English introduction, pure white, sweetly scented, and closely resembling a gardenia. It is an excellent grower and forcer and has flower stems fourteen to sixteen inches long.

XI. Botanical Species

The botanical species contain excellent material for the rock garden, such as *Narcissus bulbocodium* (Petticoat Daffodil) and its varieties. They are natives of southern France, Spain, and Portugal. The bulbs always remain small. The perianth is not greatly developed, but the cup is large and well spread out. Other species are:

N. citrinus, light yellow; *N. clusi*, pure white; and *N. conspicuus*, golden yellow; *N. triandrus*, very attractive, with pure white flowers of which three to five droop from one stem; *N. calathinus concolor*, soft yellow; *N. cycamineus*, extremely graceful with strongly recurved petals; *N. viridiflorus*, the so-called *green narcissus*, difficult to obtain and more prized for its novelty than for its beauty.

ORDERING AND CARE BEFORE PLANTING

For the amateur it is advisable to buy narcissus bulbs from a reliable seed store or grower. Most of them gladly send upon request, illustrated catalogs which will give one a good idea about prices, varieties to select, and colors. By comparing a few catalogs one may make a very satisfactory selection, but it is still better to see the varieties growing.

It is always well to order early and to unpack the bulbs as soon as they are received, which is usually late in August or early in September. The bulbs should be carefully spread out to prevent bruising and kept in a dry, well-ventilated and shaded location until planted. Narcissus keep best in a rather cool place—a good cellar is generally satisfactory. While handling the bulbs one should be careful not to injure the skins, since they form a protection against excessive evaporation.

It frequently happens that mice, moles, or dogs spoil part of the bulb beds. This possibility makes it advisable to buy a few more

bulbs than one needs. The surplus can be planted in small pots and plunged into a corner of the garden to be used for replanting bare spots later.

OUTDOOR CULTURE

Situations and Uses

On the margins of streams or lakes, under fences, beside hedges, among thin shrubbery, or as colonies in borders, narcissus are highly attractive and succeed well. Charming color effects can be made by massing them along drives or walks with blue grape hyacinth, *Scilla sibirica*, rose and blue hepaticas, primroses, and *Myosotis scorpioides*.

Some narcissus, such as *N. triandrus*, *N. cyclamineus*, and *N. minimus*, are peculiarly adapted to the rock garden, and they delight in a gravelly soil. *N. cyclamineus* and *N. calathinus* require a moist situation and a cool soil. *N. calathinus* succeeds best in a northern exposure.

Very often, narcissus are planted under trees, but they will not succeed well in such a location unless they are supplied with moisture and plant-food.

When naturalization in the grass is desired, the grass should remain unclipped until the ripening period of the bulbs approaches, which is discernible by the yellowing of the foliage. Bulbs are frequently planted in a lawn and as soon as their flowering period is over, the foliage is cut down to the ground. This seriously impairs the vitality of the plants, and in comparatively few years they die. It is better to plant where the grass need not be cut until the tops of the narcissus are ripe. For naturalizing, one should avoid planting in rows or formal designs. A good plan is to scatter the bulbs like seed and plant where they fall. Simply remove a bit of sod, make a small hole, three to six inches deep, in the soil, insert the bulb, compact the soil over the top, replace the sod, and nature will do the rest. If the bulbs are planted in sheltered corners where they find protection from rough winds, and are shaded during the warmest part of the day, the flowers will keep much better.

Planting

Authorities differ considerably as to the depth of planting. For planting in the open, the safest rule to follow is to cover every bulb with twice its own depth of soil. The bulbs vary greatly in size according to the variety, some being less than one-half inch in diameter. The depth of planting will vary, therefore, from two to

six inches according to the size of the bulb. The larger bulbs may be planted from four to six inches apart, and the smaller ones from three to four inches. At this distance apart the bulbs will soon completely fill the spaces, forming a compact mass, and it is then that their flowers are produced most freely. It is one of the good features in growing narcissus that in two or three years after planting they need no further attention, as they will protect themselves against all encroachment.

