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THE AMERICAN *Horticultural* MAGAZINE

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Daffodil Handbook

A Special Issue of the American Horticultural Magazine

GEORGE S. LEE, JR., EDITOR

Representing the American Daffodil Society
WILLIS H. WHEELER, *Executive Editor*

Representing the American Horticultural Society
FREDERIC P. LEE, *Member Editorial Committee*

The cover illustration is a four-color photograph of Accent, one of the new pink daffodils. Bred and introduced in 1960 by Grant E. Mitsch of Canby, Oregon.

Plates 2, 11, 36-41, and 54 are published through the courtesy of the Netherlands Flower-Bulb Institute, Inc.

PLATE 1

U. S. DEPARTMENT OF AGRICULTURE

B. Y. MORRISON

to whom this issue of the *American Horticultural Magazine* is dedicated.

B. Y. Morrison

1891—1966

Benjamin Yoe Morrison died in Pass Christian, Mississippi, January 24, 1966. Born in Atlanta, Georgia, he spent most of his professional life in the Washington, D. C. area and nearby Takoma Park, Maryland, where he had his home until retirement in 1951.

Ben Morrison was the principal founder of the American Horticultural Society in 1924. He served as Editor of its *American Horticultural Magazine* for 37 years until 1963, and as President of the Society from 1936 to 1940. Through the years his enthusiasm, limitless energy, extensive contacts with horticulturists, gardeners and botanists and his remarkable number of horticultural lectures and articles enabled the Society to grow and take a leading position in American horticulture. Morrison spoke and wrote with an excellence of style that included a special verve and charm.

For the Magazine Morrison insisted on a high standard of original horticultural contributions, scholarly, forthright and accurate, genuinely to inform the serious amateur. He was bluntly inimical to authors whose manuscripts were rehashes or embodied uninformed opinions.

There were many facets to Ben Morrison's activities. By profession he was a horticulturist and landscape architect. Following his undergraduate work at the University of California and a master's degree in landscape architecture from Harvard University, completed in 1915, he served as a 2nd Lieutenant in World War I and then briefly practiced landscape architecture with a New York City firm. In 1920 he went with the United States Department of Agriculture as assistant to David Fairchild. From 1934 to 1948 he was Chief, Division of Plant Exploration and Introduction, and from 1937 until 1951 also Acting Director and then Director of the United States National Arboretum. The Morrison Azalea Garden at the Arboretum was dedicated to him after his retirement as Director. An indefatigable dirt gardener, he tested great numbers of unusual plants in his own gardens in Takoma Park and later at Pass Christian.

As an artist Ben Morrison excelled in his drawings of horticultural subjects and had an extraordinary capacity for carrying in mind over long periods the precise details of flowers and plants. Plates 3-10, 13, and 14 in this Handbook are example of his work. He was also a fine musician, sang as soloist with several choirs, occasionally found time to give voice lessons, was frequently his own accompanist, and had an especial fondness for German lieder.

Ben Morrison has an outstanding reputation as a breeder of ornamental plants. His greatest contributions were in azaleas, the Glenn Dale Hybrids (named after the Plant Introduction Station at Glenn Dale, Maryland) and the Back Acres Hybrids (named after the estate in Mississippi to which he retired). Recently he had been working with the Satsuki azaleas, having sought out and brought in from Japan the only large representative collection outside that country. His observations and descriptions constitute most of the materials on the Satsukis to be found in *The Azalea Book* sponsored by the Society.

Morrison received numerous horticultural awards. Among them were the Gold Medal and the Liberty Hyde Bailey Medal of the American Horticultural Society, the Gold Medal of the American Daffodil Society, the Veitch Memorial

Gold Medal and the Peter Barr Memorial Cup of the Royal Horticultural Society of Great Britain for work in connection with daffodils, the Distinguished Service Medal of the American Iris Society, the Arthur Hoyt Scott Horticultural Medal and Award, and the Sarah Fife Memorial Trophy of the Garden Club of America. He was a Vice-President of the Royal Horticultural Society from 1945 to his death.

Morrison's scholastic excellence earned him membership in Phi Beta Kappa and Sigma Xi and won him the Sheldon Travelling Fellowship in Landscape Architecture that sent him on an early trip to Japan.

Another of Ben Morrison's special interests was daffodils. References to this interest—his encouragement of the early Daffodil Societies in this country and their exhibitions, his editorship of the first five American Daffodil Yearbooks, his numerous daffodil articles, notes and illustration in the *American Horticultural Magazine*—written by John C. Wister before Morrison's death, appear in chapter 16 of this Handbook. A letter received the day after his death relates the receipt from a friend in Mentone, France, of two bulbs of the rare *N. jonquilla* var. *henriquesii*.

There is therefore an especial appropriateness in dedicating this Daffodil Handbook issue of the *American Horticultural Magazine* to Benjamin Yoe Morrison. Few have risen to his pinnacle of accomplishment in ornamental horticulture.

Frederic P. Lee

PLATE 1A

U. S. DEPARTMENT OF AGRICULTURE

J. Earl Coke, Assistant Secretary, U. S. Department of Agriculture (left), and B. Y. Morrison, at the dedication of the Morrison Azalea Garden, United States National Arboretum, Washington, D. C., May 3, 1954.

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The first and still the leading specialist in miniature daffodils; many of the hybrids on the American Daffodil Society's list of miniatures are of his raising; has sold his nursery which for years was the principal source of small daffodils and now confines his activities to hybridizing. Author of *Miniature Daffodils.*

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Daffodil nurseryman and the only professional daffodil hybridizer in England; continuing the work of the late Walter O. Backhouse in developing red trumpets. Author of *The Daffodil* (1951).

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General Data Processing Manager for Ohio Bell Telephone Co., President of American Daffodil Society (1960-62); has grown daffodils for 25 years producing specimen flowers with minimum ritual.

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Director and member Editorial Committee of American Horticultural Society; Chairman, Advisory Council of the United States National Arboretum. Author of *The Azalea Book,* recipient of Gold Medal of the American Horticultural Society, The American Rhododendron Society, and other awards. Charter member of the American Daffodil Society.

GEORGE S. LEE, JR., New Canaan, Conn. Chapter 3: *Kinds of Daffodils;* Chapter 10: *Natural Plantings;* and Chapter 14: *Miniature Daffodils.*

Editor of the Daffodil Handbook; charter member and former President of the American Daffodil Society (1957-60) and recipient of its Meritorious Service Medal; persistent spokesman for miniature daffodils and American strains of hybrids.

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Graduate of Indiana University with major in botany; Chairman of Committee on Daffodil Study and Show Schools of American Daffodil Society; Master Judge and horticulture instructor of National Council of State Garden Clubs; charter member and recipient of Meritorious Service Medal of American Daffodil Society and Honeywell Trophy for excellence in horticulture in Indiana.

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Research Botanist in charge of Herbarium, United States National Arboretum, Washington, D. C. He is also a plant explorer and introducer. Recent exploration trips have included Ethiopia, Western Europe with special attention to daffodils, and the Juan Fernandez (Robinson Crusoe) Islands. Member Editorial Committee, American Horticultural Society.

GRANT E. MITSCH, Canby, Oregon. Chapter 11: *The Elusive Pink.*

The leading grower and source of American-bred daffodils with some 125 of his own varieties registered and introduced; has made important advances with many types of daffodils, especially pinks and reversed bicolors. Charter member of American Daffodil Society and recipient of its Gold Medal (1965).

B. Y. MORRISON, Pass Christian, Mississippi. Chapter 6B: *Culture on the Gulf Coast.*

Mr. Morrison died while the Daffodil Handbook was at the printers. Photographs and a memorial statement setting forth his horticultural achievements appear in this Handbook. "He added to the stature of all horticulture."

DR. CHARLES R. PHILLIPS, Frederick, Maryland. Chapter 1: *Daffodil, Narcissus, or Jonquil?*

Division Chief at the United States Army Biological Laboratories, Fort Detrick, Md. A research chemist by profession, he has been raising and breeding daffodils as a hobby and has an extensive collection of old daffodil books and prints. Managing Editor of the American Daffodil Society Yearbook for two years.

PHILLIP PHILLIPS, Otorohanga, New Zealand. Chapter 20: *Daffodils in New Zealand.*

Operates three large dairy farms; grows two acres of daffodils for cut flowers and raises thousands of seedlings annually; competes successfully at national shows; vice president of National Daffodil Society of New Zealand.

REV. E. W. PHILPOTT, Aldgate, South Australia. Chapter 19: *Daffodils in Australia.*

Migrated to Australia in 1921 from Holmwood, Surrey, England under Government-sponsored Farm Apprentice Scheme; entered St. Barnabas Theological College and ordained 1930. Began to raise daffodils in 1940 and grows an extensive collection; successful show competitor and daffodil breeder.

ESTHER SEEMAN (Mrs. Julius Seeman), Nashville, Tenn. Chapter 9: *Daffodils in the Home Setting.*

Regional Director of American Daffodil Society and former President of Middle Tennessee Daffodil Society. Lecturer in Political Science at George Peabody College.

GUSTAVE SPRINGER, New York, New York. Chapter 18: *Daffodils in the Netherlands.*

A lawyer representing the Dutch bulb industry as General Counsel for the Holland Bulb Exporter's Association and as Director of the Netherlands Flower-Bulb Institute. Made an officer of the Order of Oranje-Nassau by Queen Juliana in 1952 and in 1965 received the Golden Mercury Award of Interflora, the world-wide florist delivery organization.

PROF. DAN P. THOMSON, JR., Clemson, South Carolina. Chapter 6A: *Culture on the South Atlantic Coast.*

Associate Professor of Textiles, Clemson University. As a hobby grows and hybridizes daffodils to select and develop varieties suitable to the southeastern United States; consultant on daffodils for Clemson University horticultural test garden. Director of American Daffodil Society.

DR. TOM D. THROCKMORTON, Des Moines, Iowa. Chapter 6C: *Culture in the Corn Belt.*

Surgeon and member of many professional societies. Founder of the Daffodil Data Bank, the first application of automation to amateur horticulture. Director of American Daffodil Society and 2nd Vice President of American Horticultural Society.

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WILLIS H. WHEELER, Arlington, Virginia. Chapter 21: *Daffodil Bulb Trade.*

Trained in botany and plant pathology at University of California, Los Angeles; has devoted most of his time since to culture of bulbous crops and their pests and diseases; his duties have taken him to bulb-growing areas of Europe, South Africa, and Japan; charter member, President of American Daffodil Society (1962-64), and recipient of its Meritorious Service Medal.

DR. JOHN C. WISTER, Swarthmore, Penn. Chapter 16: *Daffodils in the United States.*

Distinguished American horticulturist who played a major role in spreading interest in the modern daffodil. Director of the Arthur Hoyt Scott Horticultural Foundation. Charter member of the American Daffodil Society, recipient of its Gold Medal (1961) and the honors of many other plant societies. Author of numerous books and articles; the only American to whom a *Daffodil and Tulip Year Book* of the Royal Horticultural Society has been dedicated (1965).

GERTRUDE S. WISTER (Mrs. John C. Wister), Swarthmore, Penn. Chapter 13: *Daffodils: Early and Late.*

Assistant Director of Arthur Hoyt Scott Horticultural Foundation of Swarthmore College. Director of American Daffodil Society and Editor of its Yearbook, 1962-64; author of *Hardy Garden Bulbs.*

MATTHEW G. ZANDBERGEN, Sassenheim, Holland. Chapter 15: *Split-Corona Daffodils.*

Raised on the daffodil farm of de Graaff Bros. which was taken over by his father; now operates the business growing a large collection including many of the smaller daffodils; member of the Narcissus and Tulip Committee of the Royal Horticultural Society.

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FOREWORD

It can hardly be a coincidence that both the Royal Horticultural Society and the American Horticultural Society have shown special affection for the modest daffodil. The venerable English society sponsored the first Daffodil Conference in 1884. Since 1913, as military and economic needs permitted, it has published 31 Daffodil Year Books. Under its guidance, the accepted classification of the genus for garden and show purposes has evolved. It published the first *Classified List of Daffodil Names* in 1908, a compendium which has gone through 19 editions and been further sanctioned by designation of the Society as the International Registration Authority for narcissus. The Society's two annual daffodil shows set the standard for such exhibitions and the awards made at its Wisley trial gardens are the premier honors of the daffodil world.

It is likely that more space has been devoted to daffodils in the publications of the American Horticultural Society than to any other flower. A series of Daffodil Year Books which began in 1935 was suspended due to restrictions of World War II. The ferment which began within the Society from the enthusiasm of its editor, B. Y. Morrison, spread throughout the neighboring states of Maryland and Virginia and was the genesis of daffodil societies and shows in those states, eventually leading to the formation of the American Daffodil Society.

Such overt partiality for one of the commoners of the plant world must be due to its intrinsic merits. Perhaps Lord Aberconway stated it in opening the Daffodil Conference of 1935: "Daffodils have a wide interest, because they are, as we all know, great garden flowers; they are tolerant of soil and tolerant of climate and they resist Spring frosts as few other plants will. They are found in the garden of the cottage as well as in the garden of the mansion, and they are found in great beauty and profusion in our public parks. Not only is the Daffodil a great garden flower, but I think it is a flower which you might call everybody's flower."

It is as everybody's flower that the daffodil is presented in the following pages; easy to grow, inexpensive to buy, quite free of disease, generous of increase, radiant in the early spring garden, and graceful as a cut flower in the home. Those who surrender to its charms will find that there is almost no limit to the ritual they may make of cultivation for the creation of exhibition flowers nor to the amount they may pay for the first offering of a choice novelty, but such extremes have no place in our story of the daffodil as a garden flower.

While the daffodil is an old flower, flourishing with ancient civilizations around the Mediterranean, its story as an important garden flower is rather brief, dating back scarcely more than a hundred years abroad and only to the early part of this century in the United States. As a result of this sequence, interest in daffodils in this country waited upon progress made in the British Isles and to a large extent this dependence continues.

Dependence on distant sources for plants, either overseas or even within our own country, is not an ideal situation. It has been proved in the past, first with grapes, more recently with rhododendrons, that American-bred stock is generally healthier, hardier, and more vigorous for growing in the United States than its imported counterparts. Daffodil fanciers are willing to write off a year or so, or even more, for an imported exhibition novelty to "settle down," a period of adjustment which the Dutch seem to have largely avoided in breeding their daffodils for garden rather than show performance. However, as Tom Throckmorton has pointed out, there is no more reason to expect Irish daffodils to do well in Iowa than there is for Iowa corn to succeed in Ireland, and it might be added that a selection of daffodils which prospered in Massachusetts would not necessarily find Oklahoma to their liking.

Daffodil breeding is just getting under way in this country. A few professionals and possibly a hundred amateurs are hopefully dabbing pollen and raising seed-

lings. From all this activity will come many varieties of American breeding; most will only prove the raiser's optimism and impatience, but a few will be the forerunners of an assortment of daffodils tolerant of the American climate and resistant to domestic ailments. In a land of not one, but many, climates, it is inevitable that local strains will appear.

There is no thought to disparage the work overseas which preceded any activity in this country—it is the base upon which we must build—but there seems to be little question that the future of the daffodil as a dooryard flower of American homes awaits the accomplishments of our own amateur hybridizers. It is an unplowed field and the principal requirements are youth, enthusiasm, and patience.

It is well for the beginner in daffodils to understand certain facts which set the daffodil apart from most other plants, including bulbs. Breeding daffodils is slow work; a generation from seed to flower is from four to seven years. The bulbs increase steadily, but slowly; this year's bulb will not be much more than two bulbs next year. There are faster and easier paths to wealth than hybridizing and growing daffodils, therefore, there are few who find their livelihood in the field. The number of new varieties introduced each year is small compared to daylilies or iris. Because outstanding new introductions are infrequent and will not be in good supply for many years, they will command high prices which drop slowly.

On the other hand, good varieties are not quickly superseded. Who knows where the iris and gladiolas of 1923 are, yet daffodil Fortune is of that vintage and still a credit to any garden. But slow whittling away of prices does eventually result in a figure which yields little gain and the urge is strong to abandon an unprofitable variety regardless of its merits and replace it with something newer, more expensive, and possibly better. For such reasons the gardener will find that a good deal of judgment may be exercised profitably in building up his collection of daffodils. He will gradually become aware that price is not always a measure of value and that the new is not necessarily better than the old.

No attempt has been made in the Handbook to mention every current novelty; they can be found in the catalogs of specialists. In the chapters concerned with daffodils in the garden (Chapters 3, 13 and 14), the discussion as a general rule has been confined to varieties which cost no more than a dollar or two, are cataloged, and have proved to be good garden flowers.

From the list of contributors it will be seen that many capable hands have joined in the preparation of this Handbook. Some have played down their own role in the events they describe, and it has been possible to correct this modesty only in a limited way in the thumbnail biographies of our contributors. No attempt will be made to single out individuals for special mention—the Handbook has been a team effort—although the rule must be breached to the extent of acknowledging that the contribution of many pages of line drawings by B. Y. Morrison is a special gift of the time and skill which has characterized his lifelong interest in daffodils.

It is personally gratifying in these discordant times to have held the baton during a performance which met with such complete harmony of purpose and action between The American Horticultural Society and the American Daffodil Society. Whenever invoked, the cooperation of the management and members of both societies has been notable. In these last few lines it should be permissible for the editor of the Daffodil Handbook to face his audience and call upon all those numerous individuals behind him who have participated in this tribute to the daffodil to rise and acknowledge the approval which their efforts have earned.

GEORGE S. LEE, JR.

New Canaan, Connecticut
January, 1966

PLATE 2

TREVITHIAN
Jonquilla Hybrid, Div. 7b

—1— Daffodil, Narcissus, or Jonquil?

The daffodil is the earliest of our truly important garden flowers. By important, I mean those flowers grown in almost every garden, used indoors by all those wives who have vases to be kept filled, sold by all flower dealers and even in the supermarkets—those flowers whose large followings of enthusiasts form specialized organizations, issue publications devoted entirely to their further cultivation, hold regular shows and exhibits, and offer other tributes in their honor. The daffodil starts this parade in early Spring. The chrysanthemum ends it in the Fall. Yet with all its importance, with millions of new bulbs sold each year and with old ones persisting so many years that there is hardly a garden in which it does not bloom, the general public cannot agree on what to call it.

DAFFODIL VERSUS NARCISSUS

The question, "What's the difference between a daffodil and a narcissus?" is heard often by those organization members who tend booths at flower shows. As a result, when the members of the American Daffodil Society placed a special exhibit several years ago at the International Flower Show in New York, they had the foresight to prepare themselves with a printed leaflet to hand out to answer just that one question and spare themselves the chore of repeating the same thing over and over. And yet, the answer is simple: "There is no difference." Both refer to the same genus of flowering bulbs. One is the common name; the other the Latin botanical name, which is also often used as an alternative common name in this country.

Latin is no longer a living language, even though it did persist in regular usage long after the fall of the Roman Empire. For centuries during the Dark Ages it persisted in the monasteries, and even into the Renaissance it lasted as the universal language, used by scholars and others who needed to write and talk to others outside their own countries with whom they had no common modern language. Science revived during this latter period, and since it was international, Latin was used by the earliest botanists in writing to one another and in printed texts. Later, French became the more or less universal language, with German a strong contender in science, and today English is gradually replacing both for this honor. This being the case, today there is no reason to avoid using English terms, even in technical writing, and daffodil should be preferred over narcissus in common English speech and in general horticultural or gardening literature. After all, there is the American "Daffodil" Society, and although the Royal Horticultural Society does still maintain a "Narcissus" and Tulip Committee, there is also a "Daffodil" Society in England. They do have "daffodil" shows there, and they publish a "Daffodil" and Tulip Year Book under Royal Horticultural Society sponsorship. Exact systematic botany, however, with its roots in Latin, still uses Latin terminology, but this should apply only to wild species, their botanical varieties or forms, or to their natural hybrids in the wild and should not carry over into the man-created modern horticultural plants. With modern garden forms, we should attempt to encourage the use of the term "daffodil."

I might mention that this confusion as to correct terminology seems to exist today only in English among modern European languages. The Dutch call the flower *narcis,* the Germans *narzisse,* the French *narcisse,* and the Spanish and Italians *narciso,* all cases in which Latin common words undergo slight modifica-

tion when carried over into modern languages. These terms are pluralized according to customary practice of making plurals in these respective languages. In French *daffodille* and *jonquille* also appear in dictionaries, but it is mainly in English that the most used common name, daffodil, differs radically from the original Latin term *"narcissus."* There are also a few colloquial terms used in the European languages as I gathered from letters from the two Dutch authorities, William van Leeuwen and Mathew Zandbergen, to whom I wrote concerning foreign usage. Zandbergen in particular referred to the French colloquial terms (also applied to other flowers, it seems) of "Tue-chien" or "Mort au Chien." Dead dog, indeed!

The problem in English is that daffodil, the early common name, and common usage of the exact botanical name *Narcissus* are to a large degree in competition with one another, with the term "jonquil" also adding to the confusion. This situation, if not universally unique, is at least unique in English among what I have termed the important flowers. Specialists who collect rare succulents may disdain the common English term "houseleek" and talk of their collection of *Sempervivum* to the utter confusion of the non-cognoscenti. With plants widely grown, however, such confusion rarely exists. In many cases such as this, the common name and the botanical name will differ widely. Everyone knows a lilac when he sees one, calls it that, and only professional botanists writing for formal publication will use *Syringa*. In many other cases the common name and the botanical generic name are very similar and, hence, not confused. A rose is always a rose in English, though the genus is *Rosa,* similarly, tulip and *Tulipa*. In many cases there is no truly common name, and the botanical name is in common usage. A case in point is chrysanthemum. The only difference is that when used scientifically, it is capitalized and printed in italics.

Thus we have in regular English usage, common names for plants that fall into three categories: those completely different from the Latin generic name, those similar but spelled slightly differently, and those in which the generic and the common name are identical. In the article "Re Latin Plurals," *American Daffodil Yearbook,* 1959, written in a vein that I hoped was both humorous and accurate, I indicated that those flowers known a long time in their respective countries and having well-established names kept those common names. When known from Roman Empire times or introduced by the Roman conquerors, the common names usually were of Latin derivation. When the botanists placed them formally in various genera, they differed from the common name only in minor spelling differences, as do the Latin terms that come down into the modern Romance languages or into those English terms that derive from the Norman Invasion. Thus the rose in modern French and English is a member of the genus *Rosa,* as mentioned earlier. Common names not Latin in derivation received quite different Latin names when cataloged by the early botanists. So, it is *Sempervivum,* rather than houseleek, or *Ilex,* rather than holly. In cases where the common name and the exact botanical name for the genus are identical, we are usually dealing with plants introduced relatively recently, and therefore having no common name antedating the beginning of scientific botanical nomenclature.

ORIGIN OF THE NAME NARCISSUS

The exact derivation of names is a tricky affair, especially names in common usage in any particular modern language. Even though scholars specializing in the field have given a nice scientific term for it, "philology," individual cases are often a matter of speculation. Let us speculate on the derivation of the terms "daffodil" and *"Narcissus."*

There is no doubt about *Narcissus.* Linnaeus in his epochal *Species Plantarum,* 1753, used that word as the generic name for the same group of plants to which it is applied today, in spite of the efforts of some later botanists to split the group into five or more separate genera. The term was the old Latin term for this flower, and was used by the

Roman poet Ovid. In his *Metamorphoses* he told the tale of the handsome Greek lad who, because of his habit of admiring his own reflection in a pool, drowned and was changed into a flower forever growing and nodding at its own reflection beside a stream of water. From this version of Ovid's Latin term "narcissus," there came into the medical psychiatric literature the word "narcissistic." However, and here is speculation, Ovid was retelling a Greek story, and there is a Greek word "*narke*," meaning deep sleep or stupor, which gives rise to another chemical or medical term, "narcotic." The daffodil bulb does contain a toxic alkaloid which, when eaten, produces this effect. Pliny, another Roman author, who wrote not poetry but almost the first effort at a scientific text on natural history, attributed the derivation of the name of the flower to this Greek term, "*narke*," and not to the *fabuloso puero*, or boy in the fable. Since certain wild forms of *Narcissus* are native to both Greece and Italy, this sounds logical and led me to state in an article "And that's how the Daffodil got its Name," *American Daffodil Yearbook*, 1960, that the Greeks called our favorite flower "stupifying" and meant it literally. So much for *Narcissus*, the official botanical term since 1753 when Linneaus established it. But what about daffodil and other less used common English names?

ORIGIN OF THE NAME DAFFODIL

Daffodil goes far back in common English terminology and was regularly used to describe the wild native (or was it introduced by the Roman conquerors?) yellow trumpet, *Narcissus pseudonarcissus*. This is the daffodil that Wordsworth immortalized in his phrase "When all at once I saw a cloud, a host of golden daffodils." Bowles, in his excellent book *A Handbook of Narcissus*, London, 1934, lists nine or more variations of the spelling in older English literature, including Daffa-down-dilly, but daffodil it has been in English for a long time now. He considers it a variant of Asphodel. This term also goes back to Greek and Latin, and in its various forms appears in many of the early herbals. What is certain, however, is that Linnaeus used the term "*Asphodelus*" for another genus belonging to the family *Liliaceae* rather than for the genus *Narcissus* belonging to the family *Amaryllidaceae*. Whatever its original derivation (and although its older form now refers to a different group of plants and one unimportant horticulturally), in modern form daffodil is certainly the common English term for those bulbous plants belonging to the genus *Narcissus* and is a perfectly respectable term for use in modern horticultural terminology.

This point has been made over and over, although it has still to become well-established in common terminology. I cannot help but quote Parkinson, who wrote in 1629 in his *Paradisi in Sole Paradisus Terrestris* (fortunately republished in facsimile in 1904 so that it is now more readily available), "Many idle and ignorant Gardeners . . . doe call some of these Daffodils Narcisses, when as all know that know any Latine, that Narcissus is the Latine name, and Daffodil the English of one and the same thing." Obviously, even after 300 years many have not yet got the word.

According to my Irish and British correspondents, Mrs. J. L. Richardson, C. F. Coleman, Alec Gray, and Michael Jefferson-Brown, the two terms in common usage there are "daffodil" and "narcissus." The former term is usually applied to the large yellow trumpet or large-cupped varieties, which are similar in appearance to the native trumpet. However, "Lent Lily" seems to be used also for the wild species. With the smaller, shorter-cupped, and mainly white varieties, "narcissus" is the term generally used by the British public. These types are of relatively recent (i.e., post-Linnaean) introduction. They originally appeared in southern Europe and the Mediterranean area in the wild form, and they do not particularly resemble the large yellow trumpets. This nomenclature is in keeping with the general theory that when plants come into common use only after they have received an official botanical name, the Latin generic name usually becomes the common name. However, because of inten-

sive hybridization between these two types, modern gardens contain all sorts of intermediate varieties, and everyday British gardeners are confused as to the correct terminology. The British authorities prefer daffodil for the whole genus, but the situation deplored by Parkinson still persists, although perhaps it is improving.

JONQUIL

In the United States we have still more complications with a third common name, "jonquil." As a youngster in Georgia, I never heard the term "daffodil." We had old varieties there that had persisted in the same place, or had been passed along from garden to garden, for over a hundred years. The yellow ones were all jonquils to the Southerners. Some of these were actually relatives of *N. jonquilla* of Linnaeus, particularly the old campernelle type, which is now considered a natural hybrid. But as Miss Elizabeth Lawrence, North Carolina, reminds me, a small early yellow trumpet has been grown just as long in the Deep South, and it is also called a jonquil there. Narcissus is still used as a common term in the South as well as over the rest of the United States and the British Isles, but is usually applied in the South to the many varieties of *N. tazetta,* which persist outdoors there. Late-blooming *N. poeticus* and its relatives do poorly in those warm climates, but where grown they would be called a narcissus also, and not a daffodil.

B. Y. Morrison from Mississippi and Mrs. G. F. Roennfeldt from Missouri also confirm my opinion that jonquil is the usual Southern term for yellow forms, and Mrs. D. H. Patteson-Knight and Mrs. G. D. Watrous tell me it is common as far north as Virginia and the District of Columbia. I was surprised to hear of its use in Iowa from Tom D. Throckmorton and in California from L. S. Hannibal (along with the use of "China Lily," rather than narcissus, for *N. tazetta*) . Only Helen Scorgie from the far North in Massachusetts denies that jonquil is a common term in her region. Apparently most of the United States is burdened with three names in common use: daffodil, narcissus, and jonquil.

The origin of jonquil is also classical. *N. jonquilla* goes back to Linnaeus. The term is a diminutive form of the Latin word for reed or rush and was used to designate the unusual leaf, which is round or rush-shaped rather than flat as in the other major groups of wild *Narcissus.* Several closely related species also have this characteristic, along with small yellow flowers, usually several in a cluster and with a strong, distinctive, sweet odor. The modern hybrids of the jonquil group (Div. 7 in the present *Classified List,* see Chapter 3) usually retain the distinctive leaf and flower characteristics. The one exception that comes to mind is Shah which most people at first glance would consider a trumpet. Its odor, however, betrays its jonquil ancestry.

As a common name, however, jonquil should be avoided unless deliberately applied to the wild species of that group and their Div. 7 hybrid descendants. It is definitely inaccurate to apply it to trumpets and other large, yellow, modern garden hybrids, as is so frequently done in the South and other regions of this country.

PLURAL OF NARCISSUS

I cannot end without bringing up an old prejudice of mine expounded at some length in "Re Latin Plurals." It is rather commonplace now to bring foreign terms into all modern languages. Telephone and airplane are terms picked up by all tongues. Sputnik will probably appear in future editions of Webster, if it is not there already. However, spelling of these new terms is sometimes changed to conform with grammatical practice in the new languages and, in particular, established procedures in forming plurals are usually followed. This practice of forming customary plural forms was usually followed with the newer plants that had no older common name and simply used the botanical generic name in common usage after the plants were introduced. Thus chrysanthemum, plural chrysanthemums, never chrysanthema; azalea, plural azaleas, not azaleae in English. However, Latin words ending in -us cause

problems in English grammar. Modern American dictionaries give the plural narcissuses as first preference, narcissi, the Latin plural, as second choice. The latter form is rather widely used in England (even by the Royal Horticultural Society) and by the Dutch growers in their English-language catalogs. My claim is that both are equally awkward in English, the first hard to pronounce, the latter affected. So why not narcissus for both singular and plural, as with sheep and deer? People who say this is botanically inexact have no refuge there. There is only one genus *Narcissus* even though there are a number of species and subspecies or varieties in that genus. *Narcissi* does not exist as a term in botanical literature. To those who find this logic hard to follow, let me remind them that however many McGregors there may be in the Glasgow phone book, Scotland has just one Clan McGregor.

I sent reprints of "Re Latin Plurals" to the editors of the major American dictionaries after it was published, and received from all of them nice letters saying in effect that this was a very good idea, but that they followed custom rather than establishing it. Whenever the American public took up this recommendation, they would change their dictionaries. The American Daffodil Society, by formal vote of its Board of Directors made the same form "narcissus" for the singular and plural their formal policy several years ago. The American Gladiolus Society officially banned gladioli quite a few years previously. The European languages that used a modified form of narcissus as their common term all follow their normal custom in forming plurals.

Thus both daffodil and *Narcissus* are correct, the former as the everyday name, the latter as the botanical name. Jonquils, however, are only one of the many kinds of daffodils and the name should be used only for the wild jonquil species and for those plants that are listed under Div. 7 of the *Classified List.*

—2— General Cultural Requirements

Daffodils are very hardy plants and most varieties will thrive in all types of soil and in most areas of the United States, provided there is adequate moisture and good drainage. They will grow in full sun or partial shade and will generally withstand the vagaries of weather and the abuses of mankind. Insects, rodents, and diseases are not a major problem. The bulbs are planted in the fall and a good show the next spring is almost as certain as death and taxes. "Dig a hole and drop it in" is not the recommended cultural instruction for daffodils, but the expression does indicate that they may be planted with a minimum of effort and give surprisingly good results for 3, 5, or even more years with little or no further attention. Bulbs accidentally dropped on the ground in the fall are likely to send their roots into the soil and bloom the next spring though not even covered with soil. However, better results will be obtained if a few simple cultural rules are followed.

These rules are based on experience in Cleveland, Ohio, and should be applicable in a general way to that part of the United States east of the Mississippi and north of Tennessee and North Carolina. Elsewhere, as the summers become warmer, longer, and more humid or even drier, some modifications of the usual cultural practices are essential and these are considered in a series of regional commentaries to be found in Chapter 6.

It is important to understand that the current year's flower is produced from food stored in the bulb during the previous year's growing period. A good strong bulb, planted in pure sand in the fall, will produce a first-class bloom in the spring without any further food whatsoever, but if flowers are expected in the next and subsequent years, food must be manufactured by the leaves and restored in the bulb during the early part of the growing cycle when conditions are most favorable. To obtain this restoration and an increase in bloom by the growth and division of the original bulb, the following requirements must be met: a good root system made possible by a porous soil capable of admitting and holding sufficient water and air, good drainage, some soil nutrient, sunlight, and foliage left on the plant until it ripens naturally.

Soil—To obtain a good root system, bulbs should be planted early in the fall, in September or at least by mid-October, in deeply prepared soil. Since the bulbs should be set so that the base is 5 or 6 inches below the surface and since the feeding area of the roots is all below this level, soil preparation of 12 inches or more is desirable. However, if rock or heavy subsoil conditions restrict preparation to a depth less than this, satisfactory results may still be expected if good drainage is provided, either naturally, or by the use of drain tile or raised beds. Daffodils will not do well in soil that is waterlogged. Depth of planting is not critical. In light soils, daffodil bulbs have a tendency to use their contractile roots to adjust and seek the level they like best, and some may be found 10 to 12 inches below the surface a few years after planting. Daffodils will grow in any type of soil: sandy, loam, or clay, acid, neutral, or alkaline. Clay soil will benefit by the addition of generous quantities of coarse sand, and, unless the soil is fairly rich in humus, the addition of peat moss will improve the tilth. But do not add animal manure which seems to encourage the growth of basal rot, especially in areas where soil temperatures are high.

Fertilization—Daffodils do not re-

quire much fertilizer. If grown in soil which does well for garden produce or other plants, none may be needed. When planting in beds, the incorporation of 2 or 3 pounds of 4-12-4, 5-10-5, or similar formula per 100 sq. ft., well mixed with the soil, sand, and peat mosss at planting time, should be sufficient for several years' growth. When planting in clumps of 3 to 12 bulbs, a handful of fertilizer should be mixed with the soil beneath the bulbs. Bulb food which is sold in most garden stores in small packages is expensive but good and is convenient when planting only a few bulbs. A light application of low-nitrogen fertilizer in the spring as the leaves emerge may be needed if soil tests or poor growth indicate a food deficiency. Fireplace ashes are rich in potash and may be spread on top of the soil any time.

WATER—Water is needed in the fall to assure good root growth before freezing weather sets in and again in the spring when active top growth starts. If your area does not have sufficient rainfall to soak the roots during these periods, artificial watering will be most helpful in producing good quality flowers and in developing strong bulbs for future years. It is especially important that newly planted bulbs have ample water soon after planting so that root growth can start immediately. Early planting is useless unless the soil has enough moisture to assure prompt rooting. In areas where autumns and winters are dry or when daffodils are planted under trees where there is competition for moisture, they may need additional soaking, both in fall and spring. Where drainage is good, they can not get too much water while in active growth in the spring.

LEAVES—The leaves manufacture the food which is stored in the bulb and it follows that the longer the foliage can be kept green and growing, the larger and better bulbs will be produced for good bloom the following year. It is important, therefore, that the foliage should not be cut until it dies down naturally, usually by the first week in July. The leaves should not be tied together with string or rubber bands or braided since this restricts the amount of sunlight they would receive if left to die down naturally. When planted in borders, daffodils should be placed so the maturing foliage will not be objectionable, behind ferns or other later growing plants. If daffodil leaves are needed for arrangements, take only one or two from each plant and do not take any from new or expensive varieties.

SUNLIGHT—Daffodils need sunlight to develop and continue to bloom year after year. Some shading is desirable in the case of red- or pink-cupped varieties which have a tendency to burn or fade in full sunlight, but if planted in full shade on the north side of buildings or evergreens, daffodils will die out in a few years. Since much of their growth is completed before deciduous trees leaf out in the spring, bulbs may be planted in sparsely wooded areas. When planted close to trees or shrubs, there will be competition for food and moisture, but good landscape effects can be obtained in such plantings, and if additional moisture and fertilizer are added, satisfactory bloom will continue for many years.

WHERE TO PLANT—Daffodils of exhibition quality can be grown in clumps in the shrub border where they will receive sunlight for at least half the day. They are most effective if planted in groups of from three to a dozen of one variety in front of evergreen hedges or in the foreground of azaleas or rhododendrons. Be careful to plant the tall trumpets and large cups toward the rear and the nodding, shorter growing triandrus, cyclamineus, and jonquilla varieties in the foreground. If the bulbs are set 5 or 6 inches apart, the clumps will not become crowded for several years, but eventually the size and quantity of bloom will decrease appreciably as the bulbs in the clump multiply. It is then time to dig and replant them. Wait until the foliage has become yellow, then dig promptly before the leaves disappear. The bulbs may be divided and the larger ones replanted immediately in the same spot, after the soil has been prepared and enriched, or they may be stored for replanting in the fall. Daffodil foliage should be removed after it has dried up

and the holes left by the shrunken leaves filled in with soil or mulch to discourage slugs or insects from entering and laying their eggs in or near the bulbs.

Mulching—Mulching daffodil plantings is recommended for a number of reasons. It conserves moisture, keeps the soil temperature at a more even level, discourages weed growth and makes it easier to remove those that do grow through, prevents mud spatter on flowers during heavy rains, and generally improves the looks of the beds or planting areas. Pine needles, where available, are excellent; shredded sugar cane (bagasse) is good and inexpensive; and shredded bark or wood chips are satisfactory as are ground corn cobs or sawdust after the weather has darkened the color. Peat moss is not satisfactory as a mulch since it forms a hard crust that sheds rain and, in addition, will splash on the blooms during a rain as badly as the soil itself.

Lifting—If the bulbs are to be lifted, it is best to do so before the foliage has completely dried up as it is much easier to locate the bulbs especially those grown in clumps in a shrub or perennial border. Dig them with a spading fork being careful not to cut or bruise them and do not let them lie in the hot sun. After shaking off the loose soil, bulbs should be placed in shallow trays, onion sacks, or, for small quantities, in old nylon stockings, being careful to include the label with the variety name. They should be allowed to dry out in a cool and well-ventilated location for several weeks after which they can be cleaned by removing the old dried roots and loose outer skins. Discard any bulbs that are soft or which show any signs of rot. Do not throw these on a compost pile but burn them to prevent possible spread of disease. As the bulbs are cleaned, the offsets should be separated if they break away easily without tearing the basal plate, and all of those to be replanted replaced in the trays or sacks and kept in as cool a location as possible until planting time in the fall. Poet varieties have a very short dormant period and it is wise to replant those as soon as possible. Any variety may be replanted soon after cleaning except in areas where the weather is very hot and the soil temperature is known to encourage basal rot.

Daffodils are dependable and need not be pampered. They are so easy to grow that successful results are just as likely to be obtained by the beginner as by the skilled daffodil connoisseur. Few garden plants will give so much pleasure with so little effort.

IMPORTED DAFFODILS

Daffodil bulbs imported from Australia or New Zealand will require at least a year or two to become acclimated to the Northern Hemisphere. Bulbs shipped from Down Under will have bloomed in September and are normally received up here in February or March. If planted immediately, they will try to grow and bloom without their normal resting period. It is understood that some growers handle the bulbs this way, but probably it is better to store them in a moderately warm, well-ventilated storage place and plant them as late in the fall as possible. The effect of this is to lengthen the normal period of dormancy after flowering. If planted early in the fall, they will attempt to hurry into bloom after their extended rest and before winter arrives. However, beginning about September, the bulbs should be inspected occasionally for evidence of softness and, if found, they should be planted promptly.

The first or even second year bloom will very likely not be truly representative of the variety, but from then on the bulb should begin to recover from the shock of changing to our seasons and give more normal bloom.

Bulbs imported from Holland, Ireland, or England, and, indeed, even those moved from one area of the United States to another area may require a year or two to settle down and become contented with their new location. Some varieties become acclimated and do well the first year, others may take several years to produce the quality of bloom equal to that at their home location; a few varieties never do.

As a general rule, and ignoring varietal traits, the length of time required to

settle down is directly related to the difference between conditions under which the bulb was grown and those to which it is subjected in its new home. When the disparity is extreme, typical growth and flowers may sometimes not occur until an entirely new bulb of flowering size has developed from the imported bulb.

MINIATURE DAFFODILS

Small species and the newer hybrid miniature daffodils have recently become quite popular with the growing interest in small gardens and the backing given them by the American Daffodil Society. They are not suited for growing in rows with the large exhibition varieties but should be planted in rock gardens, on a slope, or, best of all, at the top of a retaining wall which is high enough to let them be viewed without stooping.

While some of the species miniatures can be a bit temperamental, as a rule the miniature garden varieties are less demanding than their larger colleagues, but they do have a culture of their own. None of them is more than two generations from its species ancestors which grow in the mountains of the western Mediterranean, and they are quite contented with a lean, stony soil which is hot and dry in summer and cold and windy in winter. The exceptions are *N. cyclamineus* and all the European bulbocodiums which thrive in quite damp locations. All the rest, while they will tolerate ample moisture when in full growth like all daffodils, should be given a well-drained situation where the bulbs will receive a good baking during the summer. The trumpet and triandrus species enjoy light shade, but the jonquils seem to need full sun.

Most of the miniatures have small bulbs, although there are exceptions, and the depth of planting should take into consideration the size of the bulb; for the smaller ones 2 inches is usually sufficient. However, there is evidence that at least some of the smaller daffodils have ideas of their own as to the depth they prefer. Bulbs of Quince and × *biflorus*, no larger than the end of one's finger and planted near the surface, have been found a few years later from 6 to 12 in. deep. To facilitate finding the smaller bulbs, try planting them in plastic berry baskets, clay pots, or even tin cans sunk in the soil. Cans should be open at both ends and pots should be large enough for ample root run.

The smaller daffodils may be planted fairly close together and the poorest soil seems to yield all the nourishment they require. To make a real showing in the garden it would be necessary to plant a hundred or so of the smaller varieties, but miniatures should be admired closely as individuals. There are easier and less expensive ways to create a big splash of color.

The miniatures offer a certain amount of challenge, especially the species. Some, like Canaliculatus, increase rapidly but are reluctant to bloom; others, like the bulbocodiums, are fall and winter bloomers but do not care for our kind of winter; some, like *N. cyclamineus,* are not long-lived, apparently increasing in the wild from seed rather than offsets; and a number, such as Tanagra, increase at a painfully slow rate. While failures may mingle with successes, there are certain to be plenty of the latter. Success will be assured if one starts with the hybrids and graduates to the species.

CULTURE OF DAFFODILS FOR EXHIBITION

The Daffodil Handbook does not concern itself with photography, arrangements, daffodil shows, or other uses the flowers may be made to serve after they have been grown. However, growing daffodils for exhibition is a legitimate venture and a few simple cultural changes are likely to pay extra dividends in blue ribbons.

If the highest quality of bloom is desired for exhibition, or even if the flowers are grown mostly for cutting, it is better to grow daffodils in rows in beds about 4 or 5 feet wide and as long as needed. These beds should be deeply tilled and the sand, peat moss, and fertilizer thoroughly mixed. Plant in rows one foot apart and space the bulbs about 6 in. in the rows. Dig a trench 6 or 7

inches deep across the bed and put a handful of coarse sand under each bulb to improve drainage and encourage rapid root growth. Deep planting tends to discourage bulb increase and permits leaving the bulbs down longer without crowding; shallow planting encourages bulb increase. Before covering the bulbs with soil, it is wise to protect them with 5% granular chlordane or dieldrin (see Chapter 7). This treatment will control the larvae of the narcissus bulb fly which causes considerable damage to daffodil bulbs in many areas.

As bulbs are planted, each variety should be carefully marked with a permanent label and, in addition, a careful record should be made in a notebook or on a map of the location of each variety, since labels always seem to become lost or removed by the little boy next door. The best flowers are generally obtained the second year after planting, but good exhibition flowers should be expected the 3rd, 4th, or even 5th year if given sufficient moisture and good cultivation.

FORCING

Forcing daffodils is not difficult and it is surprising that few gardeners make the slight effort required to have their daffodil season begin in January rather than March or April. Forced flowers also have a purity and depth of color which cannot possibly be obtained when flowers are exposed to unruly spring weather. A cool greenhouse is ideal for forcing, although a conservatory, sunporch, or any room where there is strong light and the temperature can be kept on the cool side will do almost as well. A few rules must be followed, but they are within the limitations of anyone.

Operations should begin about October 1 by soaking the bulbs for 24 hours in a solution of Rootone or similar rooting stimulant. At the same time sufficient pots or boxes should be prepared. An 8-inch container will hold half a dozen large bulbs, but whatever size is used it should be at least six inches deep and have holes or cracks for drainage. Fill each container to within two inches of the top with any light soil, gently compact it, set the bulbs close together, and then fill to the rim with additional soil. The noses of the bulbs should protrude. Fertilizer need not be added to the soil, but the planted pots should be thoroughly watered on two successive days. Waterproof labels should be firmly attached.

The containers must be stored below frost while a strong root system is formed. A trench is preferable and should be dug to a depth that will allow eight inches of soil above the rims of the buried pots. An inch or so of sand or ashes, or even wooden slats, may be placed in the bottom of the trench if there is any reason to question sharp drainage. Set the pots upright, place stakes at each end of the trench to jog your memory, fill in the trench, and cover with a layer of leaves.

The pots may be dug up and taken indoors for forcing when three conditions have been met: 1) ten weeks have elapsed, 2) the new growth is at least three inches high and 3) the flower bud plainly visible. After being taken indoors, the pots should be given subdued light and for two weeks the temperature should be held to 50-55°. For the final two weeks required to complete the forcing full light may be given and the temperature allowed to rise to 60°. Once the flowers have opened, the pots may be placed where desired for decoration, always remembering that heat, especially bottom heat, will shorten the lives of the flowers. Generous daily watering is usually essential to maintain constant moisture.

Not all varieties take kindly to forcing, but there are plenty which do. As a general rule, those varieties which flower early outdoors will force well (see Chapter 13). This means the trumpets, most large-cups, a few small-cups, the cyclamineus hybrids, and certain tazettas. Some varieties known to force well are:

1*a* Cromarty, Golden Harvest, King Alfred, Magnificence, Mulatto, Rembrandt, Unsurpassable.
1*b* Foresight, Music Hall, Patria.
1*c* Ardclinis, Cantatrice, Kanchenjunga, Roxane.
2*a* Aerolite, Bahram, Carbineer, Carlton, Dunkeld, Fortune, Golden Torch, Havelock, Hollywood.
2*b* Brunswick, Carnlough, Daisy Schäffer, Greeting, Kilimanjaro, Mercato, Penvose, Rustom Pasha.
2*c* Dunlewey, Truth, Zero.
3*a* Diana Kasner, Edward Buxton.
3*b* La Riante, Verger.
6*a* February Gold, Peeping Tom.
8 Cragford, Early Perfection, Geranium, Silver Chimes.

—3— Kinds of Daffodils

It would take a good deal of space and serve little purpose to trace the nuerous efforts to group daffodils in a meaningful way. The work continues; there is still much uncertainty as to the true species and their relationships, but the final hairsplitting need not concern us, and probably the daffodils are quite indifferent.

Parkinson divided them in 1629 into "Narcissos, true Daffodils, and Pseudonarcissos, bastard Daffodils," based on whether the cup was longer than the "outter leaves" (perianth segments). His successors were scarcely more successful, the number of genera and species waxing and waning until in 1875 J. G. Baker, Keeper of the Royal Herbarium at Kew, brought all the earlier genera together into the single genus *Narcissus*.

Having settled on a single genus, Baker then divided the species into three groups: magnicoronati, mediocoronati, and parvicoronati; thus returning to Parkinson's notion that the length of the corona offered a useful measure for classifying the species which Baker felt did not number more than sixteen. Baker's ponderous Latin titles were irreverently, but aptly, paraphrased "long-nosed," "short-nosed," and "snub-nosed." Today they are referred to as trumpet, cup, and disc or saucer. Botanically, they are the crown or corona.

Three years before his death in 1877, Edward Leeds, a stockbroker of Manchester, England, offered his large collection of seedlings for sale and it was purchased by Peter Barr, who also presently acquired the important collections of William Backhouse and the Rev. J. G. Nelson. Meanwhile other breeders were at work and some method of classifying the growing number of hybrids seemed necessary. Barr consulted Baker and it was agreed to group the hybrids under the names of their originators. Thus arbitrary, rather than botanical, subdivisions were created bearing such names as Barrii, Leedsii, Humei, Backhousei, Nelsonii, and Burbidgei. Baker's classification of magni-, medio-, and parvicoronati, together with the subdivisions using the hybridizers' names, was used by Peter Barr in a series of catalogs which his firm issued beginning in 1884.

Barr's catalogs proved adequate for some years, but in time the Council of the Royal Horticultural Society decided that the enormous increase in the number of named daffodils, and the crossing and inter-crossing of the once fairly distinct classes, necessitated the adoption of a classification for garden and show purposes. In 1909 a committee recommended the present system, and it was given the blessing of the Royal Horticultural Society. At the same time, the first of many editions of the *Classified List of Daffodil Names* was issued by the Society. In 1955 the Fourteenth International Horticultural Congress designated the Society the International Registration Authority for daffodils and the *Classified List* was renamed *Classified List and International Register of Daffodil Names*.

The classification, which became effective in 1910, was modified in 1915, again in 1923, and thus stood until 1950 when it was substantially revised, and so it stands today. There are eleven major divisions, and briefly it may be said that the first three are based on the length of the corona, the fourth is devoted to double daffodils, the next five bring together hybrids revealing the characteristics of certain species, Div. 10 is concerned with daffodils as they are found in nature, and the last division is a haven for daffodils not otherwise classified.

The 11 divisions with their 18 subdivisions are presented on the following pages. Each subdivision is considered separately with its specifications and its history. Species which have played an important role in development of the garden flowers are identified. A selection of varieties is named for each division or subdivision; a few for their historical interest, but most because they are good garden varieties carried by dealers at a reasonable cost. Novelties are occasionally noted with the warning that they are scarce and therefore expensive. The chapter concludes with several special lists of varieties.

DIVISION 1
TRUMPET NARCISSUS OF GARDEN ORIGIN

Distinguishing characters: One flower to a stem; trumpet or corona as long or longer than the perianth segments.

(a) *Perianth colored; corona colored, not paler than the perianth.*

This, the first subdivision of the Classification, has stood without major change since the present system was established in 1910. Prior to 1950, a "yellow or lemon-colored" trumpet was specified, but the revision of that year accepted the broader wording "corona colored," in order to accommodate existing pink trumpet varieties as well as red trumpets of the future; a precaution which events have justified.

A term which is frequently encountered in catalogs and daffodil literature is "Ajax" or "subgenus Ajax." It is a term first used in 1812 by R. A. Salisbury in classifying what were then considered to be the true daffodils. The genus *Narcissus* was restricted to what we now know as *N. poeticus* and its forms; Salisbury created numerous genera named after Greek heroes, and the trumpets were placed in the genus *Ajax*. In current usage, Ajax means a flower, either species or hybrid, of trumpet proportions.

Yellow trumpets trace back, almost without exception, to what is commonly called *N. hispanicus*, sometimes referred to as Maximus or Maximus Superbus, but properly *N. pseudo-narcissus* Linnaeus subsp. *major* (Curtis) Baker. This splendid flower still grows in gardens and orchards in southwestern France and has been known and described since 1576. It is characterized by a rich golden color, large size, a twisted but not unattractive perianth, by fussiness as to where it will grow, and by extreme earliness; the latter a desirable quality which it has imparted to its numerous offspring.

Without question, the creation of King Alfred by John Kendall in 1899 was the greatest single advance ever made in the progress of daffodils. He accomplished it by crossing *N. hispanicus* with an unknown pollen parent, possibly Emperor or Golden Spur. Sixty-seven years later it is still the most widely grown variety. Those who think there is only one daffodil—the yellow trumpet seen in florists' windows—have King Alfred in mind.

With either pure *hispanicus* or the mixed blood of King Alfred dominating their ancestry, a series of seedlings gradually widened the range of trumpet characteristics. A first-generation seedling of *hispanicus* was Magnificence, still about the earliest trumpet. Royalist, a second-generation seedling from *hispanicus* by way of King Alfred, contributed a flat perianth and a well-balanced trumpet and in the third generation gave us Kingscourt, one of the better moderately priced trumpets.

PLATE 3 B. Y. MORRISON

TRUMPETS

Kingscourt (Div. 1a), Beersheba (Div. 1c), and Garron (Div. 1a)

KINGSCOURT 1a

BEERSHEBA 1c

GARRON 1a

Work with the yellow trumpets was scarcely under way before crosses were made with two fine old white trumpets, White Emperor and White Knight, in order to improve form and quality. Others sought the same result by mating yellow and bicolor trumpets. This infusion of white created a group of cream or lemon-yellow trumpets apart from those displaying the unadulterated gold of *hispanicus*.

Varieties of lighter shades which have proved to be good garden plants are Hunter's Moon, Inver, Moonstruck, and Mulatto, the latter very pale. Of the deeper golden yellow, favored varieties are Cromarty, Garron, Goldcourt, Kingscourt, Bastion, Irish Luck, Ulster Prince, Arctic Gold, and Slieveboy. Popular Dutch varieties are Magnificence, Golden Harvest, Unsurpassable, Burgemeester Gouverneur, Rembrandt, William the Silent, Joseph MacLeod, Dutch Master, and Flower Carpet; the latter is the same as, or similar to, King Alfred. The best American-bred varieties are Luna Moth, Moonmist, and Late Sun.

There are a number of miniature trumpets: Tanagra and Wee Bee are usually cataloged; Bowles's Bounty, Charles Warren, and Sneezy have been registered. Little Gem is a selected form of *N. minor*.

If criticism must be leveled at the yellow trumpets, it would be that they look a good deal alike to the untrained eye. Some of them tend to be too large and a bit coarse, and the length of the stem is not always proportionate to the size of the flower.

(*b*) *Perianth white; corona colored.*

Prior to 1950, white trumpets were classified as subdivision 1*b* and the bicolors as 1*c*. With the revision of 1950, these two subdivisions were reversed to conform to changes in Divs. 2 and 3. In addition, the old requirement that the trumpet be "Yellow, lemon or primrose" was replaced by the present "corona colored," so that pink and red trumpets would not be waifs.

A number of species and subspecies have bicolored forms. The record might begin with Empress, probably a cross between *N. pseudo-narcissus bicolor* and *N. pseudo-narcissus,* the Lent Lily. Bicolors combining clean, contrasting colors with a good constitution were elusive, and until recently most bicolors were incidental to the mating of white and yellow trumpets in the search for better yellow trumpets. Bonython, Boswin, and Sincerity proved to be good byproducts, although they are no longer widely offered.

As with the yellow trumpets, the bicolors may be divided into those with pale trumpets and those where the contrast is sharper. Among the former of improved quality are Content, Pres. Lebrun, Foresight, Music Hall, Spitzbergen, and Frolic. With darker trumpets are Bonnington, Effective, Trousseau, and Preamble.

A number of pink trumpets have been bred in Tasmania, but with the exception of Woodlea they are probably not available in this part of the world. The best American-bred pink trumpet is costly Rima which is incorrectly carried in the *Classified List* as a 2*b*.

There are a few bicolor trumpets of miniature proportions: Bambi, Little Beauty, and Rockery Beauty.

On the whole, breeders have rather neglected the bicolor trumpets because of genetic difficulties. The choice of good but inexpensive varieties is still limited.

(*c*) *Perianth white; corona white, not paler than the perianth.*

This subdivision has had a continuous existence from the start of the modern classification in 1910, although prior to 1950 it was 1*b* rather than 1*c*.

White trumpets trace their ancestry back to *N. moschatus* L., *N. alpestris* Pugsley, and *N. albescens* Pugsley, all of which are now regarded as subspecies of *N. pseudo-narcissus*. Most of the early hybrids of these subspecies were weaklings; only Colleen Bawn, a miniature, is still occasionally seen. Breaking new

ground began with Mme. de Graaff, whose marriage to King Alfred resulted in Mrs. Ernst H. Krelage, which is still a good garden variety. A grandchild of Mme. de Graaff is Beersheba, a flower of such perfect form and purity of color that it holds its own after 40 years and is the most widely grown of all white trumpets.

Eventually breeders were forced to choose between larger and coarser flowers and smaller but more refined ones. Notable for size, but often rough and badly proportioned, came Roxane, Kanchenjunga, Broughshane, and Mt. Hood. For greater refinement, but more modest size, we may choose among Tain, Ardclinis, Samite, Scapa, Silver Wedding, White Tartar, Fairy Dream, and Silverdale. Cantatrice is a popular exhibition variety of uncertain disposition. Recent breeding has made progress in combining quality and size in several expensive novelties, such as White Prospect and Rashee.

The absolute whiteness of the poet daffodils is not usually achieved in white trumpets; a comparison will reveal a trace of cream which may bleach out as the flower reaches maturity. Note that the definition of the subdivision contemplates a corona which might be paler than the "white" perianth.

W. P. Milner, an old miniature white trumpet still widely grown is excellent in rockwork or grass.

The chief cultural problem with the white trumpets is their susceptibility to basal rot.

(*d*) *Any color combination not falling into* (*a*), (*b*), or (*c*).

In the revision of 1950, Divs. 1, 2, and 3 were each given a fourth subdivision lettered (*d*) to take care of reversed bicolors of which two—Spellbinder (1*d*) and Binkie (2*d*)—were in existence at that time.

The familiar bicolor daffodils have white perianths and a colored corona which may be any shade of yellow, pink, or even red. The so-called reversed bicolors, which are appearing in increasing numbers, display a yellow perianth and a lighter corona.

Spellbinder was introduced in 1944 as a 1*a* and promptly given an Award of Merit as an exhibition flower by the Narcissus and Tulip Committee of the Royal Horticultural Society, although some of the Committee seem to have had misgivings about the odd coloring, since seven of the panel of 21 judges withheld their approval.

Starting with the cross of King of the North × Content which gave Guy Wilson Spellbinder, Mitsch quickly ended Spellbinder's solitary reign. In 1954 came Lunar Sea, to be followed four years later by Entrancement and Nampa, then Moonlight Sonata in 1960 and Honeybird in 1965. These are expensive and strong demand will keep the supply down for some time, but they represent a break from conventional coloring in flowers of good quality. Future breeding may overcome the present need to wait several days for the trumpets to bleach until the bicolor effect is achieved.

The only flower in this subdivision from below the Equator is Rus Holland by Hugh Dettman of Australia. It is quite unlike other 2*d*'s, with heavy frills which retain to some extent their original greeny sulphur-lemon, while the inside of the trumpet passes to white.

DIVISION 2

LARGE-CUPPED NARCISSUS OF GARDEN ORIGIN

Distinguishing characters: One flower to a stem; cup or corona more than one-third, but less than equal to the length of the perianth segments.

(*a*) *Perianth colored; corona colored, not paler than the perianth.*

In 1950 the more descriptive term "Large-Cupped" replaced the designation "Incomparabilis" formerly applied to this division. Subdivision 2*a* now requires only that the corona be colored, whereas the earlier description was

"yellow shades with or without red coloring on the cup." At the same time the dividing line between Divs. 2 and 3 was adjusted so that the flowers in which the cup is exactly one-third the length of the perianth segments were classified as Div. 3 rather than Div. 2, as formerly. No hint was given as to just how this precise measurement of an inconstant flower was to be made. Presumably the answer lies in the fact that it is the privilege of the raiser of a new variety to decree its classification.

All flowers in Div. 2 are of hybrid origin, derived initially from crosses of trumpets and poeticus forms; any growing outside of cultivation must be considered as either natural hybrids—*N.* × *incomparabilis,* for example—or escapes from cultivation. These facts were not always understood. Prototypes of our large cups were growing in English gardens in the early part of the 17th century, and Parkinson describes several color variations in his *Paradisus.* After Parkinson, little was written about daffodils until in 1812 R. A. Salisbury published a proposed classification and created the genus *Queltia* for Parkinson's flowers, naming it after Nicholas Le Quelt, a French botanist who is said to have found one form. This genus was embraced by A. H. Haworth in 1831 in his elaborate classification, but a few years later William Herbert reduced Haworth's structure of 16 genera to 6, discarding, among others, the genus *Queltia.* Herbert proved by repeating the crosses that the "species" assigned to Queltia were merely hybrids between trumpets and poets. However, the terms "Queltia" and "Incomparabilis" continued in use for many years, Queltia being dropped in Barr's catalogs, but Incomparabilis survived until the revision of the classification in 1950.

Div. 2 is by far the most popular of the eleven divisions. It includes possibly half of all registered varieties and about half of those, or one-quarter of all varieties named in the *Classified List,* are 2*a's.* While subdivision (*a*) does not distinguish between self-colored flowers and those with red, orange, or pink cups, some shows provide separate classes for these when the color of the cup is predominant, and some catalogs segregate the yellow, the orange or red, and the pink cups by adding an additional letter or number to the basic 2*a.*

In 1884 Sir Watkin appeared out of obscurity, named in memory of Sir Watkin W. Wynne. Still-remembered varieties followed during the next three decades: Gloria Mundi, Frank Miles, Killigrew, Croesus, Helios, Hospodar, and Yellow Poppy; still good garden flowers if they can be found, especially for planting in the grass or woods.