The bulbs are set with a trowel or a dibble. One should be careful, especially when planting with a dibble, that no air-space is left below the bulb. This condition is very likely to occur in a loamy soil. The

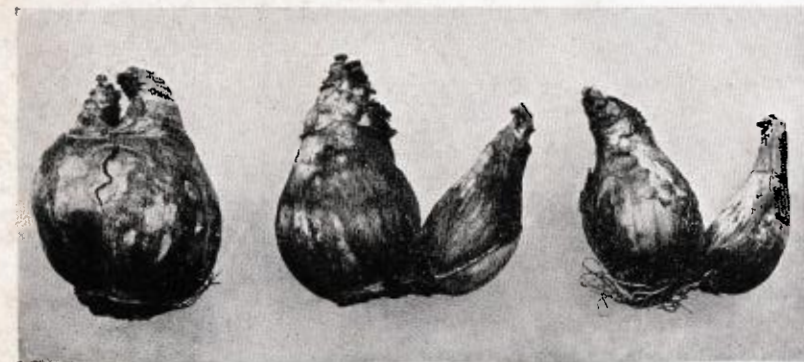


Fig. 6
DOUBLE NOSE BULBS OF TRUMPET NARCISSUS SPLIT, BOTH BLOOMED SPLIT, ONE BLOOMED

best remedy is to have a pail of finely pulverized soil or sand at hand, to be used in filling part of the dibble hole so the base of the bulb will rest solidly on the soil.

Care After Planting

At the end of June or early in July, when the foliage is dying and becomes yellow, the beds may be cleaned and planted with shallow-rooted annuals such as asters, zinnias, snapdragons, or other summer flowering plants that have been sown in the spring. By this method the beds are gay with flowers from early spring until late in the fall. It is obvious that where this system is carried out, the plants would be benefited by a coating of manure applied to the soil each fall in order to maintain fertility for the two crops of flowers.

The bulbs may be left undisturbed from six to ten years. When the flowers gradually become smaller it is well to lift and replant them. On this occasion the larger bulbs may be selected for replanting and the smaller ones for increasing the stock. Especially in an exposed location it is well during the first winter after planting to protect narcissus with a litter three or four inches thick of straw, hay, or leaves—preferably straw. Hemlock, spruce, or fir boughs are also excellent material. Covering is best done after the first severe frost, some time in December or early January. It will keep the frost in the ground and prevent the heaving of the soil through alternate freezing and thawing, which may cause injury to the roots. The covering should be removed some time in March, the exact time depending on location and weather conditions. The best time is just before the leaves come through the litter. It is advisable to remove the litter gradually. This will permit the yellow leaves to become green and harden gradually. When the entire litter is removed at one time, severe cutting winds or frost may damage the tender yellow leaves considerably.

Time to Plant Outside

When grown under normal conditions, narcissus develop a strong root system before any top growth is made. Experience has proved that a strong root system must be developed before the soil becomes frozen, but that no top growth should have started because of the possibility of frost injury. The roots prevent the bulbs from being heaved by alternate freezing and thawing, and also cause an immediate growth activity when spring arrives. The best time to plant is between the middle of September and the middle of October. Early planting is to be recommended. Late planting, even into late November, may be done, but sometimes at the expense of flower and plant.

If for some reason the shipment of the bulbs has been delayed until freezing weather, the soil should be prepared and covered with a mulch to prevent freezing. After the planting is finished and the bulbs are covered with soil, a mulch should be applied again in order to permit the bulbs to develop roots before the soil underneath the mulch becomes frozen. This method should be adopted when bulbs are planted in December. One should not make the method a regular practice, however, as the result may prove disappointing.

A great deal of the success of producing the largest, most perfect, and richest colored flowers and foliage is due to maximum root

development. Just keep the following in mind: "No roots—no flowers; poor roots—poor flowers; good roots—good flowers."