The landmark flower of this subdivision is Fortune, an early flower of exceptional style and quality with a large orange crown; an aristocrat among the commoners of its day. It was found in 1915 by Walter T. Ware among a batch of mixed seedlings in his nursery near Bath, England. Since his daffodils were afflicted with eelworm, Mr. Ware parted with a few bulbs in 1917, three to The Brodie of Brodie, a circumstance which may have prevented the extinction of this splendid flower since Mr. Ware died later that year. Having the advantage of a large collection of choice varieties, The Brodie was able to start Fortune on its long and distinguished career as a flower and a parent.

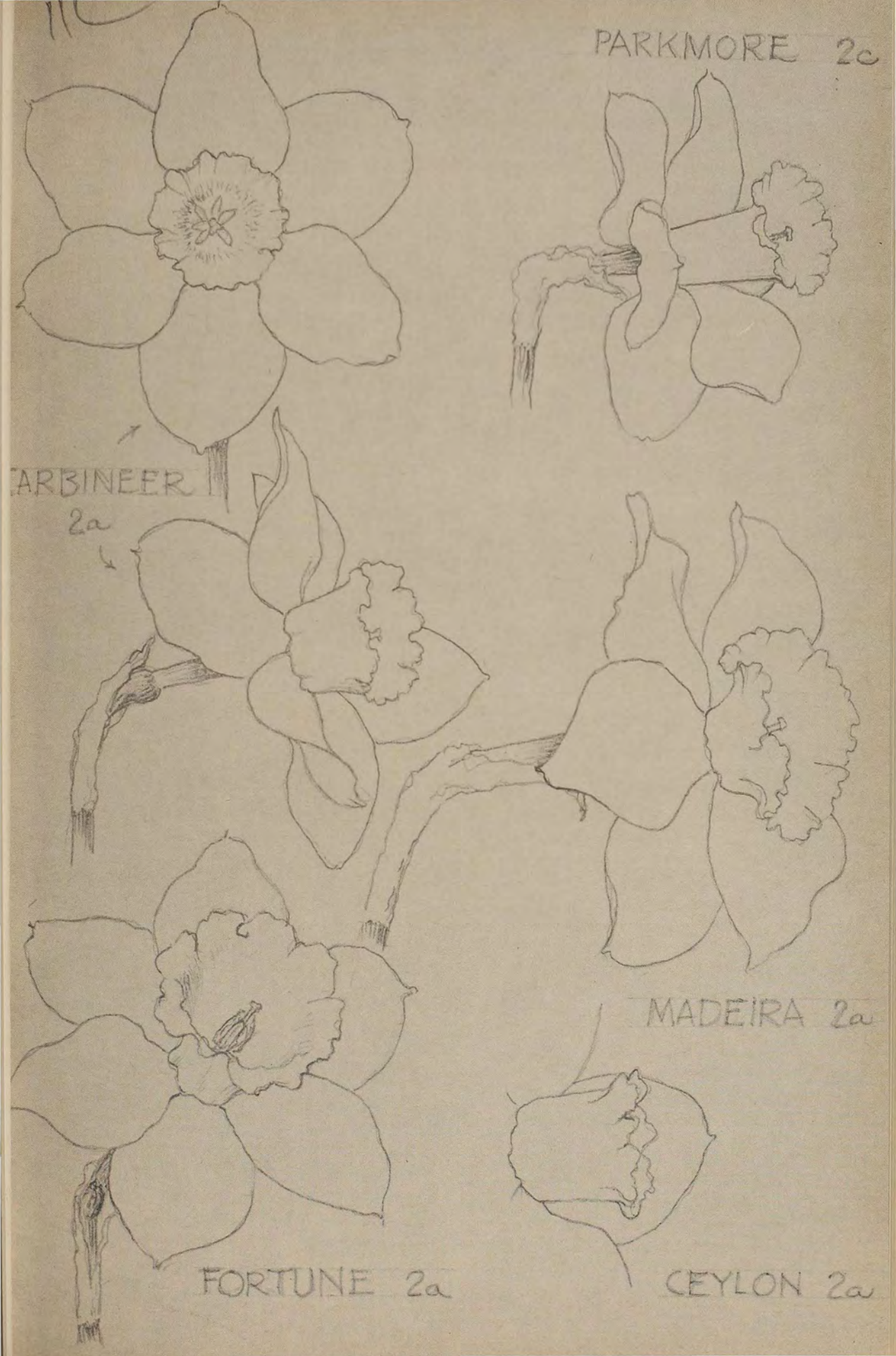
The red or orange in modern daffodils has been largely derived from a poeticus form known botanically as *N. poeticus* L. subspecies *radiiflorus* (Salisbury) Baker var. *poetarum* (Haworth) Burbidge and Baker, usually referred to, for obvious reasons, as *poetarum.* It has never been found growing in the wild and is rarely seen even in gardens. Its only virtue is a small cup stained deep red.

A number of orange and yellow flowers preceded Fortune, notably Helios and Killigrew, but it was Fortune that opened the gates to an unabated stream

PLATE 4 B. Y. MORRISON

LARGE-CUPPED HYBRIDS

Parkmore (Div. 2c), Carbineer (Div. 2a), Madeira (Div. 2a), Fortune (Div. 2a), and Ceylon (Div. 2a)


PARKMORE 2c
ARBINEER
2a
MADEIRA 2a
FORTUNE 2a
CEYLON 2a

of orange and red cups. Such is the popularity of these striking flowers that the most minuscule difference is sufficient to bring a new variety to the market with a flurry of drums.

Damson, Porthilly, Penquite, and Trevisky are four reddish varieties introduced between 1925 and 1930 by that master craftsman, P. D. Williams. They may no longer be offered, and it would be unfortunate if such fine garden flowers were to be lost.

A representative collection of quality flowers in the orange to red range which are offered at reasonable prices might include Carbineer, Rustom Pasha, Marksman, Aranjuez, Scarlet Leader, Bahram, Dunkeld, Krakatoa, Red Goblet, Tinker, Armada, Scarlet Elegance, Mary Roozen, Illuminate, Narvik, Ceylon, Mexico, Red Devon, Sun Chariot, Alamein, Magherally, Missouri, Castlerock, Lizard Light, Revelry, Pleasant, Home Fires, Red Sunrise, and Matlock. Recent novelties which will be found to be more expensive are Kindled, Paricutin, Air Marshal, Border Chief, Foxhunter, Madeira, and Court Martial. Many of the later introductions have come from the nursery of the late J. Lionel Richardson of Waterford, Ireland.

The nearest to a pink in this subdivision is Rouge, an early introduction of Guy Wilson with a pinkish-buff perianth and a brick-red corona.

In the quest for red, or at least orange, in the corona, the solid yellows have been somewhat neglected. The early breeding for them sought shorter cups of poeticus proportions and 1927 was a vintage year, producing Carlton, Havelock, St. Egwin, and St. Issey, all splendid garden flowers. In recent years, cups of almost trumpet proportions have been favored, and we have Crocus, Trenoon, Butterscotch, Golden Torch, Galway, Cargan, Ormeau, and St. Keverne.

Goldsithney and Nor-Nor are of intermediate size and Marionette and Mustard Seed are miniatures.

If the flowers in Div. 2 have faults, the most serious is the tendency of any red in the corona to fade and of the rim of the cup to burn. The extent of such damage depends on the variety itself and the amount of heat, wind, and sunlight to which the open flower is exposed. Colors are invariably richer and deeper in the British Isles and our Pacific Northwest than in the eastern and southern United States, where the reds and pinks are apt to be at their best only in cool, cloudy seasons. Richly colored flowers intended for exhibition or home decoration should be cut shortly after opening and matured indoors.

(b) *Perianth white; corona colored.*

The above brief definition was substituted in 1950 for the older "Bicolor varieties with white or whitish perianth, and self-yellow, red-stained, or red cup." Some of the Leedsii varieties were transferred to this subdivision when the white and pale flowers formerly classified as Div. 4 were dispersed in 1950.

Scarcely less crowded than subdivision 2*a*, 2*b* must accommodate more varied types: white and yellow, white and orange or red, and most of the pinks.

There should be a place in the garden for some of the older 2*b*'s: John Evelyn, Nissa, Bodilly, Daisy Schäffer, Gertie Millar, and Tunis among the yellow and whites; Hades, Folly, Red Abbot, and Red Hackle among the red-cups. These are gradually being dropped from the catalogs.

Varieties free of red whose vigor and quality still earn them a place in dealers' stocks, although each is over 25 years old, are Polindra, Coverack Perfection, Brunswick, Carnlough, Greeting, and Green Island. George L. Lewis of New Zealand is the originator of a number of interesting 2*b*'s: Marie Louise, Papanui Queen, and Satin Queen are obtainable in the United States. The last has a narrow orange frill. If the budget permits and enthusiasm for daffodils is on the rise, one may indulge in Tudor Min-

strel, Festivity, and Woodgreen, or even later and more expensive novelties.

Many years have passed and many daffodils have come and gone since a vase of Dick Wellband, placed against a backdrop of black velvet, was presented to the public at a New York International Flower Show. Disparaged by connoisseurs, it still charms many with its genial behavior and bright splash of color in the garden. Now it is the veteran of a multitude of orange or red cups: Rubra, Flamenco, Fermoy, Kilworth, Buncrana, Kilimanjaro, Leeuwenhorst, Artist's Model, Semper Avanti, Flower Record, Mercato, Selma Lagerlöf, Fairy Mother, Red April, Blarney's Daughter, Royal Orange, and Alicante. From these one may ascend to such blue ribbon winners as Arbar, Daviot, and Signal Light.

"John Evelyn Hybrids" is the collective name of a number of varieties which are classified as 2*b*'s. When the commercial urge is strong, they may be offered as "weatherproof" daffodils. These are of Dutch origin and are characterized by a wide, thick, heavily frilled, colored cup. The fastidious sniff at them, although like most Dutch varieties they are effective garden flowers. It is questionable whether they are more resistant to weather than any other daffodils of good substance. A sampling of them would be Duke of Windsor, Oranje Bruid (Orange Bride), Wodan, High Life, and Brookville. Stadium is a Richardson variety of this type.

At present, the only miniature 2*b* is Tweeny.

The official classification makes no special provision for pink cups or trumpets. They are classified according to their dimensions, but almost without exception they are 2*b*'s and their number is legion. Competition to bring forth a clear, sunfast pink cup of good form and habits has been going on for over forty years, but the end may now be in sight. There are contestants from the United States, British Isles, Australia, Tasmania, and New Zealand. While we await the winner, we can gamble on a long list of varieties which reflect the industry, the hopes, and all too frequently the imagination of the numerous hybridizers engaged in the search.

We might start with Mrs. R. O. Backhouse (pronounced Bacchus). It isn't really pink, but neither are many other "pinks." We can get a little closer and still be quite frugal with Rose of Tralee, Pink Rim, Wild Rose, Rosario, Moylena, Interim, Rose Ribbon, Mabel Taylor, Mrs. Oscar Ronalds, and especially Radiation. The price, if not the value, rises steadily past Rose Caprice, Fintona, Carita, Interlude, Passionale, Pink Pearl, Foray, and others. Mitsch's Accent (pictured on the cover) is probably the best pink 2*b* of American breeding, but it is costly.

More work has been done with pinks in Australia, New Zealand, and particularly Tasmania, than elsewhere. Dealers in those countries are listed on a later page and offer a wide selection. The following varieties are now stocked by dealers in this country and Europe: Pink-a-dell, Rosario, Chiffon, Pink Monarch, Mabel Taylor, Mrs. Oscar Ronalds, Stray Pink, and Hugh Dettman.

The pink-cupped Lady Bee is worth growing as the only really small pink daffodil.

As is true of many of the highly colored cups, the performance of pink daffodils is apt to be erratic. Imported bulbs may require a few years before settling down, but even in established plantings the pink will be pinker in some years than others. If the flowers can be sheltered from the midday sun, and the weatherman can be persuaded to postpone heat waves until July, the flowers may approximate the catalog descriptions.

(*c*) *Perianth white, corona white, not paler than the perianth.*

This subdivision was created in 1950 for certain varieties formerly classified as Div. 4—Leedsii. The latter division which lasted from 1910 to 1950 embraced flowers with a white perianth and a cup less than the length of the perianth segments colored "white, cream or pale citron, sometimes tinged with

pink or apricot." A subdivision 4*a* was created in 1915 for flowers with a cup not less than one-third the length of the perianth segments which were then known as Giant Leedsii. In the revision of 1950, the pure white Giant Leedsii were transferred to the new subdivision 2c, while those with color in the cup were considered bicolors and placed with the 2*b*'s. The Leedsii in subdivision 4*b* with a cup less than one-third the length of the perianth segments were correspondingly divided between the present subdivisions 3*b* and 3*c*.

Edward Leeds was the first of a succession of English gentlemen who have sought to perfect the daffodil as a specimen flower. He began making crosses in 1835 and among the seedlings he sold to Peter Barr and his associates in 1874 were many light-colored ones which, with their descendants, formed the basis, first of the Leedsii division of the original classification established by the Royal Horticultural Society in 1910, and now of the present subdivision 2*c*.

The story of modern 2*c*'s might begin some forty years ago with White Nile, bred by The Brodie, and Tenedos, by the Rev. George H. Engleheart, a pair of large-cups which still have their good points but are no longer offered. These were quickly followed by two splendid garden varieties—Courage, by The Brodie, and Niphetos, by P. D. Williams. These are still seen frequently in gardens but are being replaced in catalogs.

The late Guy Wilson of Broughshane, Northern Ireland, made white daffodils his speciality and during a long life he advanced this form close to perfection as a specimen flower of faultless form and purity of color. His large-cupped whites included Dunlewey, Ave, Zero, Truth, Parkmore, Corby, and a number of current novelties. Wilson felt that the best whites were those with green, rather than yellow bases, and this type may now be found among trumpets and cups of the first three divisions. It was Wilson's belief that the green came originally from *N. hispanicus* which has a green midrib in the backs of its petals. This characteristic was probably transmitted through Naxos, a tall-stemmed 2*c* raised by Engleheart which has been superseded as a flower, but has proved of value in breeding tall whites of great purity with green bases.

Other growers did not leave the field of white cups entirely to Wilson. Richardson gave us Killaloe, Glendalough, and Namsos; A. M. Wilson left us Ludlow; and W. J. Dunlop, a neighbor of Wilson, has brought out Woodvale and Wedding Bell. White Spire is Mitsch's entry in this class.

White cups have a reputation for lacking vigor and being susceptible to basal rot. These difficulties may be more apparent in some years than others, and more in the warm South than in the cooler North. The typical shortness of stem is gradually being overcome.

(*d*) *Any color combination not falling into* (*a*), (*b*), or (*c*).

In the revision of 1950, Divs. 1, 2, and 3 were each given a fourth subdivision to take care of reversed bicolors which were beginning to attract attention.

The first variety qualifying for this subdivision was Binkie, raised by W. Wolfhagen of Tasmania in 1938. Binkie was not seriously challenged until 1958 when Mitsch introduced Bethany and Nazareth whose breeding was Binkie × (King of the North × Content), this latter the cross which gave Wilson his 1*d* Spellbinder and which Mitsch repeated to create his own reversed bicolors.

In the following years Mitsch brought out Daydream, Halolight, Limeade, Gleeful, and Pastorale. Daydream and Bethany are generally considered his most successful 2*d*'s. Pastorale is an unregistered variety and should not be confused with the 2*b* Pastorale registered by F. E. Board in 1965 and carried in the *Classified List*. It must be expected that prices for these novelties will remain high for some time.

Reversed bicolors usually open a greenish-lemon and growers should bear in mind that the bicolor effect is achieved only after several days during

which the cup bleaches to a more or less pure white. Consequently, the flower must be allowed to mature, preferably on the plant and in a strong light. The color upon opening is not unattractive, and some breeders are trying to stabilize it, thus creating a 2*a* flower of unusual coloring.

DIVISION 3

SMALL-CUPPED NARCISSUS OF GARDEN ORIGIN

Distinguishing characters: One flower to a stem; cup or corona not more than one-third the length of the perianth segments.

(a) Perianth colored, corona colored, not paler than the perianth.

In 1950 the more graphic "Small-cupped" was substituted for "Barrii" which long usage had attached to hybrid daffodils of poeticus proportions. At the same time the restrictive "yellow shades with or without red coloring on the cup" was replaced by the more comprehensive "corona colored." The precise dividing line between Divs. 2 and 3 is described under Div. 2. While the corona or crown in this division is officially called a small cup, in many varieties it is so shallow that the terms "disc," "saucer," or "eye" are more appropriate and will frequently be encountered.

All the flowers in Div. 3 are crosses between large-cupped varieties and forms of *N. poeticus*. As is the case in Div. 2, *N. poetarum* has been dominant in the frequent appearance of red. Sometimes it is modified by first being mated with *N. poeticus exertus* 'Ornatus' (*N. poeticus* subsp. *radiiflorus* var. *exertus*) and occasionally the influence of *N. hellenicus* (*N. poeticus* subsp. *poeticus* var. *hellenicus*) is apparent. In this division the poeticus influence is stronger than it is in Div. 2, and, as a result, the perianth is usually white and there is almost certain to be some red in the cup.

There are a limited number of 3*a*'s with orange or red cups, but self-yellows are almost non-existent. The best of this type—St. Egwin—was transferred to Div. 2*a* and the others which have appeared in the past are no longer traded. Richardson introduced Lemonade in 1959 as a 3*a* because both the perianth and corona are colored, but the color is more green than yellow, and the price is awesome.

Barrii Conspicuus and Princess Mary were milestones in the breeding of good 3*a*'s with colored cups. The latter, a frail thing of no discernible importance, proved to be a parent of the utmost value and it is found, frequently more than once, in the family trees of numerous small- and large-cupped modern flowers.

A generation ago there were many popular 3*a*'s with yellow perianths and orange or red cups: Seraglio, Diana Kasner, Dinkie, Tredore, Treskerby, Goyescas, and Market Merry, but of these only Dinkie is now likely to be found.

Jezebel (1948) is about the best representative of this subdivision for the garden. It might be joined by Dinkie, Edward Buxton, Mangosteen, Therm, Chungking, Ballysillan, or Russet. Ardour is a show flower; Apricot Distinction has an exotic color that attracts attention. However, all burn in the sun and the best use for the limited garden material is to grow the older varieties where a little burning is unnoticed.

(b) Perianth white, corona colored.

In 1950 the above concise but broader wording replaced the former "Bicolor varieties with white or whitish perianth and self-yellow, red-stained, or red cup." This subdivision also acquired at that time the smaller, light-colored (not white) Leedsii formerly classified as Div. 4*b*.

Today Princess Mary and Will Scarlett would be given short shrift, but in their day they had immense influence in breeding brightly colored small cups. About 40 years ago, Mrs. R. O. Backhouse used Will Scarlett to produce a strain of large, white-petalled flowers of fine substance with highly colored eyes


FORFAR
36
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3c
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such as Sunstar, Princess Miriam, and Lidcot. The Rev. Engleheart crossed Princess Mary with numerous poets and brought forth Firebrand and Beacon, two nondescript flowers which proved to have valuable genetic traits. Firebrand, crossed with King Alfred by J. C. Williams, gave us Hospodar from which came a series of vivid red and yellow flowers combining the clear yellow of *hispanicus* with the smooth qualities and color of Princess Mary. The Brodie crossed Beacon with Fortune and seedlings of Will Scarlett, obtaining a number of smooth flowers of good habit.

From such complex ancestries, the 3*b*'s of today have been developed. They are frequently grouped into flowers with 1) the red or orange of the cup predominant, meaning the cup is fully colored orange or red, 2) the red or orange of the cup not predominant, meaning the cup is only rimmed with the warm color, and 3) cups without red, pink, or orange, meaning the cup is rimmed or banded with shades of green, yellow, or grey. Frequently the base of the cup is green.

Among the first group are Verger, Forfar, La Riante, Bravura, Mahmoud, Limerick, Matapan, Tebourba, Barrett Browning, Corncrake, Enniskillen, and Fair Colleen. Snow Gem is an American flower bred by C. W. Culpepper of Arlington, Va.

Some of the most refined flowers and delicate colors are to be found among the 3*b*'s with just a touch of red or orange on the cup. Many of the endless variations of red, orange, cream, yellow, gold, green, and grey in lines, bands, and overlays were the handiwork of Guy Wilson. The best of these are not for massed effects at a distance, but for close inspection of the blending colors, preferably to be picked and brought into the house soon after opening. Of this description are Dreamlight, Grey Lady, Blarney, Kansas, St. Louis, Corofin, Ballycastle, Carnmoon, Autowin, Winifred van Graven, Coloratura, Bithynia, and Redstart. The last three are Mitsch introductions.

Because of their poeticus heritage, red is usually present in a 3*b*, but White Lady, Mrs. Nette O'Melveny, Angeline, and Sylvia O'Neill are without it. Aircastle, Noweta, Crepello, and Syracuse are current favorites. Pinkish effects will be found in Mystic, Blush Queen, and Lough Areema.

(*c*) *Perianth white, corona white, not paler than the perianth.*

This subdivision was created in 1950 to take in the pure white, small-crowned Leedsii left homeless when Div. 4—Leedsii, was broken up. The white Giant Leedsii were transferred to Div. 2*c* and varieties with traces of color were divided between Divs. 2*b* and 3*b*.

Since the flowers are colorless except for the green in the eye, the differences in this subdivision must be concerned with the amount of green, the size of the flower, and the time of flowering. The older varieties are smaller, which in no way detracts from their beauty, and they come nearer the end of the season. Reflecting the dominance of their poeticus ancestry, these varieties offer the purest whites of any of the hybrids in Divs. 1, 2, and 3. While breeding this type is declining in favor of large show flowers, many are available: Samaria, Distingué, Cushendall, Frigid, Bryher, Foggy Dew, Stardust, Portrush, and Dallas. Some growers find that the flowers in this subdivision lack vigor, a failing of many whites.

It was the appearance of Chinese White that brought to an end the series of small, refined, green-eyed whites. Subsequent breeding has rung the changes on Chinese White, a 4½-inch giant of faultless form and quality. It is a splendid garden as well as show flower, immensely popular, and, fortunately, now

PLATE 5 B. Y. MORRISON

SMALL-CUPPED HYBRIDS

Distingué (Div. 3c), Forfar (Div. 3b), and Limerick (Div. 3b.)

moderately priced. From it are being bred a number of novelties whose garden behavior has not yet been fully tested.

Xit is a delightful and easy 3*c* miniature. Considerable variation exists among the bulbs of Xit which are on the market, and it is apparent that they represent a hybrid group, i.e., descended from several seed of the same cross, rather than a clone developed vegetatively from a single seed. The typical and most desirable form is considered to be the one with a pure white cup.

(*d*) *Any color combination not falling into* (*a*), (*b*), or (*c*).

This subdivision was established in 1950. So far, only one Australian variety, Green Elf, appears to have been registered. There is doubt as to its value and even whether it is properly classified.

DIVISION 4

DOUBLE NARCISSUS OF GARDEN ORIGIN

Distinguishing character: *Double flowers.*

Double daffodils are born of single daffodils, and it is possible for any species or garden variety to generate a double form. These may appear by chance among seedlings in connection with the crossing of garden varieties or by mutation, i.e., by the sudden appearance of a sport among the bulbs of a certain species or variety.

There are three forms of doubling. In the first, the corona or crown is completely absent and replaced by additional perianth segments; Eystettensis (syn. *capax plenus*) is an example. The second form has a normal perianth, but the trumpet or cup is entirely filled, as in the case of Hollandia. Finally, the stamens acquire leaflike excrescences which fill the cup. This aberration gave us the popular Cheerfulness, a sport from a long-forgotten Poetaz, Elvira.

The Royal Horticultural Society ruled in 1965 that double forms of species were not entitled to specific status and transferred all of them from Div. 10 (Species and Wild Forms and Wild Hybrids) to Div. 4. This action united the usual garden doubles and a number of odd flowers which have all the characteristics, both good and bad, of their ancestral species.

There are double forms of three of the trumpet species: *N. pseudo-narcissus* 'Plenus', *N. pseudo-narcissus moschatus* 'Plenus,' and *N. minor pumilus* 'Plenus.' The latter has been aptly described as resembling a small dandelion with twisted yellow petals tinged green; it also is inclined to go to leaves. Sometimes it masquerades in the trade as Rip van Winkle which may help sales, but fails to improve the flower. Just as *pseudo-narcissus* is a polymorphic (several different forms) species, so its double forms appear in variety. As a rule these are rare and difficult to handle, but Kehelland, which is considered by some to be one of them, has no contrary traits.

N. moschatus 'Plenus' is creamy white and rare, but occasionally is seen in gardens. It is worth growing if it can be found, contented in the rock garden, but increasing slowly. There are at least two forms: one roselike with duplicate perianth segments and shattered corona, the other with all doubling inside the corona.

A double which appeared as long ago as 1601 without its credentials is Eystettensis (*capax plenus* of the trade), or Queen Anne's Double Daffodil. Queen Anne of Austria, that is, and not to be confused with Queen Anne's (of England) Double Jonquil. The *Classified List* is content to pronounce Eystettensis a triandrus hybrid, but it is probably a cross between a triandrus and a double trumpet, possibly Van Sion. It is a delightful garden flower of historical interest and well worth the effort to locate it. The corona has been replaced by six layers of soft yellow segments directly

imposed upon the original segments, but diminishing in size, resulting in a three-dimensional, six-pointed star; height about 7 inches. It dislikes being kept out of the ground.

Both *N. jonquilla* and *N.* × *odorus* have double forms which are easily confused. The former, *N. jonquilla* 'Flore Pleno', is a feathery ball on a 12-inch stem, attractive enough, but the entire stock is said to be infected with stripe. A form only half as tall is in the trade as Pencrebar and believed to be identical with the old Queen Anne's Double Jonquil. Occasionally a stem will bear two of the yellow, roselike flowers. It is an excellent garden variety. The double campernelli, *N.* × *odorus* 'Plenus' (*rugulosus plenus* of the trade), will reach 15-18 in. and is the tallest of the three double jonquils. Pencrebar and × *odorus* 'Plenus' are suitable for the garden.

Properly classified as Div. 4, but having little in common with other doubles, Daphne is a sport of *poeticus* 'Ornatus.' The flower is pure white and fragrant, while the doubling of the small eye is not conspicuous. Daphne was first noticed in a batch of cut flowers forced for market in 1908. To locate this single mutation, it was necessary to plant the spent bulbs in a field and grow them until the flower reappeared two years later.

N. poeticus var. Flore Pleno (Albus Plenus Odoratus of the trade), the Double Pheasant's Eye, is desirable, but it shares with many doubles a penchant for blind flower buds. More than one trial may be needed to satisfy it.

Double daffodils have been in gardens for centuries and were accepted as a legitimate and desirable member of the family until gardeners began to scrutinize the genus a hundred years ago. In 1884, the Royal Horticultural Society held a Conference on Daffodils at which a committee was appointed to revise the classification, J. G. Baker serving as chairman. The committee duly reported, listing under the subdivisions of magnicoronati, mediocoronati, and parvicoronati previously established by Baker, such further refinements as species, garden varieties, and "monstrosities." All doubles were consigned to the latter class, doubtless testifying to their low estate as well as their unconventional origin.

In the years since, doubles have generally been in disfavor. True, some of the sports which Nature threw often showed contempt for the critical judgments of discriminating gardeners and the early modern forms were inclined to sulk. As a result, the opposition to doubles became so widespread that it took considerable courage to speak on their behalf. This may all be changing now.

We need not linger over doubles prior to 1900. A double tazetta, Double Roman, arrived in Holland from Constantinople prior to 1600. The indestructible Telamonius Plenus (syn. Van Sion) was known to Parkinson in 1629. Early and streaked with green, it grows happily throughout the Northeast, surviving the homes it once surrounded. A number of mutations of the old Incomparabilis (large cup) varieties appeared in the years before 1900; all bore the family name of Phoenix with such given names as Orange, Golden, Yellow, Apricot, Primrose, and Sulphur. Their form distresses some, but they had vigor and were exchanged hospitably by our grandmothers under such bucolic names as Eggs and Bacon, Butter and Eggs, and Codlins & Cream.

The first serious work with doubles was that of W. F. M. Copeland who produced Feu de Joie, Mrs. William Copeland, Irene Copeland, and Mary Copeland, all good flowers still in commerce, the latter the seed parent of the phenomenal Falaise. Nature also relented and gave us better mutations, such as Cheerfulness from Elvira, Yellow Cheerfulness and Primrose Cheerfulness from Cheerfulness, Holland's Glory and Camellia from Emperor, Golden Ducat from King Alfred, and Hollandia from Whiteley Gem.

The Dutch have given us such popular garden varieties as Twink, Snowball (syn. Shirley Temple), and White Lion, while from England came the current exhibition favorite, Swansdown. Grant Mitsch offers two interesting items: Patricia, an improved form of *poeticus*

'Flore Pleno' selected by Murray Evans, and Pink Chiffon, a pink double by A. N. Kanouse. Erlicheer is a small white double tazetta from New Zealand, and White Marvel is a sport of the multiflowered *triandrus* Tresamble and the only double triandrus. It was encountered in decorating a float and, like Daphne, the stock had to be grown for another year to locate the mutation.

From a fertile sport of Spring Glory, Jan de Graaff (Oregon Bulb Farms) created a number of excellent garden doubles beginning with Riotous whose seed parent was Fortune. Others followed, including Pink Cloud, Windblown, Windswept, Sunburst, Prince Charming, and Enterprise.

Possibly the best from the Antipodes, as yet unregistered, is Eleanor May by H. E. Reeve of Tasmania.

There are several miniature doubles: Kehelland, Pencrebar, Eystettensis, Wren, and Rip van Winkle.

From a chance seedpod on Mary Copeland, J. L. Richardson grew Falaise, a second-rate plant itself but destined to be the landmark flower among the doubles. From it is coming an entirely new line of superb late doubles of which we now have Gay Time, Double Event, and other more recent introductions at higher prices.

Doubles may not be for everyone nor for every location, but they are definitely back in the family fold.

DIVISION 5

TRIANDRUS NARCISSUS OF GARDEN ORIGIN

Distinguishing characters: Characteristics of Narcissus triandrus clearly evident. (*a*) *Cup or corona not less than two-thirds of the length of the perianth segments.*

Div. 5 has had a continuous existence since 1910. Subdivisions (*a*) and (*b*) were established in 1923, and in 1939 the measurement dividing them was shifted from one-third the length of the perianth segments to two-thirds, as it became apparent that few triandrus hybrids would have a corona as short as one-third.

Triandrus means "three anthers," a misnomer applied by Linnaeus to a flower described by Clusius who failed to note three additional shorter stamens within the tube.

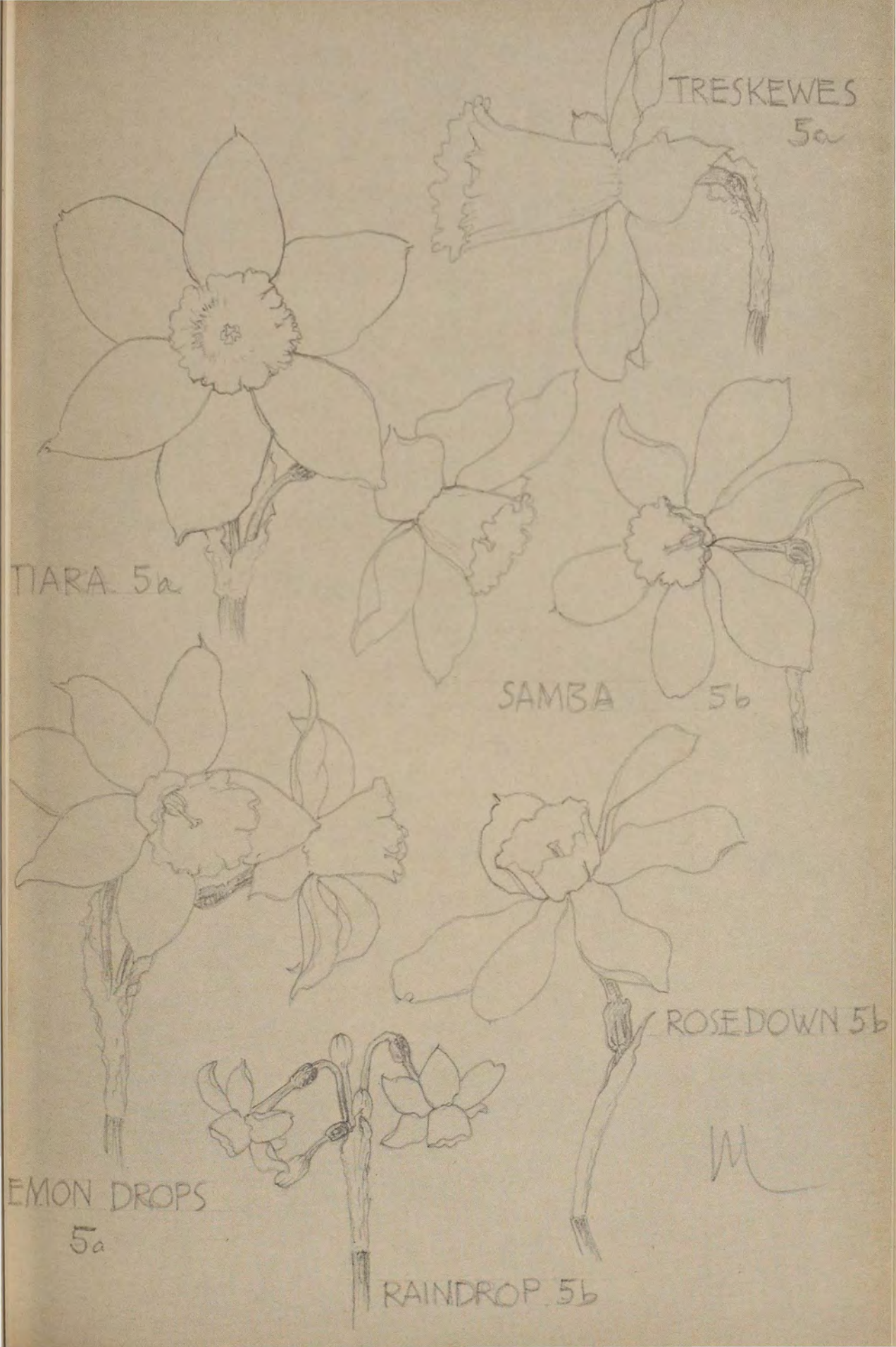
This is the first of five divisions closely related to certain species and differing markedly from the preceding divisions. On the whole the flowers are smaller, there may be several florets on a stem, there will be less red and fewer pinks or reversed bicolors, but there may be fragrance. Results are less predictable, the number of varieties in commerce is limited, they are less commonly seen in gardens, but many adventurous gardeners consider these the most interesting and charming members of the genus. There are numerous miniature varieties and all in this division are suitable for the rock garden.

Until recently, this and the following divisions were not aggressively promoted by the trade, so that prices were usually reasonable even for the infrequent new introductions. Supply has always been the greater problem; Alec Gray of Cornwall, England, and George Heath of Gloucester, Va., sharing the limited market. The American Daffodil Society in its brief existence has sought greater understanding and appreciation of all forms of daffodils and, while Gray has retired from the retail business to devote himself to hybridizing, Grant E. Mitsch of Canby, Oregon, and Michael Jefferson-Brown of Whitbourne, England, are listing an increasing number of varieties among these long-neglected divisions and prices are beginning to stiffen.

PLATE 6 B. Y. MORRISON

TRIANDRUS HYBRIDS

Treskewes (Div. 5a), Tiara (Div. 5a), Samba (Div. 5b), Lemon Drops (Div. 5a), Rosedown, (Div. 5b), and Raindrop (Div. 5b)


TRESKEWES
5a
TIARA 5a
SAMBA 5b
ROSEDOWN 5b
EMON DROPS
5a
RAINDROP 5b

All triandrus hybrids are attractive and graceful. The one to several bell-shaped flowers are more or less pendent with the perianth segments turned back and often slightly twisted. The foliage is slender; the color is usually white or pale sulphur; and, on the whole, triandrus hybrids are late bloomers.

The wild flowers gathered within this division vary widely in color, length and form of the corona, and height, but the cytological studies of Fernandes indicate they are all forms of a single species, *N. triandrus*, although *albus, cernuus, concolor, loiseleurii* (Calathinus of the trade), and *pulchellus* may be distinguished as natural varieties. Aurantiacus is a common form of uncertain origin.

Most gardeners will have greater difficulty in handling the species and hybrids of this division than those in any other. It sometimes seems as if they scarcely know themselves what they want, but the usual prescription is sharp drainage, poor gritty soil, and a good baking during summer dormancy. Some growers report greater success when the bulbs are planted under thin sod.

Where the parentage of triandrus hybrids is known, it is usually found that either *N. triandrus albus* or *N. triandrus loiseleurii*, both whites, have been crossed with a trumpet, large or small cup, tazetta, or poet. While the triandrus influence must be clearly evident in this division by definition, there is considerable latitude for variation in size, form, and pose. Because the triandrus parent is whitish, color is nearly always white or pale yellow, and any trace of red is rare. The older varieties are usually whites; yellow has appeared more recently. Showing some degree of yellow are Stoke, Forty-Niner, Liberty Bells, Yellow Warbler, Lemon Drops, King's Sutton, Honey Bells, and Harmony Bells.

Triandrus hybrids have been considered to be mules genetically, but Matthew Fowlds of Canby, Ore., broke this barrier with his Honey Bells, Silver Bells, and Harmony Bells and from their seed and pollen should come greater variety of form and color among triandrus hybrids.

Among the whites are many familiar names of varieties which perform rather well: Thalia, Moonshine, Tresamble, Phyllida Garth, Niveth, Rippling Waters, Shot Silk, Tiara, and Tristesse. Lemon Heart and Pearly Queen are the only bicolors.

Miniatures are especially charming and there are three: Mary Plumstead, Sennocke, and Shrimp.

(b) Cup or corona less than two-thirds the length of the perianth segments.

Even with the extension of the measurements for this subdivision from one-third to two-thirds, the choice of varieties is limited. Sidhe and Thoughtful are good self-yellows; Rosedown is yellow with an orange cup; Ivory Gate is white; Dawn and Oconee are bicolors; and Samba is the only red-cup.

The miniatures comprise April Tears, Arctic Morn, Cobweb, Frosty Morn, Hawera, and Raindrop.

DIVISION 6

CYCLAMINEUS NARCISSUS OF GARDEN ORIGIN

Distinguishing characters: Characteristics of Narcissus cyclamineus clearly evident

(a) Cup or corona not less than two-thirds the length of the perianth segments

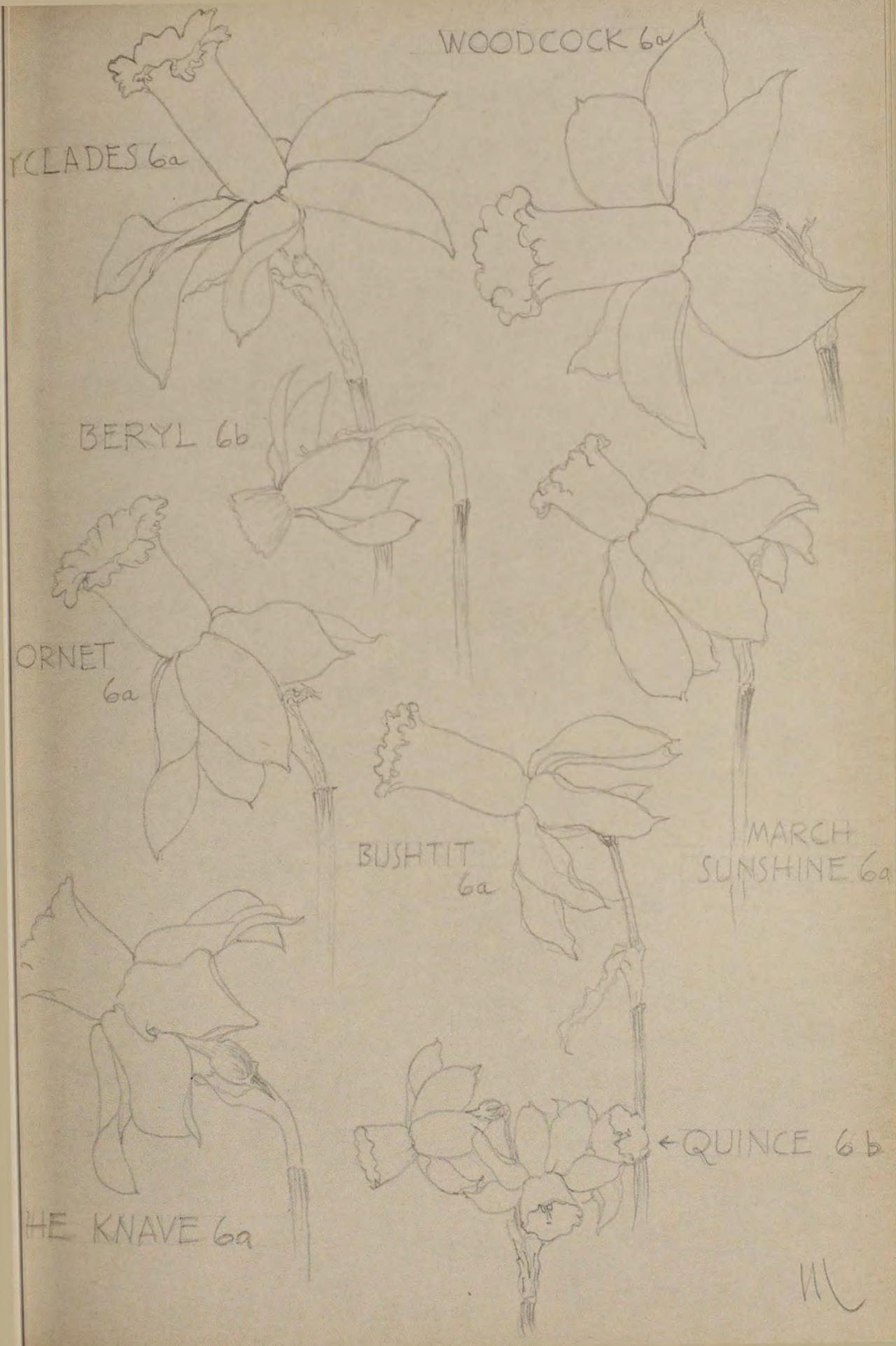
This division was established in 1910, but the subdivisions were not created until 1950.

Just one species, *N. cyclamineus*, has been the progenitor of every hybrid in this division which contains some of the most engaging and affable varieties of

PLATE 7 B. Y. MORRISON

CYCLAMINEUS HYBRIDS

Cyclades (Div. 6a), Woodcock (Div. 6a), Beryl (Div. 6b), Cornet (Div. 6a), Bushtit (Div. 6a), March Sunshine (Div. 6a), The Knave (Div. 6a), and Quince (Div. 6b.)


WOODCOCK 6a
YCLADES 6a
BERYL 6b
ORNET 6a
BUSHTIT 6a
MARCH SUNSHINE 6a
HE KNAVE 6a
QUINCE 6b

the entire daffodil family. Its perianth, streaming away in the wake of the long, slender trumpet, is unique and gives personality to the species and to all its offspring.

The fact that *cyclamineus* is given its own division should not obscure the fact that botanically it belongs with the large trumpets in Div. 1. In view of that relationship, breeding has tended to be with other trumpets; so cyclamineus hybrids are nearly always yellow and of 6*a* dimensions.

The most notable event in the story of this division was the crossing of Mitylene × *cyclamineus* by C. F. Coleman which gave him the three sisters: Charity May, Dove Wings, and Jenny, all exceptional flowers for the garden. The first is an all-yellow of excellent quality and probably the most desirable flower in this subdivision; the second is a bicolor, the only one of its type; and the third is a trifle less vigorous, but the only white available at a modest cost.

All cyclamineus hybrids are early, but the variety which receives the special benediction bestowed upon the first of the larger flowers to open will in most cases be either Bartley, Cornet, February Gold, Jana, or Peeping Tom, all 6*a*'s.

Most cyclamineus hybrids are yellow and the list of desirable varieties is lengthy: Golden Cycle, March Sunshine, Le Beau, Trewirgie, Little Witch, Larkelly, Bartley, Woodcock, Cyclades, Estrellita, Caerhays, Baby Doll, and Bushtit. There are a few with orange in the cup: Roger, March Breeze, and Chickadee. Red-cupped novelties are now being introduced, but their resistance to fading has yet to be proved.

Aside from Dove Wings, other bicolors are February Silver, The Knave, and Jack Snipe; not to be confused with Snipe, a delightful miniature with a long, pencil-like trumpet which fades from cream to white.

Jenny and Titania, the latter a Richardson novelty, are the only pure whites.

N. cyclamineus is a miniature itself and from it others have been bred, such as Greenshank, Mini-Cycla, The Little Gentleman, Tête-a-Tête, Mite, Jumblie, Mitzy, and Jetage; all are yellow except Mitzy which is white and Jumblie which has an orange-shaded cup. Tête-a-Tête, Jumblie, and Quince (6*b*) came from a single seed pod.

(*b*) *Cup or corona less than two-thirds the length of the perianth segments.*

Since *cyclamineus* has a long trumpet, these specifications exclude almost all hybrids with cyclamineus characteristics. While Beryl, with poeticus blood, is the only variety commonly seen, it is a quality flower. Quince, from Cyclataz selfed, is a soft yellow miniature with three or four flowers to a stem. Kitten is an expensive novelty with a tangerine cup, from Alight × Charity May by Coleman.

DIVISION 7

JONQUILLA NARCISSUS OF GARDEN ORIGIN

Distinguishing characters: Characteristics of any of the Narcissus jonquilla group clearly evident.

(*a*) *Cup or corona not less than two-thirds the length of the perianth segments.*

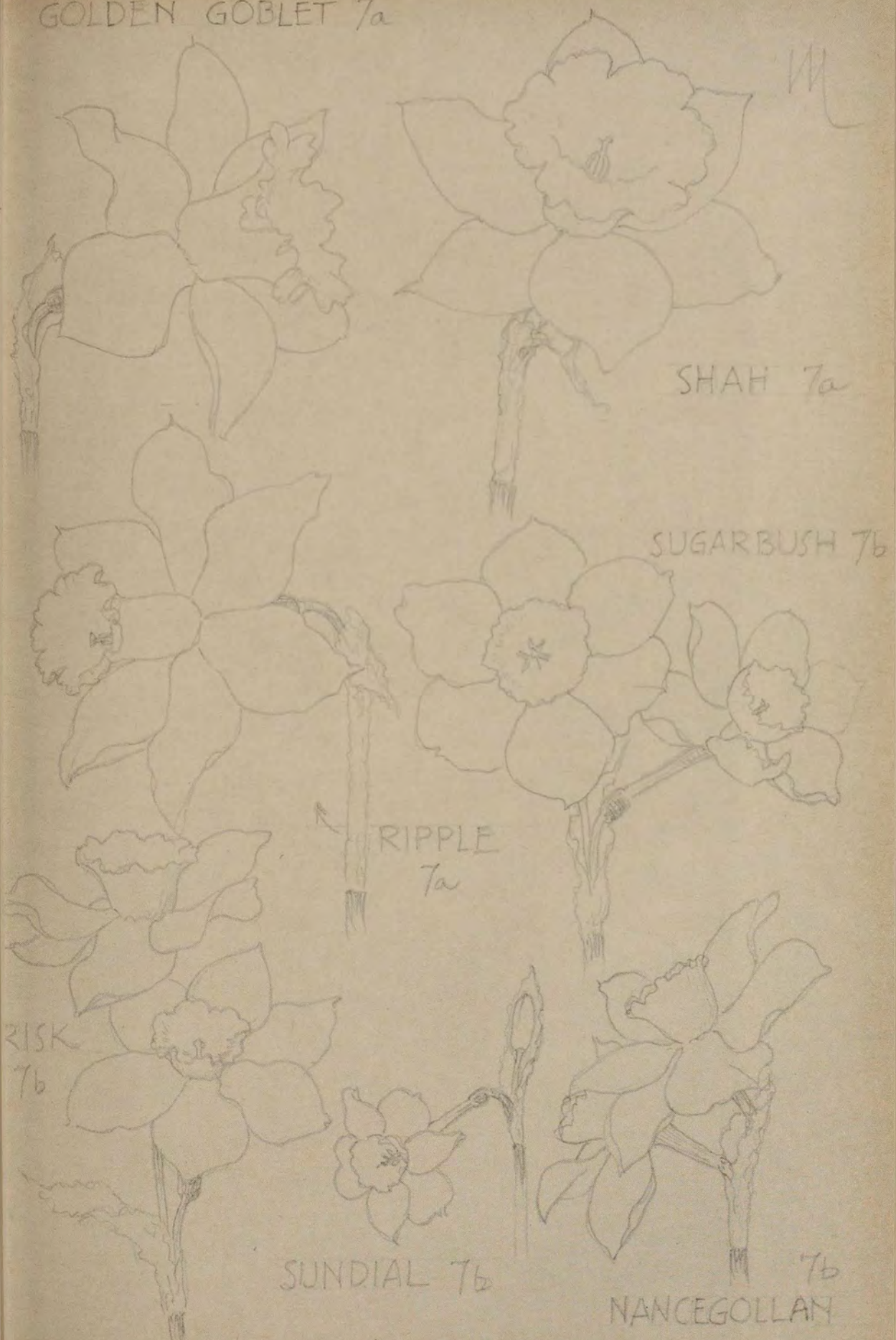
The above wording and the two subdivisions date only from 1950. Prior to that Div. 7 was a single class reading "All varieties obviously derived from Jonquils (e.g., *N. jonquilla, N. juncifolius,* etc.) such as Buttercup, odorus, etc." "Jonquil" is derived from the Latin *juncus,* a rush.

While the jonquils in nature are a

PLATE 8 B. Y. MORRISON

JONQUILLA HYBRIDS

Golden Goblet (Div. 7a), Shah (Div. 7a), Sugarbush (Div. 7b), Ripple (Div. 7a), Prisk (Div. 7b), Sundial (Div. 7b), and Nancegollan (Div. 7b.)


GOLDEN GOBLET 7a
SHAH 7a
SUGARBUSH 7b
RIPPLE 7a
RISK 7b
SUNDIAL 7b
7b
NANCEGOLLAN

tangle of true species, wild forms, and natural hybrids, nearly all of the larger hybrids have *N. jonquilla* as a common parent. The miniature hybrids are the result of crosses employing *N. scaberulus, N. calcicola, N. rupicola, N. watieri,* and *N. juncifolius,* none of which is more than a few inches tall.

The true jonquils are a distinctive group with several well-marked characteristics. The leaves are dark green and rushlike; the scape is tall and slender with from two to six flowers. As a family, the jonquils have good substance, are exceptionally durable, relatively free from disease, and the flowers are the most fragrant of the entire genus.

While most of the cyclamineus hybrids were 6*a*'s due to the long trumpet of *N. cyclamineus,* most of the jonquil hybrids are 7*b*'s because *N. jonquilla* has a short corona, but in both divisions yellow flowers are the rule.

The de Graaff and Barr families took an early interest in the jonquils, the former giving us Golden Sceptre and White Wedgwood, the latter Fairy Nymph, Ripple, Shah, and Hathor. Sweetness, by Dr. R. V. Favell, is somewhat smaller, but the most popular variety in this class. His Waterperry is no less desirable. Golden Goblet is an old Dutch favorite and Mitsch has introduced all-white Alpine.

There are only two miniatures: Little Prince and Skiffle.

(*b*) *Cup or corona less than two-thirds the length of the perianth segments.*

The cornerstone of the 7*b*'s, in fact of the entire division, is Trevithian (1927), one of the great flowers of that vintage year from the dean of daffodil breeders, P. D. Williams. It was preceded by his own Hesla and Lanarth and by de Graaff's Golden Perfection. Jefferson-Brown has performed a service in reviving Polnesk and Prisk, yellow; Nancegollan, white; Snow Bunting, bicolor; and Parcpat, a red-yellow; all by P. D. Williams and his son, Michael.

Kasota, with a yellow perianth and orange cup, is one of the few varieties still offered from those bred by the late Edwin C. Powell of Rockville, Md.; Skylon has a red-edged cup, Tittle-Tattle should come with a touch of orange in the cup, but Pipers Barn is deep butter yellow. The darkest flower of all is Orange Queen, believed by some to be none other than Aurantiacus (a 7*a*), the latter being a form of *N* × *odorus,* itself a wild hybrid of *pseudo-narcissus* × *jonquilla.* Orange Queen has 2-3 sweetly scented flowers on a 15-in. stem. Cheyenne, Kiowa, and Nirvana are whitish and Chêrie has a shell-pink cup and white perianth. Sugarbush has a perianth of ivory and a maple sugary cup.

Grant Mitsch, who is one of the true frontiersmen in daffodil advance, has made important contributions to the jonquils. The cross of Binkie × *jonquilla* has given him several reversed bicolor jonquil hybrids, the first of which are Dickcissel, Pipit, and Verdin. Bulbs in this series will be very scarce for some years, although they are said to increase rapidly. Orange-red cups are not uncommon, but Mitsch's Kinglet and Bunting are two of the better, and his Vireo is a smallish flower of lemon with a deep green eye.

Dr. Favell has been mentioned as the originator of Sweetness among the 7*a*'s. Two highly colored 7*b*'s of his raising are Sweet Pepper and Susan Pearson, the latter coming with a red cup.

There are numerous miniature jonquils; in shades of yellow are Baby Moon, Baby Star, Kidling, Pease-blossom, Sea Gift, Sun Disc, and Sundial; the latter with a greenish cast. Bebop and Demure are bicolors, and Bobbysoxer, La Belle, Lintie, and Stafford should show some orange. Flomay is the only white.

Pixie (*juncifolius* × *jonquilla*) by Matthew Fowlds is a delightful miniature with 3-5 small, sweetly scented, yellow flowers. Companions for it are promised before long.

DIVISION 8
TAZETTA NARCISSUS OF GARDEN ORIGIN

Distinguishing characters: Characteristics of any of the Narcissus tazetta group clearly evident.

Div. 8 has been linked with the tazettas ever since the classification was established in 1910. "Tazetta" is an Italian word meaning "small cup." The tazettas are the most widely distributed and the oldest known forms of the entire genus. They grow well from the Canary Islands, along both shores of the Mediterranean, on through Syria, Persia, India, and as far as China and Japan. There is little doubt that they are the narcissus known to ancient writers.

It takes a sharp blade to cut through the tangled knot of tazettas (see Chapter 12). As one might expect, such a far-reaching plant has evolved many regional forms which were collected for generations and introduced to the gardens of Europe, North America, and Australia. Equally understandable is the fact that numerous local, popular, and pseudo-scientific names have become attached to these forms or clones with the inevitable result that what appears to be the same clone is known under several names and the same name is applied to what are obviously different clones.

Introduced forms of tazettas have become naturalized in this country along the South Atlantic and Gulf Coast states and are known by such delightful names as Christmas Star, Seventeen Sisters, Golden Dollars, Twin Sisters, and Pearl. Other equally uncertain forms are found in California and came from China.

While stout hearts and curious minds search out the answers, the rest of us may accept the verdict of the Royal Horticultural Society as expressed in its *Classified List* that there is one species, *N. tazetta,* with numerous subspecies and wild, or presumably wild, varieties known only in gardens. It will also resolve many uncertainties to assume that any tazetta blood in hybrids is derived from *tazetta,* a single species with many regional variants.

It was by the tazettas that daffodils were first known away from their natural homes. The daffodil literature and catalogs of the nineteenth century list dozens of tazettas, known collectively as polyanthus, or cluster-flowered, narcissus. J. G. Baker eventually classified them in three series: 1) perianth white, corona colored; 2) perianth and corona both white; 3) perianth and corona both yellow; a grouping which still has horticultural, if not taxonomic, value.

Unfortunately, the early tazettas proved to be rather tender in Northern Europe and they languished following the ravages of war and the rising popularity of the trumpets and large cups. This reaction has gone so far that hybridizing has almost ceased and a dozen varieties is the most that can be found in any current catalog. Many dealers completely ignore the division.

Hardiness is always the uncertain factor with hybrid tazettas which are usually referred to as the Poetaz varieties, and the only safe statement which can be made is that there are varieties which are reliably hardy even below zero, that most varieties are probably hardier than is generally thought, and that no one should hesitate to try out the limited varieties available. They are inexpensive and, where hardy, their bold, multi-flowered scapes, vigor, fragrance, and reliability make them ideal garden material. Occasionally varieties will prove to be hardier in sod than in a garden bed.

The first Poetaz were the work of Dutch growers, especially R. van der Schoot. Geranium, Orange Wonder, and Laurens Koster are the most widely grown, but Laetitia, Aspasia, Mrs. Alfred Pearson, Pride of Holland, Early Splendour, and Canarybird are still offered. P. D. Williams and other English breeders also tried their hands and produced Scarlet Gem, Red Guard,


COMPRESSUS
MATADOR
CRAGFORD
HALINGY
ANGIE

Glorious, and St. Agnes. In the United States, the Oregon Bulb Farms introduced two excellent varieties in Matador and Golden Dawn. Martha Washington, one of a series which Adrian Frylink developed by mating the Poetaz with the small cups, stands so far apart from all other Poetaz in size that it is scarcely to be recognized as one.

Silver Chimes, which is half tazetta and half triandrus, was classified as 5*b* from 1916 to 1965 when its tazetta characteristics were conceded and its was transferred to Div. 8. An excellent flower where it can be grown, but it is not fully hardy in the North.

The best daffodils for forcing are found among the tazettas and Poetaz. Cragford, Paper White, Scilly White, Sacred Chinese Lily, and Soleil d'Or are popular for this purpose. Not hardy, of course, in the North.

Pango, with the odd parentage of *N.* × *dubius* × John Evelyn, spent some years in Div. 11, but the tazetta blood in × *dubius* finally won it lodging with the other tazettas.

There are several miniature tazettas: Cyclataz, Angie, Halingy, Hors d'Oeuvre, and Shrew.

DIVISION 9

POETICUS NARCISSUS OF GARDEN ORIGIN

Distinguishing characters: Characteristics of the Narcissus poeticus group without admixture of any other.

Div. 9 has been devoted to the poet daffodils since the inception of the classification in 1910. Why the word "poeticus" was considered appropriate is unknown, but according to E. A. Bowles it was first used by Lobel in *Stirpium Adversaria Nova* in 1570. At one time the poets were considered to be the only true *Narcissus.*

In his monograph *Narcissus poeticus and its Allies,* H. W. Pugsley recognized nine species divided between two series, *Poetici* and *Radiiflori,* but modern taxonomy considers these to be two subspecies of *N. poeticus* and gives Pugsley's nine species variety status only.

The influence of *N. poeticus* and its variations has been enormous in building up the present wide range of form and color now found in all daffodils. The three principal varieties used in breeding have been *N. poeticus* subsp. *poeticus* var. *recurvus,* the familiar Pheasant's Eye; *N. poeticus* subsp. *radiiflorus* var. *poetarum;* and the form of *N. poeticus* subsp. *radiiflorus* var. *exertus* known as Ornatus. The deep red cup of var. *poetarum* has been the source of nearly all the pink and red now appearing in other divisions; var. *recurvus* has contributed sparkling, alabaster whiteness; a flat perianth; green eye; strong scent; and lateness. Ornatus offers earliness in a group that usually ends the season.

Perhaps the tallest figures in the daffodil world have been the Rev. George H. Engleheart and P. D. Williams. They were of the same generation, but Williams worked chiefly with the red-cups and jonquil hybrids, while Engleheart's first love was undoubtedly the poets. Numerous varieties bear his mark, but Horace was his greatest triumph. It was bred from Ornatus × *poetarum* and first exhibited in 1907. A friend purchased the entire stock and within ten years it was a leading market variety yielding one grower on a single day a check for over $4,000 for a shipment of nearly 150,000 cut flowers. Horace inherited the best features of its parents: earliness, a snowy-white perianth, and a red-edged cup. Today it would be difficult to purchase a bulb.

Such is the quality of the wild poeticus forms that only minor improvements are possible in garden hybrids. Engleheart did far more than anyone to better them, using the cross which produced Horace. He created a large group of seedlings and from the blending of those and the oc-

PLATE 9 B. Y. MORRISON
TAZETTA HYBRIDS
Compressus, Matador, Angie, Halingy, and Cragford (all Div. 8)

casional infusion of wild forms has come the present rather limited number of garden varieties.

Breeding offers scant hope of progress or profit, and years may pass without a new introduction in this division. Nevertheless, the poets are a distinctive and useful type of daffodil. Some have persisted in gardens or grass with little attention for generations. They have a wide appeal and are universally recognized and admired for their whiteness and bright eye. The flowers have a strong nutmeg-like fragrance, although to some it is less appealing than the scent of the jonquils.

Nearly all the varieties offered date back to the 1920's and 30's. The subtle differences concern the amount of red, green, and yellow in the tiny corona or eye. Actaea is by far the most widely grown variety, but other varieties available and grown to some extent are Dactyl, Red Rim, Smyrna, Sea Green, Milan, King of Diamonds, and Shanach. Cantabile is widely known and an excellent, but temperamental, exhibition flower. There are no miniature poets.

As a class, the poets bring a season to its close, but Actaea is comparatively early and usually represents the poets at shows.

The principal criticism of this division is the similarity of all varieties.

DIVISION 10

SPECIES AND WILD FORMS AND WILD HYBRIDS*

All species and wild, or reputedly wild, forms and hybrids.

In the reshuffling of 1950, Div. 10 was vacated by the transfer of double daffodils to Div. 4, and all species or wild forms, hitherto included in other divisions, were brought together here.

This division is a showcase for what Nature can achieve, working with the dull tools of evolution or the sudden impact of mutation, natural hybridization, polyploidy, or chromosome changes. It contains a large assortment of material suitable for gardens, ranging from small to large, early to late, easy to difficult, tender to hardy, common to scarce, and fragrant to scentless.

In considering the species and wild forms as garden subjects, certain changes will have to be made in the ground rules which have been observed in discussing other divisions. Mentioning a species here does not mean that bulbs can be obtained without difficulty. It may mean no more than that they are, or have been, in the gardens of persevering growers. A few are regularly listed in the catalogs; others only occasionally. Commercial growers, especially those engaged in hybridizing, often have species which they do not list, but which they might be persuaded to share with a good customer.

Some bulbs are nursery-grown; most are collected, although wild sources of some species are rapidly being depleted. Nursery-grown bulbs are usually identified and are likely to command higher prices, because it is more expensive to grow them than to collect them, and they should be of flowering size and correctly named. Collected bulbs may or may not be of flowering size, and the bulbs received have a disconcerting way of not being what was ordered. The nomenclature is quite confused; long-established trade names continue to be published although no longer approved by the taxonomists. In this discussion, the accepted botanical names will be used, but synonyms which may be encountered in daffodil literature and catalogs will be given in parentheses. The parents of wild hybrids will also be stated as far as known or suspected.

TRUMPETS

The bellwether of the yellow trumpet species is *N. pseudo-narcissus,* the Lent Lily, which is naturalized, if not native, in England. It varies in color, size, and

*Detailed descriptions of all the species and wild hybrids may be found in Chapter 4.

form, but at its best is not an impressive garden flower, being more at home in grass, meadows, or near the edge of open woods. *N. pseudo-narcissus* subsp. *pallidiflorus* is a straw-colored form grown in England with some success. Also similar, but rarely to be found, is *N. pseudo-narcissus* subsp. *major* (*N. hispanicus* or Maximus Superbus). In any event, it should not be forgotten that its better qualities are present in almost every yellow trumpet in the garden. *N. pseudo-narcissus* subsp. *obvallaris* (*N. obvallaris*), the Tenby Daffodil, belongs with the foregoing. It is an excellent flower of deep yellow, dwarf, and very early. Fortunately, it is undemanding, so it is available and widely grown. *N. pseudo-narcissus* subsp. *gayi* (*N. gayi* or Princeps) is also notable for its good manners, if little else. It resembles *pseudo-narcissus* but is larger, has an unpleasant scent, and is lacking in substance; however, it is early and can provide a colorful massed effect as well as take care of itself.

Both *pseudo-narcissus* and *gayi* have perianths which are lighter than their trumpets, the contrast creating a bicolor effect in some forms, but the most distinctive species of this type is *N. pseudo-narcissus* subsp. *bicolor* (*N. bicolor*). It is a sturdy plant which presents no problems and is often listed. The garden which has Empress has a reasonable facsimile of *bicolor*.

For garden purposes there is only one white trumpet, *N. pseudo-narcissus* subsp. *moschatus* (*N. moschatus*) of Linnaeus, sometimes sold as *N. cernuus*. There are two other whites—*N. pseudo-narcissus* subsp. *alpestris* Pugsley (*N. alpestris* or *N. moschatus* of Haworth) and *N. pseudo-narcissus* subsp. *albescens* Pugsley (*N. albescens*)—but the latter is not obtainable and the former dies out under cultivation. *N. moschatus* L. is about 10 inches high; the corona hangs its head surrounded by a drooping perianth of twisted segments, but it may be expected to perform well.

Among the above, *alpestris, bicolor, moschatus,* and *obvallaris* are considered to be miniatures, but the term is comparative and there are smaller miniatures. *N. asturiensis* (*N. minimus* Hort.), for example, is the smallest and usually the earliest of all species. It is scarcely 3 inches high and its determination to flower in the face of lingering winter wins it universal admiration. The yellow trumpet nods almost to the ground, but a mulch of pine needles will keep it clean. It increases slowly, but sets seed which grow readily. It will do well in poor, stony soil in full sun.

A bit taller and later, but long confused with *asturiensis,* is *N. minor* L. (*N. nanus* Hort.) and its satellites, var. *conspicuus* Haworth (*N. nanus* Spach or *N. lobularis* Hort.) and var. *pumilus* Salisbury (*N. pumilus* or *N. minor* Hort.). *N. minor* keeps its flowers out of the mud and increases steadily. The corona is deep yellow, the perianth a soft yellow. The two varieties are about 6 inches tall; *pumilus* solid yellow and early, *conspicuus* close to a bicolor and later. These three, especially *minor,* have a tendency to divide rapidly and produce a mass of foliage, but few flowers. All are stocked and have no special requirements.

CYCLAMINEUS

Although grouped apart from the trumpets, *N. cyclamineus* is of trumpet proportions and probably stands first among the species in the affection of gardeners. It is a jaunty, first-early flower with a streaming perianth that stirs disbelief. In fact, so singular is this species that when two drawings were the only evidence of its reality for an incredible period of 263 years, its very existence was disputed. Finally, in the spring of 1885 the species was again encountered.

It is fortunate that *cyclamineus* escaped attention for so long, because its range is limited and once found it was collected so heedlessly that it is now close to extinction. While bulbs are usually short-lived, the species grows readily from seed and self-perpetuating colonies have been established in protected spots in England and Portugal. Most dealers stock collected bulbs, but a few grow it from seed which seems to be Nature's method of propagation. Unlike most wild daffodils, *cyclamineus* will flourish

only in damp soil; other than that it seems quite tolerant where it spends its brief life.

N. × *johnstonii* is another Ajax variety found in Portugal by A. W. Tait in 1885 and believed to be a wild hybrid of *pseudo-narcissus* and *triandrus*. The true form is extremely rare, apparently completely lost in the wild and now growing only in a few gardens in Portugal and England. It is a delightful flower, pale sulphur yellow in color, with a long, slender corona. The perianth segments point forward. A few years later Peter Barr found a similar wild form in northwestern Spain which is now known as Queen of Spain. It is distinguished from *johnstonii* by reflexing perianth segments. Queen of Spain persists in a few gardens in the United States. Neither can be considered easy, either here or abroad, but scarcity of bulbs is the greater problem. There is another form known as King of Spain which has a slightly rolled rim, but it is believed to be no more than a seasonal variation of Queen of Spain.

N. × *macleayi* is a small flower which has lost its passport, but is generally thought to be a wild hybrid, possibly *poeticus* × *pseudo-narcissus*. However, Bowles considered it to be a hybrid of *poeticus* and × *abscissus*, the latter being *poeticus* × *pseudo-narcissus*. The bulbs offered by specialists from time to time show little evidence of such a large infusion of *poeticus*, and Dean Herbert may have been nearer the truth when he said there was tazetta in its background. It is a bicolor of small-cup proportions, the flower a couple of inches wide with a bright yellow corona half an inch long.

TRIANDRUS

While the taxonomists recognize only a single species, *N. triandrus*, among all the triandrus forms which range from white to yellow with from 1 to 6 pendent flowers, and from a bulbous to a long, vase-shaped corona, several varieties are distinguished and in the trade. Most often seen is *N. triandrus albus*, the well-known Angel's Tears which can vary considerably, but typically has a cluster of elegant little bell-like, drooping flowers of creamy white on a short stem, the perianths reflexed. It is not difficult to manage. Var. *concolor* is a golden Angel's Tears. Calathinus is a form of *N. triandrus loiseleurii* which is larger and whiter than *loiseleurii* with exceptional substance and 2 or 3 flowers on a stem; the foliage is nearly prostrate and oddly twisted. It is said to be short-lived in the garden, but can be grown from seed which is freely set.

N. triandrus 'Aurantiacus' (Hort.), not to be confused with Aurantiacus (Hort.), a form of × *odorus*, seems to be a darker colored form of *concolor*, but it also blooms earlier and has a darker bulb. Like *concolor*, it is slow to increase. It is regarded with skepticism by taxonomists, but it exists in gardens and in the trade; in the opinion of gardeners, it is the loveliest and most tractable of the group.

While many gardeners find the triandrus difficult to handle, just what pleases —or displeases—them is not clear. They are all miniatures and thus belong in the rock garden. It seems certain that they prefer a damp soil, but one which has very sharp drainage, considerable sun, and there are reports of good performance in a thin sod. They are probably not fully hardy across the northern United States and they are also plagued somewhat by disease; certainly they are reluctant to increase. If they do offer a bit of a challenge, success with them is generously rewarded.

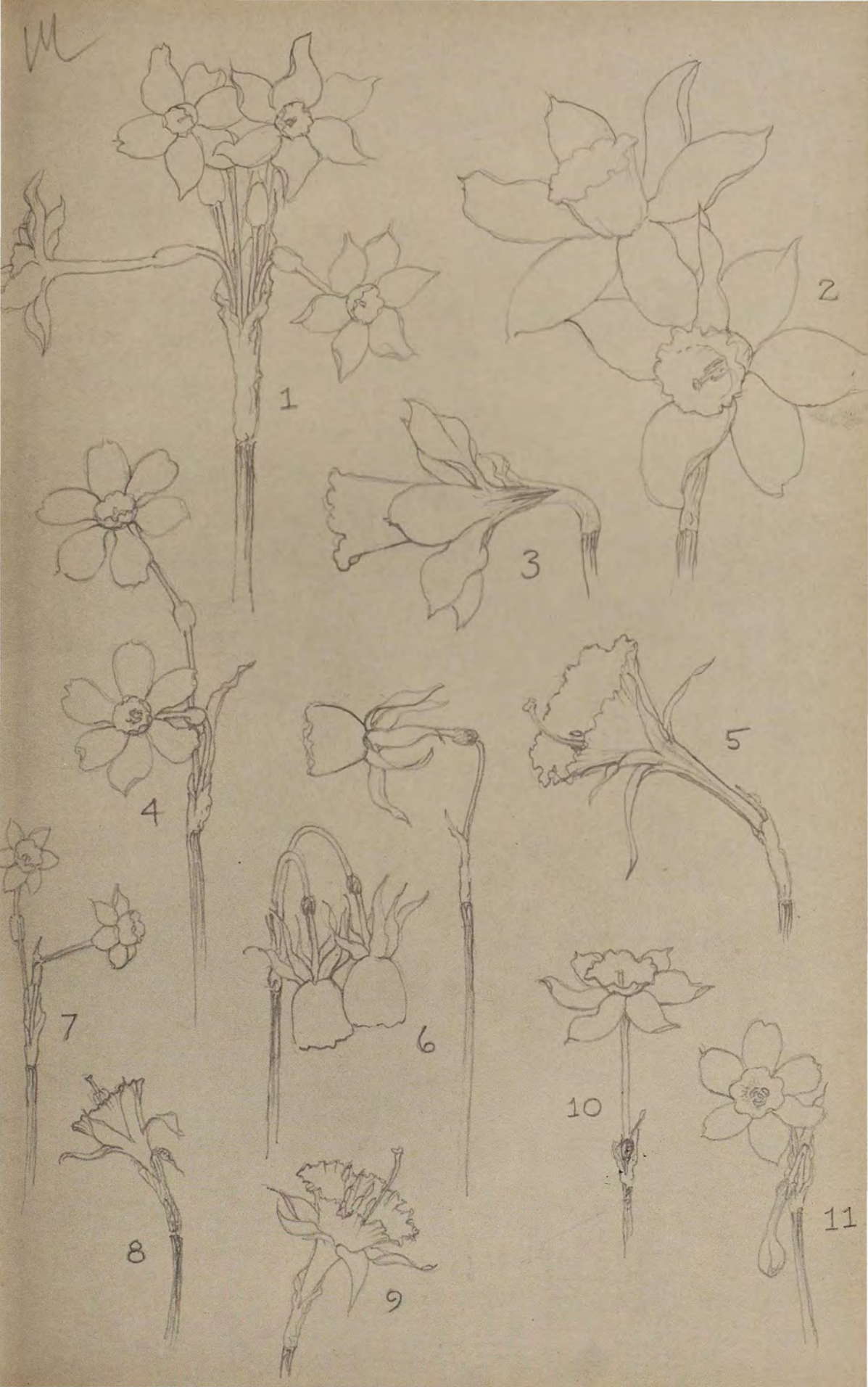
JONQUILLA

The largest, one of the earliest, and surely the most fascinating of all the groups of species are the jonquils. Here are the jewellike miniatures, that shade of yellow which the textile trade is pleased to borrow, and the fragrance

PLATE 10 B. Y. MORRISON

SPECIES, WILD FORMS, AND WILD HYBRIDS

1. × *intermedius* 2. × *odorus* 3. *pseudo-narcissus* subsp. *moschatus* 4. *jonquilla* 5. *bulbocodium* subsp. *vulgaris* var. *citrinus* 6. *triandrus* 7. *gaditanus* 8. *hedraeanthus* 9. *cantabricus* 10. *rupicola* 11. × *dubius* (all Div. 10)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which can scent a room. The head of the family is *N. jonquilla* (erroneously, but persistently, called *simplex* by the trade) with several strongly scented, deep golden yellow flowers on a tall, cylindrical stem. The corona is small and the perianth segments broad and pointed. It is about a foot tall, but there is a delicacy and grace about it which makes it suitable for the rock garden where it should do well in a sunny spot. *N. jonquilla* var. *minor* is slightly smaller and has a longer corona. *N. jonquilloides* is smaller in all its parts than *jonquilla*. There is some opinion that *minor* and *jonquilloides* are wild hybrids, but the question is academic as far as gardeners are concerned, since both send up masses of leaves but rarely flower. *N. jonquilla* var. *henriquesii* is said to be an exceptionally good form of *jonquilla*.

The campernelli jonquils have been in gardens for a very long time, but their lineage is uncertain and the terminology adopted by the trade only compounds the confusion. Linnaeus started it all by giving specific status as *N. odorus* to a flower which is now believed to be a wild hybrid of *pseudonarcissus* × *jonquilla*, so that the correct designation is *N.* × *odorus* (campernelli jonquil or *odorus campernelli* of the trade). It is often confused with *jonquilla*, but there are obvious differences. Both are fragrant and similar in color, but × *odorus* is taller to 18 in. and has much larger flowers with broader segments and a larger lobed cup. *N.* × *odorus* 'Rugulosus' Hort. (*campernelli rugulosus*) is the largest of all. Typically it is a soft yellow, but it sometimes appears in an orange-yellow form known as Maximus.

What are believed to be natural crosses of *jonquilla* and *poeticus* have given us *N.* × *gracilis* and *N.* × *tenuior*, a pair of wild hybrids of garden value. While related, × *tenuior* is somewhat smaller with 1-3 straw-colored flowers which bleach to nearly white, carried on a weak 6-inch stem; the cup is sulphur yellow. Its performance is uncertain, but it may respond in a dry rock garden. *N.* × *gracilis* is twice as tall as × *tenuior*, pale yellow with a darker cup, and shows its jonquil ancestry in its slender foliage. Each stem carries 3-5 jonquil-like, sweetly scented flowers. It comes into bloom later than × *tenuior;* only the latest poets keep it company.

N. calcicola is the earliest and tallest of the small jonquils; the foliage rising to 6 inches and topping the flower scapes which carry half a dozen butter-yellow flowers with a cuplike corona and a characteristic scent. The foliage is gray green and erect; the bulbs dark brown and comparatively large.

N. scaberulus resembles *calcicola*, but is an inch or two shorter, not quite so early, has fewer flowers on a scape, and is scentless. The corona is shallower and almost orange; noticeably darker than the perianth. The two leaves are prostrate and curled; enclosed in a white sheath which rises well above the ground.

N. rupicola is the most widely distributed of the small jonquils and, unlike *calcicola* and *scaberulus*, it varies widely. The typical flower is 3-4 in. tall, clear yellow with a slight contrast between the corona and perianth, a flat corona, and overlapping segments. The leaves are gray green and 3-4 in number. However, the corona may be slightly or deeply divided into three lobes, the corona orange, the segments narrow and overlapping, the entire flower dwarfer and paler, or even twin-flowered. The bulbs are pale brown and there may or may not be any scent. The only one of these variants to have variety status is *marvieri*. It is somewhat larger with white tips to the outer perianth segments and the leaves are prostrate, but not curled.

Scapes of the jonquil species may be expected to carry from 2 to 6 flowers; the exceptions are *rupicola, marvieri, watieri,* and *atlanticus*. A single flower is the rule with these.

N. watieri is a pure white *rupicola*, but a less vigorous grower. The leaves are erect and the rather large bulb is white. It is sparing of its lovely, scentless, Tom Thumb flowers, a fault for which the best antidote is a good baking during summer dormancy.

N. atlanticus is a rarity, having first been collected in 1936 in the Atlas Mountains of Africa. It differs from *watieri* in having a cup-shaped corona and by being slightly taller, sweet-scented, and creamy white. It differs from *rupicola* in the creamy white color of the flower, broader leaves, and larger bulb.

N. juncifolius is no taller than the other small jonquils, but it may be distinguished by its foliage which is dark green, rather than pale. There are several deep yellow flowers to a stem; the corona is larger and somewhat darker than the perianth; the fragrance is rather pleasant. This is a late-flowering species which is easy in the dry rock garden. *N. fernandesii* is closely related, but of deeper coloring and heavier substance. It has been known only since 1948 and there is still some question as to its status, but so far it has proved to be a satisfactory garden flower. Other satellites of *juncifolius* are *N. gaditanus* and *N. minutiflorus,* both so rare and difficult that it is sufficient just to mention them.

TAZETTA

The tazettas can be considered for growing outdoors only in the cotton and tobacco states; most of them are suitable only for the Gulf Coast and Southern California. The identification of such bulbs as can be obtained baffles even the experts (see Chapter 12). However, where the tazetta species will grow, they lose none of their charm through loss of their family tree, and they are unrivaled in the garden. Most of the wild forms are considered to be subspecies of *N. tazetta*: *bertolonii, papyraceus, panizzianus,* and *italicus.* Canaliculatus, a trade name, is a form of subsp. *lacticolor.* In addition, there are two wild hybrids: *N.* × *dubius* (*juncifolius* × *tazetta*) and *N.* × *intermedius* (*jonquilla* × *tazetta*).

Standing between the tazetta and poeticus species is *N.* × *biflorus,* a spontaneous cross which may occur wherever stations of the two species are neighboring. It might be described as a yellow-cupped poet with two flowers on a scape and is a congenial garden plant. Naturally, with such a background, it is fragrant.

POETICUS

Only one of the poeticus species needs to be considered for the garden. The ever-popular Pheasant's Eye, *N. poeticus* var. *recurvus,* is one of the primary flowers of the genus. Its slightly reflexed perianth sets the standard for whiteness in a daffodil and frames a sparkling green and yellow eye rimmed with red. It is a most vigorous grower, strongly scented, and a fitting flower to close the season.

BULBOCODIUMS

The bulbocodiums, or Hoop Petticoats, are the despair of all. The taxonomists are uncertain how to classify them, few gardeners can bring them into bloom, and the uninitiated find it hard to believe they are daffodils. Prof. Dr. Abilio Fernandes, their ablest student, has found no less than 12 different chromosome numbers among the wild plants and considers they are a recent development, still in Nature's workshop. A number of forms or clones have been selected and named, but the differences are not great and there is little to choose among them as to performance and quality. Perhaps the most distinctive are *N. bulbocodium* subsp. *obesus* and *N. bulbocodium* subsp. *vulgaris* vars. *conspicuus, citrinus,* and *nivalis,* all natives of Europe. Recently, a group formerly classified as *N. bulbocodium monophyllus* (*clusii*) was detached and given species status as *N. cantabricus.* The clones usually seen are the temperamental *monophyllus* and the more tolerant *foliosus,* both whites which desire to flower during our winters. These two, along with *N. bulbocodium romieuxii,* a pale lemon, are natives of North Africa.

The bulbocodiums are in active growth a large part of the year, and this fact, as well as a degree of tenderness in all forms, makes them useless for growing outdoors where winters are long. They prefer a damp, gritty soil in the sun, but to be dried off during the summer. A piece of glass laid on the ground over them will accomplish this. As a whole, they are best suited to growing in a greenhouse or coldframe, especially *romieuxii* and the two forms of *cantabricus.*

Quaint is the word usually applied to the Hoop Petticoats; appropriate enough in view of their diminutive size, bulging coronas, and rudimentary perianths. The named forms, as well as mixed seedlings, are in good supply and inexpensive; facts which may justify trying them if the grower is prepared for disappointment.

N. hedraeanthus is similar to the bulbocodiums. It is scarcely 2 inches tall, pale yellow, and requires the protection of a greenhouse.

At the bottom of the barrel of wild daffodils are three autumn-flowering species: *N. elegans, N. serotinus,* and *N. viridiflorus;* they start the season, if fall may be said to precede spring. All are rare, and flowering them places one in a special class among the experts. They are of interest only as primitive forms with curiosity value. The fact that the first two may be found both north and south of the Mediterranean is presumptive evidence of an ancient land bridge between Europe and Africa.

DIVISION 11
MISCELLANEOUS NARCISSUS

All narcissus not falling into any of the foregoing divisions.

This division was created in 1950 as a concession to Nature's refusal to be completely and permanently codified. At that time it was largely a gesture, since the only oddments were a few bulbocodium hybrids, but creation of the division has since been justified by a growing number of entries. In fact, Div. 11 may prove to be a way station where new forms gather strength before moving on to a place of their own.

At present, Div. 11 is the refuge of such an unlikely combination as the bulbocodium hybrids and a new tribe known as the split-corona daffodils. A name so pallid for such singular flowers is apt to be challenged before long by a more sales-provoking trade name.

Crossing bulbocodium species has thus far been an enterprise in which only D. Blanchard of Blandford, England, and, to a lesser extent, Alec Gray of Camborne, Cornwall, have engaged. Working with the cross *cantabricus foliosus* × *bulbocodium romieuxii* made both ways, Mr. Blanchard produced Nylon, Tarlatan, Taffeta, Muslin, and Jessamy. His objectives were an early flowering plant with the wide corona of *romieuxii* and an early yellow. He was successful in his first goal, but the white of *foliosus* proved to be dominant in his quest for a yellow. Poplin and Tiffany are second-generation hybrids. All these are small plants, but larger and more vigorous than their miniature parents. Since they are disposed to flower in November and December, most gardeners will have to provide shelter for them.

Alec Gray has registered Elfhorn, a later-flowering hybrid which seems not to be offered any longer; Marychild, a blending of *triandrus* and *bulbocodium* which resulted in a bright yellow flower; and Kenellis, a bulbocodium hybrid formerly classified as 5*a*.

The split-corona daffodils did not begin to appear in the *Classified List* until about ten years ago, although work on them began in the 1920's. At present there are some 30 registered varieties about equally divided between J. Gerritsen & Son of Voorschoten, Holland, and J. W. A. Lefeber of Lisse, Holland. For the full story of these, see Chapter 15.

Considering the chilly reception which the split-corona daffodils have been given by daffodil enthusiasts, it is surprising that many carry a substantial price tag. However, venturesome gardeners who choose to form their own judgments will find Gold Collar, Evolution, Split, Elisabeth Bas, Baccarat, Estella de Mol, and Mol's Hobby available at reasonable prices. There are also varieties on the market which have never been registered, including Artist and the ubiquitous Hillbilly and Hillbilly's Sister.

LISTS OF DAFFODILS

A. The current *Classified List* contains the names of some 12,000 species and garden varieties of daffodils; of these possibly 2,000 are carried by retail dealers from Holland to New Zealand. Prices per bulb will range from 15c to, at times, several hundred dollars. Catalog dealers tend to favor their own creations—on which they briefly hold a monopoly—and to exclude many interesting forms and varieties which they feel may be less profitable.

Small wonder that the home gardener buys rather blindly, assuming that the offerings of a nearby source of supply or of whatever dealer's catalog may come his way include all that is worthwhile in the genus. It may be some years before experience and curiosity open doors to the lesser known, and often more interesting, material.

Lists of daffodils are of limited value and that value is to speed the process of becoming acquainted with all daffodils. Having sampled the clan, the independent gardener will soon learn what aspects of gardening with daffodils most appeal to him: decoration, hybridizing, exhibiting, forcing; and what forms of the genus win his particular interest: pinks, miniatures, novelties, tazettas, etc.

To speed the novice on his way, a representative collection of 100 daffodils is offered below. It does not attempt the impossible task of naming the 100 "best" daffodils. Its modest goal is to present in capsule the full range of the daffodil family, considering variation in time of flowering, size, color, and form. All divisions and subdivisions are represented, none is expensive, all have a record of good garden performance, and all are listed in current catalogs. Nearly all are of show caliber.

1*a*. Bastion
Kingscourt
Moonstruck
Mulatto
Ulster Prince
Wee Bee (M)

1*b*. Bambi (M)
Content
Effective
Preamble
Trousseau

1*c*. Ardclinis
Beersheba
Mt. Hood
W. P. Milner (M)
White Tartar

1*d*. Spellbinder

2*a*. Armada
Carbineer
Carlton
Ceylon
Fortune
Galway
Golden Torch
Goldsithney
Rouge
Rustom Pasha

2*b*. Brunswick
Daisy Schäffer
Duke of Windsor
Flamenco
Kilworth
Mabel Taylor
Polindra
Rose of Tralee
Selma Lagerlöf

2*c*. Dunlewey
Killaloe
Ludlow
Parkmore
Truth

2*d*. Binkie

3*a*. Ardour
Ballysillan
Chungking
Edward Buxton
Russet
Therm

3*b*. Angeline
Bithynia
Blarney
Corncrake
Dreamlight
La Riante
Limerick
Verger

3*c*. Bryher
Chinese White
Cushendall
Frigid
Xit (M)

4. Gay Time
Golden Ducat
Mary Copeland
White Lion
Yellow Cheerfulness

5*a*. Liberty Bells
Moonshine
Rippling Waters
Thalia
Tresamble

5*b*. Dawn
Hawera (M)
Oconee

Thoughtful
6*a*. Charity May
Dove Wings
February Gold
Little Witch
Peeping Tom
6*b*. Beryl
7*a*. Golden Sceptre
Sweetness
7*b*. Bobbysoxer (M)
Kidling (M)
Lintie (M)
Sugarbush
Tittle-Tattle
Trevithian
8. Cragford
Geranium
Martha Washington
Matador
Scarlet Gem
9. Actaea
Cantabile
10. *asturiensis* (M)
cyclamineus (M)
jonquilla (M)
rupicola (M)
11. Split
(M) = Miniature

B. Periodically the Royal Horticultural Society polls a number of daffodil specialists for the varieties they favor for garden decoration which are listed in a current catalog at a price not exceeding 5s. (70¢). The last balloting which was held in 1963 with 18 specialists participating resulted as follows:

Name	Position	No. of votes	Name	Position	No. of votes
Kilworth (2*b*)	1	14	Blarney (3*b*)	15	4
Ceylon (2*a*)	2	13	Carlton (2*a*)	20	3
Carbineer (2*a*)	3	8	Goldcourt (1*a*)	20	3
Galway (2*a*)	3	8	Stadium (2*b*)	20	3
Armada (2*a*)	3	8	Garron (1*a*)	20	3
Narvik (2*a*)	6	7	Preamble (1*b*)	20	3
Polindra (2*b*)	6	7	Trevithian (7*b*)	25	2
Limerick (3*b*)	6	7	Charity May (6*a*)	25	2
Brunswick (2*b*)	6	7	Adamant (2*a*)	25	2
Flamenco (2*b*)	6	7	Cardigan (2*b*)	25	2
Kingscourt (1*a*)	11	6	Golden Harvest (1*a*)	25	2
Ludlow (2*c*)	11	6	Spellbinder (1*d*)	25	2
Trousseau (1*b*)	13	5	Dove Wings (6*a*)	25	2
Mount Hood (1*c*)	13	5	Revelry (2*a*)	25	2
Rustom Pasha (2*a*)	15	4	Bastion (1*a*)	25	2
Cromarty (1*a*)	15	4	Frigid [3*c*)	25	2
Fortune (2*a*)	15	4	Firemaster (2*a*)	25	2
Golden Torch (2*a*)	15	4	Red Hackle [2*b*)	25	2

C. While daffodils are natives of the Northern Hemisphere, growing and hybridizing them in Australia, New Zealand, and Tasmania keeps pace with, and sometimes surpasses, activity in the British Isles and United States. The best of the British novelties are promptly imported, acclimated, and shortly appear at shows and in the family trees of domestic hybrids. The reverse movement of introductions from the Antipodes to the Northern Hemisphere is more random, possibly because the British have a longer tradition and a sense of leadership in the field, while growing modern hybrids in the United States is a recent activity which began on the East Coast where ties to British growers were natural. However, Pacific Coast gardeners have been importing bulbs from Australia and New Zealand for some years, and there is a small but regular traffic across the Pacific.

There is no question of the high quality of the varieties being produced in Australia and New Zealand, and it is generally agreed that Tasmania holds the lead in breeding pinks. The problems which have tended to restrict the exchange of varieties are those of adjusting to the difference in seasons, import regulations, and ignorance of the names of dealers willing to serve American customers. These obstacles are resolved elsewhere in the Handbook, (see Chapter 2) so there are no sound reasons why American gardeners should not enjoy the creations of outstanding hybridizers half a world away.

A generation ago, no particular effort was made by hybridizers in the far reaches of

empire to register their creations with the Royal Horticultural Society, but faster transportation, which facilitated the exchange of mail and bulbs, and the selection of the Royal Horticultural Society as the International Registration Authority for daffodils, brought changes. About ten years ago, the Royal Horticultural Society undertook to list varieties long in cultivation in Australia, New Zealand, and Tasmania; to locate and eliminate duplicate or similar names; to ascertain the approximate dates of introduction; and, in general, to improve the housekeeping in the daffodil world. However, much remains to be done, and the result must be imperfect. Many facts have been lost, some raisers are indifferent to whether their introductions are registered, and varieties offered for sale or taking prizes at shows will frequently not be found in the *Classified List.*

One of the leading breeders and dealers in Australia is J. N. Hancock of Kalorama, Victoria. For American gardens, Hancock recommends the following varieties which "have distinction and perform well in the garden and which I believe will be in Australian catalogues many years hence."

1*a*. Candlelight, Cider, Dandenong, Hillston, Latrobe, Much Binding, Trawalla.

1*b*. Bessie Scott, Caramel*, Chiltern, Dederang, Hoyle, Murchison, Windsor.

1*c*. Josephine, Sunwhite.

2*a*. Adornment, Elaborate, Euroa, Golden Mantle, Kindershot, Marshall Tweedie, Sunpool.

2*b*. Brilliant Lights*, Chartwell, Harry Brown, Japaddy, Lily Ronalds, Royal Robe, Walter J. Smith.

2*c*. Apex, First Frost, Nautilus, Show Glow, White Xmas.

3*b*. Nevose, Vibella

6*a*. The Little Gentleman.

Pinks. Bon Rose* (1*b*), Rostella, Fairy's Flight, Kortright, Mabel Taylor, Longeray, Pink Pearl, Roseport, Rose Song, Tarago Pink, The Bride (all 2*b*'s).

Early Varieties. Titch* (1*a*), Wandin Glory (1*a*), Tecoma* (2a), Toorak Gold (2*a*), Vainqueur* (2*a*).

D. David Bell is a large catalog dealer and hybridizer near Christchurch, New Zealand. Among varieties of his own raising, he suggests the following:

1*b*. Outward Bound

2*a*. Dominion Monarch, Monte Bello, Red Mars, Sarcelle, Stella Maris.

2*b*. Barbara Allen, Marilyn Monroe, Masquerade, Mooncrest, Sleepy Lagoon, Vanity Fair, Witchcraft.

3*b*. Anacapri, Kindergarten.

4. Temple Bells.

E. E. W. Cotter is another catalog dealer near Christchurch who lists the introductions of all breeders. He recommends for American gardens:

1*a*. Kanga, Ohakea, Palmino;

1*b*. Leeston*, Outward Bound, Panama*.

1*c*. Lily White*, Lochin.

2*a*. Encore, Gold Script, Golden Acre, Golden Treasure*, Lucky Charm, Tangiers, Woodside*, Volcanic Action.

2*b*. Ballet Dancer, Bazaar*, Cobden*, Glentui*, Heathcote*, Little Echo, Mandrake, Merton, Satin Queen.

2*c*. Jean Anderson

3*b*. Dresden, Hampstead, Salvador.

6*a*. Richmond Gem*.

*Not registered

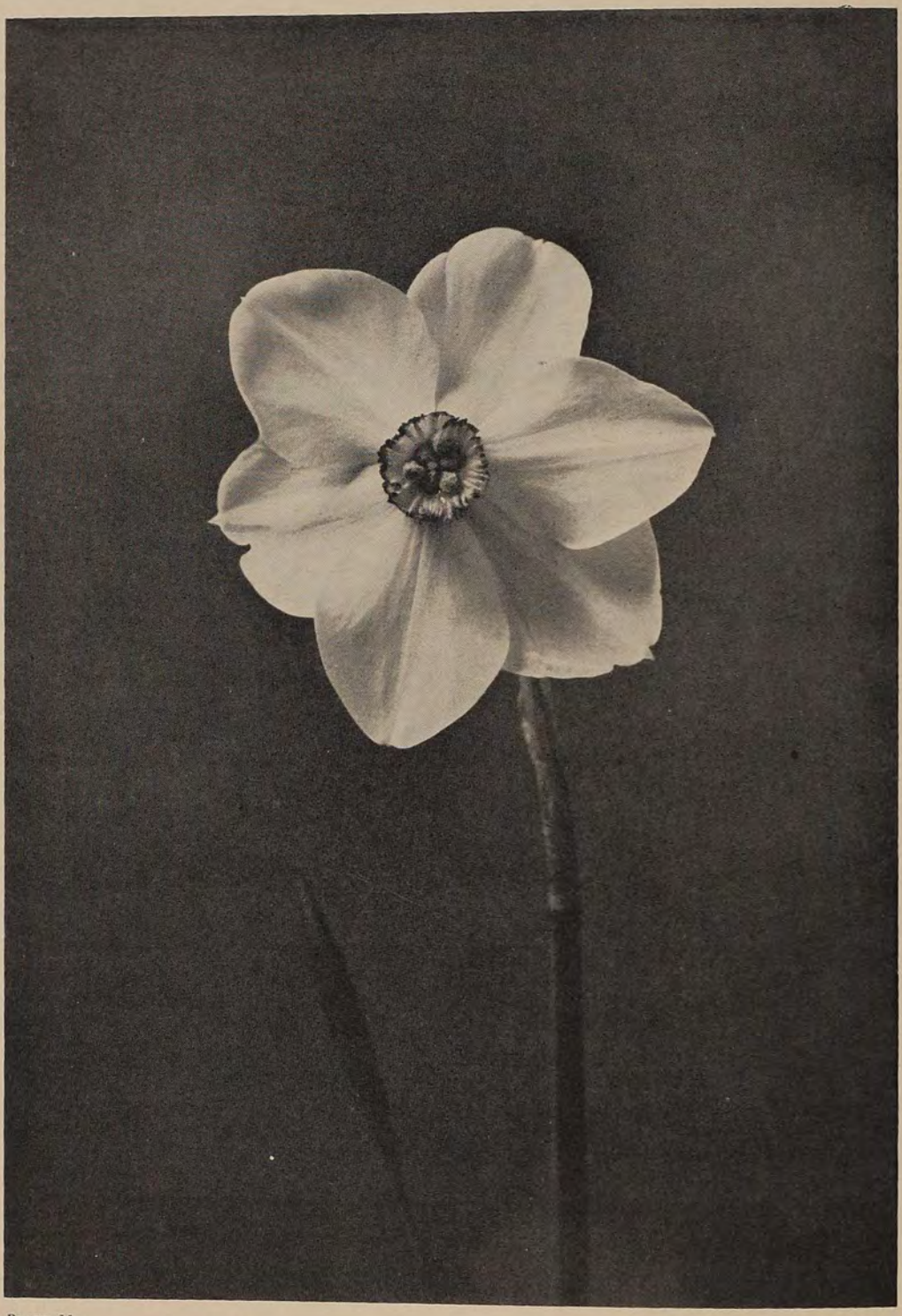


PLATE 11

ACTAEA
Poeticus Hybrid (Div. 9)

—4— Narcissus Species and Wild Hybrids

The following covers the wild species and wild hybrids. They are grouped in Div. 10 of the *Classified List and International Register of Daffodil Names* (1965).

Interest in growing *Narcissus* spans several hundred years and continues unabated to the present day. Despite the wide popularity and interest in this plant in gardens, no modern botanical treatment of the entire genus exists. Much more collecting to bring together new germ plasm for breeding purposes and to learn more about the plants in the wild is needed. With this in mind, I visited areas in Spain, Portugal, France, and Italy in 1957 in part to collect wild *Narcissus*. One of the interesting results of this trip was, for example, that *N. pseudo-narcissus* subsp. *tortuosus* was found in the wild for the first time.

In 1888 J. G. Baker published the last account to cover all of the species. In the present century, Pugsley published two fine pieces, one on *poeticus* (1915) and another on the *Ajax* subgenus (1933). Since the early 1930's Professor Abilio Fernandes of the University of Coimbra, Portugal has worked primarily on the cytology of *Narcissus* trying to interpret the relationships of the species. This fundamental work has resulted in the classification used by the Royal Horticultural Society of Great Britain and the system used throughout this Handbook.

The genus *Narcissus* of the family *Amaryllidaceae* comprises 25 species in the present listing. Some authors list 30 or more species. These plants are natives of the Mediterranean region, some extending into central Europe. *N. tazetta* reportedly extends to China and Japan. Assertions of the occurrence of *tazetta* in the Orient and the nebulous story of the origin of the Chinese Sacred Lilies need more concentrated study before acceptance.

Narcissus is of particular interest to gardeners because most of the species may be hybridized with relative ease. Allowing for polyploidy, the resulting hybrids will be at least partially fertile. It is possible to obtain an almost endless combination of characters. This possibility makes daffodil breeding a highly rewarding hobby for amateurs having no special knowledge of genetics or cytology. At one time it was believed that interfertility of the order found in *Narcissus* could not characterize genuinely distinct species. This, of course, is not the case at all. Indeed, *Narcissus* is a well-defined genus by any criterion and distinctness of species has been maintained despite the ability of most species to cross with any other member of the group.*

NARCISSUS LINNAEUS (1753)

Subgenus 1—Eunarcissus

Section I—Jonquilleae

1. *Narcissus rupicola* Duf. (1830)
(*rupicola,* inhabiting rocky places)
Low-growing with smooth, slightly channelled grasslike leaves, 5 to 6 in. long; the

*A discussion of the cultivation by the gardener of the species and wild hybrids more commonly available to him will be found in Chapter 3.

flowering scapes are usually slightly longer. Differs from *N. juncifolius* chiefly in the solitary, bright yellow, fragrant, nearly sessile flowers, about 1 in. across, opening flat. In *juncifolius* the flowers vary from one to four per scape and the pedicels are ½ to 1½ in. long; chromosome number 2n = 14.
Distribution: On rocky declivities, particularly on decomposed granite, in New Castile and Terragona, Spain, and in central and northern Portugal. Wild bulbs collected in Portugal by me have multiplied profusely, although shy to flower. Currently available from bulb specialists.

1a. var. *marvieri* Jahand. & Maire (1925)
(*marvieri,* in honor of Marvier)

A larger *rupicola* having deeper yellow flowers than *rupicola.* Also thought of as a yellow-flowered *N. watieri,* which (according to Dr. Fernandes, the Portuguese specialist on *Narcissus*) has itself evolved by chromosomatic mutation from *N. rupicola* var. *marvieri.*
Distribution: Clearings in forests of Evergreen Oak, 6000-7000 ft. el., Grand Atlas Mts., Morocco.

Grown in Great Britain occasionally since being introduced in 1936, but scarce. Said to be as hardy as *N. rupicola* itself. Has been offered by Alec Gray*.

2. *Narcissus watieri* Maire (1921)
(*watieri,* in honor of Watier).

The only white-flowered species of the Jonquilleae section; leaves about 4 in. long, channelled, grayish; scape as long as the leaves, round, erect; flowers solitary, about 1 in. in diameter with a crystalline texture; tube about 1 in. long, greenish white; perianth segments pure white, opening flat; corona very shallow, nearly flat; chromosome number 2n = 14.
Distribution: Woodlands and pastures at 6000-7000 ft. el., Grand Atlas Mts. (Mt. Yagour near Mesfiona), Morocco.

Now more common in cultivation, which, however, is not easy except in rock gardens. First introduced into British gardens about 1931. Currently offered by specialist bulb growers. *N. watieri* is thought to have evolved by chromosomatic mutation from *N. rupicola* var. *marvieri.*

3. *Narcissus atlanticus* F. C. Stern (1950)
(*atlanticus,* of the Atlantic)

Leaves 3 to 6, up to 13¼ in. long and ⅜ in. wide, gray green, channelled; scape about 3 in. long, round; flowers fragrant, 1 per scape, about 1 in. in diameter, creamy white; chromosome number 2n = 14.
Distribution: "Growing under shade of shrubs and trees in soft moist loam." (E. K. Balls) 6500 ft. el., Amiziz in Grand Atlas Mts., Morocco.

First flowered in cultivation in garden of Sir F. C. Stern, Highdown, Goring-by-Sea, Sussex, England in 1948. Has been offered by Alec Gray in England.

This recently described species, still barely known, deserves more study in view of its alleged relationships with *N. watieri* and *N. rupicola. N. atlanticus* differs from *N. watieri* by the cup-shaped corona, the taller stature of the plant, larger perianth, and the fragrant flowers. It differs from *N. rupicola* in that it has creamy white flowers, wider leaves, and a larger bulb.

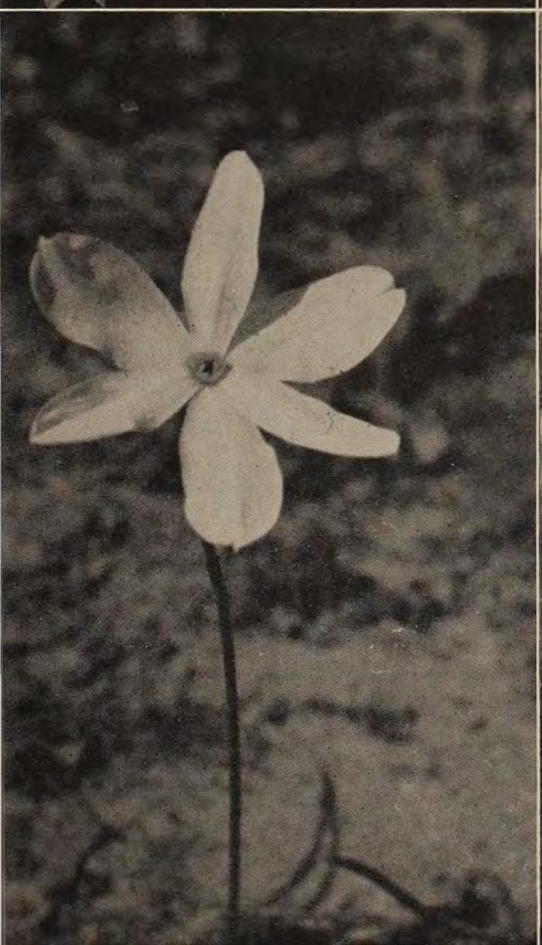
4. *Narcissus scaberulus* Henriq. (1888)
(*scaberulus,* a little rough, scurvy, scabrous)

Leaves usually in pairs, 5 to 6 in. long, lax and often prostrate, with slightly roughened margins (scabridulous); scape as long as the leaves, erect, slightly roughened;

*Of Camborne, England. Has recently sold nursery to Broadleigh Gardens. See Appendix C.

PLATE 12 IVAN N. ANDERSON

VARIOUS SPECIES
Italicus (upper left); *viridiflorus* (upper right); *serotinus* (lower left); *triandrus* var. *albus* (lower right)



flowers 1 to 2, bicolored, about ½ in. across, the tube slightly curved; perianth segments opening flat, deep yellow; corona proportionately larger than the segments and nearly orange in color; chromosome number 2n = 14.

Distribution: Restricted to acid soils in well-drained open sites, or in pine (*Pinus pinaster*) woodland in a small area of central Portugal.

Cultivated shortly after 1888, only recently has this plant become well known in cultivation. Alec Gray offered it for several years. Garden hybrids have been produced.

5. *Narcissus calcicola* Mend. (1930)
(*calcicola,* inhabiting limestone)

Related to *N. juncifolius* and *N. scaberulus*; plant 5 to 6 in. tall when in flower, twice as tall when in fruit; leaves green, erect with smooth margins as contrasted with the roughened margins and lax gray leaves of *N. scaberulus*; flowers uniformly bright yellow; chromosome number 2n = 14.

Cultivated since 1930 and has been offered by Alec Gray.

Distribution: In pockets of limestone filled with humus, Serra de Sicó, 1200 ft. el., near Ramalhaes, west of Pombal, and on the peninsula directly south of Lisbon, Portugal.

5a. var. *grandiflorus* Fernd. (1953)
(*grandiflorus,* large flowered)

Flowers larger with longer and narrower perianth segments which do not overlap.
Distribution: Occurring with the species. Serra de Sicó, Portugal.

6. *Narcissus juncifolius* Lag. (1816)
(*juncifolius,* leaves resembling *Juncus,* the rush)

Leaves 3 or 4, round or nearly so, very slender and grasslike, erect; scape 3 to 8 in. long, round; flowers uniformly bright yellow, fragrant, 2 to 6, on pedicels ½ to 1½ in. long; perianth tube about ½ in. long, the segments spreading, about ½ in. long opening flat; corona perhaps a little darker shade of yellow, about ¼ in. long; chromosome number 2n = 14.

Distribution: Meadows in parts of the Pyrenees, near Gèdres; southern France in stony soil on limestone hills near St. Rémy; mountains of Andalusia to Catalonia, Spain. Some doubt exists whether the plant is wild in Corsica and Balearic Islands.

Cultivated since 1576. The natural hybrids *N.* × *dubius* and *N.* × *magnenii* (*N. juncifolius* × *N. tazetta*) are known. See later in this chapter under the heading "Wild Species Hybrids of Narcissus."

7. *Narcissus gaditanus* Boiss. & Reut. (1842)
(*gaditanus,* of Gades, a town in Roman Spain, now Cadiz)

Leaves 5-8 in. long, twisted; flowers 4 to 5, up to ¾ in. across, bright yellow, fragrant; perianth segments not over 1/6 in. long; corona cup shaped, nearly as long as the perianth segments; chromosome number 2n = 14.

Distribution: Brushy slopes in areas rainless in summer; in the Algarve, Portugal, and southern Andalusia near Jerez, and between Cichlana and Medina-Sidonia, Spain.

Closely related to *N. juncifolius,* but differing in that it has longer, twisted leaves, more flowers per scape, curved flower tube, and pedicels of unequal length.

8. *Narcissus minutiflorus* Willk. (1860)
(*minutiflorus* refers to the small size of the flowers)

Perhaps the smallest-flowered species and closely related to *N. gaditanus*. Leaves round, rushlike, 5-8 in. long; flowers 4 to 6, uniformly bright yellow, the tube about ⅓ in. long, the pedicels ½ to ¾ in. long; perianth segments very short, about 1/6 in. long, spreading; chromosome number 2n = 14.

Distribution: Brushy slopes in areas rainless in summer; Spain and Portugal (where it occurs with *N. gaditanus*).

Differs from *N. gaditanus*: smaller in every respect and the style is much shorter than the tube. In *N. gaditanus* the style extends beyond the throat.

9. *Narcissus jonquilla* L. (1753)

Leaves 12-18 in. long, 2 to 4 per bulb, dark green, rushlike, erect, strongly channelled on the upper surface, nearly round; scapes nearly as long as the leaves; flowers 2 to 6, about 1¼ to 1¾ in. wide, bright yellow, strongly fragrant; tube round, about 1 in. long, greenish; perianth segments obovate, opening flat; corona about as long as the segments; chromosome number 2n = 14.

Distribution: River banks in stony-sandy soil where the bulbs often are buried more than one foot by river sand. Also reported to grow in mountain meadows, Portugal and Spain, and to be naturalized in suitable places in southern Europe. Collected by me in 1957 in Portugal along the Douro River at Barca d'Alva while in flower March 25; also collected along the banks of the Rio Guardiana near Serpa on April 10. Cultivated since about 1565.

The best known of the Jonquilleae section; variable with several wild varieties known in cultivation. Widely grown in the southern United States. Queen Anne's Jonquil is the double-flowered form.

9a. var. *henriquesii* Henriq. ex Samp. (1901)
(*henriquesii,* in honor of Henriques, a 19th century Portuguese botanist)

Leaves 1-2 mm. wide; perianth uniformly orange yellow; corona about ⅓ or more as long as the tepals; tepals about 1 in. long; chromosome number 2n = 14.

Distribution: Castello de Vide and Tarrão, along the Tagus River, Portugal.

Distinguished from the typical form of the species by the relatively long corona. This plant was first noticed by Prof. J. A. Henriques who sent material to the Daffodil Committee, Royal Horticultural Society, London, for the April 27th meeting of 1886. The name *N. henriquesii* Hort. was suggested in the Gardeners' Chronicle article of May 8, 1886, but this does not constitute a valid description. Sampaio later described the plant in 1901. The plant apparently is still cultivated in Europe, and two bulbs of it were received in 1965 by B. Y. Morrison from a friend in Mentone, France.

9b. var. *minor* (Haw.) Bak. (syn. *N. minor* Haw. (1831); not to be confused with *N. minor* of Linnaeus).
(*minor*, smaller or lesser)

A shorter form, with very slender leaves; flowers about ½ in. in diameter.

Distribution: Occurs with the species. Bulbs of this variety have been offered by Alec Gray, but the authenticity of material grown under this name is questionable.

9c. var. *stellaris* Baker (1888)
(*stellaris* alludes to the starlike shape of the flowers)

Perianth segments narrower than in the species and reflexed; corona distinctly 6-lobed.
Distribution: Occurs with the species.

10. *Narcissus fernandesii* Pedro (1948)
(*fernandesii,* named for Professor Abilio Fernandes, of Portugal, well-known authority on *Narcissus*)

Allied to *N. juncifolius, N. gaditanus,* and *N. jonquilloides.* Leaves 2 to 3, erect or recurved, longer than the scape, grasslike, semiround with faint veins; scape round, about 4 in. long; flowers yellow, the pedicels unequal, the longest exceeding the flower tube; perianth segments about 3/8 in. long, obovate, ultimately a little reflexed, and overlapping; corona wavy margined, cup shaped, about half as long as the lobes.

Distribution: Grassy margins of ditches in sandy soil; Portugal, banks of the Tagus River near Zamora Correia. February—March. Has been introduced into cultivation.

Differs from *N. juncifolius,* having obsoletely veined leaves longer than the scape, a scape hollow above, a long-acuminate spathe, a lightly incurved perianth tube, and uniform color of the corona. It differs from *N. gaditanus,* having somewhat broader leaves, a less incurved perianth tube, and a shorter corona; from *N. jonquilla,* having a shorter and lightly incurved tube, distinctly overlapping lobes, and a longer corona; and from *N. jonquilloides,* having pedicels which before flowering are shorter than the spathe, and the lightly incurved perianth tube, the longer lobes, and the somewhat shorter corona.

PLATE 13 B. Y. MORRISON

JONQUIL SPECIES
1. *fernandesii* 2. *calcicola* 3. *scaberulus* 4. *rupicola*

PLATE 14 B. Y. MORRISON

BULBOCODIUM AND RELATED SPECIES

1. *bulbocodium* subsp. *albidus* var. *zaianicus f. lutescens* 2. *b.* subsp. *romieuxii* 3. *cantabricus* 4. *b.* subsp. *tananicus* 5. *b.* subsp. *praecox* 6. *b.* PI 239061 7. *b.* subsp. *obesus*

11. *Narcissus jonquilloides* Willk. (1860)
(*jonquilloides,* jonquilla-like)

Differs from *jonquilla,* having a smaller bulb, narrower leaves shorter than the scape, pedicels longer than the spathe, and smaller flowers; perianth tube ½ in. long; flowers about ¾ in. in diameter; corona more than half as long as the perianth segments; chromosome number 2n = 21.

Distribution: Marshy ground in Portugal, between Monchique and Lagos in the Algarve also in Spain along river courses between Seville and Cadiz, Spain. January—February.

The relatively long corona (nearly as long as the perianth segments) is an important distinguishing aspect of this plant.

Sometimes considered a variety of *N. jonquilla.* Professor Fernandes considered *jonquilloides* to be of hybrid origin between *N. jonquilla,* a naturally occurring tetraploid species, and *N. gaditanus,* a diploid. However, *jonquilloides* does not appear to be in any way a simple triploid derived from this parentage. Has been offered by Alec Gray.

12. *Narcissus viridiflorus* Schousboë (1800) Rush Daffodil
(*viridiflorus,* from *viridis* for the green-colored flowers)

Leaves 1 to several, nearly round, rushlike, up to 24 in. long, produced after the flowers; scapes 12 to 18 in. long, before the leaves, nearly round; flowers 2 to 4, dull green, fragrant; tube round, about ½ in. long, green; perianth segments strongly reflexed, recurved at the tip, resembling a crochet hook; corona insignificant, green, 6-lobed; chromosome number 2n = 28.

Distribution: Open sandy places and open slopes, Spain, in the vicinity of Gibraltar; Morocco, along the coast. November.

Distinct species from all others in the Jonquilleae section flowering in autumn with green flowers. Known in England since the days of Parkinson and figured in his *Paradisi in Sole* (1629), and probably cultivated since that time. Offered recently by Alec Gray.

Hybrids between *N. serotinus* and *N. viridiflorus* were found near Gibraltar in 1883 by G. Maw, and in 1886 more abundantly six miles from Tangier where the two species intermix.

Section II—Ganymedes

13. *Narcissus triandrus* L. (1753) Angel's Tears
(*triandrus,* with three stamens)

Name coined by Linnaeus whose faulty observations overlooked the three stamens of the lower row, which sometimes remain hidden in the lower part of the tube.

Leaves 6-8 in. long, very slender, semiround, 2 to 4, channelled; scapes 6 to 12 in. long, 1-4 or 5-flowered flowers usually cernuous (drooping), uniformly creamy white the tube round, ½ to ¾ in. long; perianth segments reflexed; corona cup-shaped, truncate at the throat; chromosome number 2n = 14.

Distribution: Open grassy slopes and pine woods, on granite boulders, often in acid soils. Flowers in March and April. Occurs widely over the Iberian Peninsula, except in the southwestern part of Portugal and southwestern Spain. Common to granitic hills of northern Portugal near Coimbra and Oporto. A relic station for the plant (var. *loiseleurii*) exists on one of the islands of Glénan off the south coast of Brittany. An extremely variable species, with variants distinguished chiefly by the color and size of the flowers. Used as a parent of hybrids in cultivation mostly through the var. *loiseleurii.* Cultivated since 1579.

The following botanical varieties are recognized:

13a. var. *albus* (Haw) Bak. (syn. *Ganymedes albus* Haw. (1831))
(*albus,* white for the flowers)

Should be regarded as the typical form of the plant among the wild variants. Probably form described by Linnaeus with uniformly creamy-white flowers.

13b. var. *cernuus* (Salisb.) Bak. (syn. *Ganymedes cernuus* Salisb. (1812))
(*cernuus,* pendant, hanging)

Flowers bicolor, the corona deeper yellow than the perianth segments; perianth tube relatively long, up to about ¾ in. long; corona up to ¾ in. wide.

PLATE 15 DONALD F. MERRETT

SPECIES *asturiensis*

Distribution: Widespread in Portugal and Spain. Found by the author on moss-covered granite boulders along the main road west of León in northwestern Spain and near Madrid; introduced to English gardens in 1777 from Oporto, Portugal.

13c. var. *concolor* (Haw.) Bak. Yellow-flowered Angel's Tears. (syn. *Ganymedes concol*or Haw. (1831))
(*concolor* for the uniformly lemon-yellow color of flowers)

Plant short, 3 to 4 in. tall (shorter than in var. *albus*); flowers uniformly lemon yellow; perianth tube relatively short, about ½ in. long; corona about ¼ in. wide; styles of three lengths (trimorphic). Thought of by Prof. Fernandes as probably the ancestral form from which all other present day forms of *triandrus* have arisen.
Distribution: Widespread in Portugal and found by me on steep rocky slopes above the Mondego River near Coimbra; said to occur in the south and center of the Iberian Peninsula. Apparently known to Parkinson (1629) and probably cultivated since that period.

13d. var. *loiseleurii* Rouy (1908)
(*loiseleurii*, to honor Loiseleur, a Frenchman)

Flowers the largest of the wild varieties, half again to twice the size of var. *albus*, white or uniformly pale sulphur yellow; perianth tube up to ¾ in. long; corona about ¾ in. wide and nearly 1 in. long, nearly as long as the perianth segments; styles of two lengths (dimorphic).
Distribution: Found only in the Isles of Glénan, off the southwestern coast of Brittany, where it grows on short grassy patches constantly bathed by sea mist, and where frost is rare.

Less hardy than all other forms of *triandrus*. Introduced early in 19th century. Widely used in garden hybrids.

13e. var. *pulchellus* (Salisb.) Bak. (syn. *Ganymedes pulchellus* Salisb. (1812))
(*pulchellus*, derived from *pulcher* meaning beautiful, handsome)

The only form of the species with a creamy-white cup and yellow perianth segments.
Distribution: The literature distinctly lacks any reference to truly wild plants of this variety. Known in cultivation since Parkinson's time (1629).

PLATE 16 LONGWOOD GARDENS, G. HAMPFLER

SPECIES *bulbocodium*
from a bog near Coimbra, Portugal; flowers deep orange yellow

Section III—Serotini

14. *Narcissus serotinus* L. (1753)
(*serotinus* from *sero,* late in reference to flowering of this plant in autumn)

Leaves 6 to 9 in. long, grasslike, deeply channelled, usually only one or absent, often leaves are not present on flowering bulbs; scapes resembling the leaves, about the same length; flowers solitary (rarely 2 or 3), about ¾ in. wide, fragrant; tube nearly round, greenish; perianth segments white; corona nearly rudimentary, lobed, yellow; chromosome number 2n = 30.

Distribution: Open rocky slopes in areas with rainless summers near the sea around the perimeter of the Mediterranean basin from Portugal and North Africa to Italy, Greece, Lebanon, and Israel. *N. serotinus* and *N. tazetta* are the most widely distributed species of the genus. September—October.

Although known to Clusius in 1576, *N. serotinus* has never attained wide attention in cultivation owing to the difficulty of cultivating in northern gardens.

Section IV—Hermione

15. *Narcissus elegans* (Haw.) Spach (syn. *Hermione elegans* Haw. (1831))
(*elegans,* choice, fine, elegant)

Leaves 1 to 4, semiround, 4 to 6 in. long; flowers 2 to 6, pure white; pedicels erect, the tube greenish white, ½ to ⅝ in. long; perianth segments spreading, acute, ½ in. long; corona saucer shaped; chromosome number 2n = 20.

Distribution: Morocco along the coast to Libya and Italy, Corsica, Sardinia, and Sicily. September—October.

N. serotinus and *N. elegans* are closely related and may be distinguished as follows:

Elegans	*Serotinus*
1. Leaves 2 or more, flat, before the flowers.	1. Leaf 1, round, with the flowers more often absent.
2. Corona generally conical and entire.	2. Corona 3-6 lobed.

In 1576 Clusius illustrated *N. elegans* in his *History of Spanish Plants,* and in the *Theatrum Florae* (1638). Difficult to cultivate in moist climates, because it requires a long rest period over a rainless summer and a mild moist winter, typical of the Mediterranean.

16. *Narcissus tazetta* L. (1753) Polyanthus Narcissus*

Leaves 4-6, flattish, bluntly keeled on the back, ½ to ⅝ in. wide; scapes 12-18 in. long, compressed; flowers 4 to 8, strongly fragrant; tube round, ¾ in. long, greenish; perianth segments white, obovate; corona 1 to 1¼ in. across, cup shaped, 1/6 in. long, with an entire margin, lemon yellow; chromosome number $2n = 22$.

Distribution: Along streams and moist meadows near coast, Iberian Peninsula, Canary Islands, North Africa to Libya, southern France, Italy, Corsica, Sardinia, Balearic Islands, Sicily, Greece; coastal areas of Syria, Lebanon, and Israel; and island of Cyprus. China and Japan also are included in the distribution of this plant, according to some authors.

Next to the trumpet daffodil (*N. pseudo-narcissus*), *N. tazetta* is the most widely known species of the genus. By 1800 between 200-300 cultivars were offered by the Dutch growers. Still widely grown today, especially *papyraceus* the Paper White. *N. tazetta* is cultivated extensively outdoors in the milder parts of this country, especially in the Deep South and California. The Poetaz *narcissus* are hybrids of *N. tazetta* × *N. poeticus*.

Tazetta is characterized by earliness of growth which usually begins in late autumn or early winter, depending upon the area. Flowering usually occurs from the end of December into February or later in areas where the plants grow wild. Cultivated since 1557.

The wild varieties recognized by the *Classified List* (1965) are distinguished mostly by the color and size of the flowers, but the taxonomy is very imperfect and the plant definitely needs more study based on wild plants.

16a. subsp. *aureus* (Lois.) Bak. (syn. *N. aureus* Lois. (1827))
(*aureus,* yellow for the flower of this color)

Flowers 10 to 12, 1 to 1½ in. across; perianth segments ovate; corona entire, about ⅓ as long as the segments, entire, deep orange yellow. Earlier authors suggested that the well-known garden plant Soleil d'Or is a form of this variety.

Distribution: Occurs with the species.

16b. subsp. *bertolonii* (Jord.) Bak. (syn. *N. bertolonii* Parl. (1848))
(*bertolonii,* in honor of Bertoloni)

Closely related to subsp. *aureus* but with oblong acute perianth segments and the flowers uniformly bright yellow.

Distribution: Italy and on rocky hillsides near Algiers in North Africa.

16c. var. *canariensis* (Herb.) Bak. (syn. *N. canariensis* Herb. (1837))
(*canariensis,* from the Canary Islands)

Distinct variety with flowers about ½ in. in diameter, the tube about ¾ to 1 in. long, white throughout; perianth segments acute.