Soils and Fertilizers

Narcissus, unlike many other bulbous plants, will grow to perfection on any well-drained soil, even in heavy clay if there is not too much lime present. The addition of some sand, ashes, or gravel to such a soil type, however, will make for still better results. A very poor and sandy soil will be considerably improved by the addition of some well-rotted manure. In the past, the idea prevailed that narcissus neither needed nor responded to fertilizers. At present a light to medium application of well-rotted manure or leaf-mold is considered beneficial on the majority of our soils for all varieties, with the possible exception of Golden Spur and Double von Sion, which are very sensitive to manure. The manure or leaf-mold should be spaded in and thoroughly incorporated in the soil in the spring previous to the planting. If this is not practicable, it may be done just before planting. On most soils bone meal will give beneficial results. This fertilizer may be considered the best for all bulbous stock. It should be worked into the upper two or three inches of topsoil after the planting has been done. An application of $\frac{1}{2}$ pound to 25 square feet will furnish enough phosphoric acid and nitrogen. It is impossible, however, to state a definite amount of natural or artificial fertilizer to use, because of the great variation in texture and fertility of soil types. The soil should be well supplied with water during the growing season but as this season comes in April and May, nature usually provides it generously.

FORCING

Use as Cut Flowers

Because of their graceful appearance and beautiful color blending, narcissus are exceedingly useful for cut flowers. A small vase with two or three flowers loosely arranged, with their own foliage for greens, makes a bright, attractive spot in any room. The best results are obtained when the flowers are cut while still in bud or just beginning to open. It is by this method that they retain their warm, brilliant colors, which often fade if the flowers are cut when fully open. Like all other flowers, narcissus should be cut early in the morning or on a dull day.

Commercially, narcissus bulbs are forced by the millions, mostly for cut flowers. *Narcissus totus albus*, or paperwhite narcissus, especially, has been indispensable as a moderately priced flower in funeral



FIG. 7

NARCISSUS POLYANTHUS
GRAND SOLEIL D'OR

work. Other varieties such as Grand Soleil d'Or, the earliest yellow, are used in large numbers around Christmas time. The trumpet narcissus also form ideal material for cut flowers and are great favorites around Easter.

Varieties for Forcing

For earliest forcing the best varieties are *Narcissus totus albus* (paperwhite), the yellow Grand Soleil d'Or, *N. clusi*, *N. tazetta orientalis* (Chinese Sacred Lily), *N. obvallaris*, Trumpet Major, Golden Spur, Henry Irving, Cervantes. The first two are easily brought into flower for Christmas and the others follow in close succession.

A little later are the large trumpet varieties, such as Princeps, King Alfred, Tresserve, *N. odorus giganteus*, Glory of Sassenheim, Early Beauty, Rosa Lynd, Glory of Leiden, Van Waveren's Giant, Bicolor Victoria, Emperor, Empress, Majestic, and *N. von Sion* (double daffodil).

The medium and short trumpet, such as Leeds White Lady (with pure white perianth, yellow cups); Leeds Mrs. Langtry; and Duchess of Westminster, are excellent.

The incomparabilis variety, Sir Watkins, and also *Narcissus jonquilla*, particularly the varieties *N. jonquilla rugulosus* and *N. rugulosus pleno*, are very desirable. The latter have small sweet-scented flowers in clusters.

Measures Preparatory to Forcing

Narcissus are forced in pots, pans, bowls, or boxes. When the flowers are intended for use in the room the first three receptacles are most desirable. When the florist intends to use narcissus for cut flowers, he grows a large part of his crop in boxes because they afford economy in handling as well as in space.

For forcing, only first-class bulbs should be used and if possible the double-nose type, which will give two flower stems to the bulb, should be bought. If, for any reason, the bulbs cannot be potted immediately, they should be treated as mentioned under "Ordering and Care Before planting," but it should be kept in mind that early potting in late August and September is always advisable.