Distribution: Canary Islands. Not so attractive as some other varieties and rarely grown.

16d. subsp. *corcyrensis* (Herb.) Bak. (syn. *N. corcyrensis* Herb. (1837))
(*corcyrensis,* the Latinized form of Corfu)

Flowers the same color as *tazetta* but more star-shaped with narrower acute reflexed perianth segments and lobed coronas.

Distribution: Island of Corfu.

16e. subsp. *cupularis* (Salisb.) Bak. (syn. *Hermione cupularis* Salisb. (1812))
(*cupularis,* with the shape of a cupola)

Close to subsp. *aureus* but the corona and the segments lemon yellow. Salisbury in 1812, under the epithet *H. cupularis,* calls it the Soleil d'Or of Dutch florists.

Distribution: Locality undesignated.

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*A further discussion of the tazettas appears in Chapter 12.

PLATE 17 F. G. MEYER

SPECIES *pseudo-narcissus* SUBSP. *tortuosus*
(above) its home in the wild is grassy hillsides in the foothills of the Picos de Europa, Santander Province, northwestern Spain; (below) a close-up as it grows in the wild.

PLATE 18 F. G. MEYER

16f. subsp. *gussonei* Rouy (syn. *N. gussonei* Rouy (1912))
(*gussonei,* in honor of Gussone)

Related to subsp. *italicus;* perianth segments dull white, subequal, obliquely twisted; corona widely flaring, yellow, irregularly 3-lobed and wavy.

Distribution: Borders of fields near Mentone along the French Riviera and adjacent Italy.

16g. subsp. *italicus* (Sims) Bak. (syn. *N. italicus* Sims (1809))
(*italicus,* from Italy)

Flowers often 10 to 12; perianth segments nearly white, suggesting yellow, acute; corona lemon yellow, often distinctly 6-lobed.

Distribution: Italy. Known to naturalize freely in gardens on the French Riviera.

16h. subsp. *lacticolor* (Haw.) Bak. (syn. *Hermione lacticolor* (1831))
(*lacticolor,* combining form of *lac,* milk)

A plant with white perianth segments and a yellow corona, and closely allied to the typical form of *tazetta* itself.

Distribution: Unspecified but presumably with the species.

16i. subsp. *ochroleucus* (Lois.) Bak. (syn. *N. ochroleucus* Lois. (1806))
(*ochroleucus,* from the Greek *ochra* yellow earth and *leucos* white)

Flowers 1 to 1¼ in. across; perianth segments white; corona lemon yellow, the throat erect, entire. Perhaps the same as the plant called *N. orientalis* which no longer can be upheld as a valid name.

Distribution: Unspecified but presumably with the species.

16j. subsp. *pachybolbus* (Dur.) Bak. (syn. *N. pachybolbus* Dur. (1846))
(*pachybolbus,* from the Greek *pachy* thick and *bolba* bulb)

Bulbs very large, 2 in. or more in diameter; scapes 5-8 flowered, the flowers about ¾ in. wide; perianth segments obtuse, white; corona white.

Distribution: Oran, in Algeria.

16k. subsp. *panizzianus* (Parl.) Bak. (syn. *N. panizzianus* Parl. (1848))
(*panizzianus,* in honor of Panizzi)

Plant slender and relatively smaller than in subsp. *papyraceus;* flowers 4 to 6, about 4/5 in. wide; perianth segments acute, white; corona white, about half as long as the perianth segments.

Distribution: Collected originally near San Remo along the Italian Riviera.

16l. subsp. *papyraceus* (Ker-Gawl.) Bak. Paper White. (syn. *N. papyraceus* Ker-Gawl. (1806))
(*papyraceus,* after *papyrus* for the papery white nature of the flower)

Flowers often more than 8, about 1½ in. wide, strongly fragrant; perianth segments oblong, acute, white; corona white.

Distribution: Said to be naturalized in Portugal, Spain and through the French Riviera into Italy and interspersed with the smaller-flowered wild forms growing in these areas.

An old garden plant that should be treated as a cultivar and for this reason is reluctantly listed here. It may have been brought in from the wild originally. Cultivated in Italy for centuries, it is today the most widely known form of *tazetta,* especially for forcing. Distinguished by the perianth segments which are longer, as compared to the cup, than in all other known forms of *tazetta* except subsp. *italicus* and subsp. *bertolonii,* both of which may have been derived from the Paper White. The Paper White is well-known for the very strong fragrance considered by some to be sickly as compared to some other forms. The double form, called Double Roman, has been long grown in Italy.

16m. subsp. *patulus* (Lois.) Bak. (syn. *N. patulus* Lois. (1806))
(*patulus,* spreading, in relation to the flower)
Smaller and more slender than other forms of the species; flowers about 1 in. across; perianth segments white; corona lemon yellow.
Distribution: Range unknown, perhaps of garden origin.

16n. subsp. *polyanthos* (Lois.) Bak. (syn. *N. polyanthos* Lois. (1806))
(*polyanthos,* from Greek *poly,* many and *anthos,* flower)
Flowers 10-20 up to 1½ in. across, uniformly white; corona faintly tinged at first with sulphur yellow then white.
Distribution: Gibraltar and Malaga, Spain; and Portugal near Lisbon and the Algarve. In this region it grows with subsp. *papyraceus* which has smaller flowers.

16o. var. *chinensis* Roem.
In the *Flora of Japan,* J. Ohwi (English edition, 1965) lists this variety as a doubtfully naturalized plant in Japan. Described as a bicolor with white perianth segments and a yellow corona about ⅜ in. across.
Distribution: Naturalized (?) along seashores of Honshu (Kanto Distr.) and westward, Kyushu; presumably also in China, but truly wild plants in either Japan or China have not been adequately documented.
Single-and double-flowered forms of the Japanese plant, long cultivated in Japan, were formerly imported into Europe.

17. *Narcissus broussonetii* Lagasca (1816)
(*broussonetii,* to honor the French botanist Pierre Marie Auguste Broussonet, 1761-1801)
Leaves 4, linear, about 12 in. long; scapes as long as the leaves; flowers white, 4 to 8; tube about ¾ in. long, greenish below; perianth segments oblong, obtuse, ½ in. long; corona rudimentary; stamens exserted from the perianth tube; chromosome number 2n = 22.
Distribution: Mogador, a seacoast town, ca. 100 mi. west of Marrakech, Morocco. October.
Autumn-flowering species allied to *N. tazetta* but distinct by the almost complete absence of a corona and the strongly exserted stamens. Bowles states that the large white flowers with conspicuous yellow anthers look more like those of a small *Cooperia* (a *Narcissus* relative) than those of a *Narcissus.* Rarely grown except as a curiosity, partly on account of its tenderness and because it is not particularly handsome.

18. *Narcissus poeticus* L. (1753) Poet's Narcissus
(*poeticus,* narcissus of the poets)
Widespread from Spain across middle Europe to Greece, with much variability. Has contributed to the development of two major garden groups of narcissus, the *incomparabilis* (Divs. 2 and 3 by current *Classified List*) and the Poetaz covered by Div. 8 of the modern classification. The pink daffodils of modern origin involve the corona color of *poeticus.* The typical plant is characterized as follows:
Leaves about 4, flat, 12-18 in. long, ¼ to ⅓ in. wide; scape 12 in. or more long, compressed and two-edged; flowers 1 or 2, 1¾ to 2¾ in. across, horizontal or ascending, fragrant; tube round, white, 1 in. long; perianth segments spreading, white, yellowish at base; crown flat and disclike, about ⅝ in. wide, strongly wavy, with a bright scarlet edge; chromosome number 2n = 14.
Distribution: Moist meadows from near sea level, southern France to high mountains of central Europe, the Pyrenees, the Swiss alps, and the Balkan mountains south to Greece. Wild varieties as follows:
A. Poeticus Group. *Stamens unequal; perianth segments usually shortly narrowed and imbricate below; corona flat and discoid at maturity.*

18a. var. *hellenicus* (Pugsl.) Fernd. (1915)
(*hellenicus,* of Greece)
Plants large and robust, 12-18 in. tall; flowers 1½ to 1¾ in. across, at first opening round, later the perianth segments reflexed.
Distinguished by robust habit and relatively small flowers.

PLATE 19 F. G. MEYER

SPECIES *rupicola*

(above) Bulbs from wild growing in pot; (below) its home in the wild is the rocky hills of northern Portugal.

PLATE 20 F. G. MEYER

PLATE 21 F. G. MEYER

SPECIES *triandrus* VAR. *cernuus*
Growing in wild in pine woods of Orense Province, northwestern Spain.

Distribution: Greece, Mt. Pindus in northern Thrace. May—June.

18b. var. *majalis* (Curtis) Fernd. (syn. *N. majalis* Curtis (1793))
(*majalis,* refers to the large flowers)

A large robust phase, often 15 in. tall at flowering time, large flowers, often 2 in. across.
Distribution: The common phase of the species in southern France. Seen by me near Aix-en-Provence and at Levans above Mentone on the French Riviera.

18c. var. *recurvus* (Haw.) Fernd. Pheasant's Eye. (syn. *N. recurvus* Haw. (1831))
(*recurvus,* for the perianth segments which turn back)

Plants 12 to 18 in. long; flowers 2¼ to 2½ in. wide, very symmetrical; perianth segments recurved with inflexed margins; corona with a wavy-margined cup, green in middle then chrome yellow with a broad deep red rim.
Distribution: Switzerland, 4000-6000 ft. el. in the Valais.

18d. var. *verbanensis* Herb. (1837)
(*verbanensis,* from Verbania, a classic locality of northern Italy)

Flowers 1 to 1½ in. across, smaller than in var. *majalis,* leaves about 1 ft. long. A low-growing, small-flowered phase of the species.

Distribution: Restricted to the Italian Lake district. Abundant in rocky meadows and open woods on mountain slopes above Lake Maggiore, near Pallanza. May.

B. RADIIFLORUS GROUP. *Stamens subequal; perianth segments usually cuneately-narrowed below; corona small, cup shaped.*

18e. subsp. *radiiflorus* (Salisb.) Bak. (syn. *N. radiiflorus* Salisb. (1796))
(*radiiflorus,* from *radi* provided with rays or spokes and *florus,* flower)

Scape 12 to 16 in. tall; flowers 2¼ to 2¾ in. wide; perianth segments radiate and starlike, not imbricate, oblanceolate, spreading, greenish white; corona cup shaped, about ⅓ in. wide, bright yellow, edged red.

Distribution: Switzerland, Austria, and northern Yugoslavia.

18f. var. *exertus* Haw. (1831)
(*exertus,* thrust forth, projecting, for the exserted stamens)

Flowers 2 to 2½ in. wide; perianth segments imbricate below, often twisted, spreading or recurved, snow white tinged yellow at base; corona flat and discoid; stamens exserted.

Distribution: Switzerland.

18g. var. *poetarum* Burb. & Bak. (1875)
(*poetarum,* resembling *poeticus*)

Phase with larger flowers than *poeticus* with imbricate perianth segments; corona red throughout.

Distribution: Not known in the wild, but has contributed as a source of red color in some present-day garden hybrids.

18h. var. *stellaris* (Haw.) Fernd. (syn. *N. stellaris* Haw. (1831))
(*stellaris,* for the star-shaped flowers)

Flowers starlike, about 2½ in. in diameter. Allied to subsp. *radiiflorus* but the corona 2/5 in. wide, cup shaped, yellow with a narrow white zone within the narrow scarlet rim.

Distribution: Mountainous regions of Austria from the Tyrol to Transylvania.

SUBGENUS 2—AJAX

19. *Narcissus asturiensis* (Jard.) Pugsley Asturian Daffodil. (syn. *Ajax asturiensis* Jord. (1903); *N. minimus* of hort. not *N. minimus* of Haworth)
(*asturiensis,* from Asturias province and former kingdom in n.w. Spain)

Smallest of the trumpet daffodils, 3-7 in. tall; leaves 2-4 in. long, shorter than the scapes; flowers 1, about 1 in. long, inclined or drooping, uniformly soft yellow throughout or nearly so and very slightly scented; corona inflated at base, contracted about the middle, then rather abruptly spreading at the margin; stamens attached close to base of the flower tube; chromosome number $2n = 14$ or 15.

Distribution:Grassy slopes and open woodland; Spain from Asturias to Castile and Portugal in the central mountains. Seen growing by me in the thousands in Asturias along the mountain roads from Santandar near the summit of Puerto de San Gloria, 4827 ft. el. In Portugal, the plant is abundant in the Serra da Estrella and on mountain slopes near Bragança, in the northern part of the country.

N. asturiensis is often confused with *N. minor,* from which it clearly differs, having a constricted corona and basal insertion of the stamens. Cytologically *asturiensis* is also distinct. A species not well documented until Jordan pinned it down, although illustrated first in Besler's *Hortus Eystettensis* (1613).

19a. var. *brevicoronatus* Pugsley (1933)
(*brevicoronatus,* with a short corona)

Usually differs from the species in that it may have only 2 leaves and a slenderer scape; flowers ½ to ¾ in. long, the tube longer than in the plant usually grown; corona with the margin less lobed and more serrate.

Distribution: Found with the species.

19b. var. *lagoi* (Merino) Fernd. (syn. *N. lagoi* Merino (1909))
(*lagoi,* perhaps with reference to Lugo on the banks of the Minho in Galicia)

A large growing form of the species with scapes 16 to 20 in. tall, as compared with 3 to 7 in. for the species itself. Although originally described as *N. lagoi*, the relationship is clearly with *N. asturiensis*.
Distribution: Galicia in northwestern Spain.

20. *Narcissus cyclamineus* DC. (1816)
(*cyclamineus*, in reference to the poised cyclamen-like aspect of the flowers)
Bulbs small, round, about ½ in. wide; leaves up to 8 in. long, about 3/16 in. wide; scapes about 6 in. long, sometimes taller, erect, nearly round; flowers drooping, 1 to 1¾ in. long from edge of corona to tip of perianth segments, uniformly deep yellow, unscented; perianth segments linear-oblong, about ¾ in. long, strongly reflexed upwards over the capsule; corona as long as the perianth segments, the margin irregularly notched; chromosome number 2n = 14.
Distribution: Portugal near Oporto, and northwestern Spain (Galicia) near Coruña and Pontevedra. Now extremely rare in nature due to thoughtless digging by bulb hunters.

PLATE 22 F. G. MEYER

SPECIES *poeticus* SUBSP. *poeticus* VAR. *majalis*
Growing in natural habitat near St. Cannat, Aix-en-Provence in southern France.

A highly distinct and local species. Of interest is the following quotation from Pugsley (*Jour. Roy. Hort. Soc.* p. 37, 1933); "Its [*N. cyclamineus*] rediscovery in 1885, by Messrs. Tait and Schmitz after being lost to cultivation for about 250 years . . . [is remarkable] it is so well figured by Vallet in *Jardin du Roi Henry IV* (1608) and in the *Theatrum Florae* (1633) that its identity cannot be questioned." The species was formally described by De Candolle in 1816 in Redouté's *Liliaceae* based on the plant figured in 1633.
N. cyclamineus has been cultivated for certainty only since its rediscovery in 1885; recently it has contributed to fine garden hybrids, such as Beryl, Charity May, Cyclataz, February Gold, Peeping Tom, and a host of others.

21. *Narcissus minor* L. (1762)
(*minor*, smaller, lesser) Known in gardens as *N. nanus*.
Plant 6 to 8 in. tall; leaves 3 to 4 in. long, about ¼ in. wide; flowers up to 1¼ in.

long, horizontal or nodding, faintly scented; tube about ½ in. long; perianth segments ovate-lanceolate, acute, wavy, erect to spreading, uniformly yellow; corona 6-lobed, the lobes incised, overlapping and transversely roughened; chromosome number 2n = 14 or 15.

Distribution: Although represented in the herbarium of Linnaeus, nothing exactly like the plant he described has since turned up in the wild.

Of questionable standing as a wild plant, although distinct as a horticultural subject. Usually kept separate as a species closely related to *N. asturiensis,* and the ordinary trumpet daffodil, *N. pseudo-narcissus.* Cultivated in European gardens since about 1600.

In the classification by Prof. Fernandes and in the *Classified List* (1965) four variants of *minor* are listed, namely vars. *pumilus, conspicuus, parviflorus,* and *provincialis,* all of garden origin.

22. *Narcissus pseudo-narcissus* L. (1753) The name daffodil was originally applied to this species.

(*pseudo-narcissus,* from pseudo, false or bastard narcissus); name selected by Linnaeus to distinguish the daffodil from other plants so-called by the ancients, some not narcissus at all.

The wild daffodil is still abundant in many parts of western Europe and throughout its distribution shows a remarkable degree of variability. A generalized description of the wild plant follows:

Bulbs 1 to 1¼ in. long, nearly round; leaves erect, up to 14 in. long, glaucous, usually somewhat channelled, up to about ½ in. long, obtuse; scapes as long as the leaves in flower, elongate after flowering, 2-edged; flowers drooping to nearly horizontal up to 2½ in. long in var. *tortuosus* or half this long in the variety of the species known as the Lent Lily common in English cemeteries, uniformly sulphur yellow or cream colored or bicolored with the perianth segments darker yellow than the lighter perianth tube; corona straight, without distinct lobes but irregularly cut and dentate; chromosome number 2n = 14.

Distribution: A plant of meadows and fields, France, Portugal, and Spain. Some authorities include England where it has naturalized.

Trumpet daffodils in the wild are divided into two principal groups: (1) those with uniformly yellow, small flowers produced on a small plant with small bulbs, typified by the Lent Lily of northern France and England, and (2) those with bicolored flowers, produced on a larger, more robust plant with larger bulbs and broader leaves, typified by subsp. *nobilis* of Spain.

Subspecies and varieties of *pseudo-narcissus* listed in the *Classified List* are:

22a. subsp. *abscissus* (Schultes f.) Pugsl. (syn. *N. abscissus* Schultes f. (1830))

(*abscissus,* to tear off, for the abrupt straight edge of the corona, called "clipt-trunk" by Parkinson)

Flowers bicolor, the perianth segments pale or sulphur yellow, the perianth tube orange yellow, the corona golden yellow.

Distribution: Pyrenees.

Known in English gardens of the 17th century and figured by Parkinson (1629), formerly common but now rare.

22b. var. *graciliflorus* Pugsl. (1933)

(*graciliflorus,* from *gracilis,* for the narrow flowers)

Flowers drooping, up to 2 in. long; perianth segments narrow; corona narrow with suberect subtruncate margin.

Distribution: Gavarnie in the French Pyrenees.

A narrow-flowered variety of subsp. *abscissus.*

22c. var. *serotinus* (Jord.) Pugsl. (syn. *Ajax serotinus* Jordan (1903))

(*serotinus,* late)

Scape much shorter than the leaves; perianth segments wavy, spreading. Flowers later than the type.

Distribution: Gèdres, in the French Pyrenees.

22d. var. *tubulosus* (Jord.) Pugsl. (syn. *Ajax tubulosus* Jord. (1903))
(*tubulosus,* formed like a pipe, tubular)

Perianth tube very short, only ¼ in. long; perianth segments narrowly lanceolate, acute, conspicuously exceeding the narrow, slightly lobed and wavy corona.
Distribution: Gèdres, in the French Pyrenees.

22e. subsp. *albescens* (Pugsl.) Fernd. (syn. *N. albescens* Pugls. (1933))
(*albescens,* to become white, whitish)

Not known in the wild, according to Pugsley (1933). Sulphur-white flowered phase, closely allied to subsp. *moschatus.*

22f. subsp. *alpestris* (Pugsl.) Fernd. (syn. *N. alpestris* Pugsl. (1933))
(*alpestris,* of the mountains)

Leaves up to about 6 in. long, rarely 10 in., glaucous; scapes as long as the leaves; flowers drooping or inverted, 1½ to 1¾ in. long, pure white, except the bright green stripes or suffusion on the perianth tube, almost odorless.
Distribution: Known only from the Central Spanish Pyrenees at about 7000 ft. el.
Closely related to subsp. *moschatus* but differs in its lower and more slender habit, narrower and more channelled leaves, white flowers with a more truncate corona and broader, more triangular capsules. Not easily maintained in cultivation.

22g. subsp. *bicolor* (L.) Bak. (syn. *N. bicolor* L. (1762))
(*bicolor,* for the flowers of two colors)

Bulb large, up to about 2 in. long; plant more robust than in any of the forms of *pseudo-narcissus* except subsp. *leonensis*; leaves nearly flat and not twisted, up to ¾ in. wide; flowers bicolored; perianth segments whitish or cream colored; perianth tube yellow; corona golden yellow.
Distribution: May occur in the Pyrenees, but wild plants not known for certain.
Cultivated since about 1613.

22h. var. *lorifolius* Herb. (1837)
(*lorifolius,* for the strap-shaped leaves)

A derivative of *bicolor* and unknown in the wild.

22i. subsp. *confusus* (Pugsl.) Fernd. Spanish Daffodil. (syn. *N. confusus* Pugsl. (1933))
(*confusus,* confused)

Plant robust; leaves erect, 12 to 14 in. long, flat; scape a little shorter than the leaves; flowers uniformly yellow or nearly so; perianth segments a little twisted.
Distribution: Central Spain.
Cultivated since 1601.

22j. subsp. *gayi* (Henon) Fernd. (syn. *N. gayi* Henon (1903))
(*gayi,* after the French botanist, J. Gay)

Not known in the wild.

22k. var. *praelongus* (Jord.) Pugsl. (syn. *Ajax praelongus* Jord. (1903))
(*praelongus,* very long)

Not known in the wild. A garden form perhaps most closely allied to *gayi.*

22l. subsp. *leonensis* (Pugsl.) Fernd. (syn. *N. leonensis* Pugsl. (1933))
(*leonensis,* from León, a province in northwestern Spain)

Flowers very large, ascending, about 2¾ in. long to edge of corona, about 3 in. long to tip of perianth segments, bicolored; perianth segments cream colored, the perianth tube yellow.
Distribution: Spain, in the northern part of the province of León.
Known only from a single gathering made in 1896, it has the largest flower of any known wild daffodil. Probably not in cultivation.

22m. subsp. *longispathus* (Pugsl.) Fernd. (syn. *N. longispathus* Pugsl. (1933))
(*longispathus,* with a long spathe)

Spathes variable, sometimes up to 4 in. long, never as short as in *pseudo-narcissus*; pedicels slender, erect, 1½ to 3½ in. long.

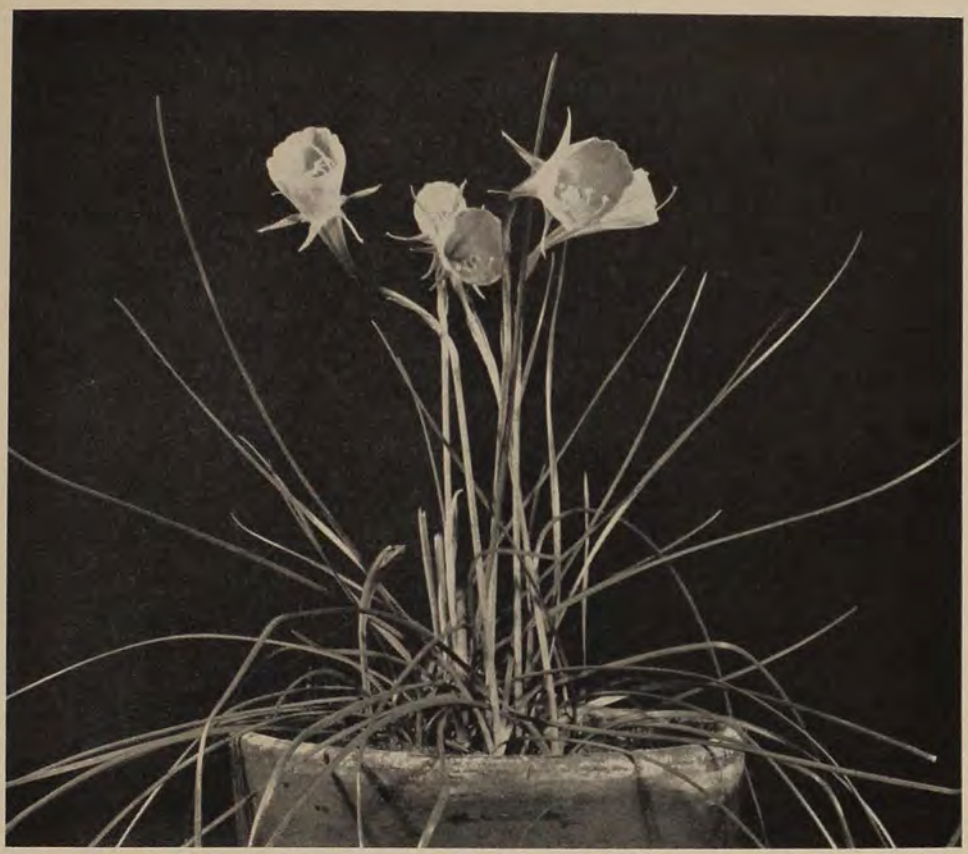

PLATE 23 F. G. MEYER

SPECIES *bulbocodium* SUBSP. *vulgaris* VAR. *citrinus*
Grown from bulbs from natural habitat in grassy slopes above the sea near San Sebastian, northeastern Spain.

Distribution: Spain, 5500 ft. el. on Sierra de Cabrilla, province of Jaén.

Distinguished from all other trumpet daffodil species of subgenus *Ajax* by the long spathes and pedicels.

The notes accompanying the figure of this plant in *Curtis's Botanical Magazine,* 170: t. 246 (1955) are interesting with respect to the size of the plant in the wild. V. H. Heywood and P. H. Davis found this plant in the middle zone of the Sierra de Cazorla in Spain where "plants were often up to 1.5 m. tall and sometimes actually rooted in water." This may be a record for height of a wild daffodil.

22n. subsp. *macrolobus* (Jord.) Fernd. (syn. *Ajax macrolobus* Jord. (1903))
(*macrolobus,* large lobed with reference to the perianth segments)

Leaves 6 to 10 in. long, glaucous, nearly flat, up to ½ in. wide; flowers cream white with a yellowish tube, with a sulphur- or lemon-yellow corona; perianth tube ½ to ¾ in. long, scarcely half as long as the corona; perianth segments larger than in typical *pseudo-narcissus,* more or less twisted; corona broadened and expanded with a spreading margin cut into shallow overlapping lobes.

Distribution: Eastern and central Pyrenees.

Differs from typical *pseudo-narcissus* in the broader foliage, more uniformly dwarf habit, usually lighter-colored flowers, much shorter perianth tube and larger perianth segments, and in the broader and more expanded corona. Flowers handsomer than *pseudo-narcissus.*

PLATE 24 F. G. MEYER

SPECIES *cyclamineus*
Grown from bulbs from wild in northern Portugal.

22o. var. *pallescens* Pugsl. (1933)
(*pallescens,* to grow pale, to lose color)

Perianth segments straw colored, with rather deeper tube and corona.

Distribution: Central Pyrenees (Mont Louis).

A color form of subsp. *macrolobus.* Has been cultivated in England.

22p. subsp. *major* (Curtis) Baker. (syn. *N. major* Curt's (1788), *N. hispanicus* Gouan of authors (1733), *N. maximus* Hort.)
(*major,* larger, greater)

Leaves somewhat spirally twisted; pedicels erect but curved above, 1 to 1¼ in. long; flowers 2 to 2⅜ in. long, deep golden yellow throughout, sweet scented; perianth segments regularly spirally twisted; corona about 1¾ in. across, obscurely lobed.

Distribution: Southwestern France, and the Pyrenees to northern Spain and Galicia, but not a well documented plant in the wild.

The plant known as *N. hispanicus* and *N. maximus* may be recognized by its erect pedicels, its deep golden-yellow large flowers, with twisted perianth segments and widely expanded corona. Grown in Europe since the latter part of the 16th century.

22q. var. *concolor* (Jord.) Pugsl. (syn. *Ajax concolor* Jord. (1903))
(*concolor,* of the same color)

Leaves not spirally twisted; pedicels about 7/8 in. long; flowers uniformly golden yellow; perianth segments shorter than the corona.

Distribution: Southern France: Le Luc (Var).

Resembles Golden Spur, differing in its slenderer flowers with the lobes of corona distinct and handsomely crenulated. Has been cultivated in England.

22r. var. *propinquus* (Salisb.) Herb. (syn. *N. propinquus* Salisb. (1796))

Leaves less twisted than in *N. major;* flowers golden yellow, the perianth tube and base of segments flushed with green; perianth segments slightly twisted.

Distribution: Southern France: Agen (Lot-et-Garonne), and near Bayonne.

Resembles Golden Spur which has larger flowers than var. *propinquus.* Cultivated since 1712 in England.

22s. var. *spurius* (Haw.) Pugsl. (syn. *Ajax spurius* Haw. (1812))
(*spurius,* illegitimate)

Smaller than the var. *propinquus,* about 12 in. tall; pedicels about 5/8 in. long; flowers golden yellow.

Distribution: Specimens closely resembling this variety are known from northwestern Spain in Asturias.

22t. subsp. *moschatus* (L.) Baker (syn. *N. moschatus* L. (1762), *N. cernuus* of gardens)
(*moschatus,* musk scented)

One of the most distinct daffodils for the handsome, drooping, white flowers with a narrow, slightly cut corona.

Distribution: Pyrenees.

Cultivated at least since the 18th century when it was grown by Linnaeus at Uppsala; perhaps the parent of some of the early white daffodils of gardens. Considerable confusion still exists in distinguishing between subsp. *alpestris, moschatus,* and *tortuosus,* all white flowered.

22u. subsp. *nevadensis* (Pugsl.) Fernd. (syn. *N. nevadensis* Pugsl. (1933))
(*nevadensis,* of the Sierra Nevada in southern Spain)

Plant low growing; leaves up to 6 in. long, about 3/16 in. wide, scape a little longer than the leaves; pedicels very long (1 in.); flowers small, about 2 1/4 in. long, yellow with a golden corona.

Distribution: In stony ground, Sierra Nevada, Spain. Discovered in 1931.

Distinct in the long pedicels which recall those of subsp. *longispathus* and in the dwarf habit and long perianth tube. May not be in cultivation, unless re-collected in recent years. The author was unsuccessful in locating the plant on his visit to the Sierra Nevada in April, 1957.

22v. subsp. *nobilis* (Schultes f.) Fernd. (syn. *N. nobilis* Schultes f.)
(*nobilis,* noble, celebrated)

Leaves 6 to 10 in. long, about 3/4 in. wide, glaucous; pedicels short, about 1/2 in. long, suberect to curved; flowers rather large yellow, with a golden-yellow corona; perianth segments spreading, twisted, a little shorter than the corona; corona with spreading margin.

Distribution: Central Pyrenees and the provinces of León and Old Castile in Spain.

Closely related to typical *pseudo-narcissus,* but a larger plant with suberect pedicels and spreading perianth segments and corona.

Figured by Parkinson (1629) as *N. variformis* and cultivated since the early 19th century.

22w. subsp. *obvallaris* (Salisb.) Fernd. Tenby Daffodil. (syn. *N. obvallaris* Salisb. (1796), *N. lobularis* Haworth (1830))

Distinct, dwarf plant, up to about 12 in. tall, with flat leaves; flowers uniformly deep golden yellow; corona distinctly 6-lobed.

Distribution: Unknown in the wild, but naturalized in England. Described from plants found at Tenby.

Offered in the trade sometimes as *N. lobularis*. Cultivated 1613.

Three varieties of *obvallaris,* namely, *concolor, toscanus,* and *maximus* are strictly garden plants.

22x. subsp. *pallidiflorus* (Pugsl.) Fernd. (syn. *N. pallidiflorus* Pugsl. (1933))
(*pallidiflorus,* for the pallid or pale flowers)

Flowers drooping or horizontal, 1¾ to 2¼ in. long, cream or straw colored with a slightly deeper-colored corona, nearly scentless; perianth segments broadly oval; corona about 1¼ in. across, 6-lobed.

Distribution: Western Pyrenees, especially near Bayonne.

Differs from subsp. *moschatus* and typical *N. pseudo-narcissus* in its broader perianth and corona and in the very short, abruptly deflexed pedicel. Known to Parkinson (1629); reintroduced into cultivation, 1882.

22y. var. *intermedius* Pugsley (1933)
(*intermedius,* intermediate)

Leaves narrower than *pseudo-narcissus;* pedicels nearly obsolete; flowers uniformly primrose yellow or nearly so; corona sometimes a little deeper yellow, not spreading.

Distribution: Central Pyrenees, (Haute-Garonne) France, and in the eastern Pyrenees. Cultivated,1889.

22z. subsp. *pisanus* (Pugsl.) Fernd. (syn. *N. pisanus* Pugsl. (1933))
(*pisanus,* from Mount Pisano (Tuscany) Italy)

Flowers uniformly clear yellow with slightly deeper-colored corona; pedicels short, about 3/16 in. long.

Distribution: Monte Pisano (Tuscany) and Lugano and other parts of northern Italy.

Allied to subsp. *major* (*N. hispanicus*) and subsp. *obvallaris* differing from both in the shorter pedicels and relatively longer perianth tube; plant shorter, with leaves not twisted and smaller lighter-colored flowers than in *major*. Introduced by Peter Barr in the 19th century.

22aa. subsp. *portensis* (Pugsl.) Fernd. (syn. *N. portensis* Pugsl. (1933))
(*portensis,* from Oporto, Portugal)

Perianth segments narrow, linear-lanceolate, acute, distinctly shorter than the corona; corona large, straight, gradually expanding toward the top, becoming somewhat funnel-shaped.

Distribution: Portugal near Oporto and Lisbon (Serra da Sintra), thence across Spain to Madrid and Galicia.

Differs from other forms of the trumpet daffodil in its narrow perianth segments and its large, funnel-shaped corona; somewhat the aspect of a Hoop Petticoat (*N. bulbocodium*).

22bb. subsp. *pseudo-narcissus*

Under *N. pseudo-narcissus* the *Classified List* names the following varieties: *festinus, humilis, insignis, montinus, platylobus,* and *porrigens*. Most of these originally proposed by Jordan in his *Icones ad Floram Europeae* (1903), constitute what might now be called cultivars. Whether they have been in cultivation is unknown.

Subgenus III—Corbularia

23. *Narcissus bulbocodium* L. (1753) Hoop Petticoat.

The ridiculous name *bulbocodium* was proposed by Linnaeus through a remark by Clusius, in his *Historia* (1601), that some believe it is Bulbocodium of Theophrastus. Actually, the genus *Bulbocodium* of the Lily Family is distinct and occurs with species of *Narcissus* in Spain and Portugal.

N. bulbocodium is an extremely variable species with a rather large number of wild variants. The following brief description typifies the species in the broad sense:

Leaves 2 or 3, nearly round and grasslike, 4 to 8 in. long, usually shorter than the scape; flowers single, ascending or horizontal, not drooping, yellow to white with pedicels about ¾ in. long, the tube as long as the corona; perianth segments small, linear, ½ to ¾ in. long, not more than ⅛ in. wide at base; corona funnel shaped, ½ to ¾ in. deep and as wide at the entire or wavy mouth; chromosome number 2n = 14, 21, 26, 28, 35, 39, 42, 49, 56.

Distribution: Southwestern France from Bordeaux to Toulouse; Portugal and Spain; Morocco and Algeria.

Called *Corbularia* by Haworth and others because the flower differed drastically from all the other species. The plant has been extensively studied by Prof. Fernandes in Portugal with the conclusion that *N. bulbocodium* is the youngest species of the genus and is now undergoing a fast rate of change in nature. Two geographic centers of diversity exist, namely the European center north of Gibraltar in Spain and Portugal and another in North Africa. Among the North African forms in Morocco and Algeria are found white-flowered plants and others which are not reliably hardy in northern gardens. The following wild variants are listed in the *Classified List* after the work of Fernandes:

23a. subsp. *albidus* (Emberger & Maire) Fernd. (1929)
(*albidus,* whitish)

Flowers whitish yellow or white with a slight greenish yellow shade; perianth segments about ⅛ in. wide at base.
Distribution: Morocco, east and west Riff (from Moulouya to Oued Laou, including the Riffian Atlas).

23b. var. *zaianicus* (Maire, Weiller & Wilczek) Fernd. (1938)

Flower white to slightly greenish yellow; perianth segments less than 1/16 in. wide, shorter than the corona.
Distribution: Zaian mountains, Morocco.

23c. subsp. *obesus* (Salisb.) Maire. (syn. *N. obesus* Salisb. (1796))
(*obesus,* fat, stout with reference to the flower shape)

Leaves spread out nearly flat over the ground; perianth segments very short; corona ½ to ¾ in. long and 1 in. wide slightly constricted around the mouth; chromosome number 2n = 26.
Distribution: Spain and Portugal.

23d. subsp. *praecox* Gatt. Weiller (1937)
(*praecox,* precocious, early)

Leaves 1-3, narrow; flowers pale yellow; stamens included.
Distribution: Maquis covered hills in acid soil on south and west exposures; Yauem, Cherrat, Nefifik, Morocco. November to January.

23e. subsp. *romieuxii* (Br.-Bl. & Maire) Maire (syn. *N. romieuxii* Br.-Bl. & Maire (1922))
(*romieux,* in honor of Romieux)

Flowers sulphur yellow; spathe whitish, papery; pedicels about ⅛ in. long; perianth segments nearly as long as the corona; anthers light yellow.
Distribution: Northern zone of central Morocco, Middle Atlas (including Mt. Tazzeka), and the Great Atlas.

23f. var. *rifanus* Emberger & Maire (1931)

Flowers sulphur yellow; spathe violet brown; pedicels a little longer than ⅛ in.; perianth segments longer than the corona; anthers golden yellow.
Distribution: Morocco, east and west Riff (from Moulouya to Oued Laou, including the Riffian Atlas) and central Middle Atlas.

23g. subsp. *tananicus* Maire (1932)

Leaves 3 to 5 to a bulb; flowers nearly white, nearly vertical.
Distribution: Morocco.

23h. subsp. *vulgaris* var. *citrinus* Baker (1880)
(*citrinus,* of a citron yellow)

Leaves up to 10 in. long, pale lemon yellow; corona 1 in. in diameter at the throat.
Distribution: Seen by me in Spain on grassy slopes and open woodland above the sea beyond Pesajes de San Juan, near San Sebastian, where it is abundant in March; also on screes of eastern Gibraltar.

The var. *citrinus,* one of the largest-flowered forms of *bulbocodium,* is often cultivated.

23i. var. *conspicuus* (Haw.) Burbidge. (syn. *Corbularia conspicua* Haw. (1831))
(*conspicuus,* striking, remarkable)

Leaves and scapes about 4 in. long; flowers buttercup yellow.
Distribution: Spain and Portugal.

Illustrated in Parkinson (1629); now the most common phase of the plant in cultivation.

23j. var. *nivalis* (Graells) Maire
(*nivalis,* of the snowy)

Scape 2 to 4 in. long; flowers orange yellow, small; diploid.
Distribution: Spain, on decidedly acid soils.

23k. var. *genuinus* Cout.
(*genuinus,* authentic, genuine)

The same as the typical form of *bulbocodium;* diploid.
Distribution: Spain and Portugal.

23l. var. *graellsii* (Webb) Baker. (syn. *N. gratellsii* Webb ex Graells (1859))
(*graellsii,* in honor of Graells)

Leaves usually 2; scapes 4 to 6 in. long; flowers primrose yellow, ½ in. long and broad with very short pedicels; perianth segments with a brown keel.
Distribution: Spain, mountains of Castile.

24. *Narcissus cantabricus* DC. (1816)
(*cantabricus,* from the Cantabrian Mountains)

Formerly known as *N. bulbocodium* var. *monophyllus.* Prof. Abilio Fernandes (1957) has shown that *cantabricus* is distinct from *bulbocodium* in several basic respects as follows:

N. bulbocodium	*N. cantabricus*
1. Flowers yellow	1. Flowers white
2. External scales of bulb varying from whitish to dark brown	2. External scales of bulb always dark brown (almost black)
3. Flowers with pedicels	3. Flowers nearly sessile
4. Flowers slightly fragrant	4. Flowers very fragrant
5. Corona usually not expanded	5. Corona expanded at the throat
6. Grows in open situations	6. Grows in the shade of bushes

Hybrids between *bulbocodium* and *cantabricus* are highly sterile. The latter species is thought to have originated through *bulbocodium* by structural changes of the chromosomes.

Synopsis of the wild variants of *cantabricus*:

A. *Bulbs with more than one leaf.*

1. var. *cantabricus* (syn. *N. clusii* Dunal (1847))
Leaves spread over the ground.
Distribution: South Spain at Almeria and at Oran in Algeria.

2. var. *foliosus* Maire (1929)
(*foliosus,* leafy)

Leaves erect or recurved, 3 to 8 to each bulb; perianth segments white 1½ to 2¼ in. long; chromosome number 2n = 28.

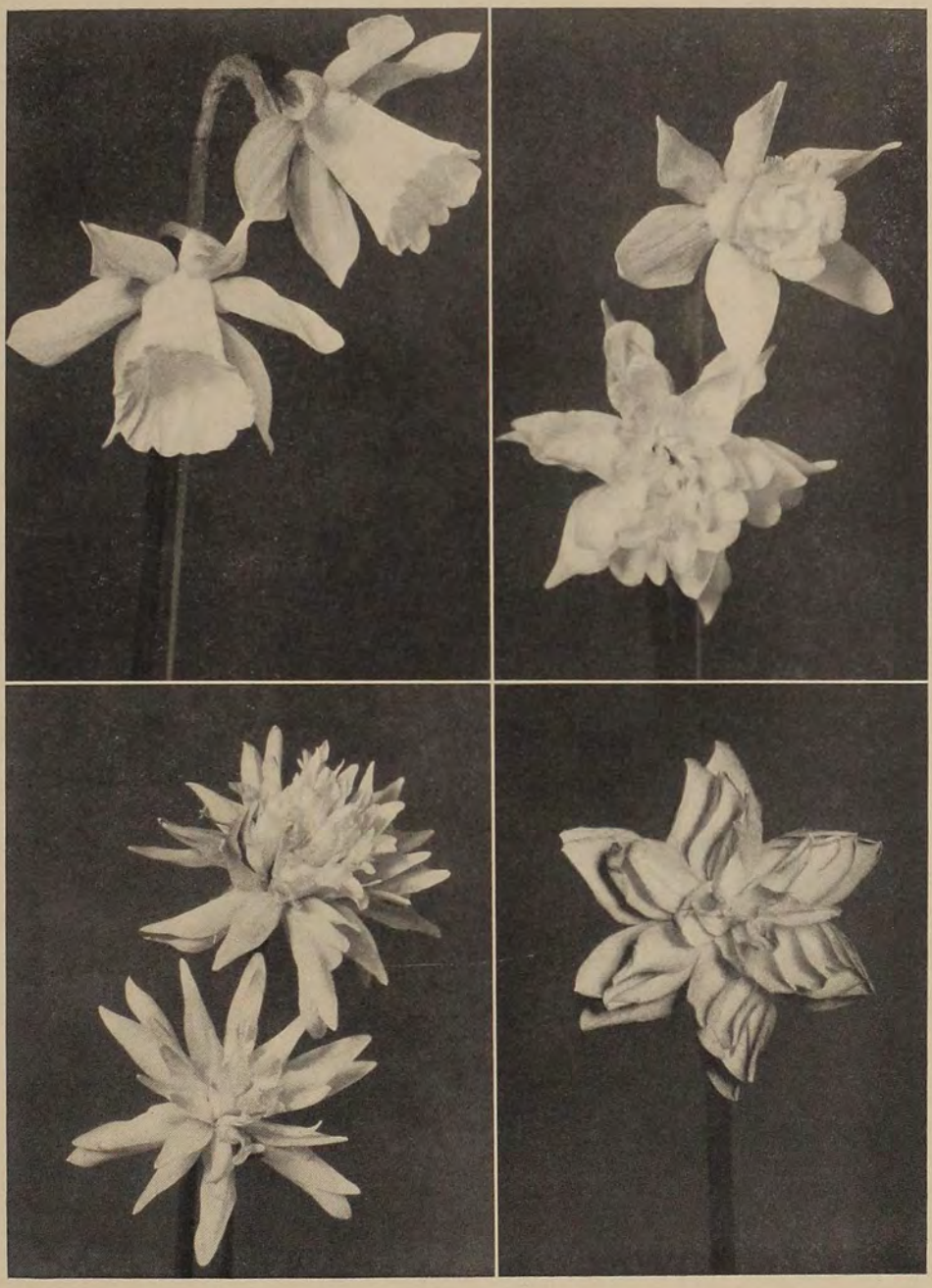

PLATE 25

DOUBLE FORMS

Pseudo-narcissus subsp. *moschatus* and Plenus, a garden derivative of it (upper row); *minor* var. *pumilis* Plenus (syn. Rip Van Winkle) and Eystettensis (syn. *capax plenus*) (lower row)

Distribution: Northwestern Morocco at Oued Nefifik and southwest Morocco at Sokrat-en-Nemra, prov. Boulhaut.

3. var. *kesticus* Maire & Wilczek (1936)
(*kesticus,* from Mount Kest)

Leaves erect or recurved, 2 to each bulb; perianth segments greenish white, about 1¼ in. long.

Distribution: Mount Kest, southwestern Morocco.

4. var. *petunioides* Fernd. (1957)
(*petunioides,* petunia-like in reference to the corona)

Leaves erect or recurved, 3 to 4 to each bulb; corona widely expanded, simulating the corolla of *Petunia;* pedicels up to 3/16 in. long.

Distribution: Algeria (?) Authentic material from the wild is unknown. This plant may have been imported by C. G. Van Tubergen, bulb growers in Holland. A highly distinctive plant not yet widely available.

B. *Bulbs usually with one leaf.*

5. subsp. *monophyllus* (Dur.) Maire. (syn. *Corbularia monophylla* Dur. (1847))
(*monophyllus,* one-leaved)

Bulbs usually one-leaved; flowers white.

Distribution: Along the south coast of Spain from Gibraltar to Almeria and in Morocco and Algeria; also in the Balearic Islands.

Known to Clusius (1601) and figured in his *Historia,* and probably cultivated since that time.

25. *Narcissus hedraeanthus* (Webb & Heldr.) Colmeiro (syn. *Corbularia hedraeanthus* Webb & Heldreich (1850))
(*hedraeanthus,* alluding to the sedentary and sessile flowers)

Closely related to *N. bulbocodium* and perhaps only a variety of it. Differs at once from all other components of the *bulbocodium* complex by its sessile, not pedicellate flowers. The pale yellow flower color resembles *N. cantabricus.* The following brief description is based upon the most recent account of the plant in *Curtis's Botanical Magazine,* 175: t. 248 (1955):

Leaves 1 per bulb, linear, 2½ to 3½ in. long, about 1/16 in. wide; scape erect or oblique, usually emerging almost horizontally and continuing this aspect throughout flowering; flowers sessile, 1 per scape, horizontal or ascending, ¾ to 1¼ in. long, sulphur or pale sulphur yellow, uniformly so throughout; tepals more or less equaling the corona in length; corona straight, gradually broadened above with the margin undulate, obscurely 6-lobed; style and stamens strongly exserted and ascending during flowering; chromosome number 2n = 14?

Distribution: Southeast Spain; Sierra de Segura and Sierra de Cazorla (Prov. Jaén), about 5200 ft. el. and Ciudad Real in the limestone zone.

Although discovered in 1849 at Era de Fustal (Prov. Jaén), the species has never been in general cultivation, having been introduced as recently as 1948 to British gardens.

Wild Species Hybrids of *Narcissus*

Natural hybridization may be expected between any of the species wherever they occur together in the wild. A high degree of interfertility exists between the various species. In fact, some of the difficulty in understanding the wild species may well be the result of incipient hybridization. The following list of hybrids, admittedly, is incomplete, but does show some of the best known natural crosses.

1. *N.* × *dubius* Gouan (*N. juncifolius* × *N. tazetta*)
Leaves narrow; flowers cream color or nearly white. 2n = 50.

Distribution: France; near Toulon, Hyères, Avignon, and Montpellier, *N.* × *magnenii* Rouy is another form of the hybrid.

2. *N.* × *intermedius* Lois. (*N. jonquilla* × *N. tazetta*)
Intermediate between the species; nearly round leaves 12 in. long; flowers 3 to 10, yellow, but paler than in *jonquilla.*

Distribution: France; near Bayonne, Dax in the Pyrenees foothills.

3. *N.* × *biflorus* Curtis. (*N. poeticus* × *N. tazetta*)

Flowers usually 2, rarely 1 or 3, 1¼ to 1½ in. wide (thus intermediate between the species); segments milky white; corona orange yellow; scape 12 to 18 in. tall; leaves about ½ in. wide.

Distribution: Southern France in places where *poeticus* and *tazetta* grow together.

This hybrid was known in English gardens of the 16th century according to Gerard who published an herbal (1597). It is accurately figured by Parkinson in his herbal (1629). The garden form is reputedly always sterile. The *biflorus* cross gave rise to the highly successful Poetaz narcissus originated by the Dutch in 1885.

4. *N. poeticus* × *N. pseudo-narcissus*

Plants produced by this cross are:

N. × *incomparabilis* (1768)	*N.* × *juratensis*	*N.* × *macleayi*
N. × *bernardii*	*N.* × *abscissus*	*N.* × *sabinii*
N. × *incomparabiliformis*	*N.* × *boutignyanus*	*N.* × *leedsii*

N. × *incomparabilis* as the oldest name in the above list is the only valid collective epithet for the cross. Under this name the plant was figured in de Pas's *Hortus Floridus* (1614) and by Parkinson (1629). The innumerable cultivars of *incomparabilis* produced over past years are among the best known of cultivated narcissus.

5. *N. pseudo-narcissus* × *N. cyclamineus*

6. *N. pseudo-narcissus* × *N. juncifolius*

7. *N.* × *odorus* L. (1762) Campernelle Jonquil
(*N. pseudo-narcissus* × *N. jonquilla*)

Although recorded by Clusius in 1595, the wild plant has not been observed.

8. *N.* × *laetus,* DC.
(*N. minor* × *N. jonquilla*)

9. *N.* × *johnstonii* (Baker) Pugsley 'Johnstonii' (syn. *N. pseudo-narcissus* var. *johnstonii* Baker (1886))

(*N. pseudo-narcissus* × *N. triandrus* var. *cernuus*)

Distinguished by its clear yellow flowers and long, narrow perianth tube and more or less reflexed segments. According to Prof. Fernandes, × *johnstonii* is derived from a tetraploid form of *N. pseudo-narcissus* and a diploid form of *N. triandrus* var. *cernuus;* chromosome number 2n = 21 and the plants are sterile. The plants resemble the *N. pseudo-narcissus* parent.

Distribution: Margins of Rio de Avintes, Portugal.

Two plants with the same parentage are known, namely *N.* × *johnstonii* (1886) and *N.* × *taitii* (1887). Both plants were discovered simultaneously by A. W. Tait and Edwin J. Johnston in Portugal growing together along the Rio de Avintes in March, 1886. Part of the material reached the Daffodil Committee of the Royal Horticultural Society for their meeting on April 27th of the same year, and less than two weeks later, on May 8th, the name *N. pseudo-narcissus* var. *johnstonii* Baker appeared in the Gardeners' Chronicle (N.S.) 25: 590 (1886). On May 20 of the same year (1886), the name appears again in a little known work, *Notes on the Narcissi of Portugal* by A. W. Tait. A more amplified description of *Johnstonii* appeared in Curtis's Botanical Magazine 114: t. 7012 (1888). Another portion of the same collection by Tait and Johnston reached Prof. J. A. Henriques at the University of Coimbra. This material was described as *N.* × *taitii* Henriques in 1887.

The Portuguese plant apparently has not been cultivated to any extent, although form called 'Queen of Spain' has been grown in gardens for at least 65 years from Peter Barr's introduction from northern Spain in 1887 and 1888.

9a. *N.* × *johnstonii* (Baker) Pugsley 'Taitii' (syn. *N.* × *taitii* Henriq. (1877)
(*N. pseudo-narcissus* × *N. triandrus* var. *cernuus*)

Leaves shorter than the scape; fls. clear yellow, 1 to 2 per scape, resembling the triandrus parentage. Derived from a diploid phase of each parental species and sterile.

Distribution: Margins of Rio de Avintes, Portugal.

Perhaps not in cultivation, although again found in the wild by A. Roziera in Portugal a few years ago and studied by Prof. Fernandes in a special work. This plant should be treated as a cultivar of *N.* × *johnstonii,* as cited above.

10. *N. bulbocodium* × *N. triandrus*

I have collected plants of this hybrid in Portugal in 1957 on one or two occasions. While not common, occasional plants do occur wherever the parents grow together, which is frequent. The plants seen resembled triandrus and have orange-yellow flowers.

11. *N.* × *carringtonii* Rozeira (1962)
(*N. scaberulus* × *N. triandrus* var. *cernuus*)
(*carringtonii,* in honor of J. Carrington Simões da Costa of Portugal)

The first reported natural hybrid involving *N. scaberulus;* intermediate between the parents with flowers ¾ to 1 in. long and with subreflexed perianth segments ⅜ in. long; tube up to ¾ in. long; corona about ¼ in. long, and ⅜ in. wide. The original description does not mention flower color.

Distribution: Ervedal da Beira, Portugal.

12. *N.* × *tenuoir* Curtis 'Tenuior' (syn. *N. tenuoir* Curtis (1797))
(*N. jonquilla* × *N. poeticus*)

An old garden plant of unknown origin, long grown in Europe and brought to England from Holland in the 18th Century and described in *Curtis's Botanical Magazine* 11: t. 379 (1797). The plant still exists in old gardens. This hybrid may be looked for in the wild where the parental species meet in northeastern Spain. Flowers very late.

13. *N.* × *tenuoir* Curtis 'Gracilis' (syn. *N. gracilis* Sabine (1824))
(*N. jonquilla* × *N. poeticus*)

Although of the same parentage, the hybrid name *N.* × *tenuior* (1797) is the older name and therefore takes priority over *N.* × *gracilis* (1824). For this reason, the name *gracilis* should be treated as a cultivar. Differs from *N.* × *tenuior* 'Tenuior' in being taller, with a rounded, not compressed, and nearly 2-edged scape, and pale yellow, unequally spreading tepals. A plant first recognized in England, more than 140 years ago, but still occasionally cultivated in this country and in Europe. Not known in the wild state.

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—5— Anatomy and Physiology of the Daffodil

The daffodil is a monocotyledonous plant which is a member of the family *Amaryllidaceae* and the genus *Narcissus*. Based on anatomical differences, the genus is divided into species and the species into subspecies and botanical varieties. The term "variety" is applied to both botanical varieties of the subspecies and by the gardener also to forms produced by man through cross pollination. The man-made forms or hybrids commonly called varieties are now sometimes referred to as "cultivars."

The plant is a bulbous perennial. The part above ground dies down in summer, leaving the bulb beneath the soil where it remains dormant, or partially so, for a period of time, depending on the species. Following the resting period, the plant, consisting of a subterranean bulb, forms roots and sends up leaves followed by the scape and flower. If two plants which differ from one another in one or more traits are crossed, and if pollination and fertilization take place, the ovary of the seed parent may set seeds. These, when planted and permitted to grow for several years, will produce bulbs, leaves, scapes, and flowers. Due to genetic differences of the parents, the offspring are hybrids brought about by sexual reproduction. Certain characteristics may be either dominant or recessive in the offspring, depending on the random gene combinations received from the parents; thus new varieties with some outstanding quality may result.

Another method of reproduction is asexual, or by vegetative means. When a bulb becomes mature, a lateral bulb may form which, in time, will separate from the parent bulb; characteristics of both plants will be identical, and any further lateral bulbs produced will exhibit the same characteristics as the parent plant.

ANATOMY OF THE DAFFODIL PLANT

THE SEED. Mature daffodil seeds vary in size with the parentage. Most seeds obtained from miniature parentage are smaller than those from large varieties. The seeds may vary in size from 1.5 to 3 mm. wide by 2 to 4 mm. in length and are oval in shape. The outside coat, or testa, of the seed is black, shiny, and smooth. A ridge, called the raphe (formed by a part of the stalk of the ovule), runs along one side of the seed from end to end. A longitudinal section of the seed made at right angles to the raphe shows the testa thickened or wing-like at both ends (Pl. 28C). The lower end is known as the micropylar end and is the place where the seed was attached to the seed stalk of the ovule. The upper end is called the chalazal end. Beneath the testa and integument (inner seed coat) lies the endosperm, or food supply, upon which the new plant lives until it has sufficient roots and leaves to manufacture its own food. The stored food in the endosperm consists of protein and oil globules. Near the micropylar end lies the embryo, or the potential new plant, which is about one-third the length of the seed (Pl. 28C). Most of the embryo consists of the cotyledon (seed leaf) which surrounds the plumule, or leaf bud. At the lower end of the cotyledon is the root cap from which arises the primary root of the new seedling.

By cell division the embryo begins to develop, and a leaf forms which pushes downward from the micropylar end of the seed. In doing so, a connection is retained with the endosperm, so that food may be absorbed. The roots develop af-

ter the seed leaf. The vascular system which carries food and water throughout the plant develops first in the roots from special cells which are termed meristematic (capable of actual division). The vascular system sends branches to the cotyledon and upward to the first leaf; thus the leaf and roots become connected.

By the time germination is complete and the seedling is anchored in the soil —about six months—the reserve food supply, or endosperm, becomes depleted, and the shriveled cotyledon falls away and decays in the soil. The plant now must produce its own food through the process of photosynthesis which will be discussed later.

THE SEEDLING. Germination of the seed usually starts in the fall, and emergence of the first leaf may occur in either late fall or early spring depending upon the parentage. Some species start growth earlier than others. *N. elegans, N. serotinus* and *N. viridiflorus* are fall bloomers.

During the first growing season the new plant forms roots, two or three in number. Food reserves in the form of starch are stored in the basal portion of the tiny bulb which is composed of the first leaf and the apical meristem—commonly called the growing point—(a group of meristematic cells which by division produce the precursors of the tissues of root and shoot). At the end of the growing period, an abscission layer (separation layer) forms at the bulbous base of the foliage leaf, and the leaf falls away. By the end of the summer, another abscission layer forms around the basal portion, or plate, of the bulb, and the entire root system falls away and decays in the soil. The tiny bulb, without roots and leaves, passes its first dormant period in the soil. The bulb is oval in shape, covered by a thin brown scale which is the remains of the sheath which covered the cotyledon in the seed. Inside the brown sheath are the fleshy base of the foliage leaf of the first year and a group of cells capable of division in all directions: the apical meristem or growing point. From this group of cells, future growth will originate.

The second year of growth of the seedling may start as early as November or December, depending on climate and temperature of the soil. The roots develop, usually three to five in number, around the edge of the basal plate. They are slender and delicate and vary in diameter from 0.7 to 1 mm. and in length from 5 to 30 mm.

The foliage leaf of the second year is encircled by a sheathing base composed of cells containing starch. The sheathing base extends slightly above the neck of the bulb (Pl. 29B). The new leaf contains a number of vascular bundles which form a network; however, the main bundle is located near the center of the leaf. At the base of the leaves are rows of elongated cells which contain calcium oxalate crystals (raphides); as a result animals do not relish the plants as food (Pl. 30). By the end of the second year, the bulb has stored much starch, and the leaf and roots fall away in the same manner as at the end of the first year.

The growth of the plant in the third and fourth years is about the same as in the second year; however, by the third year the above ground portion consists of two leaves which take on the appearance of the ribbon-like structures of the mature plant, instead of the cylindrical appearance as in the first two years. Some species retain the rushlike foliage throughout the life of the plant, e.g., *N. jonquilla.*

Before the plant reaches maturity, each new sequence of growth is produced by the entire apical meristem, but when the plant reaches flowering stage the apical meristem divides into two parts, one smaller than the other (Pl. 31A). The larger portion of the meristem produces the scape, and the smaller portion continues to function as the growing point.

PLATE 26 IVAN N. ANDERSON

TRIANDRUS HYBRIDS

Ivory Gate (upper left), Sidhe (upper right), Silver Chimes (lower left), April Tears (lower right)—All Div. 5b except Silver Chimes (half triandrus and half tazetta) transferred in 1965 to Div. 8.

PLATE 27 LILIAN A. GUERNSEY

FORTUNE
Large-cup (Div. 2a)

THE FLOWERING PLANT. Usually by the fifth year the bulb is mature and will send up a scape and inflorescence. Some seedlings will flower in four years, while others may take as long as seven. At the flowering stage, the underground portion of the plant consists of the following parts, the number depending on the age of the bulb; one brown scale on the outside, scale leaves, sheathing bases of foliage leaves from previous years' growth, foliage leaves, sheathing base which subtends the scape, and the apical bud (Pl. 31A). The scale leaf is a com-

plete sheathing structure which extends slightly above the neck of the bulb. It is similar to the sheathing base of the foliage leaf, but does not develop a leaf. Its function is protection to underlying tissues and starch storage. (Pl. 31B). The foliage leaves completely encircle the scape and apical meristem with the exception of the innermost foliage leaf which is semi-sheathing and partially encloses only the scape. The sheathing bases of the foliage leaves also store starch.

The scale leaves which surround the scape are the longest and extend above the neck of the bulb, a condition which furnishes support to the scape as it emerges from the bulb. By the time the scape is mature, the scale leaves have become dry and withered around the neck of the bulb. The scape enclosed in a sheath is produced within the bulb near the end of the previous year's growth; although it is very short it contains a tiny flower bud. As growth begins in the spring, the sheath and scape grow simultaneously. The flower bud is covered by the sheath (spathe) until the flower begins to open, then the sheath splits and becomes brown and papery, but remains attached to the stem at the neck for a time after the bloom has withered.