It is well to use a rather rich compost. A good mixture is formed by the use of three-fourths good garden soil with one-fourth leaf-mold or well decomposed stable manure. When the garden soil is rather heavy a liberal addition of sand will prove beneficial as it will

aerate the compost and provide for drainage. Be sure, however, not to use soil from a compost pile in which residues from bulbs of the previous year have been mixed; if such soil is used insect pests and disease may be the result.

When the soil is prepared one should select the proper receptacles. Some of the smaller types may be forced successfully in 4-inch pots,



Fig. 8

DOUBLE NARCISSUS
NARCISSUS TELAMONIUS PLENUS

but the large majority require a 6-inch or 8-inch pot or pan. Pans are shallow pots, therefore less bulky, and considered from the standpoint of beauty, are the more desirable receptacles for narcissus. The pans or pots should be well provided with gravel, cinders, or broken crocks for drainage, and filled about three-fourths full with the compost. When placing the bulbs on top of this soil one need not leave more than one-fourth or one-half inch of space between them. Five to ten bulbs may be placed in each pot according to the size of the bulbs and of the pot. The tips of the bulbs should be about one-half to one inch below the upper edge of the pot. Soil should be carefully placed between the bulbs and firmly pressed, leaving one-fourth to one-half inch of space between the soil level and the rim of the pot for watering. After this is done, the pots should be placed outside in a coldframe or shallow pit, preferably in a somewhat shaded place, which should be well drained to reduce the possibility of a rotting of the bulbs.

Proper labelling is advisable when several varieties are used. For this purpose, stakes made of 1-inch by 2-inch material are very good. They should extend at least a foot above the pots. At the top of each, a label should be attached on which the variety name and the date of planting are written. After a thorough watering, the pots must be covered with five or six inches of clean soil or cinders. The object of this covering is to prevent drying out, and to maintain a uniform and rather low temperature around the bulbs to encourage a strong root growth. If there is danger from severe frosts it is well to cover the soil with straw or leaves or to use sash with a straw mat covering. This will prevent deep freezing and enable one to remove the pots in mid-winter without difficulty. Many pots have been broken and bulbs injured as a result of overlooking this safety measure.

When a large quantity of bulbs are to be forced on a commercial scale, it is becoming a more general practice to provide a bulb cellar. This may be part of the existing cellar or may be specially constructed. Along the sides, racks and shelves are placed, upon which the flats or pots may be set. A few steam or hot water pipes may be installed to maintain the temperature around 35 to 40 degrees. By the use of a bulb cellar, a supply is always available for forcing regardless of the outside conditions.

Many urban people have no garden or back yard. They may place the pots in a dark closet in a temperature not exceeding 55 to 60 degrees Fahr. If no closet is available, one may be made of an old box or, if there is a cellar, a place may be provided there for the pots. Under such conditions moisture, which is essential at all times, must be supplied by regular watering.

Before removing the plants to the place where they will flower it is imperative that they be well rooted. This can be determined by inverting the pot and tapping the rim gently upon some firm object. When the soil is moist the ball of earth will come out intact. The bulbs are sufficiently rooted when the outside of the ball is well matted with roots. After the examination, the pot is carefully replaced and the pot is turned over to its normal position. At this stage of development the plants have usually produced two or three inches of top growth. The time has then arrived to give them full daylight in the living room or in a partially shaded place in the greenhouse.

Forcing in the Living Room

For forcing narcissus in the living room, the temperature may vary from about 40 to 75 degrees Fahr. The best results are obtained at a uniform temperature. If grown in a cool place the plants will remain rather stocky and the blooms will develop slowly and have great keeping quality. When the plants are grown in a warm place they will grow rather tall, and the flowers will reach maturity much sooner. The keeping quality, however, will be somewhat impaired, because the flowers lack substance. A temperature ranging between 50 and 65 degrees Fahr. is probably best. This temperature is sufficient to bring the plants into flower in five to eight weeks, depending largely upon the varieties and the season of the year. Knowing this, one is enabled to bring the pots into the forcing room at the proper time. To prevent the flower buds from shrivelling, neither the soil in the receptacles nor the atmosphere should be allowed to become dry.

Bulbs which have been potted in September will be well rooted by the middle of November, at which time some of the earliest narcissus may be placed in the forcing room. By bringing in a few each week, a continuous display of flowers may be had from late December until Easter.

Forcing in the Greenhouse

The amateur or commercial grower who possesses a greenhouse in which he intends to force bulbs, usually desires to have his bulbs bloom at a certain time, either for the purpose of having a continuous display or to be able to sell them at a given date. For this type of amateur and for the commercial grower the so-called "Dutch bulb chain" deserves recommendation. In this chain are six links, as follows: *a.* the outside quarters; *b.* carnation temperature (50 degrees Fahr., at night); *c.* hot or sweat box; *d.* carnation temperature; *e.* basement; *f.* store or display counter.

In order to have a continuous display or to have a certain number of flats or pots ready for sale at a given time, the commercial grower needs almost complete control over the forcing conditions. This control

is made possible by the use of the hot box, which is usually underneath an enclosed section of a bench, and where by means of steam or hot water pipes a temperature from 70 to 100 degrees Fahr. may be maintained. This box is kept moist and dark. This condition, in addition to the great heat, draws the plants up very rapidly. They may remain in the box until the buds show color. It is obvious that by either raising or lowering the temperature in this box one can retard or hasten the development considerably. If the hot box is pitch-dark and the temperature is very high the foliage is likely to become yellowish green and soft. When the plants are removed to the cool greenhouse they should be kept well shaded for a few days until they regain a deeper green, and more vigor. A constant light shade over the plants will make the flowers last longer.

It is advisable to use the bulb chain as follows: Take a desired number of pots or flats from link *a*, the outside quarters, and move to link *b*, the cool greenhouse; in two or three days they may be removed to *c*, the hot box, and remain there until they are tall enough; from there they are taken to link *d*, the cool house, in order to harden them slowly; and, if designed for greenhouse display, they may remain there. If the flowers are intended for sale it is a good policy to remove them to *e*, the basement, where they will harden still more, to wait the demand at *f*, the retail counter or store.

Unless each link of this chain is filled, a steady supply—which is the only way to make a profit from the bulbs—cannot be relied upon. It is, generally speaking, not wise to bring in many at a time, because the demand must often be cultivated. However, a few good specimens will usually create a demand for them.

If the grower is not particular about having the plants bloom at a certain time, he may curtail this bulb chain to two links, the outside quarters and the cool or temperate greenhouse. A night temperature between 45 and 55 degrees Fahr. will give excellent results.

Since Easter sometimes comes later than the natural flowering time of the bulbs, it may become necessary to retard the growth as much as possible. It is not advisable to leave the plants in the outside quarters any later than the last week in March. If they are kept there much longer, the shoots will become so tall that the plants cannot be removed without causing considerable injury to the foliage and the flower stems. If Easter comes late, the best plan is to remove the stock directly from the outside quarters to a light, cool basement. If Easter comes early in April the plants should be taken up early in March and placed in a cool, shaded greenhouse.

The plants should be removed from the outside quarters three to four weeks before flowering. Foliage which has developed under the soil is blanched and quite yellow. It requires about a week of daylight before this foliage takes on its natural green color and acquires vigor.

Growing Narcissus in Saucers on Pebbles

The Chinese narcissus, also called Chinese Sacred Lily, (*Narcissus tazetta orientalis*); the paperwhite narcissus (*Narcissus totus albus*); and the *N. tazetta* variety Grand Monarque, are especially adapted to growing in saucers on pebbles.

Forcing narcissus in saucers or bowls—a pretty Chinese bowl is very decorative and enhances the beauty of the narcissus—is done in the following manner. A layer of pebbles or broken crocks is put in the bottom and on this are placed as many bulbs as the bowl will

hold. After this the space between the bulbs is filled with the same material to keep them in position, and water is poured on the bulbs until they are half submerged. The bowl should then be removed to a cool room and left there for two weeks. As soon as growth becomes noticeable, the bowl may be placed in the living room. From this time on, one may admire the daily rapid development of the plants.