According to some botanists, the perianth segments, composed of the sepals and petals, are formed within the spathe in a clockwise manner. Formation is said to begin with the posterior right-hand segment of the outer whorl (sepals) of the perianth. The next segment formed is one of the inner whorl (petals), then another sepal and so on, until three sepals and three petals have been formed. The anthers and filaments are formed in the same manner as the perianth segments: one member of the outer whorl series alternating with a member of the inner whorl series. The six filaments which carry the anthers are attached to the perianth tube at the base of the perianth segments. The ovary is formed from the central part of the apical meristem and is the last floral part to appear. The female parts of the flower compose the pistil and consist of the style, stigma, and ovary which contains the ovules (Pl. 32A). The stigma is tri-lobular, the the ovary has three seed locules or compartments; characteristics typical of the monocotyledonous plants.

The scape is supplied by six vascular bundles which branch at various levels and thus supply the ovary and other floral parts with a vascular system. The bundles fuse together in the outer ovary wall as do the bases of all the flower appendages. This formation produces a condition known as an inferior ovary, i.e., the floral parts are above the ovary.

During the late summer and autumn, the scape remains very short within the bulb; about December or January it begins to lengthen and slowly pushes its way through the neck of the bulb. In spring the growth of the scape is quite rapid.

The scape may terminate in one or more flowers depending upon the species. The longitudinal growth of the scape takes place by division of meristematic cells located at internodes deep within the bulb, but later, as these cells mature, the meristematic cells at the base of the bulb take over responsibility for the final lengthening of the scape.

The structure of the basal portion of the scape is similar to that of the foliage. The outer, or peripheral cells, contain chlorophyll and are photosynthetic. The vascular bundles of the scape are arranged in a circle around the hollow center, a distribution which is typical of a monocotyledonous stem. The basal portion of the scape inside the bulb is composed of storage tissue which is packed with starch. Calcium oxalate crystals are abundant in the scape as well as in the leaves.

After the bulb becomes mature and the foliage dies down, a lateral shoot usually begins to develop at the base of the outermost foliage leaf or, in varieties with three or four leaves, in the axil of the second leaf. It resembles the spathe sheathe of the flower bud at first, but later takes on the characteristics of a lateral growth. After two years of leaf growth, the lateral shoot will probably

produce a scape and an inflorescence. By this time the lateral growth has developed a stem plate and root system of its own and will break away from the parent bulb, thus producing an independent growth identical with that of the parent.

Contractile Roots. It has been noted that daffodil bulbs have a tendency to pull themselves down in the soil to a depth which seems most suitable for their growth. This is accomplished by contractile roots, which usually function during the growing season. Roots measured in early spring and again about six weeks later were found to have shortened several millimeters. The contraction takes place near the base of the bulb in the region of the older portion of the root. As the roots begin to contract, they become shorter in length and larger in diameter. The cortex, or outer covering, becomes wrinkled transversely which gives the root a curly appearance (Pl. 29C). Microscopic study of the cells in the contractile region shows the inner cells broader and shorter than in ordinary roots. It is thought that the cells become compressed by the longitudinal shortening of the roots, thus causing a wrinkling of the outer cells which are less elastic than those of the vascular system in which the cells have a tendency to flatten out.

Leaf Structure. Daffodil leaves may be straplike or rushlike depending upon the species; however, the structure of both is similar. The leaves have their origin in the primary meristem. They emerge as a protuberance on the side of the apical meristem. As the leaf sheath grows, it extends laterally around the apical meristem and vertically until it reaches the neck of the bulb where a limb elongates on one side the bulb. The limb portion is what we consider the true leaf; it contains vascular bundles and chloroplasts and is capable of carrying on photosynthesis.

The leaf is covered with cutin, a waxlike, complex, fatty substance which makes the walls more or less impervious to water (Pl. 30). Stomata, or pores, open into a chamber beneath the epidermis on both sides of the leaves. The substomatal chamber connects with the intercellular spaces beneath and acts as a communication route between inner cells and outside air.

In the species with tubular leaves, the center is hollow. The vascular bundles develop around the hollow core; however, in the species with straplike leaves there is a central bundle which is larger and better developed than the secondary bundles which are found near the edges of the leaf. The bundles run longitudinally along the leaf and are connected by short transverse veins which form a network system.

The Flower. The mature floral parts of the daffodil are borne atop the stem which gradually tapers into the neck. At

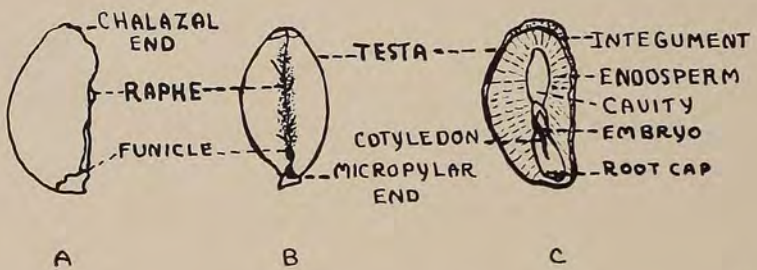


Plate 28 Helen K. Link

Daffodil Seed × 30

A. External side view. B. External view of raphe. C. Longitudinal section showing endosperm and embryo.

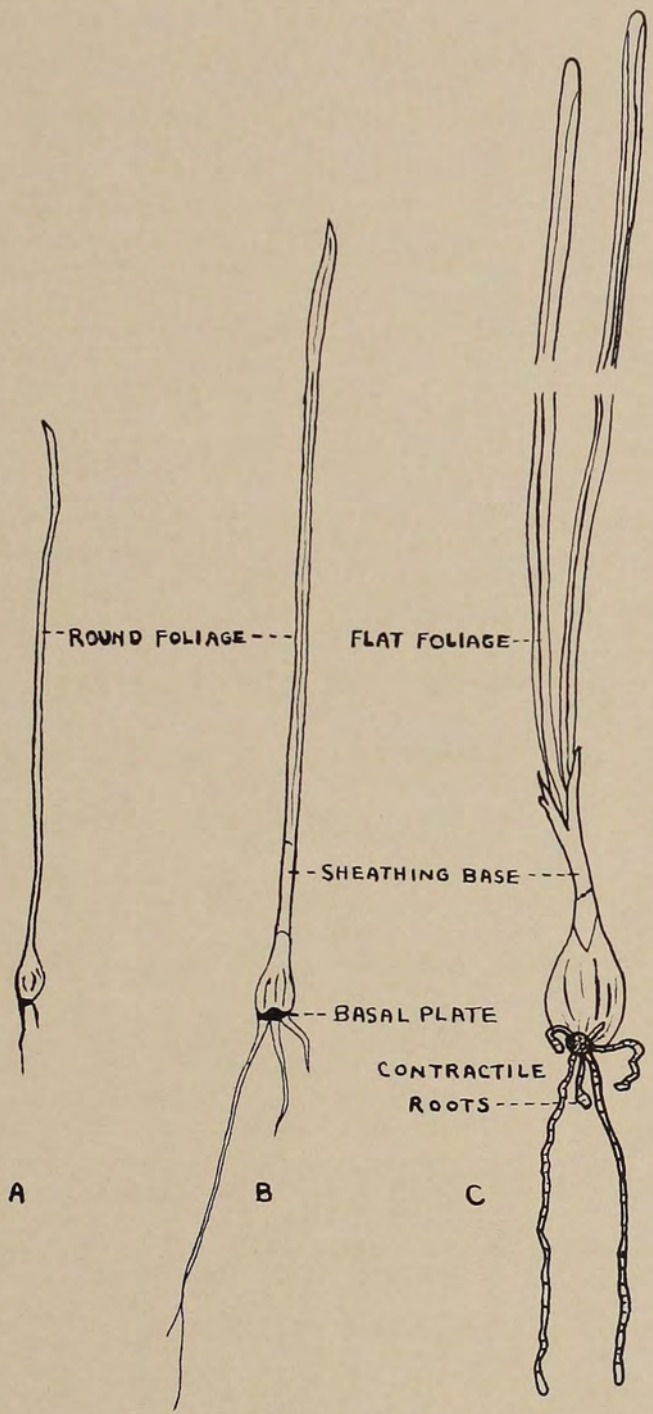


PLATE 29 HELEN K. LINK

DAFFODIL SEEDLINGS × 1

A. One year old. B. Two years old. C. Three years old, showing flat foliage and contractile roots.

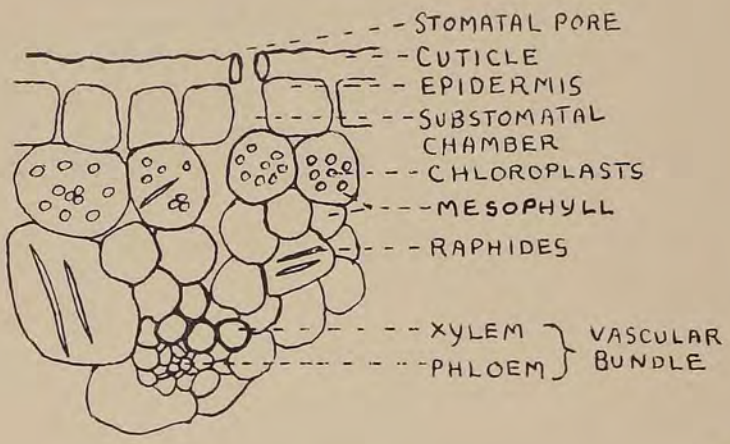


PLATE 30 HELEN K. LINK

DAFFODIL LEAF

Cross section of a portion of a daffodil leaf showing epidermis, stomatal pore and chamber, raphides (calcium oxalate crystals), and vascular bundle structure × 600.

the neck is a joint where the brown sheath which once enclosed the flower hangs ruptured after the emergence of the flower (Pl. 32A). Above the neck rests the ovary which contains the ovules or eggs (Pl. 32B). The ovary has three compartments or locules, each containing two rows of seeds. A tripartite tube (pistil) protrudes from the ovary and flares at the end into a three-lobed stigma. The cup, or corona, fuses with the sepals and petals at various distances from the ovary, depending on the species. Some species, such as *N. poeticus,* have a long perianth tube connecting the ovary to the corona and perianth segments; other species have a short tube which is more or less expanded. The trumpets and large cups are examples of the latter type of structure.

The male reproductive organs, the anthers, are six in number and attached by filaments to the perianth tube. In some species the filaments are attached to the tube just above the ovary and in others midway between the ovary and junction of the perianth tube with the corona and perianth segments. In a few species the filaments are of two different lengths.

The position of the anthers with regard to the stigma also varies with the species. In the trumpet division, the stigma is well above the anthers, while in the poeticus, the opposite relation prevails.

The anthers are oval, long, and slender. A furrow runs down the side of the anther on the side opposite the point of attachment to the filament. Along this furrow the anther ruptures for dispersal of the pollen grains.

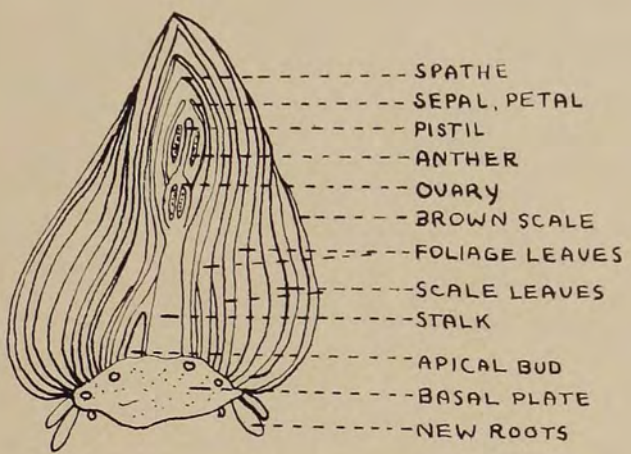
The outer whorl of the perianth segments is composed of three sepals and the inner whorl of three petals. These segments are often referred to as floral leaves.

The tips of the perianth segments are mucronate, or end in a sharp point. Upon close observation one may note that the mucros are more pronounced at the tips of the sepals than on the petals. These projections are somewhat concave and hook-shaped and serve the purpose of locking the outer segments over the inner segments until the entire flower is mature and ready to burst open. Occasionally during the blooming season a hot sun will dry out the mucros which causes them to stick together. A slight pressure with the fingertip at the locking point will release the hook-shaped projection and allow the flower to open.

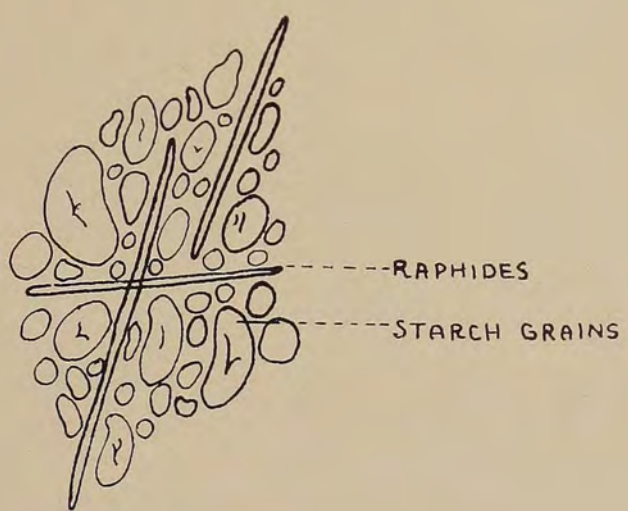
PHYSIOLOGY OF THE DAFFODIL PLANT

Roots. The roots of the daffodil plant are constructed for the purpose of absorbing nourishment in the form of mineral salts which move into the cells along with water. There are twelve mineral elements essential for proper growth; six of the elements are classed as major elements since they are more essential to the plant than the minor elements. The major elements are nitrogen, potassium, phosphorus, sulphur, magnesium, and calcium; the minor elements are iron, manganese, copper, zinc, boron, and molybdenum.

The cells of the hair roots are able to take up the nutrients and water from the soil, but do not allow it to pass out-



A



B

Plate 31 Helen K. Link

Daffodil Bulb

A. Longitudinal section of a flowering size daffodil bulb made prior to beginning of new growth; new roots have begun to form from basal plate and flower stalk has begun to elongate × 1. B. Microscopic view of mascerated tissue composing the scale leaves of bulb. Cells are packed with starch grains and raphides (calcium oxalate crystals) × 600.

ward. The walls of these cells contain many very small pores through which the fluids flow under the control of two membranes within the cell—the plasma and vacuolar. These membranes have thin walls and selective permeability which permits the passage of some materials and inhibits the flow of others. The membranes are thought to be lipid or fatty in character, a sievelike sheath with areas suited to the penetration of small molecules such as water, while restraining at the same time the outward movement of larger molecules such as sugar. The movement of the water from the soil into the plant through the plasma membrane is due to osmotic concentration of cell contents which press on the wall producing a turgor pressure. The cell wall restrains expansion of the cell by means of wall pressure.

The movement of salts into the plant cells is complicated by the process of accumulation. Ionic solutions move into the cell slower than non-ionic, also plant membrances restrict the rate at which ions move into the cell. The cell membranes have the ability to select between species of ions; some enter in abundance and others are restricted. The uptake of mineral salts by the roots is also tied in with increased plant respiration and uptake of oxygen.

TRANSPIRATION. Transpiration is the loss of water through evaporation from the leaf surfaces of the plant. The leaves of the daffodil plant consist of water-filled mesophyll cells. Wet surfaces of cells are in contact with intercellular spaces which lead to the outside of the leaf through the stomata (Pl. 30). Water lost by the leaves in the process of evaporation is brought up from the roots by the vascular system. If the roots are unable to absorb water due to lack of water in the soil, transpiration continues in the leaves, finally depleting their water supply and the plant wilts. Since the daffodil plant has large leaf surfaces, it is easy to understand why large quantities of water are needed for good culture. The salinity of the soil, the temperature, and soil aeration are other factors which influence uptake of water by the roots. Uptake of water is depressed by low soil water content, high soil solute concentrations, low soil temperature, and poor soil aeration.

The stomata of the daffodil leaves are located on both the upper and lower surfaces of the leaves, and are the main avenue for the escape of water vapor from the leaves of the plant. The opening of each stoma is bounded by two bean-shaped cells, known as guard cells (Pl. 33A), which are separated by a stomatal pore. The guard cells differ from other epidermal cells in that they usually contain plastids and thickened walls toward the pore area, thus when the guard cell becomes turgid, the thin wall at the outside of the cell pulls the stomatal pore open. As the guard cell loses turgidity, the stomatal pore closes (Pl. 33B). The opening and closing of the stomata are controlled by a number of environmental factors. Light and the water content of the leaf tissue are the most important, but recently it has been determined that the carbon dioxide within the cavity directly beneath the stoma plays an important part. When the carbon dioxide within the substomatal cavity is equal to that in the normal outside air, the stomata remain closed, but when the carbon dioxide concentration in the substomatal cavity is reduced below that of the surrounding air, the stomata promptly open. The degree of the opening depends on the amount of the reduction of carbon dioxide within the cavity. Light also produces stomatal pore opening. It is thought that during the process of photosynthesis, carbon dioxide is utilized which lowers the concentration within the substomatal cavity causing opening of the guard cells.

PHOTOSYNTHESIS AND RESPIRATION

The energy which supports the growth of the daffodil plant is derived directly from sunlight. Energy from the sun is taken up by the plant and transformed, by action of light upon the green pigment, or chlorophyll, of the leaves and stems, into carbon compounds upon which the plant lives and grows. In the photosynthetic process, carbon dioxide

from the air and water from the soil play an essential part. A by-product of photosynthesis is the liberation of oxygen into the air.

Plant respiration is the photosynthetic process in reverse. Products of photosynthesis are used up by plant growth; thus oxygen from the air combines with the carbon-containing compounds of the plant, and water and carbon dioxide are given off. Respiration of green leaves takes place both in the light and dark. Food stored in daylight hours by photosynthesis is used by plant respiration during periods of darkness. Through the photosynthetic process, daffodil leaves store starch in the scale leaves and leaf bases beyond the amount used for respiration (Pl. 31B). Thus the stored food from one year's growth supplies the carbon-containing compounds for growth and flowering of the plant the next year.

The removal of the leaves from the plant before they turn brown reduces the amount of starch which can be stored and may result in a lack of bloom the following season.

The daffodil plant has effective photosynthesis because of its large leaf surface, extensive intercellular spaces, and numerous stomatal openings; however, these same features also make transpiration effective.

TRANSLOCATION. Translocation is the distribution of nutrients within the plant. Carbon-containing compounds, photosynthesized by green leaves, are required by all tissues of the plant, and

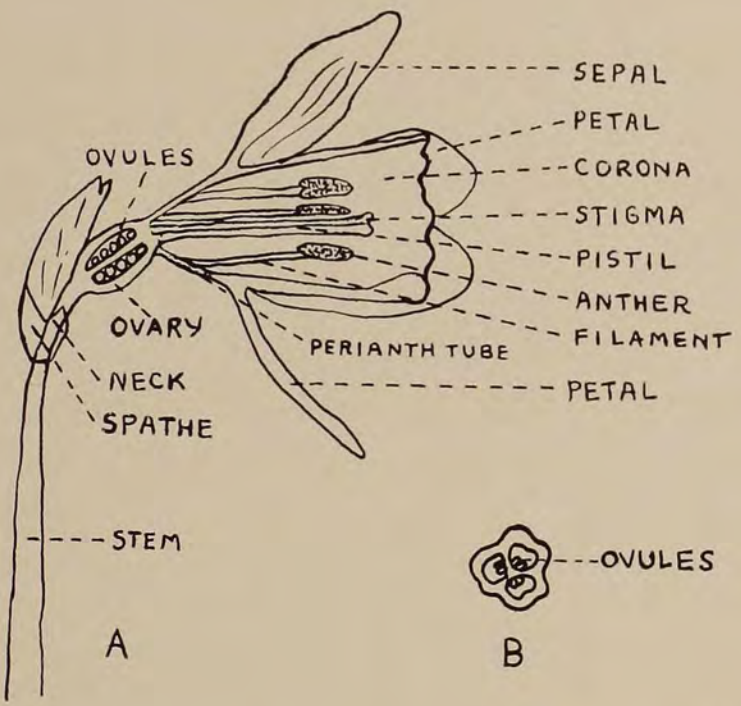


PLATE 32 HELEN K. LINK

DAFFODIL FLOWER

A. Longitudinal section of a large-cupped daffodil flower showing the floral parts × ¾. B. Cross section of the ovary × ¾.

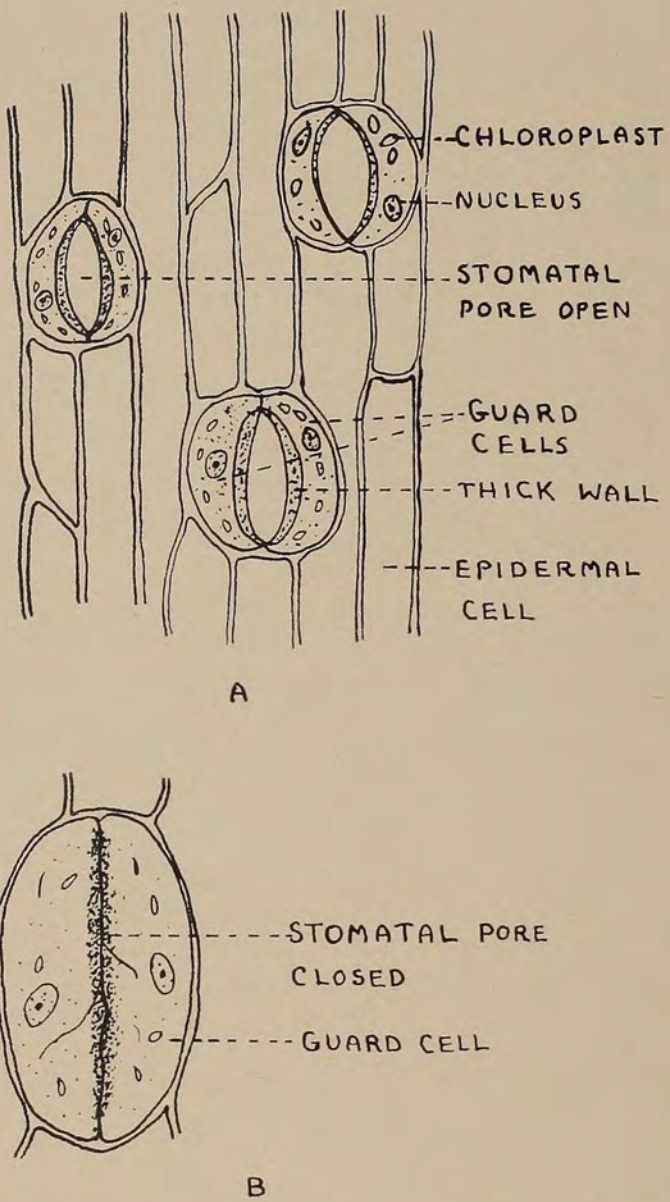


PLATE 33 HELEN K. LINK

DAFFODIL LEAF

A. Surface view of the epidermis of a daffodil leaf showing epidermal cells, stomata, and guard cells × 150. B. Guard cell in closed position × 600.

the nutrient elements taken in by the roots are moved throughout the plant to the leaf tips.

The movement of the nutrient elements takes place in the vascular system which is composed of two kinds of vessels, the xylem and phloem (Pl. 30). Photosynthate produced in the leaves is moved downward in the plant by the phloem to all growing and storage points. Carbon-containing compounds are moved from the leaves to other parts of the plant and the excess is stored in the form of starch in the bulb (Pl. 31B). The carbon-containing compounds are moved in the form of sucrose, amino

acids, vitamins, and other nitrogen-containing materials.

Temperature is a factor in the rapidity with which materials are translocated. Too high a temperature will impede movement and a range between 70° and 85° F. has been found to be most efficient. At low temperatures sugars tend to accumulate in the root, while at high temperatures respiration is increased and the leaves use up the sugars, leaving little to transport. Most of the growth of the daffodil takes place in cool weather, and most varieties do not do as well in hot climates as in cooler regions.

The phloem cells are living sieve-tube elements placed end to end to form tubes which are connected by protoplasmic strands. These elements carry nutrients in their cytoplasm to all parts of the plant by means of pressure flow. The force which drives the stream of solution is produced by a difference in turgor pressure between the cells where the nutrients are produced and the cells which receive the nutrients for use in respiration or storage. Other compounds beside sugar which are translocated by the phloem are plant hormones, virus molecules, systemic poisons, and radioactive materials.

The xylem vessels and tracheids of the vascular system carry the water and minerals taken up by the roots to the leaves as transpiration of water takes place from the leaves through the stomata. Minerals are able to transfer laterally from the xylem to the phloem.

The photosynthate produced in the leaves by the process of photosynthesis is in the form of sugar; however, excess sugar beyond the amount used for respiration is stored in the bulb in the form of starch. The sugar is transformed to starch by enzymatic action.

Sexual Reproduction. When the spathe splits and the flower emerges, the sepals and petals unfold. In a few hours, the anthers split longitudinally and become yellow with pollen grains. Insects may come to feed upon the pollen, or the wind may carry it to other plants or deposit the pollen upon the stigma of the same plant; thus pollination occurs by natural means, or man may take over the duties of Nature and carefully select the seed and pollen parents.

When viewed under the microscope, the pollen grains of the daffodil appear ovoid in a lateral position (Pl. 34A). Each grain has an exine, or covering. In equatorial view, a culpus, or furrow, is visible (Pl. 34B). When the grain is rotated laterally, it resembles an orange section (Pl. 34C).

Before the pollen is shed, the microspore mother cell undergoes meiosis, a process in which the cells resulting from division are haploid and the chromosome number has been halved. *N. triandrus* has the chromosome count of $2n = 14$; the pollen grain when shed would be $n = 7$.

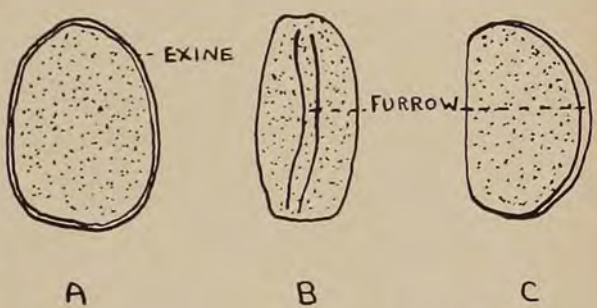


Plate 34 Helen K. Link

Daffodil Pollen Grain

A. Pollen grain in lateral view. B. Equatorial view showing furrow. C. Lateral view, grain rotated to show furrow × 600.

The mother cell, or megaspore, which eventually forms the egg, also undergoes meiosis and four megaspores result; three disintegrate and the remaining cell nucleus divides and redivides forming eight nuclei. One is the egg, three form the antipodals which are functionless, two which are termed synergids surround the egg and are also functionless, the remaining pair are the polar nuclei which fuse before fertilization occurs. The egg when ready for fertilization has the chromosome number $n = 7$ (Pl. 35B).

When the pollen grain is shed, it contains two nuclei, a generative nucleus and a tube nucleus. If the grain is viable, it starts to grow after it lands on the stigma. A tube emerges through the

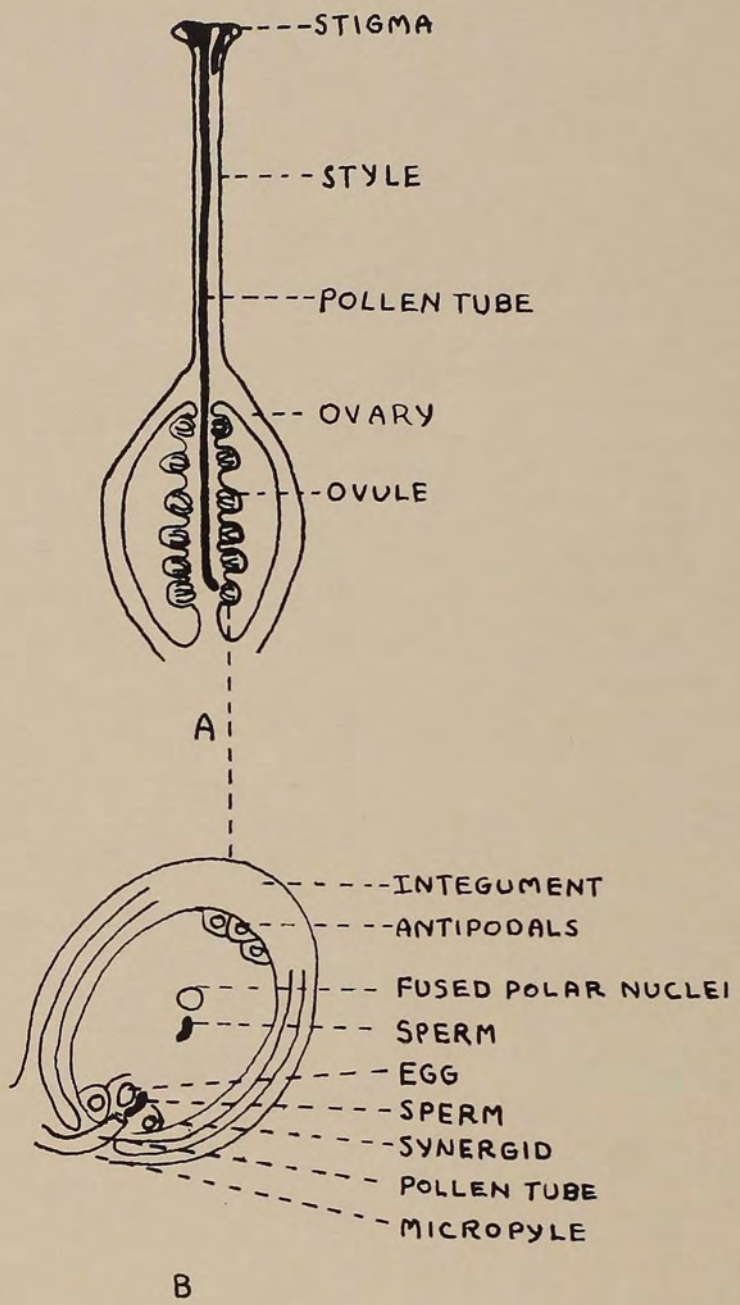


PLATE 35 HELEN K. LINK

PISTIL OF DAFFODIL FLOWER

A. Diagram of stigma, style, and ovary (which together comprise the pistil) showing growth of pollen tube into ovule × 50. B. Diagram of ovule showing ruptured pollen tube after release of the sperms. One sperm fuses with polar nuclei and the other with the egg × 150.

furrow of the pollen grain and grows downward through the stigma and style to the ovary where fertilization takes place (Pl. 35A). As the tube starts to grow, the generative nucleus divides to form two sperm nuclei which, together with the tube nucleus, travel down the tube as the tube itself grows through the micropyle of the ovule (Pl. 35B). Once inside the ovule, the tube ruptures and one sperm unites with the egg and the other with the fused polar nuclei of the ovule. The union of the sperm and the egg produces the potential embryo, and that of the polar nuclei and the second sperm produces the endosperm upon which the embryo of the seed lives until roots and leaves of the seedling are established. In the case where *N. triandrus* is self-pollinated, the sperms would carry seven chromosomes, the egg seven, and the young seedling fourteen, seven from the male parent and seven from the female, $n = 7$ and $2n = 14$. Genes for color, form, and so on are carried on the chromosomes.

A number of factors are involved in pollination and fertilization. Some varieties produce little or no viable pollen. Weather conditions may be a factor in growth of the pollen tube. Hot, windy weather may dry out the stigma and prevent the pollen grains from germinating. The failure of union between polar nuclei and sperm would deprive the embryo of a food supply. The death of the sperm or the egg would eliminate the possibility of seed production. There is also the possibility of dominant lethal genes in sperm or egg, or both. Since so many factors are involved in the production of viable seed, it is easily understood why some crosses produce few or no seeds.

If fertilization is successful, the seeds usually mature in five to six weeks. The pod, or ovary, splits at the point where the style previously joined the ovary and the seeds drop to the ground or may be collected in cheesecloth bags tied over the ovary.

—6— Regional Culture

A. THE SOUTH ATLANTIC COAST

This is a commentary on growing daffodils in the Southeastern United States, specifically that area lying between the Appalachian Mountains and the Atlantic Ocean and from Virginia to Florida. The main geographical regions are the Alpine or Mountain, the Piedmont, and the Coastal Plains. Geographically we are located at about the center of this area and believe that with slight modifications for soil and climatic differences, the following cultural procedures will produce good results. First, we must analyze the requirements of the daffodils we desire to cultivate and compare these with the conditions available. If it is possible to alter the existing conditions to meet more nearly the requirements of the plant, chances of success are increased.

Daffodils prefer a well-drained, deep, loamy soil slightly on the acid side and with plenty of moisture during the growing season and a cool soil during the dormant or resting period. They must also have adequate nutrition.

For best results, daffodils should be planted in soil well pulverized to a depth of at least 12 inches. If the soil below this level is hard and impervious to water, it should be loosened an additional 8 to 12 inches to insure good drainage. Heavy clay soils will be benefited by the addition of coarse sand and peat moss; spread 1 or 2 inches of each over the soil and work it in thoroughly. Peat moss is beneficial to all soils as it tends to aerate the soil and hold moisture.

Beds should be made up several weeks before planting time and should not be over 48 or 50 inches wide. If several are to be placed parallel to each other, leave 18 to 20 inches between beds for a walkway. Personally, I make the walkway slightly wider than my lawnmower. At the time the beds are made up, I incorporate a mixture of about half and half 20% superphosphate and bone meal (some growers question the use of bonemeal) at the rate of 4 to 5 lbs. per 100 sq. ft. into the soil in the root zone area, i.e., about 8 to 12 inches down. If wood ashes are available, they are also sprinkled in with the above mixture. The area should then be well watered and left for a week or two before planting.

Daffodils like a soil with a pH between 6.0 and 7.0. This is slightly on the acid side, a pH of 7.0 being neutral. If the soil is too acid, add ground limestone or ground dolomitic limestone (dolomite), wood ashes, or ground oyster shells, or other basic (alkaline) material. About 8 or 10 lbs. per 100 sq. ft. will lower the pH about one point on loams. Sandy soils will only require half of this amount and silt and clays about 1½ times that for loam. In most areas your county agricultural agent can arrange for a complete analysis of your soil at little or no expense to you.

Daffodil bulbs should be planted as soon as the soil begins to cool from the summer heat. This will vary with different areas of the region. In the mountainous sections planting may begin in September and continue until the latter part of October. In the Piedmont, from October 1st to November 1st is the usual planting time. In the Coastal Plains planting may be delayed three to four weeks, continuing until about December 1st. Bulbs need about six weeks to develop extensive root systems before extreme cold weather stops underground growth.

The depth of planting is determined by the type soil, climate, cultural meth-

ods, and location. The average size bulb is usually planted about 6 in. deep, measuring from the base of the bulb. In heavy clay soils the bulbs may be planted at a depth of 4 to 5 inches; in sandy soils the depth is increased to 8 inches. In the extreme south the depth may be increased to 10 in. as the soil temperature above this depth is not sufficiently low to encourage growth. Daffodils are extremely sensitive to soil temperature; they wait for cool soils to break their dormancy and in the spring excessive temperatures will send them back to dormancy before the bulbs have fully matured. Mulches may be used as an insulation to delay warming of the soil, and partial shade also retards temperature increases. When a mulch is used the depth of planting may be decreased slightly. Southern exposures will have higher temperatures as the rays of the sun strike the soil more directly; on northern slopes the rays hit the ground obliquely.

Heat, especially damp heat, is one of the main enemies of daffodils in the South, as it encourages fusarium or basal rot. Perfect drainage and mulches are the best weapons with which to fight it, but there are chemical controls which are discussed elsewhere in the Handbook.

In addition to keeping the soil temperature down, mulches serve other functions in the Southeastern United States, such as the control of weeds and the conservation of moisture. Sawdust or wood shavings, peanut hulls, ground corn cobs, pulverized leaves, and pine needles are all excellent mulches. Personally, I use pine needles about 3 inches deep.

At the Clemson University horticultural trial grounds in which the American Daffodil Society participates, all of their daffodil beds are overplanted with annuals as a green mulch during the summer months. Their bulb losses have been considerably higher than mine and it is believed that their heavier losses are due to nitrogen in the form of ammonium nitrate applied at the rate of one pound per 1,000 sq. ft. Excess nitrogen should be avoided in the Southeast in growing daffodils; use as little as possible to keep the plants in good growing condition. As the leaves emerge in early spring, an application of 4-12-12 or 5-10-10 at the rate of 3 lbs. per 100 sq. ft. is usually adequate.

Daffodils need plenty of moisture during their growing season. If a dry spell develops, water slowly and deeply about once a week or every ten days, but be sure the water reaches down to the root area. After blooming, water is still needed to mature the bulbs for the next season. Keep the leaves green as long as possible; do not break off leaves or tie in knots, as less area is exposed to the light and bulbs will not make maximum growth.

Bulbs may be left in the ground for several years, but enough room should be left at planting time for bulb increase; 8 or 10 inches each way is usually sufficient. When the bulbs show fewer and smaller flowers it is time to separate them. Wait until the leaves begin to turn yellow, then dig carefully so as not to injure or cut the bulbs, shake off excess dirt, remove damaged or diseased bulbs, and spread thinly in the shade to dry. When the outer coat is dry, the bulbs may be stored in a cool, dry place until fall. Do not pile them up as they must have air. Citrus bags are ideally suited for this purpose; for smaller amounts, nylon hose may be used. Tie off each variety with wire or string, label carefully, and hang up in the basement or other cool, dry place.

If your bulbs are used for naturalizing and you do not want to lift them often, plant them deeper, up to 10 inches. This discourages bulb increase.

In conclusion, a few comments about the relative performance of the different divisions of the daffodil classification in the Southeastern United States may be of interest:

1. Trumpets. As a whole they are very good, a little weakness is shown by the bicolors, but except for a few varieties the white trumpets are not long lived in this area.

2. Large cups. Here again, most are very good in the yellow range, with weakness showing up in the 2*b*'s, while the white cups in this division are the most difficult group to keep.

3. Small cups. About the same comments as for the large cups.
4. Doubles. Most of the doubles blast in this climate. Notable exceptions are Cheerfulness, Yellow Cheerfulness, Feu de Joie, Daphne, and White Lion.
5. Triandrus hybrids. All grow well here; excellent for naturalizing.
6. Cyclamineus hybrids. Most do well as they are early.
7. Jonquilla hybrids. These grow almost anywhere in the South and are excellent for naturalizing.
8. Tazetta hybrids. The farther south you go, the better this group grows.
9. Poeticus hybrids. Except for Actaea, they are too late for the South.
10. Species. Most will grow here with care.

Pinks. These belong to the *1b*, *2b*, and *3b* classes. They are not the easiest to grow, but they are showing improvement. Semishade helps preserve the color.

B. THE GULF COAST

The term "Gulf Coast," as commonly applied, refers to a narrow strip of country that extends from Pensacola, Florida, to Galveston, Texas. Throughout such a length, one will find a great variety of soil types, microclimates, and variations in weather patterns. One will also find a minimum of interest in daffodils. Whether this is due to actual trial and failures or not, the present writer has no idea. He is aware, however, that anyone who starts to grow daffodils must consider himself an experimenter with little knowledge available to him from any source.

The report that follows is written from Pass Christian, Mississippi, in an area that may be more or less typical of others. The soil is deep and sandy; always well drained, even to excess; humus is limited; rainfall distributed throughout the year with droughts in May, if at all; cold in January, while killing frosts may occur as early as mid-December and as late as late March. Summer temperatures sound worse than they are; the high may come to 100° F, but it is not as oppressive to humans as a much lower temperature in the North. It does appear to have some effect on the success with certain types of *Narcissus*. Thanks to the permeable character of the soil, fertilizing levels change quickly and the natural soil, always low, needs care in this regard.

Plantings here are of two sorts: groups in mass, more or less in the style of naturalization; and careful beds in which one grows varieties to examine and test for survival and whatever degree of excellence they may show. In each case, the planting areas are prepared with care as outlined, and the same practice of fertilization is carried out, though little watering has been given in the areas of naturalization. These last have been only relatively successful, and the failures can be laid largely to excessive root competition from shrubs and trees nearby and, in some areas, to excessive shade.

The test area is chiefly a long, narrow bed between grass walks, shaded in part by old pecan trees and serving also for spaced plantings of camellia and magnolia trees. In the earlier stages, varieties were planted in groups according to the division to which they belonged, but in the later additions, when the buyer was searching for this or that variety, the planting had to be mixed as to parental backgrounds. The bed, when nearly prepared, was higher than the level of the paths, but this soon changed as the peat in the bed was either used up or sank. The beds themselves vary, due to location, in the amount of shade that falls, and those beds that received the least shade were devoted to the jonquil progenies and to species, most of which come from hot enough areas in nature. As far as one can tell, this arrangement is and has been successful for years.

All beds, or parts of beds, are prepared well in advance of the planting season to allow preliminary settling. When the bulbs are placed, the trench is opened, a liberal supply of bonemeal added to the soil, mixed well into the soil, and the job is finished with a permanent label to mark the kind. In spring, particularly after the first season, the common commercial fertilizer, a 5-10-5 with an acid reaction, is spread

over the surface and watered in. This is repeated at whatever time appears to be the season when the bulbs will be making their new root growths.

Watering is done in dry weather and regularly for some varieties that give no bloom without it. Extra water must be given if late March and early April prove rainless. If one remembers to do it, the most common form of straight phosphate is added in the autumn feeding, since it is lacking in all soils in this immediate area. No effort has been made to use trace elements. Nothing has been done to approximate growing for exhibition, an elaborate business discussed elsewhere in this book. Nothing is done to provide shade for varieties with non-sunfast colors; in short, an ordinary garden.

No diseases have reared their heads, although some kinds, as bought, appear to have foliage that dies off prematurely, yellow from the tips but not showing either lesions or the veining that would suggest virus. As yet, no evidence of narcissus fly has appeared, though in several lots of purchases the bulbs showed that the source had had it. As the entire garden is regularly treated with dieldrin, this may have been safeguard enough.

Since it is the considered opinion of the writer that each daffodil lover in the lower South will have to make his own voyage of discovery, the best that can be reported here are such generalizations as indicate where success has come with a minimum of difficulty.

In most general terms, the garden here indicates that one will succeed with relatively few trumpets of value, but with a wide range of large cups, with practically all jonquil hybrids save Tittle-Tattle which needs more water to insure bloom than can be given here, with practically all triandrus derivatives, and, within the limits of those which have been tried, with nearly all cyclamineus hybrids, though these exhibit a wide range of robustness. All the bulbocodiums do well as plants, although those that flower in winter are often ruined by weather, rain as much as cold. All tazettas and their progenies do well, save the few that are very late in blooming, such as old Aspasia and the commonly found × *biflorus*, and those few like Sacred Chinese that want to flower in January. And should the gardener want something distinctive, he should try the autumn-blooming species, all of which have done well here.

The only hope he may cherish, after some of his failures, is that some small part of a bulb will continue, perhaps for years, and finally grow into a stock that will accept his conditions and climate. In the garden here, the trumpets Kingscourt, Royalist, and Goldcourt, all of which appeared to be failures, have now, after about five years, made a new stock from one or more offsets and thrive.

No double has been successful, save one of the old Phoenix varieties, probably Butter and Eggs, and that is established in many parts of the South. Twink is reported from other gardens as dependable but has not been tried here.

If one must have yellow trumpets, the only kind that has been uniformly successful here has been Garron. Kandahar appears to be a likely addition but is a less elegant flower. In other gardens, even nearby, King Alfred succeeds. Here it gives only magnificent foliage and generous increase.

Now that the group of large cups has been so greatly increased in number by the hybrids that are almost of trumpet proportions, one may get a garden effect from them, as, for example, St. Keverne which is a glorious yellow and happy. Galway, which is superb, has not yet settled down but if the surviving offsets continue, it will rival the yellow trumpets and is well worth waiting for. And if one may be allowed the scandal of suggesting that many of the large-cupped cyclamineus hybrids are, in effect, trumpets, as are some of the later jonquil hybrids, the trumpet effect is assured. Cyclades, new here but well established, is a fine trumpetlike cyclamineus hybrid. Both Woodcock and Ripple come close to looking like trumpets, though in the jonquil group. Doubtless there are others.

PLATE 36

MOUNT HOOD
Trumpet (Div. 1c)

Among the large-cupped varieties with brilliant color in the cup and a fine yellow perianth, Armada has been the outstanding success here; one clump has been in position without lifting for six years and is blooming as well as when it was first planted. It is ahead of Fortune here, though this, too, is fine. Ceylon, a more recent arrival, has been uniformly successful and fine. Many of the older varieties, such as Rustom Pasha, Narvik, Rouge, Carbineer, Diolite, Home Fires, and Indian Summer, have all been excellent. For those with white perianth and colored cup, Tudor Minstrel is the only one outstanding as yet. On the other hand, the all-white Parkmore, is almost as fine as a white trumpet! It appears to be more certain with us than Beersheba, though locally Mount Hood is usually the more successful.

Among newer plantings, Mr. Mitsch's lovely Chemawa has been exceptional, and in a small group of things from Ireland, all of which grow magnificently but are not yet settled as to permanence of performance, there have been excellent blooms from Border Chief, Court Martial, Jaguar, Madeira, and Pirate King.

It is impossible for the writer to make any final selection among the triandrus hybrids, as all do well, show a wide range of heights and habits, colors and styles of bloom, and include some that are properly miniatures; these last grown here only to know them. Certainly any southerner should explore the triandrus widely and not be content with good old Thalia, no matter how fine it is.

With few exceptions, the writer has no great passion for any cyclamineus hybrid and regrets that he has failed with the species itself. Cyclades, already mentioned, is outstanding and golden, and the commoner ones all do well, other than Jenny and Dove Wings which seem to need a little more care than they have here. Of the very new things, Titania has done well but no longer has the full appearance that one looks for in any cyclamineus child.

The lists are full of hybrids that belong in the jonquil group, and one may have as wide a choice as he wishes. It has been our practice to buy all of them except the most expensive novelties, and all have done well when the stock was sound. The first group to come into common use—Trevithian, Lanarth, and, a little later, Chérie—are still fine, but there are now so many better things one need not bother with the beginnings. The great advantage of the newer kinds is lower stature, more flowers per scape, a wider range of blooming dates, and a greater variety of color patterns, including some that are practically pure white. The only named variety which has failed has been Golden Goblet, in which, possibly, there is too much trumpet ancestry.

In Div. 8, the tazettas, one must decide whether he wants the nameless, commonly grown things of the South—most of them first class garden plants—or the newer hybrids once known conveniently as "poetaz." These last fall into two marked groups: those with many flowers per scape reflecting the tazetta ancestor, and those with fewer blooms suggesting the poeticus parent.

This writer has gathered all he might from each group, the nameless and the named. For garden effect and for picking, he would abandon none. It is difficult to make any choices, and it is hoped that some time in the near future someone will undertake to make more of the type that was foreshadowed in the late P. D. Williams' Medusa, Glorious, et al, using a fine type of poet as one parent, rather than the poets which seem to have been used earlier, although there is no record of any such, save Ornatus, in some of the first hybrids from Holland.

In this group are also many kinds that are either miniatures or near-miniatures, most of them with very fine character and lovely blooms, but the collection here is by no means complete or authoritative, and we can only report that so far all have done well.

Among the pink daffodils, there is nothing that can be reported as outstanding here. The older Wild Rose, Rose of Tralee, and Lisbreen have all been failures. The poor-quality Pink Rim is permanent and regular; Mabel

Taylor appears to be safe and sure but has not been here long enough. Salmon Trout has grown well but in 1965 gave poor color in spite of regular watering. Undoubtedly, there must be others that would do well.

No poeticus of any kind has been successful here, though relatively few have been tried. All appear to be too late, needing more water than can be managed. A few persist but do not bloom.

In the division for species, it can be said that all bulbocodium species and their immediate allies have done well, but some of the forms that are always winter-flowering run the risk of frost or, more often, devastating rains. Their hybrids, such as Taffeta and kin, all run the same risks.

The species that have caused most comment here have been *viridiflorus, serotinus,* and *elegans.* All bloom in October before any risk of frost, and, while the usual garden visitor rarely sees them unless they are pointed out, he may sense the delightful scent of *viridiflorus* and, in time, note the delicacy of *elegans. Serotinus* is here in very limited numbers, so missing it can cause no comment. The small species for spring do make talk; their small sizes being the most frequent cause of exclamation. Their only fault is their scarcity, and no good garden effect will come from them until they are planted in real groups.

What the South really needs more than anything else, and I refer to the Deep South in the common meaning of that term, is a larger group of experimenters to prove a wider range of success, and a small group of breeders who will choose as parents individuals known to be of merit and successful in our long, warm summers with their irregular rainfall and our indecisive and often troublesome winters.

C. THE CORN BELT

I suppose if a person living in our Middle West desired to raise the finest daffodils in all varieties, he would move to the Iberian peninsula. Here the daffodil was born. Mountains stand knee deep in the sea. Spring is moist, cool, and with a tang of salt sea air even at one to four thousand feet of elevation. And spring lasts about six months. Summer is arid, but despite the hot Spanish sun, the shadows are cool, and, although the soil may bake, it is never hot and moist. Fall slides into winter, and winter imperceptibly into spring; snow lies on the mountain peaks, but the daffodil roots are thrusting into the pebbly earth of mountain slopes, or into the rich soil of sub-alpine valleys during the entire time.

In case the family budget rebels at a pastel villa in Spain, how about a cabin or a ranch in northwest Oregon? All late winter and spring, the soft fog drifts inward upon clam digger and daffodil fancier alike. It is only during the short, dry summer that Mt. Hood can really see the extent of its holdings. The bulbs, fattened by a long, cool spring, ripen and mature and fashion next year's flowers during the rainless summer.

But suppose the daffodil fancier is firmly anchored to Iowa, Nebraska, Missouri, Kansas, Oklahoma, or a reasonable facsimile—what then? Actually, marvelous daffodils are grown in those areas; but knowledge is helpful, and effort is required.

To grow good daffodils in the Middle West, we have merely to do two important things: First, convert our climate, as nearly as possible to that of northwest Oregon. Second, seek out daffodils whose lack of sophistication allows them to be happy in a midwestern community.

Here in Des Moines, where I live, spring often begins on Sunday and ends on Thursday. I have had $-1°$ on March 28th, only to experience $+80°$ with hot, dry winds a week later. This doesn't sound much like the Iberian peninsula, but then I have learned to cheat the weatherman a bit.

First, *seek out your areas of microclimate.* That southern exposure at the base of a warm brick wall will bring spring two weeks early. The shadow of a building, or a stand of evergreens may let winter linger, and spring comes late to such an area. I have four daffodil beds at the crest of a gentle slope; the two which fall off to the south are seven

to ten days ahead of those which slope to the north, although both are in full sun.

Second, *realize that all daffodils do not blooom at the same time.* As a rule of thumb, yellow-cups and trumpets bloom early; flat, white-faced flowers bloom late. It is good to lean toward early blooming varieties, since some late bloomers are blasted by summer's first breath. Don't deny yourself the late flowers, but put them in an early microclimate. The judicious use of plant types and microclimates can give four to six weeks of bloom. Not many plants do better.

Third, *make your own rules*! Most daffodil experts live in a kindlier climate than you or I. Why fight it? Just ignore their rules and suggestions and do what comes naturally to you. The book says, "plant as soon as the bulbs are received, if possible by the end of August." This is great in Ireland, but not in Iowa. To consign new bulbs to a moist, highly organic soil whose temperature is over 90° F. can only lead to losses by disease. Disease in daffodils is uncommon, but moist heat will bring on an attack of whatever is available. *I plant the last week in September. I plant 6 in. to the base of the bulb. I dig a little potash and superphosphate under the bulbs,* because these elements do not travel through organic soil. *I occasionally plant on sand* (if I have time and enough help). This does nothing for the blooms or bulbs, but does make digging a bit easier. *I dig every three years,* if I want the best. The best blooms are from two-year down bulbs in Oregon; but we're just a year or two slower. Clumps last four or five years without especial deterioration, except for size of bloom. I *do not "treat" the bulbs* I dig. I have treated, at one time or another, with everything from whiskey to antibiotics—and fooled only myself. *It is better to dig early than late;* usually around the Fourth of July. The green foliage which has flopped on the ground points the way to the bulb and serves as a handle while digging. Cut the tops off about the neck of the bulb and shake the dirt from the roots. *Lay the bulbs out* in a cool, shaded area with good air circulation. I use the garage floor, but then my wife humors me. *Under no circumstances should the bulbs be heaped* up or piled up. This is the kiss of death to bulbs in the moist middle of the stack. I place the labels on or under the group of bulbs. After four weeks, the dried dirt, desiccated roots, and outer scales may be cleaned from the bulbs with a cautious thumb, and *the bulbs are sacked up. I use string onion or potato sacks* (burlap allows no air circulation); nylon hose work well if the female population of the house permits. The sacks are hung on nails or pegs in a shed, or placed on chicken wire shelves. I tried the air-conditioned basement, but the lack of circulating air and the humidity took their toll. If you must make a choice, daffodil bulbs withstand heat far better than moisture—and hot moisture is murder. *I never replant bulbs* immediately. To do so consigns them to the hot, moist grave.

What about mulch? *A mulch is not necessary because of cold* (we get —15° to —20° each winter). However a mulch keeps down weeds and prevents the spattering of blooms during the torrential rains which are a part of spring. I have tried all mulches available in this area. Pine needles (not available) are excellent; sphagnum moss is good (and expensive); ground corn cobs result in a mildewed mess; and grass clippings ditto. Probably *the best mulch is good turf*—sounds silly, but then, so did the horseless carriage. I have a friend who likes ground, shredded oak leaves. Daffodils like a bit of acidity in the soil, and she not only wins prizes but also has a really well-grown collection of daffodils.

Daffodil foliage takes a long time to mature and is not especially beautiful in itself. I think the word has gotten out that it is bad form to braid or tie up the foliage. This interferes with plant nutrition and makes the foliage about as unobtrusive as a set of false chin whiskers. It is far better to disguise the daffodil tops, and this is readily done by interplanting daffodils and hemerocallis in a border. The lively early daffodil blooms draw attention from the pale-

PLATE 37

CARLTON
Large-cup (Div. 2a)

green day-lily ramets; later, the towering hemerocallis leaves and bloom scapes overwhelm the daffodil foliage—to mutual advantage. And neither plant is really much bother. Also, for some reason or other, many daffodil fanciers lean toward hemerocallis as a second love; and the day-lily expert just naturally seems to gravitate toward daffodils, come springtime.

Now that we've diddled the climate into thinking we're Spanish or Portuguese, what about *a choice of daffodil varieties.* First, here are a few rules of thumb:

1. White trumpets or large-cupped daffodils were not made for Iowa. It's good to try them, but remember, I told you so.

2. Jonquils are immune to Iowa's worst, and live up to their best. Many jonquil hybrids bloom late, but that microclimate can fool them.

3. Poets do well here, but late doubles (with poeticus blood) never quite get off the launching pad.

4. Don't be disappointed at those "burning red lead cups, solid back to the ovary"—so what if they turn out to be red rimmed. The man who wrote the catalog was selling daffodils, and, also, had never experienced a midwestern sun, rampant on a field of blue.

5. Throw away things you really don't like, or which don't do especially well in your garden; make room for the many lovely, cheerful blooms that enjoy your home cooking.

There are three ways of acquiring daffodils that like you:

1. If they like your neighbor, they should like you. Check around your locality. If you can talk a friend out of a few bulbs, so much the better; locally acclimatized bulbs are always the best bet.

2. Buy a few of this and that. Abandon the weak and unhappy, and cling fast to those that are happy with you.

3. A few hybridizers are trying to come up with a strain of daffodils which do well in the Middle West. Instead of holding your breath while they work this out, why not step forward in this area yourself. I have always felt that commercial hybridizers threw away better bulbs than they kept—as far as Iowa is concerned. A plant which is not outstanding in Oregon, Ireland, or Tasmania may be thrifty, healthy, and a knockout in your home town. So just order some mixed seedlings from a reputable source, plant them out, and be your own judge. In a few years, you will have acquired some daffodils whose requirements are fulfilled in your garden. They will do better than many named and expensive novelties. As a matter of fact, there is no law which says you can't name your own little acquisition as you see fit—as a godparent you have some rights. And what if Perkin's Favorite is more healthy, beautiful, and reliable than the Empress of Ireland? That's your secret.

D. THE SOUTHWEST

The Southwest is the land of little rain, of hot summers and moderate or mild winters, of wild winds, little cloud cover, brilliant sunshine, of widely fluctuating temperatures, and the freak storm from fall through spring. It is an area which includes all of Oklahoma, the northern half of Texas, and the northern parts of Arizona and New Mexico excluding the higher elevations. Unalleviated, these conditions produce flowers that are small and poorly colored with stems that are short.

Many areas are devoid of trees or any sort of windbreak. Only those who live in wooded areas can create a microclimate without building high walls, growing large hedges, or resorting to lath houses or cool greenhouses, and flowers from plants grown under the latter two conditions are ineligible for competition in daffodil shows approved by the American Daffodil Society. The fortunate sections of the Southwest have 25 inches of rain per year, but it is usually spasmodic and frequently comes as gulley-washers with long periods of drought in between.

There are soils of all kinds from fine river sand which may contain root-knot nematodes to wonderful loam rich in humus but with enough grit to be well-drained, silt, a shallow layer of yellow clay on top of shale, or a stiff black gumbo that is much too sticky when wet and

much too hard with large cracks when dry. The pH varies with the type of soil. Some water supplies may be highly alkaline, in which case the correction for pH must be a continuous one. So we are faced generally with climatic and soil conditions that are not conducive to the growing of even good garden daffodils to say nothing of flowers of exhibition quality.

The problems are basically four: providing shade, windbreaks, more uniform moisture, and soil improvement, the latter being closely related to the others. Providing shade, except for a temporary sort of cloth or baskets or boxes moved in for the moment, can be a tedious process for those in the more arid regions. Walls or high hedges are the best protection from winds.

The problem of soil improvement can be discussed only as a personal problem, because knowledge is, of necessity, limited principally to one's own growing conditions. Here on a gentle slope with little, but slowly increasing shade, daffodils have been grown for 25 years in a silt soil with a pH of 6.5. The soil has been mulched annually, to the extent of two or three tons, with humus of all types: ground cotton burrs (the residue from ginning cotton), ground corn cobs, bagasse (shredded sugar cane), leaves, composted weeds, corn stalks, and the tops of Indian Head cannas. When the beds are remade all this has been turned under with coarse sand, limestone chips, and gypsum also being incorporated in the soil. Still there have been many losses from basal rot, and many varieties, except older ones, do not give good bloom after the second year.

During one dry season it was necessary to lift some clumps in bloom. Although they had not had the best of soil conditions and care, it was a vigorous old variety that had survived for years. The bulbs were found to have no more than two or three roots per bulb, a slender defense against occasional temperatures of 90° and winds of 40 miles an hour. It was evident that something extra in the way of soil improvement was needed. About this time heavy root systems were noted on some cuttings rooted in Perlite—a white, porous, nonorganic substance—and how they clung to life even though they were not regularly watered. So it was decided that even though the constituents of this material were not available, Perlite would be incorporated in the soil. Accordingly, it was added and a generous amount mixed with only a small amount of soil was put under the bulbs in lieu of the usual sand. There were no harmful effects and by the next year it had been ascertained that Perlite was inert except for a small amount of calcium, so the amount was increased. Bulbs grown in soil so treated and down three years, with care given to shade and watering, yielded flowers of exhibition quality. Upon digging, great clumps of sound bulbs were found, as large as any received from a dealer. Only in isolated instances was there basal rot.

The bulbs were returned to the ground immediately with a thick mulch of shredded sugar cane. All the bulbs came up the next year, a rare experience before Perlite was used. Bulbs down five years have been found to be in excellent shape although with clumps so large and heavy that division was plainly overdue.

I am aware that immediate replanting is frowned on in warmer sections of the country, but it is practiced here by some gardeners and found not to affect the bulbs adversely as far as I am aware. It may be that the drier soil here in summer inhibits the organisms which cause basal rot in other southern states where the humidity and rainfall are greater. It is difficult to see how it would be more harmful to lift a bulb and replant it immediately than just to leave it down all summer. Newly purchased bulbs or those which have been dug and stored are usually planted toward the end of September.

Perlite makes an excellent mulch, a 2-in. covering reducing the temperature at the surface of the soil by 5° when the air temperature is at 100°. It discolors with age, which is probably desirable

PLATE 38

SELMA LAGERLÖF
Large-cup (Div. 2b)

PLATE 39

WHITE LION
Double (Div. 4)

from an esthetic standpoint, but it does not deteriorate. It may be turned into the soil when lifting the bulbs. Perlite gives great promise of being the answer to soil improvement which will make possible wider growing of daffodils of better quality under our trying conditions.

As a general rule, all white daffodils, with the exception of the triandrus hybrids, are subject to basal rot in this area. Among the trumpets, the reversed bicolors and the lime-colored yellows do well. The large, coarse trumpets suffer from wind damage unless protected. King Alfred does poorly throughout much of the Southwest.

Of the large cups, the yellow and orange or reds are the most successful. Here again the whites rot with a few exceptions, but the reversed bicolors and lime-colored yellows are quite satisfactory. Red rims burn badly and orange and red cups will be paler than normal unless protected from the constant sun. The small-cupped whites are prone to rot and those with red rims also burn badly.

Except for the Cheerfulness clan, doubles blast unless they can be given a cool, shaded situation. On the whole the triandrus, cyclamineus, jonquilla, and tazetta hybrids do well, especially the jonquils. The late-blooming poets are not satisfactory and pinks have a tendency to basal rot.