Treatment After Flowering

If hardy varieties have been gently forced, the following measures should be taken when it is desired to use the bulbs in the garden. After flowering is over, water should be gradually withheld. The plant-food present in the foliage will then slowly be transferred to the bulbs. In three or four weeks the foliage will have withered and the bulbs should be taken out of the pots and stored just as were the bulbs which were newly received in the fall, that is, in a cool, dry, shaded, airy place. If planted in the fall, these bulbs will display some flowers the following spring and will bloom profusely in the second year after forcing. They will continue to flower for years if the conditions are right.

PESTS

Although the average amateur seldom has bulbs which are affected by insects or disease it may be well to state briefly the nature of these pests and how to control them. Where narcissus are grown intensively, as in England, Holland, France, and near Tacoma, Washington, the pests become very troublesome!

Diseases

NARCISSUS MOSAIC OR GRAY DISEASE.—This is a virus disease of the mosaic type. It occurs in all the major species but is much more plentiful in some varieties than in others. Sir Watkin, Princeps, Cervantes, Weardale Perfection, and a few others are notably susceptible. No satisfactory explanation has been given of the prevalence of the disease in some varieties and the comparative absence in others. All parts of the plants are affected, but it is principally indicated by an uneven distribution of the green coloring matter in the foliage, causing a streaked appearance and also by a

streaking of the flowers. The plants also show a decided lack of vigor. The virus affects the size and yield rather than the shape of the bulbs. The yield of mosaic stock averages less than 75 per cent of that of healthy stock.

As yet no definite control measures have been found but careful roguing of the stock as soon as the symptoms become evident, especially just before and during the flowering period, is considered the best control measure. However, stocks which are entirely free from this disease are seldom seen.

BASAL ROT.—The disease is caused by a soil inhabiting *Fusarium* and was given this name because the decay usually begins in the root plate or at the base of the scales and from there spreads through the inside of the bulb, showing generally a preference for the central portion. In partly resistant varieties, such as Sir Watkin, the decay tends to advance in streaks and layers, with healthy tissue intervening. The rotted tissue has a characteristic chocolate brown or purplish brown color, and it remains somewhat dry and spongy. There is usually no slimy breakdown and often there is little external evidence of the disease until it is advanced sufficiently to be recognized by the softened texture of the bulb. For this reason, it is difficult to eliminate all infected bulbs even by repeated sorting in the ordinary way. With small numbers of valuable bulbs, it may be advisable to remove the dry outer scales, and examine the fleshy scales underneath for initial decay. It usually occurs during storage but in warm sections it may develop in the field. The organism causing basal rot may live for an indefinite time on plant residues. If the bulbs mature in a temperature of about 60 degrees Fahr., the roots and bulbs remain healthy. A soil temperature of 75 to 80 degrees Fahr. is very conducive to the rapid spread of the disease. It is for this reason that there is more basal rot in the plantings along the Atlantic Coast than in the Pacific Northwest. This disease affects principally the large trumpet narcissus. The Jonquil and Poetaz types are very resistant, while the Polyanthus varieties are practically immune.

There is no definite control. The growers should follow the best methods of preparing the soil, correct planting, digging at the proper stage of maturity and handling the bulbs so that they are not bruised. Storage conditions should be such that the bulbs are kept dry, cool, and well ventilated. Even with these precautions, a grower may lose many bulbs from basal rot.

Insects

GREATER NARCISSUS FLY.—The greater narcissus fly (*Merodon equestris*) is the best-known pest of narcissus. The adult fly deposits the eggs between the leaves and the larva when hatched penetrates the bulb. The insect can be detected late in the fall by the "feel" of the bulb, since infested bulbs are soft and lighter in weight than healthy ones. The larva—there is usually but one in each bulb—consumes practically the entire inside of the bulb. When full grown the larva is one-half inch in length and about one-quarter inch in diameter. The larva will sometimes be forced out at the neck when the bulb is squeezed between thumb and forefinger.

The most approved Dutch method to eradicate the fly is known as the "hot-water treatment." For this purpose a tank heated by steam or hot water is used. Suspended within this is another tank in which the bulbs are placed for treatment. A constant temperature of 110 degrees Fahr. for 1½ to 5 hours is maintained in the inner tank. The duration of the treatment depends upon the size of the bulbs. In Holland all growers "cook" their narcissus in order to make sure that pests will not be exported or remain in their stock.

Amateurs will do well to examine the bulbs carefully upon receipt, and if the bulbs are somewhat soft, a hole will probably be detected on the edge where the roots will later develop. When this is the case, the bulbs should be submerged in water for twenty-four hours, during which period the majority of the larvae will leave their temporary dwelling. A still safer method is the destruction of the infested bulbs. If bulbs develop poorly or fail completely in the spring, they should be dug and destroyed. At this time a few days spent in searching the beds will pay big dividends. As the larva leaves the bulb for the ground shortly after the plants come up, the period for doing this work is very short.

EELWORMS.—The eelworm or nematode (*Tylenchus dipsaci*) is mainly of commercial importance. It is microscopic in size and makes channels through the bulb cells, by means of which it will eventually destroy the bulb. The best remedy is the hot-water treatment as described for the narcissus fly. The exact temperature is of the greatest importance. A temperature too low will leave the eelworm alive and a temperature too high will kill the bulbs.

LESSER NARCISSUS FLY.—The lesser narcissus fly (*Eumeris strigatus*) is just as troublesome as the eelworm and also usually succumbs to the hot-water treatment. The larva of this insect is, in

most cases, the cause of weak decaying bulbs at digging time in the late spring. It is a small, yellowish-white maggot, a trifle larger than that of the ordinary house fly. Several may be found in one bulb. The insect probably thrives only on non-living vegetation and is not able to penetrate living tissue.

BULBMITE.—The bulbmite (*Rhizoglyphus hyacinthi*) is visible only with the aid of a lens. It attacks narcissus, tulips, hyacinths, crocus, lilies, amaryllis, orchids, and dahlias, and is present in varying numbers in bulbs from all countries. It is yellowish white, and males and females are similar in appearance. The normal life cycle requires about one month. The minute eggs are laid singly on the surface of the bulb. The eggs laid by the individual vary in number from fifty to a hundred and hatch in from four to seven days. The mites burrow into the bulb, where they increase rapidly and feed on the bulb scales or root tissue, causing reddish-brown spots. The injury caused by the mites leaves scars, which form ideal harboring places for fungi, bacteria, and soil parasites, such as millipeds and nematodes. When heavily infested bulbs are planted, the new leaves turn yellow, the growth is checked, and the flowers may fail to develop. Although the mites are capable of living in diseased bulbs, there is much evidence to indicate that they prefer sound ones. As the infestation develops, the bulbs become soft and the mites migrate to healthy bulbs, which in turn soon start to rot.

The mites enter the bulbs before they are dug. Infested bulbs deteriorate rapidly in storage under conditions favorable for the mites. High humidity and a temperature of 60 to 80 degrees Fahr. favor their development, but low humidity and a temperature of 50 to 55 degrees cause them to become torpid. Any delay during transportation may permit these mites to cause rot in a relatively large percentage of the bulbs.

To control the bulbmite, burn all soft and rotted bulbs. Soil sterilization is necessary if healthy bulbs are planted where infested ones have grown. The bulbs may be immersed for 10 minutes in a 2 per cent formaldehyde solution heated to 122 degrees Fahr., or for 30 minutes in water at 122 to 124 degrees. These methods kill the mites and do not injure the bulb unless root growth has started. Young roots will be killed by the treatment.