Recommending named varieties can be misleading due to the varied conditions within this region and even within one's own experience this year's favorite may be next year's failure. However, it might be said that the following have been quite dependable:

1*a* Burgemeester Gouverneur, Emperor, Garron, Goldcourt, Golden Melody, Grape Fruit, Hunter's Moon, Kingscourt, Mulatto, Trumpet Major.
1*b* Empress, Music Hall, Glengariff.
1*c* Beersheba, Broughshane, Mt. Hood.
2*a* Armada, Bahram, Ceylon, Carlton, Dunkeld, Fortune, Golden Torch, Hugh Poate.
2*b* Duke of Windsor, Festivity, Jules Verne, Selma Lagerlöf, Willamette.
2*c* Still Waters.
2*d* Binkie.
3*b* Matapan.
4 Cheerfulness, Yellow Cheerfulness.
5*a* King's Sutton.
6*a* February Gold, March Sunshine, Peeping Tom.
7*a* Golden Goblet, General Pershing, Sweetness.
7*b* Goldilocks, Trevithian.
8 Geranium.
10 × *biflorus, jonquilla, poeticus recurvus* [syn. Pheasant's Eye], × *tenuior,* × *odorus* (syn. campernelli).

E. THE PACIFIC NORTHWEST

As are England, Ireland, and Holland, the Pacific Northwest section of the United States is considered very nearly ideal for the culture of all types of daffodils. As almost all gardeners know, daffodil bulbs are commercially produced in this area in enormous quantities. The soil is deep, there is abundant moisture but not excessive heat, and diseases are not a very serious problem for the home gardener. Daffodils find most of our soils to their liking and about the only concern is to avoid one which is poorly drained in view of our ample rainfall. In addition, heavy clay soils should be shunned or have enough humus added to make them friable.

While daffodils will flourish in almost any situation here, they will benefit from a careful selection of stock and observance of a few good cultural practices. The first and most important step any gardener will take is to select sound, healthy bulbs which can be obtained from reputable growers and seed houses. Choice of the numerous colors, types, and season of bloom is an individual matter, and disease-free stock of virtual-

ly all types is available.

In any locality, bulbs can be planted after the fall rains begin and the soil is cool and moist. Planting can commence here as early as September 1, but most gardeners and commercial growers plant between mid-September and mid-October. This allows a minimum of six weeks for heavy rooting before the approach of our brief winter brings growth to a halt.

The soil should be worked well to the depth of a foot or more. Bulbs to be left down for two or three years should be given at least 4 inches of space if planted in rows and 8 inches each way if bedded in blocks or clumps. About 4 inches of soil should cover the tops of the bulbs.

Daffodils do not require rich soil, but foliage will be more lush and flowers will have more substance if an optimum fertility is attained. Almost any balanced plant food will do. A commercial fertilizer such as 10-20-20 has been found to be satisfactory. It can be applied as a side dressing at the time the bulbs are planted or as a top dressing subsequently, but it must never come in actual contact with the bulbs. Mulches are not necessary here although they do no harm. Their main value is to discourage weeds which grow vigorously in the mild climate like every other plant.

When the foliage begins to emerge early in the year, the first task of daffodil growers is to watch for plants showing symptoms of virus. The most common one here is the Yellow Stripe virus and the only method of control is prompt destruction of infected plants. The leaves should also be examined several times during the growing season for diseased plants.

Otherwise, no particular attention need be paid the plants until just before the flowers open. One or two applications of Bordeaux or micronized copper spray before and after the blooming period is beneficial. Its purpose is the control of Botrytis, a fungus disease prevalent in abnormally wet seasons causing brownish spots on the blooms and early dieback of the foliage, thus retarding growth of the bulb.

The daffodil fly is a common pest and even bulbs which are free when planted can become infested from a neighboring garden. Commercial growers here control the fly with a preplant immersion in cold water to which aldrin, chlordane, or heptachlor has been added according to directions. Heptachlor is the most popular since it requires a shorter period of immersion. Enough residue of any of these materials adheres to the bulbs to kill newly hatched grubs as they try to enter the bulbs the following season.

Fusarium, or basal rot, is not nearly the problem here that it is in warmer climates. Mercury compounds are available for control, but they should be used with the utmost caution, both for the sake of the bulb and the gardener.

If there is any need to spray for weed control, it is advisable to check with a county agent or other authority on selective weed sprays.

The foregoing is not intended as more than passing references to the pests and diseases which may occur in the Northwest. Complete information on identification and treatment will be found in Chapters 7 and 8.

If bulbs are to be lifted, it can be done beginning about June 15 with the early varieties, but in general the first two weeks in July are preferred. Usually bulbs are not returned to the soil until fall and the secret for carrying them through in good shape is to store them in containers which protect them from rain and direct sunlight and yet allow air to circulate through and around them.

The mild winters give us the boon of a long flowering season. Depending on the year it can be expected to start any time after the first of January with *N. asturiensis*, followed by the bulbocodiums, and *N. cyclamineus* and extending well into June. No thought need be given as to which varieties do best in Oregon and Washington. Any daffodil which will grow in the British Isles or Holland will grow in the Pacific Northwest which means that any species or garden hybrid likely to be offered by cat-

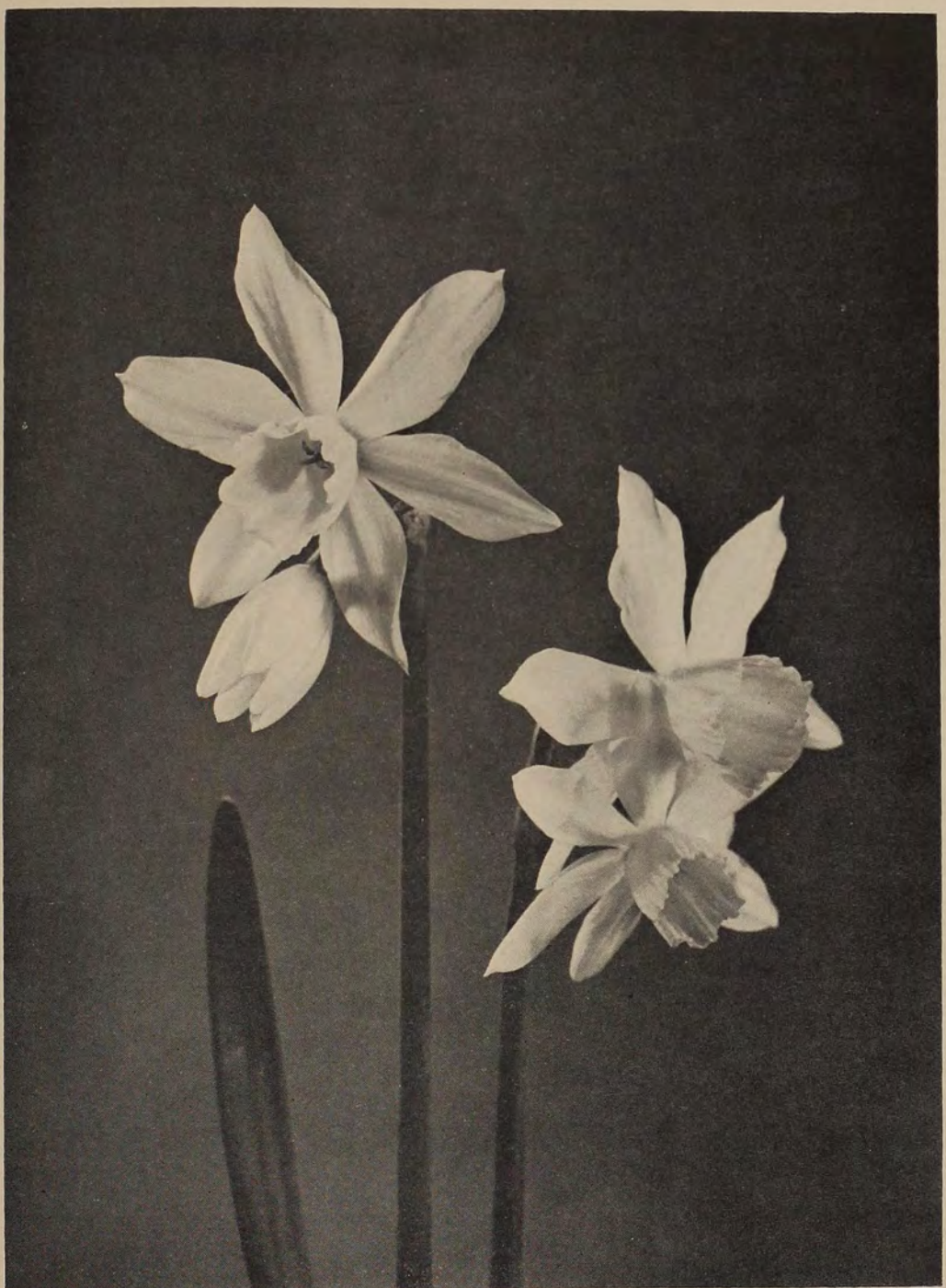


PLATE 40

THALIA
Triandrus (Div. 5a)

alog or found in stores will be perfectly at home in this area.

As I said in the beginning, the Pacific Northwest is undoubtedly the finest section of the United States for growing daffodils. It is virtually impossible to keep them from growing. So if you are an armchair gardener and even these simple observations sound arduous, throw your bulbs out on a grassy plot or in an orchard and forget them. Nature will stand them up, contractile roots will pull them into the soil, and they will still be blooming twenty years hence. About the only justification I have for making these suggestions is that you may get somewhat better flowers and certainly greater enjoyment if you give at least token observance to them.

F. THE PACIFIC SOUTHWEST

Gardeners who join the trek to Southern California will have little use for any previous experience in growing daffodils. All they need to bring with them is their enthusiasm and an open mind.

The highest temperatures of the year often occur here during late September or early October; occasionally the heat continues right up to November, so that late fall is the best time for planting daffodils in this corner of the United States. One waits, however impatiently, until the soil temperatures have cooled considerably and the evenings hold the promise of cooler days with hints of rain.

Sunny California is an attractive slogan, but the other side of the coin carries the inscription that drought is a way of life with us. This was semi-arid country when the pioneers settled here and planted vast groves of orange, lemon, avocado, walnut, and other trees. With such improvements to the watershed the rainfall increased until as much as 14 inches could be anticipated in a normal rainy season which lasts from October through March. During and after World War II huge industries moved in followed by hordes of workers who leveled the groves. As the population increased the rain lessened, until two years ago our rainy season brought us scarcely 4 inches.

The blooming season is very long throughout Southern California, although it becomes somewhat compressed as one moves north or into nearby higher elevations. The "Sacred Chinese Lilies" (*tazetta orientalis*) will be in bloom in Los Angeles by Thanksgiving along with Paper Whites, *N. viridiflorus* and *N. serotinus*. Santa Barbara will be two or three weeks earlier and Yucaipa at an elevation of 4,000 ft. occasionally sees snow and will be three weeks later. These deviations within short distances simplify the problem of filling all classes at a daffodil show. Somewhere nearby it is early or late or mid-season.

Our soils are varied, from light and well-drained to hard as a piece of terra cotta, or it may be decomposed granite overlaid with humus or pure river sand crawling with nematodes. The chances are you will find yourself on a heavy variety which bakes to armor plate in the summer sun, but whichever it may be, it can be improved by the addition of humus and wood ashes.

The ground should be well worked, preferably to a depth of 18 inches. A few days before setting out the bulbs, work it over once more, adding a little bonemeal and some cool fertilizer, such as one of the non-burning sludge derivatives. Water the beds well and let them settle. The soil for planting should be cool and damp but not wet to the touch; when clutched into a ball in the hand, it should retain its shape but with a slight crumbling at the edges. If it balls tightly and fails to crumble and looks shiny when released, it is too wet; if it fails to hold its shape at all, it is too dry.

The actual planting of the bulbs is a simple procedure, one that is followed wherever bulbs are grown. Dig a hole to a depth of no more than three times the diameter of the bulb being sure to level the bottom. Set the bulb flatside down and cover with soil. Dampen the beds with a fine sprinkler after planting and continue to water about once a week, or oftener should there be drying winds. When the bulbs start through the soil, spray with a malathion spray to discourage thrips and keep the beds damp but not saturated. When a daffodil is

growing it can stand a lot of water; more at that time than at any other in its life cycle. A drink of low-nitrogen fertilizer of slightly acid reaction will help the quality of blooms, the color will be benefited thereby, and the acidity will help counteract the alkalinity of the hard water in this area.

The strict admonition to allow all foliage to ripen naturally after blooming is the same here as elsewhere. When the foliage has turned yellow brown and is limp and comes away with a slight tug, then and only then is it safe to remove it. When the foliage is removed, it will leave holes the size of one's finger; fill these immediately with soil to which a little insect repellent has been added, otherwise they become runways for earwigs, sowbugs, ants and other pests as well as serving as funnels down which water will run and encourage rot.

Just before or after cleaning the beds of old foliage for the summer, shallow-rooted annuals can be interplanted, forming a natural cover and cooling agent for the beds during their resting period. Annuals which are good for this purpose are alyssum, petunias, marigolds (the good, strong, smelly, old-fashioned kind may be especially beneficial in repelling nematodes, so it is rumored). Mulching the beds with woodshavings, redwood bark, or dry vegetable material is an aid in keeping down weeds and maintaining a constant supply of moisture. However, if such material is used, do not work it into the soil in the fall. To do so will rob the soil of its nitrogen and the bulbs will not have enough for their own needs; unless more is added the nitrogen balance is destroyed and when once this balance is disrupted it is difficult to attain again. Therefore, it is better to remove the old mulch, fertilize as the plants need it, and then mulch with new material. Compost the old mulch so that it may serve yet another purpose.

It has been said that no plant is difficult to raise if its requirements are met, but few gardeners can comprehend that any adaptation is involved in transplanting a daffodil bulb from its cool, moist home in England or the Pacific Northwest to the hot and arid climate of Southern California. The time required for this adjustment can often equal that necessary to grow an entirely new bulb, or from four to seven years, depending on the type. This is particularly true with some varieties in Divs. 3 and 9. Not only must a bulb adjust to an unfamiliar atmosphere, soil, water, climate, and type of culture, but also to an entirely new time schedule.

The blooming period is one of the most intriguing characteristics of a daffodil. The more northern regions have a shorter blooming period than Southern California; here the period of bloom is longer with a greater distinction between the early, midseason, and late stages. The adjustment to the preferred blooming date by the plant will not be noticed by the casual gardener, but to the serious fancier who keeps a notebook, this process will be fascinating. He will note that during the first three or four years the blooming dates never, or hardly ever, coincide; usually it will become progressively earlier except in Divs. 3 and 9 where quite often the reverse will be experienced. Gradually stabilization will result and the opening dates will be found to lie within the span of a week or less.

Some varieties are almost akin to a calendar in their regularity; Arctic Gold, Content, Diotima, Binkie, Ceylon, Polindra, Silver Chimes, Chérie, Hesla, and Actaea are in this category. Strangely, Lemon Doric, a seedling of Binkie, has yet to settle down, though it has been in the garden for over five years and in its present site for three. The first year it bloomed March 25, and the date has been advancing each year since then; this past season it opened January 30.

The time of adjustment can be shortened if the bulb is left undisturbed for at least three years after its initial planting. Some varieties, mainly trumpets, the whites in all divisions, and the poets resent being disturbed as often as recommended for the best blooms. It must be remembered the atmosphere has a much lower percentage of moisture than elsewhere and in such a dry atmosphere the bulb, when out of the ground, loses

PLATE 41

FEBRUARY GOLD
Cyclamineus (Div. 6a)

much of its stored moisture and is thereby weakened. It is this factor which could possibly explain lack of stamina or the failure of performance on the part of a new bulb.

One of the challenges presented to the daffodil grower in this region is that of the high desert winds which often come at show time. To combat these and the accompanying low humidity, some growers erect stake frames around which are secured gunny or muslin fabric to form screens. Water is then sprayed over the material, thus raising the humidity and lowering the temperature within. Care must be taken that such structures do not become airborne and fly through the beds.

Some screening must be given the delicately hued and red-cupped flowers if fading and burning are to be prevented; therefore, consider protection from the sun and winds when selecting the planting site. There are very few red and pinks which will not burn if exposed to the sun and wind; winds can burn a bloom before the sun even touches it. It is better to rely on natural shields such as shrubs and trees, and permanent structures such as houses and walls, than to build temporary screens which are subject to destruction from the winds.

Cultural practices which produce firm substance and clear, bright colors are basically simple. The soil must have a slightly acid reaction to insure the best color, and it is better to create this with leafmold soils than chemicals. Acid fertilizers low in nitrogen and high in potash and phosphates, of the type sold for camellias, have proved satisfactory here in Southern California, where the soil is alkaline and the water is hard and heavily chlorinated.

Of all the divisions, Div. 9, the poets, give us the most trouble. Where extremes of temperature can be avoided and the water supply is maintained to their liking, they are superb. They seem to require more humidity during their growing and blooming periods than other types.

The whites are a bit difficult if the soil is so heavy that drainage is poor, but incorporating a goodly amount of sand and some leafmold to lighten the soil and improve the drainage will help. It must be remembered that if the soil is light it will heat during the hot summer days, and if water is applied at such times the beds will steam and the bulbs rot. It is better to have a groundcover or a thick mulch over beds exposed to summer sun to help maintain a lower soil temperature than to leave them without any protection.

Almost every variety of daffodil can be grown outdoors in Southern California, although, as I have suggested, some are less tolerant than others. It is dangerous to generalize beyond one's own experience, so I will only say that under my conditions and with the care I am able to give them, the following varieties have proved to be quite satisfactory:

1*a*. Kingscourt, Inver, Moonmist.
1*b*. Frolic, Trousseau.
1*c*. Cantatrice.
1*d*. Spellbinder.
2*a*. Ceylon, Galway, Home Fires, Indian Summer, Ormeau, Revelry.
2*b*. Polindra, Red April, Rosario, Statue, Ulster Beauty.
2*c*. Snow Dream, Wedding Bell.
2*d*. Binkie.
3*a*. Ardour, Doubtful, Market Merry.
3*c*. Chinese White, Silver Princess, Silvermine.
4. Erlicheer, Royal Sovereign, White Lion.
5*a*. Rippling Waters, Thalia, Tresamble.
5*b*. Dawn.
6*a*. Bartley, February Gold, Roger.
7*a*. Sweetness.
7*b*. Hesla
8. Golden Dawn, Silver Chimes
9. Actaea.

—7— Pests

The reason most people, including myself, enjoy growing daffodils is that they thrive, even when totally ignored. Cottontails in my garden destroy crocus about as fast as they emerge from the ground. Roses, unless treated regularly for Japanese beetle, black spot, and powdery mildew, are soon an unhappy, unthrifty lot. But "good ole" daffodils; I can plant them anywhere, and in spite of grass, weeds, poor clay soils, and hard cold winters, I get a wonderful show. In fact, many of the blooms to my untrained eye appear to be bench, blue-ribbon winners.

I feel certain you, too, walk in your garden with the uninitiated visitor who marvels at your wonderful skill in gardening. Little does he realize that with daffodils, it is hard to fail. They are the flowers for the casual weekend gardener or the expert.

One of the big reasons daffodils do so well in my garden and in yours is that they are attacked by relatively few insects, diseases, and other pests. "Oh," I can hear you say, "that's what you think." Suppose daffodils were like red clover, which is attacked by over 200 different species of insects feeding on every portion of the plant from the pollen to the nodules; or corn, which is assailed by over 250 species of insects. Daffodils are bothered by less than a dozen important pests, and for the home gardener only two or three of these are really destructive. I would like to discuss these for you and suggest how you might care for them in your home garden.

BULB FLY

Among the most troublesome of the daffodil pests is the maggot of the narcissus bulb fly. We entomologists call it *Lampetia equestris* Fabricius when speaking of it in scientific writings. The bulb fly occurs throughout the United States wherever daffodils are grown. In New York it is most common on Long Island and southern New York, where daffodils are also most commonly grown. The bulb fly larva feeds on daffodils and other hosts as well. Some of these are *Muscari, Iris, Gladiolus, Scilla, Lycoris,* lilies, and others. In general the bulb fly appears to prefer *Narcissus.* In home plantings, infestation may reach as high as 50 to 75 percent of the plants, although usually it is more often in the 10 to 25 percent range. In commercial plantings, where control is generally practiced, infestations may only range from 1 to 10 or 15 percent.

The adult bulb fly resembles a bumble bee in color and flight habits. It may be seen on sunny, warm days buzzing and zigzagging low around your blooms, but instead of pollinating them it is laying eggs. The adults are about ½ to ¾ of an inch long and their black hairy bodies are encircled with bands of yellow, buff, and orange. In New York the first bulb flies appear in late April or early May with the first daffodil blooms and continue to emerge during the entire blooming season. The flies mate and the female begins laying eggs. The tiny white eggs are laid and placed singly on the leaves at the base of the daffodil plant (at the neck) near the soil surface, although they may be scattered on the ground or in cracks in the ground. The eggs hatch in a week to ten days or more depending on the temperature. The young legless larva or maggot burrows down along the side of the bulb and enters it at the junction of the roots and base of the bulb, entering the basal plate through the root ring. Usually, there is only one maggot in each bulb, although there may be two, three, or rarely even more. The maggot

feeds on the basal plate and then tunnels with its hooklike mouth parts up into the scale region of the bulb, consuming much of the tissue. Here it passes through three different distinct sizes of maggot stages or instars, as it tunnels back and forth and finally upward. The maggot which is now wrinkled, plump, and greyish white to a yellowish tan passes the winter in the bulb. In early spring, it resumes activity and burrows out of the bulb and up near the soil surface. Here the maggot pupates within its last molted skin which forms a hardened pupa called a puparium. The puparium is hard, rounded at the ends, and dark brown to black. It has a breathing tube and a convenient escape hatch. The fly remains in the pupal stage 30 to 75 days or more depending on the soil temperature. The fully developed fly pushes out the escape hatch and works its way up into the plant where it flexes and dries its wings before mating and starting its life cycle over again. There is only one generation a year, although in some cases two years are necessary to complete larval development.

The best control of the bulb fly is based on protection of the bulb. A number of insecticides have given excellent results. Among these are aldrin, dieldrin, chlordane, endrin, heptachlor, Telodrin, and Thiodan. Others such as lindane, phorate, and Systox will work but are either too toxic to the home gardener to use or may cause injury to the bulb; but more on control a little later.

TC—7188B

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NARCISSUS BULB FLY

APHIDS AND VIRUS

The insecticides last mentioned are systemic and particularly effective on aphids and to a lesser extent on mites, leafhoppers, and thrips which are involved in the transmission of virus dis-

eases of *Narcissus*. Virus diseases are mainly the concern of the commercial large scale growers who must practice vigorous rogueing or weeding out of diseased plants whenever these appear in their plantings, as these diseased bulbs will retain the virus and pass it along to the newly formed bulbs which are usually smaller and less thrifty in appearance.

The home gardener will find that it pays to learn the symptoms of virus diseases and rogue coldbloodedly, too. Affected plants show green color that is unevenly distributed or streaky. The plants are decidedly reduced in size and vitality. Such plants should be pulled and destroyed by burying or being cast into the garbage can. Never place it where it may infect others from the compost heap.

Seven aphids are proven vectors of *Narcissus* mosaic or virus disease. The most common of these are the pea aphid, the rose aphid, and the potato aphid. As these names indicate, these aphids feed primarily on other crops found near our homes.

Good aphid control will not insure virus-free daffodils, as only a few infected insects feeding for a very short time can transmit the disease. Therefore, the best defense remains pulling and destroying the infected plants.

Recently Floyd Smith and Stanley W. Jacklin have been finding that the use of silver foil seems to repel aphids, and they are getting some success by lining the spaces between rows with foil. It is a bit early to say whether we can depend on this method to insure virus-free plants. At any rate, insecticides have not as yet solved the virus problem on daffodils in spite of their effectiveness in killing most of the bugs. You might want to try the new foil method.

Viruses are discussed in greater detail under diseases in Chapter 8.

CONTROL OF BULB FLY

For controlling the larvae of bulb flies, commercial growers make up an emulsion, usually of dieldrin or heptachlor, using one-half to one pound of toxicant to 50 gallons of water and adding a fungicide, such as formalin at the rate of 1 quart, or phenyl mercuric acetate (1 to 2 ozs.), to the water.

The bulbs to be treated are placed in wire baskets or loosely woven onion bags and then suspended in the emulsion ten minutes to an hour—usually ten minutes are enough. The bulbs are removed in the containers and hung to dry. They are now ready for planting. For commercial growers, I think this is a good practice, but for the average home gardener there are easier and much safer ways to treat the bulbs. Aldrin, dieldrin, chlordane, and heptachlor may be fatal poisons if swallowed. Skin contact with the emulsifiable concentrates is dangerous. The fumes, vapors, or spray mists can also be dangerous. If you wish to use the soak treatment, handle the insecticides and treated bulbs with sound

PLATE 43 U. S. DEPARTMENT OF AGRICULTURE

NARCISSUS BULB FLY
The legless larva or maggot burrows up into bulb from base.

rubber gloves; work in a well-ventilated area, preferably outside; and after treating the bulbs take a hot soapy bath and change into clean dry clothes including your shoes and socks. Plant and handle the treated bulbs only with tight rubber gloves.

Even though I am a professional entomologist and have handled literally tons of insecticides, I prefer to treat my bulbs in the following manner. First I remove any loose scales and dirt from the bulbs, then I roll them in a powdered fungicide, such as Ceresan or Arasan (others may be used), to protect against basal rot. Then I dig my holes or planting trench (for seedlings and bulbs for cut flowers). Using 5% granular formulations of heptachlor or dieldrin, I treat the bottoms of holes or trench; I find a teaspoonful per bulb hole is just about right. The bulbs are set in place, lightly covered, and an additional teaspoonful is added on top of the bulb. Finally the hole is filled and tamped firmly. No dust, no fumes; clean and safe.

During dry summers such as we have had for the past several years in New York, I fill each hole with water ten minutes before I begin to plant. This gives the newly planted bulb a fine start. After the water has disappeared, I start adding the granular insecticides.

Granular insecticides can be purchased from the larger farm stores or commercial fertilizer plants but not as readily in the small hardware store on the corner. All the larger agricultural chemical companies, such as California Chemical Co., E. I. Dupont de Nemours and Co., Geigy Agricultural Chemicals, Shell Chemical Co., Velsicol Chemical Co., and others, maintain offices throughout the United States, Canada, and, in fact, the world. Granulars should be readily obtainable in your area.

Some home growers might prefer to plant the bulbs in place and just prior to covering treat them with an emulsion spray of aldrin, chlordane, dieldrin, endrin, or heptachlor. Others might prefer to use a garden duster with 5% dust formulations, but for my money I'll take the granules. Granulated insecticides are just about dust free; they are freeflowing, easy and clean to handle. I much prefer them to dusts, or even sprays. Hand sprayers are notorious for clogged nozzles and leaky hose connections. I use a portable hand sprayer for aphids, thrips, and mites, but I don't like it and think a good, leakproof, easy-to-care-for one has yet to be built.

After the blooms have begun to fade, I like to run a hand-operated lawn fertilizer spreader over the plants filled with 2 to 5 percent heptachlor, dieldrin, or aldrin granules. These fall into the spaces between the leaves, stems of the plants, and the soil. Here it leaves a good residue toxic to both the bulb fly larvae and the flies. Following such a bulb-treating program, I have kept my bulbs free of such "soil inhabiting" pests as the bulb flies, lesser bulb flies, wireworms, Japanese beetle grubs, and June beetle grubs.

LESSER BULB FLY

Frequently daffodil bulbs are found just about rotted and full of maggots. These are often accused of being bulb flies, when actually they are lesser bulb flies. Lesser bulb flies belong to the genus *Eumerus*, and there may be several species involved, but the most common of these is *Eumerus tuberculatus* Rondani, known as the lesser bulb fly.

Unlike the bulb fly, the lesser bulb fly prefers injured bulbs, particularly those injured by frost, nematodes, or cases where basal rot has set in. The larvae do not infest sound, healthy bulbs or dry bulbs in storage, but only appear to be able to enter bulbs affected by decay and disease.

The eggs, as in the case of bulb fly, are small and white and are laid close to the necks of the bulbs; being deposited in groups of 3 to 15, closely side by side, in neat little clusters. The little maggots emerge from the eggs and enter the soft, decaying tissue. Twenty to a hundred or more may enter a single bulb, although usually 20 to 30 or 50 are the usual number. The maggots are legless, dirty yellowish and only about 3/8 inch in size. They pass through a life cycle

much as the bulb fly except that there are two generations a year in parts of New York, and two and a partial third on Long Island. There is much overlapping of sizes and generations throughout the state.

The methods of control outlined for bulb fly are applicable to the lesser bulb fly.

NEMATODES

According to Thorne, the bulb and stem nematode *Ditylenchus dipsaci* (Kuhn 1857) Filipjev 1936 was first recorded in 1825 by Schwertz who described certain diseases of rye, oats, clover, and other crops but did not observe the nematodes. His characteristic descriptions indicate that he had the eelworm but did not recognize it as such from the symptoms. The causal agent was uncovered in 1867 by Kammodt. In the meantime, Kuhn in 1857 discovered *D. dipsaci* in teasel and described the nematode for that plant. He redescribed unknowningly the same nematode from other plants several others times, as did other workers who assigned new and different specific names to populations on different plants, rather than presenting good diagnostic characters so that the nematodes could be recognized. Much confusion as to names remains to the present day. The nematode has a wide range of host plants, ranging from daffodils to phlox, strawberry, red clover, alfalfa, onions, rye, potatoes, tulips, sugar beets, and mint. In fact, there are over 450 known host plants of 44 different families.

How can you tell if you have nematodes or eelworms? Leaves of badly infested daffodil bulbs bear elongate swellings called "spikkles." These can be detected by stripping the leaf between the thumb and finger. In later, more advanced stages, the spikkles become yellow or brown in the center and may break down into small dead spots. In the late summer, when the leaves are dead and the bulbs mature, the nematodes will be found lying quiescent in the dry leaf tissues. Entrance into the immature leaves is made from the bulbs, it is believed, through the stomata. Some of the nemas go down into the scales where the leaves originated. After the nematode colonies become established, they form brown spots in the bulb scales which become larger gradually until the entire scale is involved. In the more advanced stages, brown rings can be seen if the bulb is cut in two. The flowers and leaves from infested bulbs are deformed, usually stunted, and often bear spikkles. Under very severe infestations, the bulbs may fail to produce any blooms.

Nematode reproduction will continue during bulb storage and often bulbs break down completely in storage. Badly decayed bulbs are not good homes for nematodes and the nemas often emerge from the bulbs near the basal plate in a woolly-like mass which is spread by the shoes of workers or by machinery to clean bulbs. If infested bulbs are planted, the nemas can migrate through the soil to other clean bulbs.

Other nematodes of the genus *Pratylenchus* are found in most soils of the Northeast. There is much confusion as to species and host plants, with *penetrans* and *pratensis* being confused, even by scientists. *Pratensis* does feed on daffodils in the Netherlands and has been found in New York on grasses and legumes, widely distributed. I think it more widespread than *Ditylenchus dipsaci* but much less important to the daffodil grower. At any rate, the chemical fumigation suggested for *dipsaci* will also destroy *Pratylenchus*.

CONTROL OF NEMATODES

Control of nematodes in bulbs is usually done using the hot water treatment which is said to have originated with J. W. Barr in England in the early 1900's. Later Ramsbottom in 1918 developed the 3-hour immersion treatment at 110° F. In the United States, this treatment failed to give the desired results in many cases, so a modification of the hot water was made in 1940 by Chitwood and Blanton, who found that one pint of formalin added to 200 gallons of water greatly improved its effectiveness on nematodes. Later it was found that a warm water (75° F.) plus wetting agent

presoak prior to treatment further improved its effectiveness. At the present time the Plant Quarantine Division of the USDA uses 4-hour immersion treatment and recommends this schedule to daffodil growers in the Pacific Northwest. With your own bulbs, be certain to remove badly decayed bulbs prior to treatment with hot water, because with such bulbs 80 to 90 percent of the nematodes survive. Complete kills, however, can be made in bulbs with only slight infestations.

Nematodes can be controlled successfully in the soil using a soil fumigant. One of the best of several soil fumigants is Telone. It is a D-D mixture of chlorinated C_3 hydrocarbons, including 1,3-dichloropropene, 1,2-dichloropropane and related compounds. For sandy soils 25 gallons are used per acre, but on heavier clay soils 30, or even 40, gallons are needed per acre. The fumigant is injected in small areas using a hand injector at depths of about 6 inches in holes spaced 10 inches apart. For light sandy soils and small areas, it may help to cover the treated areas for 48 hours with a plastic sheet or a canvas cover to prevent a too rapid loss of fumigant from the soil. If the fumigant dissipates too rapidly, incomplete kills of nematodes will result. It is best to fumigate in July or early August when soils are warm and allow a period afterward for the fumigant to leave the soil. One should allow a minimum of three or four weeks before planting to daffodils again. Since the fumigant will cost $65 to $125 or more per acre, depending on the type of soil treated and the amount of fumigant needed, it is obvious that treating large areas will be expensive. Commercial growers will want to rotate their bulb crops every six years. While volunteer bulbs are removed for the first three years, grain cover crops are usually grown. This is followed by three years of grain, hay, or row crops during which time weed host plants of the nematode are kept to a minimum. Sanitation measures in your garden and storage areas are most important. Leaves and stems should be gathered and burned in the field. Care should be exercised where soil, fragments of infested bulbs, nematode "wool," etc., are discarded. There is no easy way for a home gardener to handle the nematode problem short of discarding all infested bulbs and practicing good sanitation. Fumigation of small areas is fine if a trained man is hired who knows what he is doing and has the necessary equipment to do it. Some success can be achieved by plowing, treating with a watering can, and rototilling the soil well.

Nematodes are also discussed in Chapter 8.

You have all heard much of the pesticide controversy and, being unfamiliar with pesticides, you may be greatly concerned with their use in your daffodil plantings and flower gardens. There is no question that any pesticide can be misused, but if you use them wisely according to the directions of your state college or the U. S. Department of Agriculture, they can be a wonderful tool for you in your home garden. The safest rule to follow is do not experiment and follow directions precisely.

—8— Diseases

Daffodil diseases need not be major problems for the home-owner or the hobbyist if the bulbs are given reasonable care. This includes: planting in locations having good air and soil drainage; avoiding excessive use of nitrogen, phosphorus, and organic matter; changing plant locations at least every other year; removing flowers as soon as they wither and diseased leaves or plants as soon as they appear; avoiding bruising, sunburning, or overheating when digging; and storing in a cool, dry place until planting. These practices should minimize the disease problems which are described in this chapter. The recommendations are designed primarily for the home gardener. Additional information is contained in several of the recent books on daffodils and in the *Handbook on Bulb Growing and Forcing* published by the Northwest Bulb Growers Association in 1957.

POOR GROWTH

Stunted or yellowed growth is often a reaction to poor growing conditions, but it may be caused by fungus and nematode attacks. The most common pathogen is the *Fusarium* fungus which produces the basal rot of bulbs; a less common parasite is the root lesion nematode which feeds on roots, and occasionally other pathogens are responsible.

BASAL ROT

Basal rot is a serious and worldwide problem but more destructive in warm climates than in cooler areas, such as the Pacific Northwest. The fungus spreads rapidly in the soil at temperatures of 65° to 75° F. Temperatures below 55° retard spread and infection. Most large trumpet varieties are susceptible, particularly the white and bicolor types. Golden Harvest usually is much more susceptible than the common King Alfred. The jonquils, tazettas, triandrus, and cup types are usually resistant.

Plants from bulbs infected with basal rot are stunted, yellowed and often die prematurely. Roots are few or lacking. Eventually the bulbs are partially or entirely decayed with a soft, chocolate or reddish-brown rot which usually starts at the base of the bulb. A white or pinkish mold often develops between the scales and on the base. Severely diseased bulbs eventually dry into mummies. (The disease is caused by *Fusarium oxysporum* f. *narcissi*. This form is distinct from the ones causing basal rots of tulips and iris.)

Symptoms that may be confused with basal rot can be caused by overheating, freezing, or an overdose of methyl bromide when the bulbs are prepared for marketing. Overheating results in a brown decay beginning first at the root initials and flower bud. In contrast, after freezing injury, tissues other than roots and flower buds are the first to become discolored. An overdose of methyl bromide produces a grayish-brown breakdown, which progresses rather uniformly from the outer surface inward and along junctions of slabs and flower stems.

Infection in the soil by the basal rot fungus usually starts in the roots and progresses into the basal plate and scales. Infection usually occurs late in the growing season, especially when warm (65-75° F.) temperatures and abundant soil moisture coincide. This combination often occurs in the eastern United States but is less common in the cooler Pacific Northwest. Infection may also occur during digging, cleaning, and grading when healthy and diseased bulbs are mingled.

PLATE 44 C. J. GOULD

YELLOW STRIPE OR MOSAIC VIRUS

PLATE 45 C. J. GOULD

SILVER OR WHITE STREAK VIRUS

PLATE 46 C. J. GOULD

BASAL ROT

Infection during storage usually starts at the base of the bulb but occasionally elsewhere, particularly at wounds, bruises, sun-scalded areas, etc. As the bulbs mature in storage they become increasingly resistant to infection, but as soon as root activity begins they again become susceptible.

CONTROLLING BASAL ROT IN THE GARDEN

Proper culture is essential for the control of this disease. Dig bulbs as early as practicable and in cool, dry weather. Dry rapidly with good air circulation. Avoid sunburning, bruising, or otherwise injuring the bulbs. Diseased bulbs cannot be cured, so discard them as soon as found to avoid contaminating others. Store clean bulbs under cool (55-60°), dry, well-ventilated conditions. Change locations at least every other year, if possible.

In addition to proper cultural handling, a dip in a fungicidal solution is frequently desirable, but it is only recently that suitable types have become available in packages small enough to be practical for the average hobbyist. Dip bulbs for 10 or 15 minutes in a fungicidal solution at room temperature about 5 to 7 days after digging. Phenylmercury acetate (PMA) has been the fungicide most used in the United States in recent years. The standard rate is one level teaspoon (of the 98% powdered type) in 3 gallons of water (3.2 oz. in 100 gal.). First, make a paste of the wettable powder with hot water before mixing with remaining water. Since it is rather difficult to dissolve powdered PMA, some growers prefer to use liquid formulations. The 10% liquid type of PMA should be used at 3 liquid oz. in 10 gallons of water. Dirt "ties up" mercury compounds. Therefore, fresh solutions should be made up after dipping 4 lots of bulbs if they are clean, or after 2 lots if they are dirty. Plastic buckets or similar containers should be used since mercury reacts with most metals.

Although PMA has been the standard treatment, we have been continually looking for better fungicides. For example, during the 1964-65 growing season we compared PMA with two other mercurials (Elcide, containing sodium ethylmercury thiosalicylate, and Morsodren, containing methylmercury dicyandiamide). Each of the fungicides was used on the varieties Rembrandt and King Alfred at two rates in three different schedules of application (one week after digging, just before planting, or both times). Similar tests were also run to control basal rots of tulips and bulbous iris.

Disease control and phytotoxicity varied with the varieties, the fungicides, and the rates of application. Elcide produced the most healthy daffodil bulbs, followed by Morsodren and PMA. Elcide was best on Rembrandt at the low rate of 2.4 fluid oz. in 10 gallons of water and on King Alfred at the high rate of 3.2 oz. in 10 gallons of water. Similarly, Morsodren gave better results on Rembrandt at a low rate of 3 fluid oz. in 10 gallons and on King Alfred at a high one of 6 fluid oz. in 10 gallons. PMA was best on both varieties at a high rate, namely, .6 fluid oz. in 10 gallons of water as against .3 fluid oz.

Although Elcide and Morsodren produced the most healthy bulbs, they also caused a great deal of flower injury on bulbs dipped a week after digging, especially at the higher concentrations. Much less injury was found on bulbs treated just before planting, but this late treatment gave almost no control of basal rot. On the other hand, PMA only slightly injured a very few flowers. Therefore it appears that Elcide, and perhaps Morsodren, may prove to be useful in treating severely diseased stocks (above 2% loss) where injury to the flowers is of little concern. PMA is adequate for treating less severely diseased stock and is less likely to cause flower injury. All three chemicals provided the best disease control when applied soon after digging, and there was no apparent advantage in these experiments in making a second application just before planting.

Among the many variables, affecting the degree of fungicidal injury to bulbs are: variety of daffodil, maturity of bulb, type and rate of fungicide, length and

temperature of dip, and rapidity of drying after treating. Bulbs raised in warm climates are usually not as succulent when dug as are those produced in cool climates and are, consequently, less apt to be injured. Mercury fungicides continue to penetrate into bulbs with prolonged dipping. Our results on iris bulbs in 1963 showed that a 15-minute dip in Elcide was much safer than a 60-minute dip. Drying bulbs rapidly after treatment will also lessen the possibility of fungicidal injury and decrease the opportunity for Blue Mold to develop.

Wear rubber gloves when using mercury fungicides and follow all other directions by the manufacturer for handling. If an insecticide is added, use the emulsifiable type since the ingredients are less apt to inactivate the mercury. If bulb containers (boxes, etc.) are to be re-used, treat them with one of the above fungicidal solutions or with formaldehyde (USP type) at 1 qt. in 5 gal. of water.

Treated bulbs should be dried rapidly and stored in a cool, dry location until planted. Plant in cool, well-drained soil and as deep as practicable to avoid warm temperatures. When fertilizing, remember that excessive nitrogen and phosphorus increase losses from basal rot, while high potassium helps reduce them. Either avoid organic fertilizers or mix them thoroughly with the soil early enough to permit decomposition before planting.

Do not replant on the same land more often than once every two years in cool areas such as the Pacific Northwest and less often in warmer regions. If this cannot be done, replace the soil periodically. Treating soil to eliminate the *Fusarium* has not yet proven to be practicable because the fungus is usually reintroduced in or on infested bulbs. Some soil treatments have even increased losses, apparently because they eliminated beneficial (antagonistic) fungi. If soil treatment becomes essential, contact a custom applicator of pesticides or your local county agent.

OTHER SOIL-BORNE ROTS

A few other fungi will occasionally rot bulbs in the soil. Probably the most common of these is the Southern Blight or Crown Rot fungus (*Sclerotium rolfsii*). This fungus appears as white threads; a white mat; or small (1/16 - 3/16 in.), rounded, reddish-brown, pock-marked bodies (sclerotia) on or between the scales. An odor typical of rotting wood accompanies this fungus. Although daffodils are not often seriously injured, infected bulbs may carry the fungus into areas subsequently planted to iris, tulips, or other plants which are much more susceptible. Fortunately, the Crown Rot fungus can be killed in bulbs by a hot water treatment (described elsewhere), and it is controlled in soil by dusting pentachloronitrobenzene (PCNB) over the bulbs and adjacent soil before covering. We use 2⅓ lbs. of the 20% dust of PCNB per 100 sq. ft. on heavy or peat soil and 1¾ lbs. on lighter soils. (Residues of PCNB may persist in soil for long periods of time and research at Washington State University has shown that these residues can be absorbed by carrots planted a year following treatment at the aforementioned rates of application. Since a tolerance has not been established for PCNB in carrots, it is suggested that carrots not be planted in treated soils for at least two years following application.

NEMATODES

Both the root lesion and bulb and stem nematodes may cause a stunting and disfiguring of leaves. Their identification is discussed at length in Chapter 7, so only a few comments will be made here. Daffodils are not often seriously damaged by the root lesion nematode alone. Most damage occurs from certain soil-inhabiting fungi which invade through the nematode-produced wounds and proceed to rot the roots. Experiments by Apt and Gould in western Washington several years ago showed that soil fumigation with dichlorpropene controlled the nematode. This treatment has been successfully used by commercial growers in the few fields where the root lesion nematode was a problem. Chloropicrin and methyl bromide also controlled the nematode in the above

tests, but basal rot losses were increased, perhaps because the numbers of beneficial (antagonistic) organisms were reduced. Another possibility for the hobbyist is to try growing African marigolds in infested soil. Research in Holland has shown that these plants reduce nematode populations.

The only effective cure for the bulb and stem nematode is a treatment in hot water plus formalin. The hot water plus formalin treatment has many advantages for the hobbyist or hybridizer and justifies more widespread use now that small treating tanks are generally available. In addition to killing nematodes, the treatment also destroys most parasitic fungi, the destructive Tarsonemus mite, and other insects. Unfortunately, it doesn't eliminate the basal rot fungus, but the formaldehyde prevents spread of the fungus to healthy bulbs during treatment. Hot water-treated bulbs should be cooled and dried promptly to decrease injury and the opportunity for Blue Mold to develop.

Commercial growers in western Washington have found the hot water treatment so beneficial that they now regularly treat all their bulbs on a rotation basis every third year, whether the nematode has been found or not. Large tanks have been specially constructed for this purpose in order to treat as many as 10 tons of bulbs at a time.

LEAF SPOTTING

Fungus leaf spots are rather common but not usually serious under proper cultural conditions unless bulbs are left too long in the same location. Then the losses increase yearly. Scorch (caused by *Stagonospora curtisii*) is probably the most destructive disease, particularly in warm, humid regions such as the Southeast. The spots, which vary in length, are narrow, brown, and rough.

White Mold (*Ramularia vallisumbrosae*) begins with brown spots which later become covered by a white mold. This disease also occurs under warm, humid conditions.

In cool, moist areas such as the Pacific Northwest, species of *Botrytis* are more often the cause of trouble. This disease is characterized by large brown spots which are sometimes covered with a light gray or grayish-brown fuzz. The most common pathogen is *B. narcissicola* which causes the disease called Smoulder. Another one commonly called Fire (*B. polyblastis*) is less common but may be destructive under moist conditions at temperatures above 50° F. The latter fungus and another Botrytis (*B. cinerea*) also spot and rot flowers.

All these fungi may survive in dead leaves and most of them can also be carried on the bulbs. Fortunately, the controls for the common leaf spots are similar. Bulbs should be dug, cleaned, and replanted in a new and well-aerated location at least every two or three years since parasitic fungi continue to increase the longer bulbs remain in the same place. Diseased leaves and/or plants should be removed as soon as observed. All debris (old flowers, leaves, scales, etc.) should be put in the garbage can and not in the compost pile. These precautions are usually all that are necessary. However, in gardens where leaf spots occur every year, fungicides must be used. Two sprays are usually sufficient in the Northwest—once when the plants are about 6 in. high and another as soon as the blooms are removed. Under more severe conditions spraying should be repeated every two weeks, beginning as soon as the disease appears (or before, if approximate dates are known from previous experience). Copper compounds, particularly homemade Bordeaux mixture in proportions of 8-12-100, have been most frequently used and are still considered very reliable. However, they sometimes cause injury, especially if the weather is hot or if too much wetting-sticking agent is added. If such injury occurs, the grower should try reducing the amount of wetting agent, or fungicide, or both.

Zineb, one of the newer fungicides, has been found very promising in experiments in England and by growers' tests in the United States. Although it doesn't control the leaf spot fungi quite as well as does Bordeaux mixture, zineb is less apt to burn the leaves. The usual rate is 7 level tablespoons (1 oz.) of

zineb in 3 gallons of water. Control will be improved by adding a wetting-sticking agent according to directions on the package.

VIRUS DISEASES

Only two viruses should concern the daffodil hobbyist, although the commercial grower must consider several more. The two most common and occasionally serious are Silver Streak (or White Streak) and Yellow Stripe (usually called "Gray" in Holland and "Mosaic" in the United States). The name "Stripe" has recently been adopted for international usage. As soon as the leaves emerge Stripe can be seen as light green to yellow streaks or mottlings accompanied by a roughening of the epidermis of the leaves. (The hot water treatment may also cause a mottling of the tips of the leaves, but not a roughening.) Stripe-infected flowers are often disfigured with pale-colored streaks.

The Silver Streak disease symptoms appear after flowering as narrow, white, yellowish-white, or gray streaks. High temperatures stimulate development of the White Streak symptoms.

Virus-diseased plants cannot be cured. Therefore, commercial growers establish foundation blocks that are carefully rogued to eliminate the virus-infected plants. These plants are examined for Stripe early in the spring and later for White Streak. The most practical controls for the hobbyist of these diseases are: (1) only buy bulbs from reputable sources; and (2) dig and destroy infected plants as soon as detected. Commercial growers customarily use insecticides since many of the daffodil viruses are spread by aphids. However, the value of disease control by insecticides in small plantings is debatable, because aphids move frequently. It has also been suggested that hybridizers enclose their seedlings in aphid-proof enclosures.

Another virus disease (Chocolate, or Brown, Spot) is also common but seldom destructive. The brown to purple spots or streaks appear late in the season and are usually confined to the upper parts of the leaves. A *Phyllosticta* fungus also causes brown spots, but this disease is not as common as the virus disease. The intensity of the Chocolate virus symptoms varies from year to year. Although the spots are unsightly, neither the flowers nor bulbs are seriously affected. Nevertheless, severely-infected plants should be eliminated to keep the stock in as good condition as possible.

Additional viruses sometimes found in daffodils include Rattle, Mild Mosaic, Onion Yellow Dwarf, and Cucumber Mosaic. These may cause problems for commercial growers but are rarely of concern to the hobbyist or homeowner.

Some hobbyists are afraid of spreading viruses by picking flowers. This probably seldom occurs, but may happen with certain viruses. It has been shown elsewhere with other types of viruses that trisodium phosphate was more effective than soap for inactivating virus on hands. Dr. Frank P. McWhorter of Oregon State University states that fortunately there is no danger of mechanically transferring the common daffodil viruses.

STORAGE ROTS

Storage rots should not be a problem if sound bulbs are stored continuously under cool, dry conditions until planted. However, conditions are seldom perfect. The most common storage problem is basal rot, which has already been described.

Blue Mold (caused by species of *Penicillium* similar to those on oranges and apples) is a common but weak parasite that usually attacks only the outer scales. Blue Mold develops under cool, moist conditions and most often on bulbs that have not been dried rapidly enough after being treated in mercury solutions or in hot water, or that have been bruised, sunburned, or otherwise injured. The mold may also appear when bulbs are being precooled (preparatory to greenhouse forcing) if the humidity is too high. Control is simple: keep the relative humidity low (below 70% is probably sufficient) and avoid bruising, sunburning, or otherwise injuring the bulbs. Most of the common fungicides

used on bulbs are ineffective against Blue Mold.

The ordinary Black Bread Mold (*Rhizopus stolonifer*) occasionally causes a decay in storage. Affected bulbs develop a wet, soggy rot. The basal plate appears dark and the scales dull, grayish brown. The surface may be covered with a coarse gray mold and intermingled black specks (fruiting bodies of the fungus). This disease develops primarily on overheated bulbs or those that have mechanical or sunburn injuries and are stored at high temperatures with poor ventilation. It is prevented by: 1) avoiding injury, 2) keeping bulbs cool and well ventilated during storage and shipment, and 3) drying and cooling bulbs rapidly after the hot water treatment.

A Final Word

Do not become alarmed at the number of diseases discussed herein. The hobbyist should seldom encounter more than two or three as serious problems. In general, he should have very little trouble if he will only: buy his bulbs from a reliable source; plant in a well-aerated and well-drained soil without excessive amounts of nitrogen, phosphorus, or organic matter; promptly remove infected plants if virus symptoms appear; spray as soon as any leaf or flower disease develops; remove flowers promptly after blooming; dig and replant in a new location at least every other year. These simple procedures will permit daffodils to be a joy instead of a burden.

Precautions

Insecticides and fungicides can be poisonous to humans and to other animals but in varying degrees. Although those here recommended *for the home gardener* are relatively nonpoisonous to humans and other animals, nevertheless even they should be handled with respect and used only in accordance with the directions and precautions stated on the label of the container and those stated herein. Use only chemicals recommended for home gardens. Apply an insecticide or fungicide only to a pest or disease for which the insecticide or fungicide is recommended, and do not overdose. Mix sprays in open air and work on the windward side of the area being treated. Avoid repeated or prolonged inhalation of an insecticide or fungicide; keep it away from eyes, nose, and mouth. Wash all exposed skin with soap and water after using the insecticide or fungicide; and change clothing if you spill any of the material on it. Label all insecticides and fungicides clearly and store in closed containers in a safe place, out of reach of children and pets.

—9— Daffodils in the Home Setting

Few flowers are as versatile as daffodils. They may be planted almost anywhere in the home garden, but some places are better than others. Their beauty is not enhanced by lining them up like tin soldiers or plunking them out in the middle of a lawn. Daffodils need to be planted in depth for their grace to be effective. They need to have a background —a fence, a stone wall, a hedge, evergreen or deciduous trees, or shrubs. Daffodils are not aloof and regal. They are sociable flowers whose loveliness is intensified by suitable companions.

Daffodils need a background for functional as well as aesthetic reasons. Since they face in the direction of the greatest light, a background will encourage them to look toward you. Nothing is more demoralizing than to have a border of daffodils facing toward the neighbors. Neighborliness can go too far! It is well then to give some thought to the relation of light in the planting of daffodils.

Early varieties ought to be planted where one can see them while coming and going. It is human nature to want to stay close to home in cold, wet, and windy weather, and Spring may bring more than a few such days. Even hardy gardeners do not like to compact the soil by walking on a soggy lawn.

N. asturiensis (*N. minimus* of the trade) begins the season here. This lilliputian trumpet enjoys a corner near the doorway. It really needs to be planted on a raised plot and in quantity. *Asturiensis* blooms with the Winter Aconite (*Eranthis hyemalis*), *Crocus chrysanthus* varieties Warley White, Blue Giant, E. P. Bowles, Moonlight, and Snow Bunting and just in time for *Iris reticulata*. *Scilla siberica* Spring Beauty joins in soon. *N. minor conspicuus* (*N. lobularis*) and Bambi are very early, too.

February Gold follows closely on the heels of *asturiensis*. Visitors at the front door like to be welcomed by this jaunty fellow with the rabbit-like ears. As its clumps thicken, its bloom increases. February Silver comes a bit later and enjoys a long stay. Doorway plantings satisfy one's hunger for beauty after a long winter. They allow one to appreciate the courage and stamina of the first arrivals. Foresight is another "nearby" daffodil. It is white with a lemon cup and has the intelligence to appear when it is most needed. Its stems are short; its bloom prolific. Plant it alongside a drift of *Crocus* 'Purpurea Grandiflora.'

Daffodil plantings that can be viewed from a path in wet weather are very gratifying. The best paths are made by deer and children. A path ought to be firm and definite and, of course, it ought to lead somewhere and circle back from whence it came. Pine needles or leaves make good paths. Fortune, with its bold yellow and orange cups is an early daffodil that looks commanding planted in a long drift among trees not far from a path. Planted where one can see it from the kitchen window, it performs an heroic role. Always very early and very dependable, Fortune appreciates a groundcover. The blue flowers of *Vinca minor* will smile at their good Fortune. Many other early daffodils are listed in Chapter 13.

Slopes provide ideal drainage and perfect viewing for the daffodil. They are ideal for slightly pendant bloomers and Charity May is such a daffodil. It is so bright, so prolific, and so graceful that it stirs one's heart to see it arrive

year after year. Remember, too, daffodils and rocks are like peaches and cream. Rocks act as warmers and protectors in early spring. They retain the heat of the sun and their invincible surfaces shield the flowers from the elements. Try the underrated Parkmore with its strong stem and fine form, or Peeping Tom, a big and bold golden flower that says "Come look at me." These daffodils are complemented by *Muscari* Heavenly Blue.

Any garden with daffodils needs some deciduous trees and shrubs to break the force of the rain and wind and to temper the effects of the heat and cold. The daffodil is not a prairie flower. Perhaps this is as good a time as any to mention that daffodils not grown in grass ought to be groundcovered or mulched for obvious horticultural reasons. Splattered daffodils are not objects of great beauty. *Arabis alpina* makes an excellent spreading groundcover. Its gray-green indented foliage and airy mass of white flowers lighten the solidity of the daffodil. *Cyclamen neapolitanum* with its green ivy-shaped leaves makes a delightful neighbor. *Phlox divaricata,* the wild blue phlox, takes one's breath away as a nearby underplanting of the white *triandrus* Tresamble, especially with *clusiana* tulips chiming in. *Chionodoxa luciliae* asserts its tiny blue voice anywhere and everywhere. *Hepatica* is an early wildflower whose heart-shaped leaves enhance the daffodil. Later Bloodroot (*Sanguinaria canadensis*) with its broad leaves and glistening white blooms lends its impressive presence. The finely cut foliage of the Winter Aconite stays around for the daffodil season. The fresh green of the leaves of Sweet William (*Dianthus barbatus*) has a groundcover effect long before it blooms.

Daffodils with fragrance ought to be planted close to the natural paths of home life. You will find most of the fragrant daffodils in Divs. 7, 8, and 9—the jonquils, tazettas, and poets. The first scented daffodil to bloom in my garden is Sweetness, a clear gold jonquil of unmatched perfection of form. Plant it along the beginning of a path or at the forefront of a patio border where its fragrance will drift toward you and engulf your senses. Or perhaps near a bird feeder that you visit to refill. Skylon is another of my fragrant flowers. Bebop and La Belle are delightful, sweet-smelling miniature jonquils. The tazetta family provides its share of fragrance and Canarybird is one for which I have a special fondness. The reliable Geranium is heavily scented, while the double Cheerfulness and its yellow sister which are sports of the *tazetta* Elvira perk up the olfactory senses.

Daffodils planted near a bird feeder or birdbath are accented by the busy activity of the scarlet of the cardinal, the black and white of the chickadee, the blue and white of the jay, the gray and brushed orange of the titmouse, the brown of the thrasher, the purple of the grackle, and the darting blue of the bluebird. Their changing colors provide an evermoving setting for the daffodils. One word of caution—do not plant directly under a bird feeder, or the flowers will get rough treatment, not only from birds that are ground feeders, but also from squirrels and chipmunks.

A bit away from the house there may be a few large trees with which daffodils would associate happily. March Sunshine is unspectacular as a single bloom, but its grace cannot be surpassed in clumps among trees. Binkie, a citron-yellow, midseason flower, shines forth like cool sunlight against the dark green of hemlocks. It is a pearl of great value. Thalia is fine in a woodland and has a grace which its show sisters lack. Actaea is another tried and true woodland favorite. Trevithian, the jonquil with a sweet odor and reedy foliage, adds a different note, but give it a sunnier and damper spot. Leeuwenhorst, unpreten-

PLATE 46A IVAN N. ANDERSON

TAZETTA HYBRIDS

Matador (upper left), White Pearl (upper right), Scilly White (lower left), Mrs. Alfred Pearson (lower right)—All Div. 8.

tious as a single bloom, conveys a lovely massed effect and gets better every year. White pines make impressive backgrounds for daffodils in open sunny areas.

Of course daffodils may be planted in borders. A border to be pleasant visually needs to curve gently and have some ups and downs. Nothing is less exciting than a flat piece of ground planted with squares of daffodils. It may make an excellent exhibition bed but a dreary garden border. The border ought to be deep enough to lend the beauty of perspective to the planting. Shrubs and small trees here and there within a long border add background and solidity.

Daffodils in the border should be in groups of 3 to 25 of each variety with each group clearly separated from other groups. The best effect is created by planting in bays among the shrubbery or on curves or around corners where the effect of a large number of clumps is not seen at one glance. Most gardeners, however, after their first success are anxious to add new varieties and so the clumps crowd closer and closer together. So it should be remembered that daffodils are for garden decoration and not a garden in themselves.

Euonymus alatus compactus (Burning Bush) adds charm and strength to any border but needs room to spread its wings. Pink or red quince is pleasing with white daffodils. Try Cantatrice or Tain or Courage for a striking effect. White and yellow daffodils, like Festivity or Preamble, look well backed by the gold of forsythia. Tall and bold fellows, like Statue or Foxhunter, look commanding at the back of the border. Ceylon or Ormeau are good middle border flowers. Smaller daffodils, like Le Beau, Jenny, The Knave, Nor-Nor, Dove Wings, or the irrepressible Beryl are best in the forefront.

There is no lack of companions for the daffodil in the border. Hyacinth Delft Blue adds a blue note to early bloomers, and the more staid Grand Maitre with its deep blue bells comes along later. Include *Leucojum,* the nodding Snowflakes tipped green. Bellona is a heavy-textured and fragrant single early tulip that comes with Tresamble and Geranium. Late daffodils, such as Cushendall, Reprieve and Shagreen, bloom happily with the nodding blue bells of the Wood Hyacinth (*Scilla campanulata* Myosotis). The polyanthus primula with their cream yellows, copper reds, and medium blues add interest to the foreground of the border while the fronds of the Maidenhair Fern are beginning to unfurl. The bells of checkered *Fritillaria,* Virginia Bluebells (*Mertensia*), and the cyclamen-like white flowers of Shooting Star (*Dodecatheon meadia*) all add a gay note to the border. The awakening foliage of Columbine (*Aquilegia*) and Bleeding-heart (*Dicentra spectabilis*) contrasts with the heavy foliage of the daffodil. *Thalictrum dioicum,* the Early Meadow-rue, has equally lacy foliage. One could go on and on, for you see there is no end to the friends that come and go with the daffodil.

—10— Natural Plantings

A good deal has been written about "naturalized" daffodils, but if we are to respect the true meaning of the word, a naturalized planting would be one which is self-perpetuating without later improvement of the growing conditions. Culture is incompatible with a naturalized state. There are few plantings of daffodils in this country which are entirely on their own and therefore truly naturalized. The best example would be those—mostly tazettas and jonquils —which glorify the roadsides, hedgerows, orchards, and fields of the deep South. These survive not only complete neglect, but trampling, mowing, and plowing.

In the wild, the species of daffodils and the occasional natural hybrid grow in many settings: thin woodlands or openings in the forest; on barren mountainsides among tumbled rocks; in fields or marshy meadows; in the shallow pockets of soil on narrow ledges of rock faces; or in the crevices of moss-covered, dripping limestone cliffs.

Most gardeners are denied such sites and when horticultural writers observe that daffodils are charming when "naturalized," they usually have in mind only bulbs scattered in a lawn, field, under a tree, or at the edge of some suburban woods that have escaped the bulldozer. How permanent such plantings prove to be will depend on the varieties set out, the competition of other plants, and the length of time the power mower is immobilized. These compositions are at best natural or informal plantings, not naturalized daffodils.

Whatever the appropriate term, there is no question that daffodils are a homespun flower; ill at ease in formal beds or geometrical patterns; better in clumps or associated with other plants around the house or in the border; best of all along woodland paths, among native trees, and in drifts through fields or rough grass. Because of the need to let the foliage ripen, a process which may not cease before July, daffodils are not a suitable plant for a lawn. Wordsworth's "dancing daffodils" have no place in a carefully trimmed, thick carpet of the best lawn grasses which is the goal, if not the achievement, of most homeowners. "Daffodils in sod" is a phrase often encountered and means below a sod or turf composed not only of grasses, but of any small herbaceous plants—weeds, if you will—the sort of terrain which on a golf course is known as "the rough."

The rules and practices for growing daffodils in uncultivated ground are a bit different and more flexible. The result is less work and expense, but great satisfaction if one is content to take his reward in the massed effect of everyday flowers, rather than the perfection of individual specimens of exhibition quality.

The three rules for an attractive natural planting are 1) each grouping should consist of a single variety, 2) the planting should be irregular in shape, and 3) groupings which are visible from a vantage point should flower about the same time.

Naturalizing mixtures may help a dealer dispose of discarded varieties and nameless bulbs, but the garden effect of these offerings is disastrous. Unity is lost in the sequence of flowering, the different heights create a jagged profile, the smaller plants are obscured by their fellows, and there is an irritating clash of textures and colors.

Numerous suggestions have been made as to the shape a group should take. The precise shape is a minor matter and may be determined to some extent by the contour of the land and by trees and other natural features, but as a

general rule it should be an irregular oval with the length about three times the width and the length at right angles to the viewer. In planting, the shape may be outlined by stakes, a garden hose, clothesline, or fallen branches.

The bulbs should thin out from a denser planting near, but not at, the center, simulating slow development of the group from an original single bulb. In the case of a large layout, this impression can be furthered by two or three small, sparse clumps adjacent to the principal grouping. In the denser part of the figure, spacing may be as little as 12 inches, increasing to 18 inches toward the perimeter.

The exact spotting of the bulbs can be left to chance or carefully planned. Tossing handfuls of the bulbs around and planting them where they fall is widely recommended by armchair gardeners and certainly demands a minimum of effort, but a studied arrangement is more likely to create the desired natural effect. There is also considerable evidence that women are better at arrangements than they are at tossing balls or bulbs. If the surface vegetation is thin, the bulbs may be laid by hand on the surface and the effect carefully considered before planting. If greater visibility is needed, white pot labels or other conspicuous markers may serve as stand-ins for the bulbs.

It is difficult to create an attractive effect with less than 50 bulbs and a hundred or more would be better. The number of groups and their individual size will depend entirely on the area to be planted, but a few large groups are more effective than numerous small ones.

The method of planting will have to consider the soil and density of the turf. Ideally, the turf should be lifted and the soil beneath prepared as it would be for any other garden bed, but few will go to that trouble. There may even be reasons why it would be unwise to be so thorough, such as damage to tree roots.

Bulb planters, operated either by hand or foot, are satisfactory if they will penetrate the turf and bring up a solid cylinder of soil from a depth of 6 inches or more. This would place a minimum of 4 inches of soil over the bulb. Deep planting is desirable to retard the natural increase of bulbs and to maintain the flowering for many years. A small amount of sand or soil mixed with bonemeal should be placed in the bottom to insure that the bulb rests on firm, rich soil and not on an air pocket. A crowbar may be used, but requires soil to fill the hole, and the danger of an air pocket is greater. A pickaxe or grapehoe will bring up a wedge of soil which can be replaced after the bulb is set, again on a pad of sand and bonemeal. A spade will serve the same purpose and a wide spade may provide spots for two bulbs. Whatever tool is used, it will work easier in a soft, damp soil and planting may usually be deferred until conditions are favorable.

From one-third to one-half of the entire area should be left unplanted and there should be sufficient space around each figure to give it, and the variety which forms it, identity. Above all, irregularity and informality should be observed: irregularity in shape, in size, and in spacing; both of bulbs within a group and between the several groups themselves.

Most home gardeners should realize that they do not have a suitable site nor sufficient space to indulge in a simulated natural planting. This type of gardening should be left to parks, botanical gardens, large estates, and homeowners with at least a quarter of an acre of ground apart from the usual lawns, borders, and kitchen garden.

Those with sufficient space must first consider its suitability. Full sun or light shade is best for bulbs which are expected to thrive on neglect. A thin soil overlying rocks should be put to other use, and land which is badly drained will not appeal to daffodils. A stiff soil or a thick sod will dull the enthusiasm of most gardeners in proportion to the quantity of bulbs to be set out. On the other hand, a deep, moist loam beneath a thin sod can easily be worked; a backdrop of trees or a slope running down to a pond or stream would be a bonus, indeed. A boulder-

strewn hillside—the steeper the better—can be utilized if the planting is confined to existing or constructed pockets of soil in the shadow of the boulders. Here the species and smaller varieties can be shown to advantage.

The selection of varieties (or species) for natural plantings must consider not only performance of individual varieties under indifferent conditions, but also the availability of the more desirable varieties. As a general rule, the older and less expensive varieties have the vigor which enables them to persist and flower in sod for years, whereas the more highly bred introductions of recent years may run down rapidly. But because they are old and inexpensive, many of the better varieties for natural planting in quantity have been dropped from dealers' lists.

A gardener is fortunate if he can get starts of older varieties from a long-established planting. A clump or two of one of these oldtimers which has been down for many years will yield an amazing number of bulbs. Or a natural planting may be built up by transferring to it, on a trial-and-error basis, the surplus increase from one's own garden. In the South, the Farm Market Bulletins offer an easy and inexpensive source of tazettas and jonquils which are as uncertain of name as they are certain to thrive.

The huge trumpets and large cups seen in gardens are unknown in the wild and seem somewhat out of place in a planting which attempts to mirror Nature. Size is not a virtue in such a setting and, in general, the larger varieties in Divs. 1 and 2 should be passed over, or at least not made neighbors of the daintier jonquilla, poeticus, cyclamineus, and triandrus hybrids. Difficulty may be anticipated with the trumpets and poets in the South and with the tazettas in the North. Doubles are uncertain performers, even under favorable conditions, and are not highly regarded for planting in turf, except, perhaps, the ubiquitous Telamonius Plenus and the older Phoenix group which are occasionally still found in rural gardens.

However, if bulbs must be purchased, a search of current catalogs will still yield a sufficient number of the older and cheaper named varieties which are likely to perform well. Some dealers, usually Dutch, quote prices per hundred of a variety (50 at half the 100 rate) and some American dealers offer a limited selection by the bushel or half-bushel. Varieties of proven performance which are still cataloged are:

1*a*. Cromarty, Emperor, Mulatto, Trumpet Major.

1*b*. Effective, Pres. Lebrun, Music Hall.

1*c*. Mrs. E. H. Krelage, Moray, Mt. Hood, Roxane.

2*a*. Carlton, Fortune, Helios, Porthilly, Rouge, Rustom Pasha, Trevisky, Yellow Poppy.

2*b*. Brunswick, Dick Wellband, Duke of Windsor, Folly, Franciscus Drake, John Evelyn, Mrs. R. O. Backhouse, Rubra, Tunis.

2*c*. Ludlow, White Nile.

2*d*. Binkie.

3*a*. Clackmar, Therm, Tredore.

3*b*. Angeline, Forfar, Kansas, Mystic.

3*c*. Distingué, Polar Ice.

4. Cheerfulness, Telamonius Plenus, Yellow Cheerfulness.

5*a*. Moonshine, Shot Silk, Stoke, Thalia, Tresamble.

5*b*. Frosty Morn.

6*a*. Bartley, February Gold, Golden Cycle, March Sunshine, Peeping Tom.

6*b*. Beryl.

7*a*. Fairy Nymph, Golden Goblet, Golden Sceptre, Sweetness, White Wedgwood.

7*b*. Chérie, Hesla, Lanarth, Nirvana, Orange Queen, Trevithian.

8. Aspasia, Cragford, Geranium, Laurens Koster, Orange Wonder.

9. Actaea, Dactyl, Milan.

10. × *biflorus*, × *gracilis*, *jonquilla*, *jonquilla minor*, *minor*, × *odorus*, × *odorus* 'Rugulosus,' *poeticus recurvus*, *pseudo-narcissus moschatus*, × *tenuior*.

11. Split, Hillbilly's Sister.

—11—The Elusive Pink

Human nature being disposed to desire that which is difficult or impossible of attainment, it is perhaps quite natural that plant breeders are never content with the colors already present in any genus of flowers, and that they will bend every effort toward the developing and perfecting of shades and tints not present. As examples one may note the endeavors to produce a blue rose or gladiolus, a red iris or pansy, and a black tulip. Quite as intriguing is the quest for a pink daffodil.

Occasionally, nature in a capricious mood, produces a mutation with a new shade of coloring, suggesting a line of endeavor for the hybridist, and perhaps more frequently than otherwise, it is this that furnishes him with the incentive for the developing of a line previously not thought of, or considered beyond bounds. Being motivated with the desire to accentuate and further improve the new color, if he can bring his ideal to fruition, he not only gains the satisfaction of having accomplished a difficult task, but gardeners who grow his new plants benefit from his success.

The genus *Narcissus,* although possessed of many attributes which appeal to flower lovers, was quite limited in its color range. There are still many who think of all daffodils being yellow, and have some conception of "white narcissus." An awareness of orange or red in the coronas is less rare than it once was, but there are many to whom the thought of a "pink" daffodil is preposterous. Let it be admitted that hybridizers and fanciers take some license in naming colors of flowers! That which approaches or suggests a color is likely to be so designated. Be that as it may, the coloring in the coronas of some of the best recent introductions in this class could hardly be described other than pink when at their best.

Just where and when pink coloring first made its appearance in daffodils is probably unknown, nor has the source been ascertained with certainty, but it is generally conceded that it developed through the use of some of the white trumpet species and the poets. The latter are also credited with being the progenitors of the orange- and red-cupped daffodils. This will not be an attempt to trace the origin nor give the history of the development of the pink daffodil in detail. That will of necessity be left to a competent research student with ability, time, and access to published materials in this field. However, one cannot ignore the background and some of the phases of their development and at the same time give any clue to the advancements that have been made.

In a somewhat technical paper*, Dr. Edgar Anderson and Earl Hornback wrote some years ago on the origin of pink coloring in daffodils and the genetical linkages involved. Among other conclusions reached then was that pink coloring was linked with narrow sepals (outer perianth segments). Nearly all varieties introduced up to that time would confirm that opinion. It was assumed that pink daffodils were recombinations of characteristics derived from *N. moschatus* (of Haworth) and *N. poeticus,* the former now known as *N. pseudo-narcissus alpestris.* As the yellow from some of the bicolors and orange red from the poets were involved in getting early "pinks," it may readily be

* *A Genetical Analysis of Pink Daffodils.* Edgar Anderson and Earl Hornback. Vol. VII, No. 1, Jan. 1946, Journal of the California Horticultural Society.

seen that the colors would tend to run more to salmon and apricot shades than to true pink. It could only be by a process of selection that most of the yellow would be eliminated, leaving a more nearly true pink in the cups.

Perhaps one of the first pink daffodils to appear was Apricot, registered by de Graaff Bros., Ltd., of Noordwijk, Holland, in 1898, and is reported in *The Daffodil Data Bank** as being descended from *N. pseudo-narcissus abscissus* × *N. pseudo-narcissus albescens*. One of its progeny, Rosy Trumpet, although not registered until 1952, was apparently in commerce for many years. It has quite amazing depth of color in the narrow, rather straight, long trumpet, being of deep rosy apricot and quite weather resistant. The long, narrow, twisted perianth segments are of dingy creamy white. Although a flower of very poor form, it was quite a decided break in color.

Doubtless the first widely acclaimed daffodil with "pink" coloring was Mrs. R. O. Backhouse, named for its originator, and for many years known as "the" pink daffodil. It set a standard for judging others as it was a step forward in its class, and some of its attributes could well be emulated in modern varieties, not the least of which was its vigor and fecundity. Among its faults that are still the bane of daffodil breeders are its propensity to give good coloring only under rather ideal conditions of soil, temperature, and humidity, and the proclivity to taking several days after opening to develop optimum coloring, followed by fading while the flower is still relatively fresh looking. It is generally conceded that Lord Kitchener, a widely grown bicolor of its day, was the seed parent of Mrs. R. O. Backhouse. The seed parent of Lord Kitchener was Minnie Hume, which in turn came from *N. pseudo-narcissus albescens*.

As the variety Mrs. R. O. Backhouse became well known, breeders everywhere began working for pink seedlings, whether they used this variety in their pedigrees or not. Some having a personal dislike for the variety tried other lines and it was soon learned that Mitylene and White Sentinel gave occasional pink-cupped seedlings. The Brodie of Brodie in northern Scotland raised Wild Rose from the former using Evening, a pure white flower, as pollen parent. It was perhaps the purest pink introduced up to 1939. Unfortunately, it is even less dependable than some of the old varieties in giving good color consistently, but it is proving of some value to hybridizers. Rose of Tralee, raised by J. L. Richardson from open fertilized seed of White Sentinel, had less color but more substance and a larger flower than Wild Rose, and it in turn from open pollenized seed gave Salmon Trout, which is a flower of real show form although not too easy to grow well. In Northern Ireland, Guy L. Wilson used his little flower, Cushlake, which looks much like a poet, as a seed parent, with pollen from Dava, a nice perfectly formed 2*c*, then known as a large-cupped Leedsii. From the resulting seedlings he selected Interim, a tall-stemmed, quite large flower with white perianth, pale yellow crown widely banded apricot pink. It has proven very valuable for breeding pinks. Other good pinks originated by Mr. Wilson were Fintona and Passionale, two very smooth flowers of exhibition caliber and very pink at their best but somewhat unstable in coloring.

Doubtless one of the most successful varieties introduced by Mr. Richardson was Green Island, not because it was pink, but aside from its being an outstanding flower in its own right, it has proved most valuable for breeding pinks and other colors. Crossed on Templemore, it gave Mr. Richardson Rose Caprice, a flower of good color and substance but not very vigorous, but it, in turn, gives many good pink seedlings including the very new Romance which is not yet proved but is reported as being perhaps the finest pink yet introduced. Debutante, also from Rose Caprice, is a

* *The Daffodil Data Bank of the American Daffodil Society*—1965. Tom D. Throckmorton, The Computer Center, The Iowa Methodist Hospital, Des Moines, Iowa.

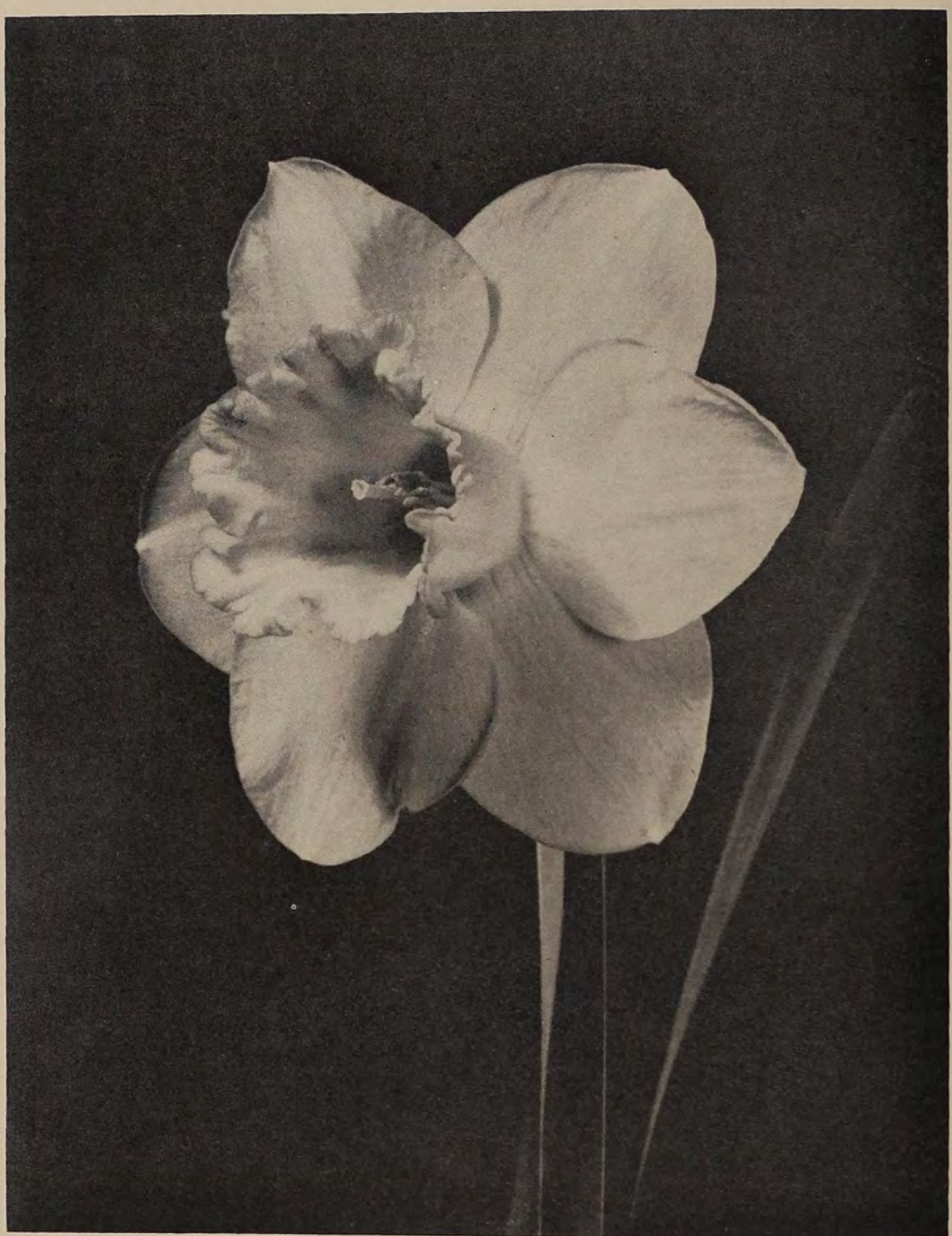

PLATE 47

GRANT E. MITCH

RIMA
Large-cup (Div. 1b)

very fine flower both in form and color and has been grown long enough to become distributed quite widely among fanciers but is still too new for wide garden usage.

In the 20's and 30's, fanciers in Australia were working avidly at producing pink seedling daffodils, and in Victoria, Alister Clark, of fame as a rose grower, introduced a good number of varieties. Doubtless his most successful one, and among the most popular of all pink daffodils today, was Mabel Taylor. It still leaves something to be desired in form, is not a true pink in the strictest sense of the word, and takes a little time after opening to develop its color. But it does have more color than most of the older varieties, and has a much frilled and ruffled crown which appeals to most gardeners. Added to this, it is proving a good parent.

On the island of Tasmania, keen competition developed among a group of daffodil fanciers as to who could show the best pink seedlings at their annual exhibitions. For some years they perhaps led the world in the development of exhibition varieties. One of the first, and the most successful breeder, was C. E. Radcliff who produced the pink trumpets Pink of Dawn and Dawnglow, the latter a large flower of excellent form and good color, but one that was difficult to grow in that it was very susceptible to disease. It is difficult to come by now, but would doubtless still be of value to hybridizers. Later introductions of his include Rosario, Karanja, and Pink Monarch of which the first has had quite wide distribution. Pink Monarch is a very spectacular flower but it, too, is a bit difficult to grow and it is prone to giving short-stemmed blooms. Several more recent introductions from Radcliff's son are reputed to be good flowers, but they have not been grown in the writer's garden.

Many other breeders in Australia have done significant work, and among them Oscar Ronalds deserves notice for the flower named for his wife, a tall-stemmed variety with very rounded, flat, overlapping white perianth, and a quite large, smooth crown of a solid good shade of pink. It has been marketed for some years, yet in spite of being a good increaser, stock remains very limited in America. It appears to be very promising as bulbs become available in greater quantity. Due to the length of time involved in getting daffodils established and fully acclimated when they cross the Equator, varieties from the Antipodes are much longer in becoming well known and distributed here than those produced in the Northern Hemisphere.

Holland has always been known for its daffodil bulbs, and while other areas were turning out what they hoped would be improved pinks, Dutch breeders were also busy, and being more concerned about good garden flowers and varieties that could be propagated easily, they apparently used Mrs. R. O. Backhouse extensively along with Tunis and Daisy Schäffer. Most of the series introduced there at the close of World War II gave evidence of such ancestry. Among them were Siam, Pink Fancy, Pink Rim, and Rosy Sunrise. Larger size, some improvement in form, and a variety of shades of pink, apricot, and salmon characterized these flowers which are now widely grown.

In America, C. E. Bailey and the Oregon Bulb Farms pioneered with work in this section. Bailey's untimely passing in the early 1940's was a loss to the daffodil world, but his seedlings were purchased by Oregon Bulb Farms and one of his best was named Charles Bailey and introduced. It had a nice pink frilled crown. A large population of pink seedlings was raised at Oregon Bulb Farms under the direction of Jan de Graaff with a large series being introduced in 1950. A visit to his farm where he had scores of clones with 50 or more bulbs each was an exciting event twenty years ago. Out of these came Roman Candle, a large flower with salmon-pink, trumpet-like crown which is reported to color well in warmer areas. More recent introductions include Troubadour, pure white perianth and soft-pink crown, and the very spectacular Carita, a very large flower with broad white perianth, and a big saucer-shaped crown of rich apricot pink that colors well in

most areas. If it should prove a good grower and increaser, it will be immensely popular, but early indications are that it is erratic in behavior in a few locations.

In the past decade, improvements in form and color are showing nearly everywhere, but consistency in performance under all conditions, and coloring that appears when the flower first opens and is retained until it wilts, is still a goal for the future. Perhaps such a flower exists now, but if such there be, it remains unproven.

Some space will be given to the work done here at Daffodil Haven, not that it is of singular merit, but that it is more familiar to the writer than that done elsewhere. One of the first pinks to be introduced here was Radiation, a flower of quite good form with an apricot-pink crown, its parents being White Sentinel × Mrs. R. O. Backhouse. It inherited much of the vigor of its pollen parent with better form. From a pale buff-yellow-cupped variety, Shadeen, crossed on Tunis, a few hundred seedlings were raised, one of which was selected for its deep salmon-pink crown, although it was of poor form and much lacking in substance; then it started making normal increase and was eventually named Interlude. Its pollen used on Interim produced Accent, a flower of exceptional substance and smooth texture, with strong rose-pink coloring that carries quite as well in the garden as the vivid orange-red-cupped varieties. Already it has proved itself as a parent, and it is to be hoped that it will play its part in developing improved strains of pinks. Kenmare × Dawnglow produced Rima, one of the relatively few large trumpet varieties with pink coloring, an apricot pink with a pale lilac suffusion. About the same time Flamingo appeared among seedlings from Coralie × Dawnglow. Although one of the purest pinks seen here, it is not a very rapid increaser. When at its best Caro Nome becomes an appleblossom pink, but it varies in color tone from one locality to another. Perhaps its main claim to distinction is in its value to breeders. One more with similar ability is Precedent, a seedling from Green Island × Mabel Taylor. With taller, stiffer stems than usual in its class, it has a large well-rounded, overlapping white perianth, and nearly flat, saucer-shaped crown of apricot salmon. Strangely enough, it not infrequently gives seedlings with decided lavender tones.

Vast strides must yet be made to obtain the ideal pink, and before it arrives our goals will doubtless be changed. The many thousands of seedlings being grown annually from "pink crosses" testify to the effort being expended. Hundreds of fanciers in addition to those mentioned here are involved in the search for that pervasive, but always elusive color! In the quest some superb flowers are certain to appear, be they pink or not!

—12—Tazettas

The tazettas came into garden use around the shores of the Mediterranean many hundreds of years before the coming of Christ. Numerous forms existed and some of the bulbs were conveyed into quite remote localities. Then in the 15th and 16th centuries the Dutch and English gardeners found the bulbs and their popularity soared almost as greatly as the tulip. Vast quantities of the bulbs were imported by the thrifty Dutch; so much so that many native haunts were completely denuded long before the end of the last century. In 1880 some 50 different variants had been recorded and as recently as 1907 A.M. Kirby listed 75 named garden forms. Then World War I brought about the sad devastation of the flower gardens of the Netherlands. Two harsh winters practically wiped out all tazettas from the Channel area. Only the hardiest of the clones survived. Lost stock could not be replaced. The many native colonies around the Mediterranean had long been stripped—just as many of the haunts of the wild daffodil are being pillaged today—and to top it off King Alfred and other hardy daffodils swept into the vacuum and captured the gardens by storm. Because of their hardier constitutions, the hybrid daffodils soon displaced the fickle, frost-sensitive tazettas in all areas but the Scilly Isles. Thus what we have today are the barest remnants of a vast vanishing race.

Currently there are barely half a dozen tazetta types to be found growing in the United States, and only three or four of these are commonly in the trade. There are several reasons for this marked decline here, too. Basically, as indicated, the natural habitat of the tazetta species is about the Mediterranean and in Turkey, and, consequently, tazettas insist on growing conditions which are Mediterranean in character. There is little use in trying to fight Nature. Thus we find White Pearl, Paper White, and Grand Primo (very commonly called Grand Monarque in error), all growing in the milder parts of the South and the Gulf area. And in the Far West, bordering the Pacific Ocean in Oregon, Washington, and California, the most likely garden types are Paper White, the Chinese Grand Emperor, Grand Primo, Soleil d'Or, and occasionally the Minor Monarque or *italicus*. Once in a blue moon a true Grand Monarque, the dwarf Canaliculatus, or a *tazetta aureus* or two may turn up.

The tragic loss of the many wild tazetta variants is most unfortunate as this definitely restricts primary breeding stock. But despite this handicap, one can use much of the existing material and produce some exquisite hybrids. Crosses are easily effected with *triandrus, jonquilla,* poets, and the smaller trumpets. The secret of success is to keep the tazetta pollen warm, to work with potted material where temperatures during pollination can be held near 70° F., for the best of the tazetta pollen are completely inert at lower temperatures.

By crossing Grand Monarque and *tazetta aureus* onto a mixed group of intraspecific triandrus hybrids, one can obtain a kaleidoscope of mixtures ranging from the well-known Silver Chimes down to the still unregistered wee Golden Pleiades with its seven tiny golden-yellow blossoms. Many of these crosses are dwarfs and most can be grown indoors in seed flats with half a hundred bulbs to a flat.

The jonquil crosses are equally dainty and complex, and, although there are many Poetaz hybrids on the market, the

diversity can be enhanced extensively by using the pollen of Soleil d'Or or some other yellow tazetta. Good yellow Poetaz of the Yellow Elvira type are still relatively scarce.

Alec Gray's Cyclataz which is *cyclamineus* × *tazetta aureus* is reported as semifertile. Unquestionably other tazetta hybrids may also be semifertile. Thus advanced hybrids are possible, particularly if the hybrid pollen is used on the parental forms, for backcrossing may often take when all other combinations fail.

Perhaps we should digress for a moment to point out that as a group the Amaryllis family, which includes the genus *Narcissus*, is not an easy one to breed. Only very closely related species will cross and give second generation F_2 seedlings following the typical Mendelian breakup. On the other hand, relatively wide crosses are quite common, but a high level of chromosome stability and linkage causes a great deal of hybrid sterility. The few semifertile hybrid pollens will strike quite readily on the parental species or related subspecies, and the backcross B_1 hybrids are usually fairly vigorous and have a higher level of viability than the initial F_1 cross. By recrossing B_1 hybrids, or crossing a B_1 hybrid with the lesser parent, further chromosome incompatibilities can be broken down. Thus, after random crossing for several generations, a series of introgressive hybrids should eventually evolve which have a fair level of viability, considerable diversity, and the vigor of the initial F_1 hybrid. The writer has broken down the outstanding incompatibilities of the genus *Crinum* by doing this, and thus far several tazetta backcrosses give promise of equal response.

The classification of *N. tazetta* is based upon the colors of perianth and cup. The key has been in effect for some 90 years or more and there appears little cause to make any changes, unless the species are regrouped according to chromosome number. At one time E. A. Bowles stated that all bicolors were hybrids, but as we have become more familiar with the breeding behavior of the plants we find this view difficult to accept. Bicolors, like the true Grand Monarque and the Chinese Grand Emperor breed quite true, suggesting a relatively homozygous chromosome complement typical of a wild population that has grown for untold centuries in some particular locality; whereas Grand Primo and Minor Monarque (*italicus*) are quite sterile, implying a hybrid source. Unfortunately, Grand Monarque, which was originally described as *Hermione floribunda,* came into garden use about 200 years ago, so we have no means now of establishing its original habitat other than it must have been from a very warm locality. The same applies to the Chinese Grand Emperor. True, the bulbs are Chinese in origin, but man could have carried them there from the eastern Mediterranean back in Marco Polo's time.

Tazetta Soleil d'Or has been identified as a triploid, but in warm weather it will self and produce a few seed and, although some seedlings turn out to be smaller Soleil d'Or, others are typical *tazetta aureus* with some randomization in size and width of the tepals. All are good breeders.

Paper White and the dwarf *tazetta panizzianus* have never been found to be good breeders. The hybrids lack substance in their perianth segments. This is probably one fault with White Pearl; the petals are thin and frail, being typically Paper White. All three plants produce seed and will cross.

Reference has been made to the confusion between Grand Monarque and Grand Primo. The two plants are very similar, but Grand Primo has a slightly shallower cup, is completely sterile, and produces numerous offsets. Both have been found to have a chromosome count of 2n=32 which suggests either a 22+10 or 33−1 combination. One variant of Grand Primo has a cup that fades out to near white on the third day. A second variant is known as Grand Primo Citronière, but it is now uncertain from descriptions just how much yellow was present in the cup and perianth of this clone, so we do not know whether the plant is one still in circulation or not.

In contrast, Grand Monarque has fertile pollen, produces few offsets—less than one a year—and has a deeper cup with crenulated margins. In full sun the blossoms stand up in a compact mass facing directly into the sun. A fully matured bulb may carry 22 blossoms in an umbel. Several seedling variants are in circulation and Compressus appears to be one of these seedlings.

Most Grand Monarques grown in the Scilly Isles and Florida are actually Grand Primo. The writer obtained his original stock from Australia, and then located two colonies in Southern California. A critical study of the plants was published in the Royal Horticultural Society's *Daffodil and Tulip Year Book* for 1964 by the writer. The work evolved from a painstaking comparison of E. A. Bowles' identifications of named clonal tazettas in his book, *The Narcissus* (1934), and J. M. Jefferson-Brown's list of specific names in his *The Daffodil* (1951). We are in complete agreement with Mr. Bowles, and the time and diligence devoted to the chapter on tazettas in his work has resulted in an invaluable reference.

The following classification, based on the grouping by Baker, covers all known garden tazettas which may be encountered in Australia, Europe, and America and indicates their known breeding behaviorism. The term "Cl. Hort." identifies the non-seeding horticultural clones. The number of florets given are those for a mature bulb after a good summer's rest.

I. Bicolor types; perianth white, corona yellow.

a. Cup orange or yellow.

CANALICULATUS (Gussone; a wild form derived from *N. tazetta* L. subsp. *lacticolor* Baker). 8 in. scape; 6-8 florets. Seldom flowers but pollen potent. Narrow perianth segments which do not overlap but form a star-shaped flower. The foliage is short and narrow, only ¼ the width of foliage of Grand Monarque. Probably a native of marshes. Several variations exist in southern France.

GRAND EMPEROR (derived from *N. t. chinensis**). 14 in. scape: 8-10 florets. Pollen active above 70° F. Exists in a number of variations including doubles and semi-doubles which are less common. Sold for forcing under such names as Sacred Chinese Lily and New Year Lily.

GRAND EMPEROR FLORE PLENO (derived from *N. t. chinensis* 'Flore Pleno'). 12 in. scape; 8-10 florets.

CYPRI (syn. *N. cypri*). A form of *N. t. chinensis* similar to but smaller than Grand Emperor.

ODORATUS. 9-10 in. scape; 8-10 florets. Pollen active. Similar to Canaliculatus in form, color, and scent, but much taller. Introduced by Alec Gray from bulbs collected in Scilly Isles.

b. Cup pale yellow.

GRAND PRIMO (syn. *N. orientalis* γ Ker-Gawler). Cl. Hort. 16 in. scape; 11-16 florets. Sterile. Shallow bowl-shaped cup containing fine radial pleats or folds. Produces numerous offsets. One variant has a cup which fades to nearly white on third day. The form which does not fade out is widely, but incorrectly, called Grand Monarque.

GRAND PRIMO CITRONIÈRE (syn. *Hermione citrina* Haworth). 11 in. scape; 8-10 florets. Sterile. Correctly illustrated as t. 180 in Jordan et Fourreau's *Icones ad Floram Europae* which is reproduced in *Daffodil and Tulip Year Book*, 1964, Fig. 32.

GRAND MONARQUE (syn. *Hermione floribunda* Haworth). 20 in. scape; 18-22 florets. Pollen active above 65° F. Correctly illustrated as t. 181 in Jordan et Fourreau's *Icones ad Floram Europae* which is reproduced in *Daffodil and Tulip Year Book*, 1964, *Fig.* 33.

* See E. A. Bowles, *The Daffodil* (1934). pp. 157-8.

Differs from Grand Primo by cup-shaped corona with a deeper rim and stronger shadings of citron. Often confused with Compressus non Haworth.

Compressus (non Haworth; Compressa of the trade). Cl. Hort. 18 in. scape; 20 florets. Pollen active above 65° F. Probably siblings or seedlings of Grand Monarque. White reflexing perianth and bright yellow corona. Makes a large bulb. Reported in France. Registered as Avalanche in 1955 by T. M. Dorrien Smith. *Compressus* of Haworth is said to be a wild form of × *intermedius* (*N. tazetta* × *N. jonquilla*).

Scilly White (syn. *Hermione leucoifolia* Salisbury). Cl. Hort. 14 in. scape; 10-12 florets. Not found in the United States. No information as to breeding behavior.

Minor Monarque (derived from *N. tazetta* L. subsp. *italicus* (Sims) Baker). Cl. hort. 20 in. scape; 9-10 florets. Sterile. Narrow cup and long, twisting, pointed segments colored very pale sulphur yellow.

White Pearl (derived from *N. tazetta* L. subsp. *polyanthos* (Loiseleur) Baker). Cl. Hort. 18 in. scape; 6-8 florets. Pollen active. Thin, milk-white perianth. Commonly found in Florida.

II. White types; perianth and corona both white.

Paper White (derived from *N. tazetta* L. subsp. *papyraceus* (Ker-Gawler) Baker). 16 in. scape; 10-12 florets. Viable. Popular for forcing. Many very minor variations were once on the market.

Paper White Minor (derived from *N. tazetta* L. subsp. *Panizzianus* (Parlatore) Baker). 10 in. scape; 11 florets. Small-cupped variant of Paper White. Viable.

III. Yellow types; perianth and corona both yellow.

Soleil d'Or (derived from *N. t. aperticorona* Haworth, a wild form of *N. t. cupularis* (Salisbury) Baker). 17 in. scape; 12 florets. Partially viable. Deep orange cup and bright orange perianth. Noticeable variation in the width of the perianth segments exists. An old plant, possibly from Africa, and *N. t. bertolonii* may have been an ancestor. Widely sold for forcing under the name Grand Soleil d'Or. Has a form, possibly a sport, which is slightly smaller with particularly viable pollen.

aureus (Loiseleur) Baker. 12 in. scape; 9-10 florets. Very viable. Width of perianth segments indicates some variation. A wild form.

bertolonii (Jordan) Baker. 9 in. scape; 6 florets. Properly viable. Miniature. Nearly black bulbs which do not increase very rapidly. A wild form.

—13—Daffodils: Early and Late

The first daffodil of spring is a delight, the last a treasure. In between these two there are many joyful flowers, but here we shall discuss only early and late varieties.

Two factors contribute to early or late bloom. First is the inherent trait of a flower for bloom at a certain time. The other is the location in which it is grown. To plant an early variety in a late location is to cancel out the advantage of its earliness. A late variety in an early location not only loses the advantage of lateness, but may be ruined by heat if it receives the reflection from a hot wall.

It is warmth, of course, provided by ample sun and protection from cold winds, that makes an early location. The sun and protection should be there all winter to give the greatest advantage. The south side of a wall, a southerly slope of ground, the sheltered side of a thick shrub planting where the low winter sun can strike and its increasing heat be effective, make a tremendous difference in the time of the upward push of growth. The ground toward the top of a slope is earlier than that at the bottom, as long as it is out of the sweep of the wind.

For a late location, look for a place that is shaded from the winter sun, where the ground stays frozen and cold for a long time. Late flowers can also be helped by some shade in the hot part of the day. High shade from two or three o'clock on is ideal. However, like all plants, the late daffodils do need sun and light for proper growth, preferably in the morning. It is holding them back in the beginning and then shielding the flowers so that they can develop properly and do not fade too soon that count.

There might be a third factor considered: the weather fluctuations in a given place at a given season, which can telescope or extend bloom periods. But this factor cannot be controlled by the gardener, who, for contentment of mind, must accept weather reverses calmly, while welcoming any blessings it may bestow gladly, though mulching and watering may alleviate some of its extremes.

Given the availability of early and late locations—and every garden has them to some extent—next comes the choice of varieties to make the most of them. In the earlier, there are many yellow trumpets, and yellow and red large cups are plentiful. There is also a good choice among the yellow cyclamineus hybrids. The choice of pale varieties and in other divisions is more limited, but it is possible to have diversity.

In the lates, the small cups predominate, many with some coloring in the cups (the varieties of the poet's narcissus are all white with red or orange in the eye), and some all white. There are also late jonquils to give pure yellow, and enough other kinds to give contrast to the dominant pale or white small cups.

Unfortunately, many catalogs and dealers are short on the small-cupped varieties in Div. 3. A search must be made beyond accustomed sources for these lovely flowers. There are a few suppliers in this country, and those who wish to take the trouble to import bulbs will find a good choice in the British Isles.

EARLY VARIETIES

* — especially early ** — earliest of all
(M) — miniature

1*a* Pale yellow trumpets: Grape Fruit, Moonstruck, *Mulatto (sometimes 1*d*).

1*a* Golden yellow trumpets: *Forerunner, Golden Harvest, Joseph MacLeod, Little Beauty (M), *Lord Nelson, Magnificence, Scotch Gold (very deep color), Sun Dance, *The First, Unsurpassable, *Wee Bee (M).

1*b* Bicolor trumpets: **Bambi (M), Chula, Foresight, Jefta, Lapford, Mirth, Patria, Preamble, Zest (very pale).

1*c* White trumpets: *Ada Finch, *High Sierra, Silverdale.

2*a* Large cups, perianth yellow, corona orange or orange red: Armada, Ceylon, Fortune, Golden Bracelet, Golden Treasure, *Hollywood, Illuminate, Krakatoa, Red Sunrise, Rouge, Sacajawea, Tinker, *Whiteley Gem.

2*a* Large cups, self-yellow: Aerolite, Carlton, Cibola.

2*b* Large cups, bicolors, all coronas rather pale: *Brunswick, *Penvose, Pink Rim, Promisso (pale pink corona), Silver Standard, South Pacific.

2*c* Large cups, all-white: Dunfane (opens 2*b*), Parkmore, Shining Waters, *Snow Dream.

4 Doubles: Bridal Crown, Hollandia, Telamonius Plenus (syn. Van Sion).

6*a* Cyclamineus hybrids: **Bartley, Caerhays, **Estrellita, **February Gold, *February Silver, *Garden Princess, Le Beau, March Breeze, March Sunshine, Mite, *Peeping Tom.

7*a* Jonquil hybrids, self-yellow: Penpol, Shah.

10 Species, Wild Forms, etc. *N. asturiensis* (M), *N. pseudo-narcissus* (M).

There are also early forms of old daffodils in certain localities, sometimes in old gardens or on abandoned homesites which are worth growing if a few bulbs can be begged from the owners or salvaged from the weeds.

The tazetta varieties of Div. 8 are very early in those sections of the country south of the Mason-Dixon Line where a mild climate allows their culture. The well-known Paper White (*N. tazetta papyraceus*) is a winter bloomer, followed shortly by the yellow Soleil d'Or and a white and pale yellow tazetta of uncertain identity. Other tazettas under unreliable but charming names may be found locally in the South.

LATE VARIETIES

* — especially late ** — latest of all
(M) — miniature

1*a* Yellow trumpets: Arranmore, Bastion, Counsellor, Golden Riot, Spanish Gold.

1*b* Bicolor trumpets: Hillsborough, Rathkenny.

1*c* White trumpets: Ambassador, Cameronian, Dunluce, Weisshorn.

2*a* Large cups, perianth yellow: Badger, Ballintoy, Cargan (self), Red Squirrel.

2*b* Large cups, perianth white: Alicante (bright orange corona), Tryst.

2*b* Large cups, corona pink: Azalea, Magic Pink, *Rose of Tralee, Roseanna, Sweet Talk.

2*c* Large cups, all-white: Corby, *Pigeon, St. Moritz.

3*a* Small cups, perianth yellow: Alcida (self), Russet (red cup).

3*b* Small cups, perianth white, cups bright: *Algeciras, **Corncrake, *Kildrum, *Pride of Erin, *Willowfield.

3*b* Small cups, perianth white, cups softly colored: *Dreamlight, *Grey Lady, *Misty Moon, **Reprieve.

3*c* Small cups, all-white: *Bryher, *Cushendall, **Frigid, *Portrush, **Silver Princess, *Silvermine.

4 Doubles: *Falaise, *Gay Time, **Patricia, *Rose of May, **N. *Poeticus* 'Flore Pleno' (syn. 'Albus Plenus Odoratus').

7*b* Jonquil hybrids: *Bebop (M), **Happy End, **Kidling (M), *La Belle (M), *Tittle-Tattle.

9 Poets of garden origin: *Cantabile, *Milan, *Sea Green, *Shanach.
10 Species, Wild Forms, etc.: **_N. poeticus recurvus_ (Pheasant's Eye), *N. × biflorus, _N. poeticus verbanensis_.

The daffodils in these lists are all priced at close to a dollar or under, many of them well under. All are supposedly in commerce at the present time. We have grown most, but not all of them.

Not included in the lists are four that we value very highly. Cornet, a well-formed golden 6*a*, may not be in commerce, but it is such a splendid extra-early flower that perhaps some day it may be. Omitted because it still costs about $3 is the lovely, very early Woodgreen, a 2*b*. The corona, almost a trumpet, is pale lemon which deepens a little at the rim; the perianth, of course, is white. Two very late poets seem to have disappeared from the lists: Lamplighter and Lights Out. Anyone who has a chance to acquire any of these should not miss the opportunity.

—14—Miniature Daffodils

While small daffodils have been around just as long as large daffodils, any awareness that there could be perfection on a small scale or that satisfaction and pleasure could be found in studying and flowering the less pretentious forms of daffodils is quite recent. The heretical idea that smaller daffodils deserved any space in a garden, except possibly a rock garden, or that they were entitled to be shown and judged on equal terms with their more generously proportioned kin is recent indeed.

By today's standards most of the raw material with which the early hybridizers began their work was small. Their goals were not only better form and greater substance, but larger size. Crossing the small species and the best of the available hybrids inevitably produced a percentage of seedlings marked by small size, most of which were discarded at once or subsequently lost. A few, such as Colleen Bawn (1889), lingered on in gardens; others, such as W. P. Milner (1884), have shown their ability to take care of themselves; and a small number, such as Sea Gift and Pencrebar have been salvaged and propagated by someone who cared.

For many years the smaller hybrids were considered the chaff of the genetic process. It was as recently as the 1920's that they caught the fancy of a Cornishman, Alec Gray, who began to collect them and eventually to hybridize them with the curious notion of creating smaller daffodils. Eventually his accomplishments were displayed at the daffodil shows of the Royal Horticultural Society where they attracted much attention and resulted in his being awarded the Peter Barr Memorial Cup of the Society in 1946. However, commercial hybridizing in the British Isles has been and continues to be, largely confined to Divs. 1-4 and since the professionals tend to dominate the daffodil shows of the R.H.S., the smaller daffodils, especially miniatures, are still the poor relations of an expanding family of trumpets and large cups. Such interest and advancement as exists is found among the amateur growers and hybridizers, notably D. and J. W. Blanchard (father and son), Sir Frederick Stern, and Cyril F. Coleman, as well as Alec Gray who has disposed of his catalog business and now is hybridizing only.

It seems quite clear that the first person in this country to give serious attention to small daffodils; to hybridize them for the sole purpose of creating smaller, rather than larger, daffodils; and to infuse others with her enthusiasm was Roberta C. Watrous of Washington, D. C., gardening in her city backyard. Mrs. Watrous has registered several small daffodils as has Matthew Fowlds of Canby, Ore. The principal show honor which miniature daffodils can win in the United States is the Roberta C. Watrous Award, a gold or silver medal, for a collection of 12 miniatures from at least three divisions exhibited at a show approved by the American Daffodil Society.

We have yet to make the distinction between small daffodils and the miniature daffodils with which this chapter is concerned. It is not an easy problem. The term "miniature" has been loosely applied in connection with all small daffodils. As a rule, the triandrus, cyclamineus, jonquilla, and tazetta hybrids; the species and wild forms and wild hybrids; in fact, all species and garden varieties with the possible exception of the poets, falling within Divs. 5 to 11 of the Official Classification, are smaller in all their parts than the trumpets and cupped varieties. For

that reason many tend to lump all these smaller daffodils together and consider them miniatures.

About 20 years ago the Royal Horticultural Society decreed that a miniature daffodil could not exceed 12 in. in height and 2 in. in width with the perianth segments flattened out. These dimensions now seem rather generous in view of the rising number of very small varieties and they present certain difficulties in application to both exhibitor and judges, but they have served the limited needs of English shows thus far.

In the United States a group of small-daffodil admirers began to grapple with the question of defining a miniature in 1958. The need for such a definition was evident from the variety of ways show committees attempted to specify the flowers which would be admitted to their miniature classes. The decisive factor was usually length of stem, although there was no agreement as to the precise length and problems of enforcement were ignored. Occasionally it was ruled that the size of the flowers should be in proportion to the length of stem, but this relationship was never reduced to a mathematical ratio. The result of such confusion was that a variety which would be qualified as a miniature at one show would be disqualified at another.

After several years the group concluded that it was impossible to frame a definition which would operate consistently and result in a way which was satisfying to the eye. Therefore, it was concluded to compile an arbitrary list of species and garden varieties which, after careful field study, should be classed as miniatures in the opinion of a number of observers. These observers were asked to consider: 1) whether the variety would appear at home in a rock garden, and 2) whether it would appear out of place on the show table among other varieties of standard size for the division. Surprisingly, this voting of an arbitrary list produced nearly general agreement.

The committee's study resulted in a report which was presented to the annual meeting of the American Daffodil Society in 1963 and adopted. The list of miniature daffodils contained the names of 75 hybrid cultivars and nearly 50 species, wild forms, or wild hybrids. The report also provided for a watchdog committee to add the names of qualifying introductions and to delist others which did not seem to meet the standards after further observation. The list was revised in 1965 and may be found in Appendix B.

Without attempting to comment on every name carried on the approved list, some observations on the desirability and availability of the species and hybrids may be useful to those who have the urge to try the smaller daffodils. For convenience, the species will be considered along with their hybrid progeny rather than be lumped together as they are in the Official Classification.

N. pseudo-narcissus, the Lent Lily, is a common miniature trumpet of no particular garden value. The best of this type, *N. asturiensis,* would be desirable for its extreme earliness, if for nothing else, but, in fact, the better forms of it are superior to all other wild trumpets with the possible exception of *obvallaris* which is not a miniature. *N. minor* (*nanus* of the trade) lacks clear coloring and is long on bulbs but short on flowers. Its varieties *conspicuus* (*lobularis*) and *pumilus* are somewhat better.

Three miniature trumpets are of uncertain origin; possibly sports or selected forms of the smaller trumpet species. Wee Bee is the best of these. It is of Dutch origin and said to be a sport of *minor,* possibly *minor conspicuus.* It is a soft yellow, vigorous, and of smooth form, although slightly hooded. Charles Warren is earlier and has a larger flower than Wee Bee. It resembles *minor pumilus,* although the latter is somewhat larger and later. Its origin is unknown; Alec Gray states that he found it on a bank in Cornwall. Little Gem is a slightly larger clone of *minor* selected by J. Gerritsen.

Almost all the smallest trumpets have *asturiensis* in their breeding. They are not difficult to create and they are en-

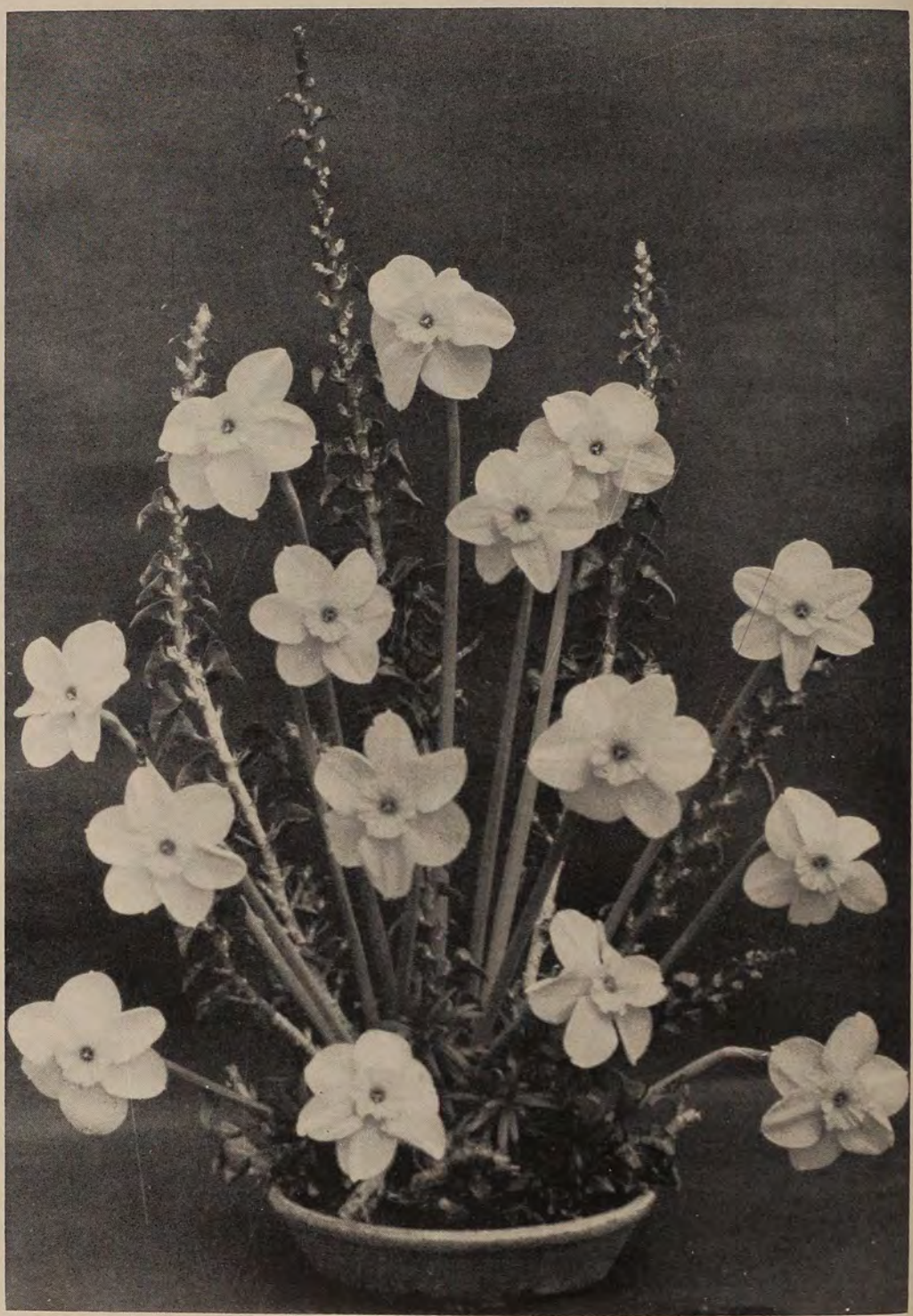

PLATE 48 ALEC GRAY

STAFFORD
Jonquilla Hybrid (Div. 7b.)

tirely fertile, but they increase very slowly and only two have been introduced—Sneezy and Tanagra—and both are hard to locate. Tanagra is a delightful tiny trumpet following right on the heels of *asturiensis* in starting the season. Sneezy is a self-yellow seedling of *asturiensis* × *obvallaris* with a largish flower on a stiff 4-inch stem. Little is known of Bowles's Bounty beyond the interesting fact that it was bred by the famed E. A. Bowles and registered by Gray in 1957; if introduced, it seems no longer to be found.

There are one species and three hybrid bicolor trumpets which have qualified as miniatures. *N. bicolor* is a sturdy, easygoing species which is occasionally offered. Bambi is a sport of *pseudo-narcissus* from Holland. It is very early, very prolific, and very cheap, but hardly a show flower. Little Beauty is a Gerritsen production of better quality and scarcely more expensive. Rockery Beauty is a tidy Dutch variety of good form but not often listed.

Miniature white trumpets present difficulties. *N. alpestris,* the only species, does not long survive in cultivation. All white trumpets, miniature as well as large, have been troubled by weak constitutions. From a number of old varieties, only two—W. P. Milner and Colleen Bawn—have survived and are still in commerce. The first goes all the way back to 1884 and Henry Backhouse, the first of three generations of distinguished figures in the daffodil world. The latter is almost as old, but a clone of *alpestris* selected by W. B. Hartland. These are sturdy garden flowers. Rockery Gem and Rockery White are modern Dutch varieties difficult to find. Snug is a recent Gray introduction, still scarce.

There are few miniatures in Divs. 2 and 3. All plants in these divisions should have *poeticus* somewhere in their ancestry. Wild or hybrid poets are tall plants and it is difficult to shrink their descendants to miniature size. The small supply in these two divisions is mostly concentrated in a group of five 2*a*'s: Marionette, Morwenna, Mustard Seed, Picarillo, and Rosaline Murphy; all are very scarce although still in existence. *N.* × *macleayi* (possibly *poeticus* × *pseudo-narcissus*) is a wild hybrid with the correct parents for a cupped daffodil, if they are, in fact, *poeticus* × *pseudo-narcissus* as the *Classified List* states. There is some evidence of tazetta ancestry but, in any event, bulbs of it are quite scarce. It has a bright yellow cup, white petals, and very broad foliage.

Other than these rarities, the only other miniatures in these popular divisions are a pair by Gray: Tweeny (2*b*) with white perianth and citron-yellow cup bred from a seedling 2*a* × *N. watieri* and Xit (3*c*) which is supposed to be pure white but is, in fact, a hybrid group and the cup may come either white or shades of cream. Its breedings is given as *watieri* × a large 2*c*.

There are several small doubles, all of unknown origin but doubtless mutants. Possibly the oldest of these—the *Classified List* is content to say "before 1601"—is Eystettensis (*capax plenus* of the trade). Rip van Winkle (*N. minor pumilus* 'Plenus') is a venerable oddity not unlike a dandelion. To call it quaint is to flatter it. The double jonquil, *N. jonquilla* 'Flore Pleno', is a golden ball, sweetly scented but very susceptible to stripe. Kehelland is a Gray introduction of rose-like form in soft yellow, possibly a sport of *minor.* Pencrebar and Wren are double jonquils, the first was found in Cornwall, and the latter which is similar but somewhat larger, more vigorous, and slightly different in color, came from southern Ireland. All the doubles can be bought with little trouble.

All the subspecies of *N. triandrus*—*albus,* Aurantiacus, *concolor, loiseleurii,* and *pulchellus*—are regarded as miniatures and there are many charming hybrids. Most are small-cupped 5*b*'s, but F. R. Waley found a large-cupped natural hybrid with four creamy-white flowers in his garden which he named Sennocke. He believes it to be *triandrus* × *minor,* but crosses of triandrus × *bulbocodium* give a similar flower. Shrimp is equally delightful with parentage of *juncifolius* × *triandrus albus.* Mary Plumstead is a faster increaser and

therefore in better supply. It resembles April Tears in pale yellow.

Among the small-cupped *triandrus,* the favorites are a pair of half-sisters, Hawera and April Tears. *N. jonquilla* is the seed parent of each; the former by *triandrus albus,* the latter by *concolor.* Hawera came to us from New Zealand and is earlier but rates below April Tears in form and color, although the latter, like most of the triandrus, is not happy everywhere. Gray's Raindrop (*N. triandrus* × *N.* × *dubius*) holds an Award of Merit and has been greatly admired, but it is doubtfully hardy and all but lost. Gray has given us three other well-bred varieties in Frosty Morn, pure white; Cobweb, cup shaped yellow; and Arctic Morn, flushed pink. All these normally have several pendant flowers.

The miniature cyclamineus hybrids are concentrated in Div. 6*a* because of the length of trumpet of *cyclamineus* itself and the fact that crosses are made with other trumpets. *Poeticus* and the tazettas appear only occasionally in the parentage.

Mini-Cycla combines *asturiensis* (formerly *minimus*) and *cyclamineus.* It is not very robust, nor is Greenshank which is similar but has W. P. Milner as a seed parent. Jetage is superior to both. Jumblie and Tête-a-Tête, along with Quince, the only 6*b* miniature, all came from a single seed pod on Cyclataz (*cyclamineus* × Soleil d'Or). These are all splendid flowers and Gray, as well as many gardeners, regards Tête-a-Tête as the most satisfactory plant he has ever raised. Jumblie is similar but has reflexed petals. Snipe, with the same parentage as Greenshank and both from the hand of the late A. M. Wilson, is the only white 6*a.* It increases slowly, but its pale, long-trumpted flowers are remarkably longlasting. Mite and The Little Gentleman came to us from the Antipodes and both are desirable and available.

The miniatures reach their climax in the jonquil group where there are a great many fascinating species and hybrids, most of which are listed by dealers. Because the species of this group have short cups, the hybrids are nearly all Div. 7*b.* The only 7*a*'s are Little Prince and Skiffle, neither of which is obtainable.

Nearly all the hybrids are the result of inter-specific hybrids and the primary species involved have been *N. jonquilla* (*simplex* of the trade), *N. rupicola,* and *N. juncifolius, N. watieri, N. calcicola,* and *N. fernadesii* have been used less frequently. When outside blood is introduced, it is likely to be that of *poeticus.* All of these jonquil species are quite small except *jonquilla* whose progeny tends to be larger.

N. atlanticus, N. rupicola var. *marvieri,* and *N. scaberulus* are all charming but rare miniature species, especially *atlanticus. N. jonquilla minor* and *N. jonquilloides* are so busy splitting that they rapidly become a clump of grass-like foliage without flowers. *N.* × *tenuior,* the "Small Straw-colored Jonquil", is an interesting old garden form of unknown origin. All the jonquil species are desirable in the garden, although some may be hard to locate and success cannot be guaranteed.

The current approved list of miniatures names 18 hybrid jonquils, 10 of which are attributed to Alec Gray. Five are from *rupicola* × *poeticus*: Bebop, Bobbysoxer, Stafford, Sundial, and Sun Disc. These are naturally somewhat similar, but all-yellow Sun Disc was the first to be registered. Bobbysoxer is taller and the cup becomes orange with a reddish edge. Bebop is similar in form to Sun Disc but gives us a white perianth with yellow cup and is later. Stafford brings us back to the yellow-orange combination of Bobbysoxer and is otherwise similar except for being earlier and having prostrate foliage. Sundial is earlier and smaller than Bobbysoxer and an all-yellow with a greenish cast.

A similar cross—*juncifolius* × *poeticus*—has given us two more excellent miniatures, La Belle and Lintie, both by Peter H. Barr. The latter is an especial favorite, yellow with a flat orange-red disc, late, and anxious to please. Another good doer and rapid increaser is Gray's Kidling (*jonquilla* × *juncifolius*). It is quite late, free-flowering,

and even more fragrant than most jonquils. Demure gets its refinement from *watieri;* it is white with a pale yellow cup. Pease-blossom is a very tiny primrose flower with triandrus blood, often twin-flowered. Sea Gift is a small self-yellow jonquil found by Gray in a Cornish garden and probably of Spanish origin.

Gerritsen has introduced Baby Moon and Baby Star. They both resemble *jonquilla* and are somewhat on the large size but free-flowering and very late. The only American introduction in this division is Pixie by Matthew Fowlds. It is from the same cross as Kidling and is similar but earlier with 3-5 one-inch flowers on a stem. Mrs. Watrous has registered, but not yet introduced, Curlylocks and Wideawake in this division.

After Div. 7 the miniatures wane rapidly. The only species with which we could be concerned among the tazettas are *N.* × *dubius,* a wild hybrid, scarce and shy with its flowers; Canaliculatus which is overly generous with its bulbs but stingy with its flowers; and *N. tazetta bertolonii,* a rare self-yellow native of North Africa. The few tazetta hybrids leave a good deal to be desired. Halingy and Hors d'Oeuvre are not very good flowers nor easy to handle. Shrew and Angie are the result of unusual matings which may explain their testy dispositions and scarcity. Cyclataz is a vigorous oldtimer with yellow perianth and deep orange cup but is not reliably hardy in the North.

There are no miniature poets and the miniatures come to an end in Div. 11 with all the bulbocodium and cantabricus species and a handful of bulbocodium hybrids raised by the Blanchards: Jessamy, Muslin, Nylon, Poplin, Taffeta, and Tarlatan. Their determination to grow and flower when other self-respecting daffodils are dozing makes them unlikely subjects for Northern gardens, but they do well in coldframes or a greenhouse and are successfully flowered outdoors where winters are less severe. Elfhorn, Kenellis, and Marychild are introductions by Gray in this division which are scarce.

Gardeners desirous of trying miniature daffodils with assurance of availability, variety, moderate cost, and success might consider the following dozen:

1*a*. Wee Bee	6*a*. Tête-a-Tête
1*b*. Little Beauty	7*b*. Bobbysoxer
1*c*. W. P. Milner	7*b*. Demure
3*c*. Xit	7*b*. Kidling
5*b*. Hawera	10. *N. asturiensis*
6*a*. Jumblie	10. *N. rupicola*

The American Daffodil Society has accepted the responsibility of examining future small daffodils as they are introduced to determine whether they should be added to the approved list of miniatures. A number have been named, registered, and are only waiting until adequate stocks accumulate before they are placed on the market. These include Rupert (1*b*), Segovia (3*b*), Paula Cottell (3*b*), Doublebois (5*a*), Poppet (5*a*), Yellow Gem (5*a*), Icicle (5*b*), Flute (6*a*), Soltar (6*a*), Rikki (7*b*), and West Wind (7*b*). While these are reported to be small, they will not necessarily prove to be acceptable as miniatures.

While the primary purpose of the approved list of miniatures is to improve their competitive position at daffodil shows, it has other important effects. For one thing, "miniature" as applied to daffodils is no longer an ambiguous term. It should be used only in connection with species and garden varieties named on the approved list. Oral discussion and correspondence can be carried on with mutual understanding, and it is expected that horticultural literature and bulb catalogs will gradually accept the proposed classification. It should be emphasized, however, that existence of a list of miniature daffodils does not tamper in any way with the Official Classification of the Royal Horticultural Society. The small trumpet Wee Bee continues in Div. 1*a*. It is now merely identified as a trumpet of very small proportions.

Interest in all smaller daffodils is on the rise in the United States and quite possibly is greater here than in England or Ireland; certainly greater than in Holland, Australia, or New Zealand. Fashions in daffodils abroad have been

shaped by the hybridizers in the British Isles and Holland and greater size has been the common objective. Australia and New Zealand have followed the lead of the United Kingdom. The chief difference is that the English and Irish hybridizers from Engleheart to Richardson and Wilson have sought large flowers of perfect form for the show bench, while the Dutch, with their eyes on the commercial market, have bred for large and spectacular garden varieties. With the exception of the catalogs of Walter Stagg who purchased the stocks of Alec Gray and, to some extent, of Michael Jefferson-Brown, the young Cornwall grower who abandoned a teaching career, European daffodil catalogs have always neglected the smaller forms, i.e., those falling within Divs. 5 to 11 of the Official Classification.

Growing interest in smaller daffodils on the one hand, and limited breeding for new varieties and slowness of increase on the other, have created a very tight market situation. Miniatures are often sterile and varieties which increase slowly are unprofitable commercially. While a source for the triandrus, cyclamineus, and jonquilla hybrids which have comparatively small flowers, but are not all true miniatures, can usually be found by a determined gardener, many of the varieties on the list of miniatures are quite scarce and the demand is growing more rapidly than the supply.

The growing of miniature daffodils will always be rewarding to those who are fascinated by perfection on a small scale, but the field will never be crowded. However, miniature daffodils have some definite advantages over flowers of standard size. Most importantly, they will advance the season for the impatient gardener to whom the daffodil symbolizes the advent of another year. *Asturiensis* and Tanagara are likely to precede February Gold, itself a comparatively small flower, but not a miniature, by a couple of weeks. Fortune, the first widely grown large flower, will be still later by a few days. In addition, the season is lengthened by the appearance of *juncifolius, scaberulus,* Baby Star, Tweeny, and some of the triandrus species and hybrids after the large flowers have passed.

While some of the species miniatures can be a bit temperamental, as a rule the miniature garden varieties are less demanding than their larger colleagues. Genetically closer to their species forebears which grow in the mountains of the western Mediterranean, they are quite contented in a lean, stony soil which is hot and dry in summer and cold and windy in winter. The exception is *cyclamineus* which must have moisture and tolerates, if it does not prefer, shade. The special cultural requirements of miniatures are fully considered in Chapter 2.

—15—Split-Corona Daffodils

On browsing through Hill's *Eden, or a Compleat Body of Gardening* (1757), I came across a note on the "Fringed Narcissus" and an interesting, but perhaps not very accurate, old woodcut of the type. The flower is described as the "Winter Daffodil": *Narcissus pumilus* var. *fimbriatus,* or "Narcissus spatha uniflora nectari limbo campanulato profundo secto"; it is currently classified as a form of *N. minor* var. *pumilus.* The margin of the corona is deeply cut into six distinct, spreading lobes; each lobe, in turn, being subdivided into three lobules. Some time ago I examined a specimen and, like other species, it demonstrated that a six-lobed corona is one of the characteristics of the genus.

It is this characteristic of the "schizocoronati," or "split-corona" daffodil that offers interesting genetic possibilities. For some time this type of daffodil, in varied dress and hues, and under florid names, has invaded the precincts of the daffodil world.

As in some other genera, the undivided corona which characterizes the daffodil is believed to be a comparatively recent attribute. The corona has mystified botanists as to its origin and nature and, in the daffodil, is said to be the most distinctive occurrence of its kind. Among the more primitive daffodil species, the corona is either completely lacking or exists in a rudimentary form.

From a letter of Prof. Dr. Abilio Fernandes, of the University of Coimbra in Portugal, I quote the following translated extract: "My experience with wild narcissus has shown me that the corona in which one can distinguish six lobes appears in the majority of species. This gives definite support to the idea that the corona was first formed entirely of six lobes. They were fused together to form the very developed corona known today. . . . Besides *N. viridiflorus* which you mention, *N. serotinus* is also of interest from this point of view. In fact, I have found plants of this species whose coronas, themselves rather small, consisted entirely of three lobes, divided each in turn into two lobules. I think that similar six-lobed coronas can be found in *N. elegans.*"

By comparing flowers of the Lent Lily (*N. pseudo-narcissus*), one finds convincing evidence of an incomplete evolution of the corona, since they vary considerably in length and the incisions of the edge of the corona likewise vary. Even in such mature species as *N. poeticus and N. tazetta,* the minutely incised edge of the corona is unmistakable, if closely observed. This also applies to *N. cyclamineus* and to the primitive wild trumpet species, *N. asturiensis,* which shows the six-lobed corona fringe quite clearly. How the undivided corona of the modern flower developed from a rudimentary stage into its present full length, while still maintaining its characteristically fringed, six-lobed corona margin, can be observed by comparing successively *asturiensis, pseudo-narcissus,* Golden Spur, King Alfred, Golden Harvest, Unsurpassable, Golden Top, Prolific, and their derivatives. Obviously these more highly evolved trumpets function as a pollen protector for flowers adapted for pollination by larger insects.

From time to time various mutations have occurred among daffodils, such as doubling, petaloid and lobuloid anthers, and different sports, along with various freaks and reversions. The old trumpet Victoria, in particular, threw these reversions with the corona split right down to the base into six lobes which

were placed before their corresponding perianth segments; sometimes overlapping, at times framed by the perianth. I have come across some of these reversions, but since they did not prove to be genetically constant and were ugly ducklings as well, they were weeded out and discarded.

In some of these freakish reversions from bicolor Victoria, the lobes of the corona margin were divided to the base and the six lobes sometimes framed by, and sometimes completely hid, their corresponding perianth segments.

One such reversion of Victoria was called Buttonhole, and some hybridizers crossed it both ways with such trumpets as Emperor, Empress, Mme. de Graaff, King Alfred, and Glory of Leiden. De Mol and A. Nieuwenhuis formed a syndicate to raise seedlings from Buttonhole and called their strain "Gigantic Orchid-Flowering Daffodils," but it deteriorated and has since been destroyed. J. W. A. Lefeber pollinated a similar reversion with large-cupped varieties and named the progeny "Papillon Daffodils." In his seedlings, the lobes of the divided corona were shorter and did not completely overlap the corresponding perianth segments; some had the corona and perianth segments placed alternately. Burning Heart, Cape Kennedy, First Lady and Papillon Blanche are examples of this strain.

J. Gerritsen of Voorschoten began his strain in 1928 by pollinating a Buttonhole seedling and thought the name "Collar Daffodils" would indicate that his strain consisted of ruffed coronas split to the base. While the first results were disappointing, he persevered by self-pollinating the offspring and soon began to make steady progress. In all his crosses, he has aimed at creating an improved split-corona and he has produced every conceivable form, shape, and shade, including a flower with a three-lobed corona resembling an iris.

The seedlings are tested for several years and only the best are selected for further trials. Thus far about 20 varieties have been named, registered beginning in 1956, and placed on the market; among them are Canasta, Evolution, Expo, Flaneur, Gold Collar, and Orangery.

As far as registration goes, the split-corona daffodil is still a problem child and has puzzled the daffodil committees both of the Royal Bulb Growers' Association in Haarlem and of the Royal Horticultural Society in London. The latter has considered the difficulty and decided to provide special classes at the London Daffodil Shows for "Ruffles," i.e., varieties in which the corona is split into segments, in order to test the reaction of the show fraternity and the public.

A variety which I took to London was sent to Wisley, at the request of the Narcissus and Tulip Committee of the Royal Horticultural Society for inspection by the botanist, C. D. Brickell. One finds an interesting note concerning this episode in the Daffodil and Tulip Year Book for 1965. In his foreword, Oliver E. P. Wyatt, chairman of the Narcissus and Tulip Committee comments on the work of the Committee, saying: "Moments of somnolence are rare, but if so innocent-looking a word as 'Ruffle' is whispered, the whole hive begins to buzz as do bees in thundery weather."

While I appreciate this kind of daffodil is not everybody's cup of tea, I have always enjoyed reading about and listening to the various opinions with impartiality, yet I have failed to understand why modern use of the original characteristic incisions of the corona has caused so much dissension.

On the recommendation of its Narcissus and Tulip Committee, the Council of the Royal Horticultural Society has decided that as far as daffodils for show purposes are concerned, varieties with the corona split to the base should be classified as Div. 11. Where the corona is not split to the base, they should be placed in the appropriate division according to the length of the so-called corona.

Correspondence initiated by the American Daffodil Society with The Royal Horticultural Society to find a mutually acceptable term to be applied to this new type of daffodil has recently been concluded. The name "Split-Cor-

FIG. 11.—NARCISSUS PUMILUS var. FIMBRIATUS.
From J. Hill's *Eden, or a Compleat Body of Gardening* (1757).

PLATE 49

SPECIES *minor* VAR. *pumilis* f. Fimbriatus

A wild form of the species and a botanical precursor of the new split-corona daffodils

ona Daffodil" has been adopted and will be in general use hereafter.

The final judgment of these flowers now rests with the public. Since tastes do vary, let us be tolerant and weigh them on their merits, realizing that in daffodils, as with people, it takes all kinds to make a world.

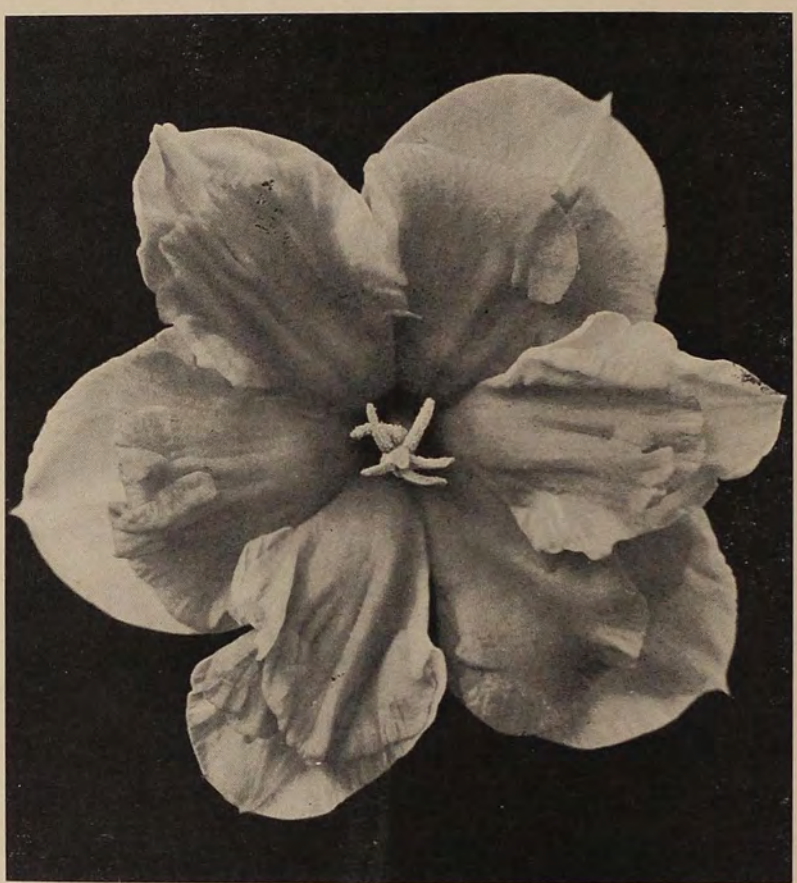

PLATE 50

ORANGERY
Split-corona (Div. 11)

—16—Daffodils in the United States

THE EARLY BEGINNINGS

There is apparently no record when the first daffodils were brought to this country. John Bartram wrote to Peter Collinson in the 1730's that they were plentiful and that he did not want any more. Unfortunately, he did not describe the kinds he was growing. It seems likely that among them was Telamonius Plenus which, under the name of Van Sion, is still to be found in old gardens.

In our southern states, many forms of *N. jonquilla* and *N. tazetta* must have come in with the earliest settlers. They have naturalized themselves and now are features in the spring landscape for mile after mile along the highways.

About a century after Bartram, William Prince, the pioneer Long Island nurseryman, was offering for sale many dozens of varieties of spring bulbs—crocus, tulips, etc.—imported from wholesale bulb growers in Holland. In 1842 his catalog featured 14 varieties of "single" narcissus including Trumpet Major; *N.* × *biflorus, N. poeticus, N. bulbocodium,* and *N. triandrus;* six double varieties including Van Sion, Orange Phoenix and Sulphur Phoenix; three jonquilla varieties: "Large Single," "Small Single fragrant," and "Double fragrant"; and 32 varieties of "polyanthus" narcissus including Grand Monarque and Grand Soleil d'Or.

PLANT QUARANTINE ACT

During the later years of the 19th century and the early years of this century, daffodil bulbs were brought in from Holland in immense quantities. American seedsmen and dealers could more than double the Dutch prices and still offer them at such reasonable prices as to encourage a large and constantly growing demand.

In the age of the large estates presided over by British-trained head gardeners, many of these bulbs were forced in greenhouses for winter bloom and then planted out in herbaceous borders, meadows, and woods. If they did not all persist for more than a few years, it was a small matter to replace them as they were so cheap.

Many did persist. Among these were Emperor, Empress, Horsfieldii, Sir Watkin, Prince of Wales, Mme. de Graaff, Frank Miles, Barrii Conspicuus, Albatross, Seagull, White Lady, *poeticus* Ornatus, *poeticus recurvus,* Primrose Phoenix, and Sulphur Phoenix.

The great seed houses of Peter Henderson, Stumpp & Walter, Vaughan, Dreer, Michell, Breck, Fottler, Fiske & Rawson, and Farquhar, and nurseries such as Wayside Gardens, began to feature finer and finer varieties. They were more expensive, yet not much more expensive than the older kinds and they found a wider market as more gardeners read about them in gardening papers or saw them in flower shows.

A revolution in gardening was beginning in the early 1900's. The great estates were beginning to give way to hundreds and thousands of amateur gardeners with small places who became interested in the finer named varieties. King Alfred appeared and with it Van Waveren's Giant, Glory of Noordwijk,

The writer of this chapter gratefully acknowledges the help in preparing it, first of all from George S. Lee, Jr.; from Charles J. Gould of the Western Washington Experiment Station; Ted Sabelis of the Puget Sound Bulb Exchange for furnishing statistics; from Jan de Graaff, Grant E. Mitsch, B. Y. Morrison, Mrs. J. Robert Walker, Mrs. George D. Watrous, Jr., Freeman A. Weiss, and many others.

Spring Glory, Great Warley, Helios, Will Scarlett, Queen of the North, Horace, and Glory of Lisse.

These changes might have continued slowly, but they were accelerated by the reaction from the austerity of the great war. Gardening suddenly enjoyed an unprecedented popularity. The membership of older horticultural societies grew rapidly; the flower shows increased in numbers and size; small garden clubs were formed and then joined into great federations; special plant societies for the rose, peony, iris, dahlia, gladiolus, etc., flourished; new books and magazines were published, and a great number of new nurseries in all sections of the country put out larger and finer catalogs.

In 1919, Plant Quarantine No. 37 shut out from American markets the importation of most plants from abroad. American forestry, agriculture, and horticulture had suffered dreadful losses from insects and diseases brought in on imported plants. A few examples, such as chestnut blight, San Jose scale, and Japanese beetle, were dramatic enough to show the gardening public the need for protection against the entry of further pests. But the cessation of the importation of new plants made the gardening public aware for the first time how much they depended on foreign sources. It at once caused amateur gardeners to yearn for plants they could not get, and it gave a great stimulus to American nurseries to produce these plants here. There was bitter controversy over the methods of the Quarantine, and many amateurs believed it was only a subterfuge for a protective tariff for nurserymen.

The 1919 law did not impose restrictions on daffodils and other bulbs, but the handwriting on the wall seemed so clear they would be included later, that Dutch bulb growers began to come to this country, to bring in immense quantities of bulbs, and to establish bulb farms even before the announcement was made that daffodil importation would be restricted in 1926. The controversy over the need and the usefulness of quarantine rose to new heights. Daffodil growers pointed out that the government had not restricted importation of bulbs during the years 1910-1915, when infestations of daffodil flies and eelworm had destroyed collections in Great Britain and Holland, but had allowed these pests to come in without restriction or adequate inspection. In the five years after the war, the Ramsbottom hot water treatment had conquered these pests. Now that foreign stocks had been cleaned up, many persons felt that the government officials chose a strange time to keep them out.

There was a rush to bring in new daffodils before the 1926 deadline, and many varieties came to this country, like Fortune and Beersheba, that are still important today, as well as great numbers that were to be superseded by the finer new productions in the 1930's, 40's, and 50's.

START OF AMERICAN PRODUCTION

Commercially, the five years from 1926 to 1931 were the experimental period when bulb farms were established in many different parts of the country, and many different methods of planting, care, and harvesting were tried out. By 1931 it was clear that, for all its science, the helpful advice from the United States Department of Agriculture, sent out chiefly by Dr. David Griffiths from the United States Bulb Station, Bellingham, Wash., beginning about 1908 and valuable to many who were establishing the new bulb farms, was not enough to overcome the lack, in many states, of the natural conditions the bulbs needed. Most of the farms that had been started in New Jersey, the Carolinas, Florida, Michigan, and California were given up. Proper natural conditions, however, were found in Long Island where the Dutch firms of Frylink, van Bourgondien, and Zandbergen had established themselves; in Tidewater Virginia where M. van Waveren and Sons started the great farm later taken over and still run by George Heath; and on the northwest Pacific coast area around Portland, Tacoma, and Seattle.

There had been far earlier beginnings

in the Northwest. In the State of Washington about 1910, George Lawler had begun to grow daffodils near Tacoma for cut flowers and by 1918 was selling bulbs of many varieties; and Joe Smith was growing bulbs near Olympia and offering them for sale in an unusual, if not eccentric, newspaper dealing not only with descriptions but offering sound advice on growing all kinds of plants, along with excursions from time to time into a general philosophy of life.

To the Portland area about 1926 came Jan de Graaff to set up the Oregon Bulb Farms. He brought from Holland the cream of the finest varieties grown by his firm and tested over 2,000 varieties before settling down to offer about 200 in his wholesale catalog. He began breeding and introduced in the next 20 years or so the first fifty or more American varieties to be grown in quantity and distributed. In 1959 all the bulbs were sold to the Puget Sound Bulb Exchange.

Other Dutch growers coming to the Puget Sound area were Fred Delkin, Francis Chervenka, A. N. Kanouse, Segers Bros., Harry van Waveren, van Zanten, and van Zonneveld. Other pioneers were Charles and Edward Orton.

There were, in addition, various local farmers who began to grow bulbs, making in all at the peak in 1936, over 100 growers on some 2,000 acres of land. These growers, after five years of experiments with various methods of planting, cultivating, and harvesting the bulbs with new machines, were able to produce enough bulbs to satisfy the growing demand for newer and better varieties, better bulbs, and seemed to have a rosy future.

END OF THE EMBARGO

Then in one moment the government that had embargoed foreign bulbs and given the opportunity and the scientific advice to build up American production reversed its stand, cancelled the Quarantine, and once more allowed foreign bulbs to come in. Most daffodil growers could not stand this competition from the cheaper labor of Holland and either gave up their farms or concentrated on other crops. Exact figures are hard to get, but Government statistics estimate that about 700 acres were devoted to daffodils in 1965 and that about one man per acre was employed full time during the year. On the other hand, the bulb growers' cooperative claims that about 75 growers are still producing daffodil bulbs or growing daffodils for cut flowers to ship all over the United States. They estimate that in 1965 about 1,500 acres are in production and that a labor force of about 15,000 men is employed. These figures undoubtedly include land devoted to tulips and to bulbous iris and the part-time labor force needed to cut, bunch, pack, and ship cut flowers, as well as the extra helpers at bulb planting time in the autumn and the bulb harvesting, cleaning, curing, and shipping in the summer and early autumn.

Daffodil bulbs produced in the Puyallup Valley near Tacoma and in nearby Mount Vernon, Sumner, and Woodland, will bloom earlier than the same varieties grown in Holland. This is believed to be due to the latitude of 47° which is four degrees farther south than Holland. The bulbs are, therefore, preferred by the great greenhouse forcing industry. King Alfred and similar varieties are grown by the million. In all, perhaps 200 varieties, mostly derived from the Oregon Bulb Farms purchase, are now being grown in the Puget Sound area.

Daffodil bulbs for forcing are even being shipped to Europe and this is true also of tulip bulbs. It is even more true of bulbous iris. The west coast growers have built up a business of over 25 million bulbs a year to Holland and other European countries. This sounds surprisingly like shipping coals to Newcastle. Apparently the European demand is larger than our growers can now supply, so it is expected the business will continue to increase.

MODERN HYBRID DAFFODILS

I have tried to give a picture of 1) the early beginnings of daffodils in American gardens and of 2) the changes in wholesale production of bulbs caused

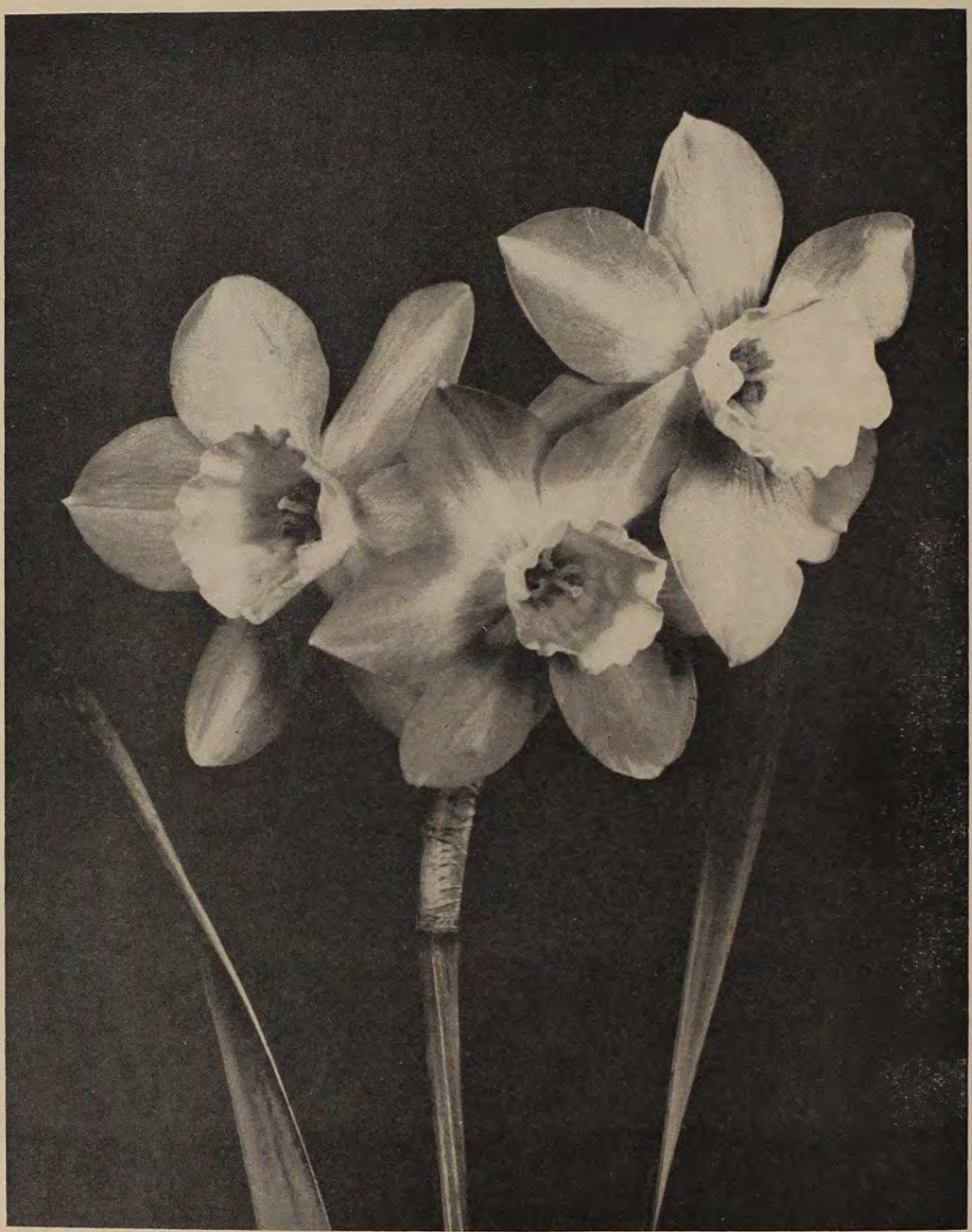

PLATE 51 GRANT E. MITCH

PIPIT
Jonquilla Hybrid (Div. 7b)

by the enactment of the bulb quarantine and then its cancellation. This has covered the varieties of daffodils grown in wholesale quantities and available nowadays from every seedsman, garden center, and hardware store in our autumn months. They are good bulbs, at reasonable prices by the dozen and the hundred, and are playing an important part in American gardens.

I now want to touch upon the approximately 50-year development of what are prize-winning exhibition varieties for the modern daffodil enthusiast, daffodil exhibitor, and daffodil breeder who wants the finest in new productions from the science and art of plant breeding.

This type of development began in Britain, not in Holland. It is generally credited to such men as the Rev. George H. Engleheart, Peter Barr, P. D. Williams, The Brodie of Brodie, Guy L. Wilson, and J. Lionel Richardson. It was slow and painstaking for them, but wonderfully rewarding to the present day enthusiastic members of the American Daffodil Society.

Hunt. It traces back to the Royal Horticultural Society daffodil shows. Reading reports of these in the British horticultural press, American gardeners of 50 years ago began to want to try some of the show winners. One American amateur, Chester J. Hunt, a New Jersey school teacher, planted several hundred bulbs of some of these winners in his backyard in 1914. So many people flocked to see them and asked him to get bulbs for them, that after the war he gave up school teaching and established an importing business built largely upon a beautiful display garden which people could visit in the flowering season, placing their orders with very attractive young ladies while being served tea.

Scheepers. About that time, John Scheepers came from Holland and started a similar garden on Long Island. Joseph Lane, then advertising manager of the *Garden Magazine,* claims to have given him a running start by persuading him to put in a full-page advertisement. Scheepers' business grew fast and he was able to put large and magnificent bulb gardens in the yearly New York Flower Shows. It was these shows, in turn, that enabled untold thousands of eager gardeners to see for the first time the almost unbelievable improvement in the newest daffodils from the British breeders already mentioned and from de Graaff, Krelage, van Tubergen, and others in Holland.

Another feature in the period between the two wars was a sudden interest in daffodil breeding by individuals, mostly amateur gardeners, in different parts of the country and apparently unknown to each other. All of them seem to have brought from Great Britain and Ireland the then new varieties. They made crosses with them wishing to develop varieties particularly suited to their climates. They grew seedlings in great quantity. Some exhibited them at flower shows and thus helped spread interest in daffodils. A few gave names to their seedlings and offered them for sale. More gave names and registered them with the Royal Horticultural Society and then sold a few bulbs privately but did not offer them for sale publicly. Some kept them in their own gardens for public display but did not allow any bulbs to go out, and still others reported in the garden papers what varieties they were using for parents but did not give out other information nor show their results.

Whatever they did, they did accomplish one thing. They spread the interest in daffodils and a good part of what we have today we owe to that. But by and large, their seedlings had no effect, and a small handful of authentic varieties from only one of the breeders mentioned are grown today or still available from commercial sources. Of the others, all are gone, their names in the *Classified List* the only evidence they ever existed.

Morrison. In the early 1920's, B. Y. Morrison of the United States Department of Agriculture, planted in his home garden in Takoma Park, Md., some of these varieties and began to make crosses. He was probably the first in this

country to do this and to show seedlings which became a feature of the daffodil shows later staged by the Garden Club of Virginia, but he never named and introduced any seedlings.

POWELL. The editor of the Agriculture Department's Division of Publications, Edwin C. Powell of Silver Spring, and later Rockville, Md., began daffodil breeding in 1925. He raised over 65,000 seedlings and exhibited them at daffodil shows. After retiring in 1940, he began to issue daffodil catalogs and named and offered for sale over 50 of his own seedlings. Apparently only a few of them are still in commerce. The most interesting of these are Cheyenne, Cherokee, Hiawassee (one of the few known offspring of Paper White), Kasota, Kiowa, Nakota, and Oconee.

FOOTE. Mrs. F. Stuart Foote (Florence Edna Foote) of Grand Rapids, Mich., went to the London Daffodil Conference in 1935. She bought some startling novelties and proceeded to use them in breeding. In the early 1940's, she registered nearly 50 varieties with the Royal Horticultural Society and they still appear in the *Classified List,* although they were never put into commercial production. There seems to be a difference of opinion on how widely they were distributed. Some of the intriguing names were Arctic Snow, Choice Gift, Crushed Strawberry, Happy Day, Michilinda, Pink Butterfly, Pink Symphony, Sylvan Pink, and Sweetbriar.

It has been difficult to learn much more about Mrs. Foote's work. During the last years of her life, she was paralyzed and unable to care for her bulbs or to write any complete record of them. Her most intimate friends are long since dead, and they apparently did not write or publish anything definite about her work. B. Y. Morrison had a rather lengthy correspondence with some persons who knew her slightly, without being able to ascertain which of her varieties are still in existence. It seems probable that those which do exist can no longer be identified by Mrs. Foote's names. There can be no doubt, however, that Mrs. Foote performed an important function in writing about them, publishing a catalog, and lecturing. Many people got their daffodil inspiration from her.

DAVIS. Mrs. Paul Davis of Deep Valley Farm, Nashville, Tenn., had, in the 1930's, the most complete garden of daffodil novelties in this country. Money seemed to be no object with her. She bought whole stocks at unheard-of prices from de Graaff, Barr, Calvert, Richardson, P. D. Williams, and others. She apparently named and registered over a hundred of these, but did not propagate or introduce them. Like Mrs. Foote, she chose delightful names: Altar Cup, Alpine King, Blazoner, Coral-beach, Danseuse, Happy Miss, and Stargazer.

REYNOLDS. Mr. and Mrs. Kenyon Reynolds of Pasadena, Calif., attended the 1935 Daffodil Conference with Mrs. Foote and began to breed varieties for California. They named and registered over a dozen seedlings, but most of these apparently have disappeared. The variety Patricia Reynolds is still grown and is offered as a prize in conjunction with the Patricia Reynolds Trophy at the Southern California Daffodil Show.

SMITH. Mrs. Harry O. Smith of Cave Junction, Ore., was another early pioneer breeder who, inspired by Dr. Griffiths, began making crosses about 1920. She has not named, registered, or introduced any of her seedlings.

MITCHELL. Two famous California horticulturists tried their hands at breeding varieties particularly suited to their climate. The first, Sydney B. Mitchell of Berkeley and already famous for his iris, began breeding in the 1920's. He is known to have made crosses of Tunis × Fortune, Tunis × Prince Fushimi, John Evelyn × Cornish Fire, and Beacon × Fortune.

REINELT. At Capitola, Frank Reinelt, world-famous tuberous begonia breeder, after making crosses for several years, decided progress was too slow to be justifiable commercially. He is known to have made crosses of Tunis, Polindra, and St. Issey × Galway and Zero which produced satisfactory flowers in his cli-

mate. He found Dreamlight a good seed parent and Green Island, Bread and Cheese, and Matapan good pollen parents. He must have been the first American to use Broughshane for breeding. He grew countless thousands of seedlings but did not name or introduce any.

Berry. S. Stillman Berry of Redlands, a breeder of iris and an authority on many other plants, served the daffodil world well by being about the first to import daffodils from West & Fell in Australia and from Alan Gibson and Arthur E. Lowe in New Zealand. He listed about 15 of these in his 1938 catalog. Later he named and registered at least four seedlings of his own breeding but does not seem to have distributed them widely, and they are not known today.

De Graaff. Before giving up commercial daffodil production in 1959 and selling his stocks to the Puget Sound Bulb Exchange in order to concentrate on lilies, Jan de Graaff made several series of crosses and named about 50 varieties which were widely distributed and some of them are still grown. Among them are Azalea, Bounty, Bravo, Brightwork, Carita, Circus Clown, Concerto, Cover Girl, Daring, Forty-Niner, Golden Dawn, Gremlin, Halloween, High Sierra, Indiscreet, Magic Pink, Matador, Mount Whitney, Peaches and Cream, Polar Star, Riotous, Roman Candle, South Pacific, Sunburst, Sweet Talk, Tiara, Tonto, Troubadour, Western Star, Windswept, Winkie, and Zircon.

Later Growers and Breeders. In addition to the individuals, nurserymen, and dealers already mentioned, I should add here that George Heath, trading as The Daffodil Mart, Gloucester, Va., and Gerald D. Waltz, Salem, Va., act both as dealers and growers. Their lists probably contain the largest number of varieties, both old and new. A long-established dealer in all the Holland bulbs is Charles H. Mueller, New Hope, Pa. A more recent comer is the old established Dutch firm of de Jager which has opened an American agency in South Hamilton, Mass. This firm purchased, and is now growing in England, the entire stock of the late Guy L. Wilson and will undoubtedly be offering seedlings that have bloomed since Mr. Wilson's death in 1962.

The following breeders registered seedlings and have had them introduced by Grant Mitsch: Charles D. Culpepper, Va., Red Sunrise and Snow Gem; Murray Evans, Corbett, Ore., Descanso, Wahkeena, and Space Age; Matthew Fowlds, Canby, Ore., Goldette, Harmony Bells, Honey Bells, Pixie, and Bopeep; A. N. Kanouse, Olympia, Wash., Pink Chiffon and Inca Gold.

There should be at least brief reference to the fact that the American Daffodil Society has encouraged many amateurs to take up daffodil breeding. Orville Fay of Northbrook, Ill., has raised about 15,000 hybrid seedlings in the last 15 years. He has several seedlings that are extra hardy in his severe climate under propagation for the future and has registered Band of Gold and Spring Hills. Mrs. Goethe Link, Brooklyn, Ind., has registered Corbula, Tanager, Titmouse, and Towhee; the latter voted the best flower in the convention show of 1963 at Greenwich, Conn. Mrs. Ben Robertson of Taylors, S. C., has registered Indian Brave, Mellow Glow, Myomy, Promenade, Sandra Hall, Soft Breeze, and Sunbeater; Kenneth D. Smith of Staten Island, N. Y., has registered Target and Yellow Glory. Mrs. Kenneth B. Anderson of La Canada, Calif., has bred and registered Pineapple Cup and Pineapple Frills. Mrs. George D. Watrous, Jr., of Washington, D. C., has specialized in miniatures and registered Flyaway, Curlylocks, and Wideawake. Harry I. Tuggle, Jr., of Martinsville, Va., registered Court Jester in 1964.

Mitsch. I have purposely kept Grant Mitsch of Canby, Ore., to the last in this discussion of daffodil breeders, growers, and dealers. He was the first to give his seedlings proper publicity and wide distribution. In the last 20 years he has introduced about 125 seedlings. He has published these in his yearly catalog with full descriptions and has included the parentage (seed parent and pollen parent), a matter of vital importance to other daffodil breeders. Of late years,

PLATE 52 GRANT E. MITCH

DAYDREAM
Large-cup (Div. 2d)

he has put more and more emphasis on pinks and reversed bicolors. Some of his first introductions in the 1940's have already been superseded by his later ones, but many of his introductions of the 1950's are available at reasonable prices and have not been surpassed by anyone. His introductions of the 1960's are, of course, more expensive and are not yet available in quantity.

Mitsch has set up educational exhibits in many daffodil shows. He has deservedly had honors heaped on him. His Aircastle, a 1958 introduction from Green Island × Chinese White, was awarded the title of the best flower in competitive classes in the 1963 London Show. In 1965 he was awarded the Honor Medal of the American Daffodil Society and he is also holder of the Gold Medal of the Men's Garden Club of America for his work with daffodils. His fame has spread abroad; he has definitely put America on the world daffodil map.

It is quite impossible for any one person to pick out the best of his many introductions. However, I list here some random examples in a wide range of type, size, and colors that have come from his garden over the years. The years are the years of registration.

1952. Ardour (3*a*), Chinook (2*b*), Fairy Dream (1*c*), Mirth (1*b*), Paricutin (2*a*).

1954. Bithynia (3*b*), Festivity (2*b*), Radiation (2*b*).

1956. Lemon Drops (5*a*).

1958. Aircastle (3*b*), Bethany (2*d*), Moonmist (1*a*), Nampa (1*d*), Nazareth (2*d*), Spring Song (2*b*).

1959. Allurement (2*b*), Chickadee (6*a*), Kinglet (7*b*).

1960. Accent (2*b*), Bushtit (6*a*), Daydream (2*d*), Moonlight Sonata (1*d*), Precedent (2*b*).

1962. Abalone (2*b*), Angeles (2*b*), Butterscotch (2*a*), Caldron (2*a*), Chemawa (2*a*), Flaming Meteor (2*a*), Gleeful (2*d*), Gossamer (3*b*), Limeade (2*d*), Prologue (1*b*), Satellite (6*a*), Silver Bells (5*a*), Tranquil Morn (3*c*), Vireo (7*b*).

1963. Dream Castle (3*c*), Eminent (3*b*), Joyous (2*b*), New Song (2*b*), Noweta (3*b*), Pipit (7*b*), Prowess (2*b*), Thistle Dew (2*b*).

1964. Coral Ribbon (2*b*), Silken Sails (3*b*).

1965. Audubon (3*b*), Bobolink (2*b*), Bunting (7*b*), Flicker (7*b*), Quetzal (9), Small Talk (1*a*), Tern (3*c*), Verdin (7*b*), Wings of Song (3*c*).

DAFFODIL SHOWS AND SOCIETIES

The work of the growers, dealers, and breeders I have mentioned shows how the interest in the daffodil has evolved in the nearly forty years since the daffodil embargo. It will be well now to consider the even greater influence of daffodil shows on today's position of the daffodil in the horticultural world.

In addition to the displays of forced daffodils in the great March flower shows in New York, Boston, Philadelphia, and other big cities, April and May shows of outdoor-grown daffodils were being held before the American Daffodil Society was organized. It is said that a lecture given in 1919 by an amateur gardener, T. McKean Miere, at a garden club meeting in Baltimore, inspired Elizabeth Clark and Mrs. Duncan Brent to organize the Maryland Daffodil Society. Its members purchased bulbs from the best British sources and held their first show in 1922. Shows were held every year except during the second world war. Sixty-four garden clubs with a total membership of over 2,000 now belong to the Maryland Daffodil Society. B. Y. Morrison and E. C. Powell helped stage and judge many of the early shows.

In 1930, Mrs. Leslie H. Gray, President of the Garden Club of Virginia, organized, with Mrs. Floyd Harris, a system of daffodil test gardens in different parts of the state. Mrs. J. Robert Walker became the first Test Garden Chairman. With the help of a number of daffodil experts, fifty varieties were chosen to represent the range of daffodil types in the official classification. Nineteen participating clubs purchased ten bulbs of each of these fifty varieties to grow in their home district. The garden club sponsors brought cut flowers from these collections to the first daffodil show of the Garden Club of Virginia which was held in 1931 in Charlottesville. State shows have been held almost every year since that time. There are now 43 co-

operating member clubs with a total membership of over 2,500, each with its own Daffodil Committee. They grow the daffodil collections distributed annually and carry on the testing program in cooperation with the Garden Club of Virginia. About 250 varieties are now grown in each of the cooperating test gardens.

The stimulus to daffodil growing in Virginia, and very soon throughout the whole country, was tremendous. The Virginia Daffodil Show became the most important held in this country. It set a stamp on the American appreciation of the daffodil and inspired countless gardeners to grow the fine new varieties. Various local and regional societies also helped to promote interest in daffodils. The Washington Daffodil Society was organized in 1950 with Freeman Weiss as first president. Among regional societies are Indiana, Arkansas, Middle Tennessee and Southern California.

The genesis of the American Daffodil Society was an article entitled "Who Will Join a Daffodil Society?", which Paul Frese published in the October, 1953, issue of *Popular Gardening* of which he was editor. Organized activity at that time centered in the Maryland Daffodil Society, the Garden Club of Virginia, and the Washington Daffodil Society.

Upon receiving over 400 responses, Frese turned to these groups to proceed with the details of creating a national daffodil society. A committee was formed consisting of Mrs. Lawrence R. Wharton, president of the Maryland Daffodil Society; Mrs. J. Robert Walker, chairman of the Garden Club of Virginia Test Garden; Carey E. Quinn, president of the Washington Daffodil Society. The committee had the cooperation of Frederic P. Lee, Washington attorney and amateur horticulturist and Freeman Weiss, plant pathologist and curator of the American Type Culture Collection.

All those who had expressed their interest were invited to attend an organization meeting. Mrs. George D. Watrous, Jr., of Washington, called for the meeting as part of the Third Annual Daffodil Institute of Washington to be held April 9, 1954 in Chevy Chase, Md. It was called to order by Frederic P. Lee. Paul Frese was elected temporary chairman and Harry I. Tuggle acted as temporary secretary.

The organization of the Society was completed on January 22, 1955 when the Board of Directors elected Carey E. Quinn, president; Willis H. Wheeler, secretary; and Mrs. William A. Bridges, treasurer.

The first annual meeting of the new society was held in Washington in April, 1956. It was a memorable occasion to the more than one hundred members who attended and was highlighted by the first and only visit to this country of the beloved Guy L. Wilson and by the showing of his latest and then greatest seedling—Empress of Ireland. Wilson was accompanied by another daffodil stalwart, his good friend, C. R. Wootton.

Subsequent annual meetings of the Society have been held in Mansfield, Ohio; Atlanta, Ga.; Philadelphia, Pa.; Dallas, Texas; Roanoke, Va.; Nashville, Tenn.; Stratford, Conn.; Asheville, N. C.; and Pasadena, Calif. The Society has also encouraged the daffodil shows of other societies, among which are the Pennsylvania Horticultural Society, the Massachusetts Horticultural Society, and the Horticultural Society of New York.

The American Horticultural Society has always generously contributed to the growing interest in daffodils, abetted, no doubt, by the personal enthusiasm of B. Y. Morrison, one-time president of the Society and for 37 years editor of its publications. Not only could space always be found in its quarterly for notes and articles on daffodils, many of which Morrison wrote, but under his guidance the Society issued *The American Daffodil Year Book* in 1935, 1936, 1937, and 1938; the series ending in 1942, due to the war, with the *Daffodil Year Book* published jointly with the Royal Horticultural Society.

—17—Daffodils in the British Isles

Spring is a longish tradition in the British Isles. Summer is a hit-or-miss affair, spring often merging into autumn with summer perhaps appearing as a few good days immediately prior to the annual holiday. Winter starts around the first week in October and ends around the 10th of April if we are lucky. In a part of the world where the weather is the main conversational vehicle of social intercourse, it is perhaps not surprising that spring and all appertaining to it form the focus of something resembling a religion. The poets made the most they could of lambs and wild daffodils. With our industrial revolution more or less behind us, any private plan to accentuate the attractiveness of spring is likely to lean more heavily on daffodils than lambs. For these we substitute the budgies' eggs and the expectant corgi next door.

Herbert. In the middle of the last century one or two men, spurning the popular aspidistra cult, started to hybridize daffodils. One, Dean Herbert, undertook his hybridizing to prove to other botanists that kinds then listed as species were natural hybrids. Others started out of love of the flower that has remained the most popular of all, save the rose, in Britain, and it provided something to do before the cricket season started. The center of breeding was in England; the Welsh had some difficulty distinguishing between daffodils and leeks, and, while the Irish gathered all kinds and allowed them the freedom of their gardens in a land the daffodil made its own, the Scots with one notable exception were too busy building bridges, roads, railways, and managing the affairs of the English to have the time to devote to the intricacies of breeding daffodils.

Leeds-Backhouse-Barr. Edward Leeds bred a number of early daffodils. In 1874, with ill health forcing a halt in his activities, his bulbs were saved from destruction by a syndicate headed by Peter Barr who also saved the flowers bred by William Backhouse between 1856 and 1868. William Backhouse with his Emperor, Empress, Barrii Conspicuus, and others like Weardale Perfection helped to lay the foundation for the work of other breeders. The conference and exhibition of daffodils in 1884 was to a large extent due to Peter Barr's work. Certainly from this time the interest in daffodils began to increase and large prices were paid for the new kinds.

Engleheart. The Rev. George H. Engleheart became the father of the breeders of those early years, at least up to the outbreak of the First World War. His breeding was done from 1882 till his death in 1936. It says much for the quality of the flowers he produced that quite a large number are still listed and grown all over the world. His Will Scarlett with its spreading red crown was much admired and used in breeding though the influence of its poor perianth was very strong. Beacon was a small *3a*, a rather weedy plant, but it gave good seedlings, White Sentinel and Mitylene being chief among these. Engleheart's Magnificence and Forerunner are sold by the ton today. Beersheba was not the first white trumpet to make an impact on the daffodil world, but it probably was the first to gain wide recognition as an attractive plant in gardens where daffodils were only one of many plants competing for space and interest. Some of his poeticus kinds like Red Rim and Sea Green are still grown and are often without serious rivalry even now. Below are listed some of Engleheart's most important flowers. After the name

and division is given the date of registration. Similar lists appear after the mention of each breeder as it gives us some idea of the value of their work to see the flowers that have stayed the course and proved themselves for many years.

3*a* Beacon 1897 F.C.C. 1897
2*b* Will Scarlett, 1898. F.C.C. 1898
2*a* Helios, 1912
1*a* Magnificence, 1914. F.C.C. 1921
1*c* Beersheba, 1923. F.C.C. 1926
2*b* Mitylene, 1923. F.C.C. 1927
2*b* White Sentinel, 1926
9 Sea Green, 1930

Williams. A number of growers in the favored Southwest took a keen interest in daffodils and their breeding. The flower trade from the Scilly Isles and Cornwall began to become important. The leading breeder here was P. D. Williams, a man of forceful character and firm ideas about the qualities to be looked for in an ideal daffodil. It is difficult to exaggerate the value of his work as every kind that came away from his seedling beds with a name was sure to be an excellent plant. His flowers were and still are firm, well-posed, strong-stemmed, lasting kinds with good bulbs and neat strong growth. Something of the old Maximus (*N. hispanicus*) strength seemed to underlie much of his breeding. He would not have Will Scarlett on his ground. The fact that Polindra, Brunswick, Carlton, and others of his are grown by the tens and hundreds of thousands now speaks eloquently for his discernment. His method I am told was to wear a flower or two in his buttonhole and dab the pollen of these on to any flower that took his fancy as he walked around. He dabbed to good effect. Some of his flowers would have the pollen of more than one kind on its stigma, something that was also true of Engleheart's flowers.

2*a* Crocus, 1927. F.C.C. 1936
2*a* Havelock, 1927. F.C.C. 1936
2*a* Porthilly, 1927. F.C.C. 1936
2*a* Carlton, 1927. F.C.C. 1939
2*b* Polindra, 1927, F.C.C. 1938
2*b* Penvose, 1927. F.C.C. 1953
7*b* Trevithian 1927. F.C.C. 1936
5*a* Tresamble, 1930
2*a* Trenoon, 1930. F.C.C. 1936
8 Cragford, 1930. F.C.C. (forcing) 1947
2*b* Brunswick, 1931. F.C.C. 1939
1*b* Trousseau, 1934. F.C.C. 1947
3*c* Silver Coin, 1949
2*a* Scarlet Elegance, 1938
2*b* Farewell, 1938
6*a* Peeping Tom, 1948

I missed 1927 but it must have been a good year.

Backhouse. Mr. and Mrs. R. O. Backhouse in their garden some fifteen miles from our home here in Whitbourne had a few important objectives. They aimed for improved red-cupped daffodils, they hoped to get red trumpet kinds, they tried to make the pink-crowned dreams a reality. There is no doubt their contribution to breeding was most important, as, although they failed to get a red trumpet until W. O. Backhouse achieved this a few years ago, they did produce Hades, the dark red-cupped kind behind Kilworth from which the vast majority of white and red-crowned modern kinds have come. The double Texas is not a flower I can love, but it is an important commercial double yellow and orange. The pink-crowned Mrs. R. O. Backhouse is listed in the Dutch catalogs as The Pink Daffodil and it is true that scarcely any other single variety has so captured the interest of the public as this one.

2*b* Mrs. R. O. Backhouse, 1923
2*b* Hades, 1925
4 Texas, 1928

The Brodie. The Brodie of Brodie at Brodie Castle led a quiet life, rarely venturing away from his garden in spring time. Here he worked with meticulous care among a wide range of daffodils keeping careful notes of the crossing done and seedlings selected. He contributed a range of fine flowers through all the sections of the first three divisions and not forgetting some of the others. His Smyrna is still probably the most arresting of the poets. His work with the pink-crowned kinds was perhaps his most successful, the white and primrose sister seedlings Mitylene and White Sentinel being much used for producing pinks. These two together

were of very great help in breeding as they not only gave good pinks, but helped to improve the quality of the whites and reds and also gave good whites.

1*a* Cromarty, 1933
1*c* Tain, 1933
4 Swansdown, 1939
2*a* Golden Torch, 1942. F.C.C. 1949
2*c* Cotterton, 1943
2*b* Loch Maree, 1946
2*b* Daviot, 1950

A. M. Wilson. The work of A. M. Wilson spread over a long number of years during which time he raised some excellent flowers. His name would have been honored if he had only raised one, his Carbineer, which was for long the leading red and yellow. Lionel Richardson has said that for many years he did not let a season go without sowing at least a thousand seeds from Carbineer. Certainly it became one of the cornerstones of his and other breeders' work in the 2*a* section. The vigor of Carbineer and its good habit made it a "must" for using in breeding. Fairy King was one of his red cups that got an Award of Merit in the thirties. His Heaven is another exceptionally robust good plant, but this time with a smooth, thick, white perianth and a shallow crown of apricot and chrome. His Ludlow is still one of the finest 2*c*'s in the garden, being a robust plant and an icy white flower with just a touch of green in the base of the large crown.

2*a* Carbineer, 1927. F.C.C. 1938
2*c* Ludlow, 1937. F.C.C. 1940
2b Heaven, 1944

Guy L. Wilson. The two leading breeders of recent times have been the late Guy L. Wilson and J. Lionel Richardson. They are much missed. Their work was broadly complementary; in their own fields each was supreme. The friendly rivalry between them on the show bench was perhaps a spur to fresh efforts. They both had the highest regard for the other's work.

Guy Wilson from earliest childhood had loved daffodils. They grew in the grass and beds around his home in the wide green valley countryside of Co. Antrim in Northern Ireland. After a short period working in the family textile mill he started growing and breeding his daffodils commercially. He bred with all kinds belonging to the first four divisions. He is thought of as the breeder of white daffodils and, of course, he was prëeminent in this field, but, in fact, his yellow trumpets like Slieveboy can stand comparison with any and his yellow-reds include some of the most important. Armada is the earliest flowering kind of good form and color combined in a plant of excellent behavior and constitution. Home Fires and Foxhunter are two more fine colored flowers. His race of pink-crowned kinds combined the work of Tasmanian breeders with his own and that of the Brodie of Brodie. A long series of fine flowers with pink in them lead up to some of today's topliners. White Sentinel and Mitylene were much used at first. Interim was rather a break away from the usual, coming from the large-cup Dava crossed by the small-cup Cushlake. The pink-rimmed Interim gave a series of solid pink-crowned kinds including Irish Rose that has in its turn proved to be an exceptionally fine breeder. Passionale came from Rose of Tralee × Irish Rose and is the most vigorous and generous blooming quality pink we yet have. The color of the pinks from the Guy Wilson breeding lines was a pure pink range without orange undertones.

The whites, be they trumpets, large cups, or small cups, would be a poor set without the flowers that Guy Wilson produced. Some fanciers would choose Cantatrice as the finest Wilson flower. Certainly it has won all the awards it could win all over the world, and remained for the greatest length of time at the head of its section as the finest exhibition kind. His Kanchenjunga with its huge petals and wide trumpet was one stage towards the bigger and better things to come. Broughshane was a marvel in its turn. Now we have Empress of Ireland which at its best can be quite wonderful, almost up to the standards of its children like Birthright, Queenscourt, Ulster Queen, and Panache. The refinement of the latest Wilson trumpets

is such that they probably lead all the colored trumpets in quality, certainly his white large-cups beat all others. Knowehead and Glendermott are two leading flowers with definite large crowns. The silky texture is delightful. He raised a series of fine flowers on the borderline of trumpet proportions, but another stream of flowers with neat smaller cups leaned towards the small-cupped proportions and character. These stemmed in part from the small-cupped Silver Coin. Easter Moon is a flower of this type, a variety almost incapable of giving a poor seedling. Homage is a new one; in this the crown has the touch of green in the base that was one of the features which Mr. Wilson was always striving to combine with the high quality and pure whiteness of his latest flowers. It was the Wilson series of seedlings in the small-cupped division that wrought a revolution in the white-petalled, pale-colored types. Chinese White and its sisters and half-sisters made the 3*b*'s without red and 3*c*'s their own dominion. Now the newer generation is winning the top awards in these classes, but all owe something to the Chinese White race in their blood. Incidentally, it is Mr. Wilson's Chungking that after many years is still one of the very few contenders for show honors in the yellow-petalled, small-cupped classes.

The cross King of the North × Content that produced the first reversed bicolor trumpets and a series of lemon flowers was first made by Mr. Wilson. Spellbinder is still a worthy 1*d*.

2*c* Slemish, 1930. F.C.C. 1939
3*c* Frigid, 1935. F.C.C. 1950
1*c* Cantatrice, 1936. F.C.C. 1939
3*c* Chinese White, 1937. F.C.C. 1949
2*a* Armada, 1938. F.C.C. 1947
1*c* Broughshane, 1938
3*a* Chungking, 1942. F.C.C. 1950
1*a* Moonstruck, 1944. F.C.C. 1951
1*d* Spellbinder, 1944
1*b* Preamble, 1946. F.C.C. 1949
1*c* Vigil, 1947
1*c* Empress of Ireland, 1952
2*c* Easter Moon, 1954
2*c* Homage, 1955
1*c* Birthright, 1956
1*c* Queenscourt, 1956
2*c* Glendermott, 1957
1*c* Ulster Queen, 1962
1*c* Panache, 1962

RICHARDSON. The stream of world-beaters that came from the seedling beds of J. Lionel Richardson covered many show types. Originally, his strong suit was the colored flowers, the red cups. Bahram was a fine flower of good color and constitution. Then came the Narvik and Ceylon pair to set a new standard of perfection, and seedlings from these two further improved the color and form of this race of flowers. Vulcan and Flagstaff now lead with one or two others. For long the yellow-reds seemed almost incapable of improvement and the emphasis in breeding veered to other types. The red and whites had been immeasurably improved by the introduction of Kilworth from White Sentinel × Hades, and this mated with Arbar from Monaco × Forfar gave the population explosion of fine kinds that is still dazzling us every year in our novelty beds and on the show benches. Somewhat before the impact of these red and whites in large- and small-cup sizes, a series of yellow trumpets was lending new distinction in a class where it has always been difficult to raise sartorial standards. The most famous of these was Kingscourt, introduced in 1938 and still a winning show flower today. But Goldcourt with its deeper color, narrower trumpet, and perhaps thicker texture made almost as much appeal to fanciers. The two were interbred as well as the sister seedlings of Kingscourt and flowers from this line of breeding brought forth a number of fine kinds. Arctic Gold is a favorite as a rich-textured, deep-colored successor to Goldcourt with a wider balanced trumpet. Burnished Gold and Bayard, almost identical twins, King's Ransom, Royal Oak, and Spanish Gold all have something to offer. The large Golden Rapture was a rather different type of flower from the large Pretoria, a yellow trumpet with scarcely the exact fine balance to make it a leading show flower but nevertheless a good large one. Viking strides the show deck fearless of competition.

Richardson worked with very good results among the pinks. For a decade or longer his Salmon Trout was almost without rivals in commerce. Now many new kinds have come along from the pink breeding front that he established, many individuals owing much to the Salmon Trout influence with its fine perianth, others coming from the Green Island line that, mainly through Rose Caprice, added perhaps a touch more vigor and robustness to the bulbs and flowers of the latest pinks. But some fanciers will like best the pinks that trace their origin back through Salmon Trout to Rose of Tralee and so to White Sentinel.

The renaissance of interest in the double daffodils is directly the result of the work of Mr. and Mrs. Richardson. An odd seed from the old Mary Copeland gave the rather weedy Falaise that proved to be the open-sesame to the superdoubles of today and the future. Gay Time and Double Event were followed by a series that we are still watching emerge in every shade, bar the elusive pink and white that is surely due any time now. Falaise was mated with everything that looked like a daffodil and probably a few lilies and amaryllis as well. Top of the results so achieved is Acropolis, hailed as one of the finest flowers from Waterford and rightly so. It is a double of great beauty in pure white but with a few tiny fragments of red, neat in form, finespun in texture, of good size and pose. A formidable beauty.

It is interesting to speculate as to which of the Richardson flowers is his most important. Perhaps it may be the golden Galway, the large-crowned flower close to trumpet size that has dominated its class since it was first introduced quietly and modestly over 20 years ago. As a garden plant it lacks nothing, being floriferous, long lasting, of rich color, neat habit, and abundant vigor. The bulbs are like highly polished cannonballs.

2*a* Bahram, 1935. F.C.C. 1951
1*a* Goldcourt, 1937. F.C.C. 1947
2*b* Green Island, 1938
2*b* Kilworth, 1938. F.C.C. 1946
1*a* Kingscourt, 1938. F.C.C. 1947
3*b* Limerick, 1938. F.C.C. 1946
2*a* Ceylon, 1943. F.C.C. 1948
2*a* Galway, 1943. F.C.C. 1948
2*b* Arbar, 1948. F.C.C. 1961
2*b* Salmon Trout, 1948. F.C.C. 1952
2*b* Tudor Minstrel, 1948. F.C.C. 1956
1*a* Arctic Gold, 1951. F.C.C. 1960
4 Acropolis, 1955. F.C.C. 1959
4 Tahiti, 1956. F.C.C. 1961
2*b* Romance, 1959
3*b* Rockall, 1955. F.C.C. 1965

With the passing of the two leaders, Guy Wilson and Lionel Richardson, a slackening of the breeding momentum might be expected, but this has most certainly not happened. Mrs. Richardson continues the good work. Guy Wilson Ltd. are using the Wilson breeding stocks, and a group of amateur breeders are now producing flowers of the very top rank in all the main divisions.

Lea. J. S. B. Lea has a large number of fine seedlings to his credit, some having won Awards of Merit. His Canisp has twice won Best Flower in Show at London. It is a 2*c* with some trumpet character and is a flower of the most exquisite refinement from Ave × Early Mist. He has a number of other fine whites, together with a lot of red cups both white and yellow petalled and many other leading types.

De Navarro. J. M. de Navarro has yellow trumpets, whites, red and yellows, and all classes of the first three divisions with which to do exhibition battle on equal terms with any. However, he has made a special attempt to improve the sunproof qualities of the red and whites and has done some successful work along these lines. Like most other breeders he had a go at the Chinese White and Green Island cross. Out of his seedlings were selected a number of fine kinds, but Sacramento, named in honor of his mother's birthplace, was quite outstanding. To my eye, it is the best we have seen from this cross on this side of the ocean. It is a totally white flower of the most exact and perfect form that I have seen among the many fine things that have come of this jackpot of a cross. It won an Award of Merit in 1964.

D. Blanchard and his son John have become marriage brokers for the whole

Narcissus genus. The results of their labors vary from five-inch flowers to half-inch species hybrids known colloquially by some as "weeds." A heresy, of course, for their little ones are chosen from among their seedling brethren with the same care and discernment as the bigger fellows. They have a number of Awards of Merit to their credit and the F.C.C. for their white triandrus Arish Mell marks out a variety that is the first of its type to be so honored. Some will think their bright bicolor Tuesday's Child, in white and yellow, even better.

Board. On a Derbyshire hillside with a slope of approximately one in two are rank upon rank of exciting seedlings paraded under the exacting command, judge's eye, and parental care of F. E. Board, the President of The Daffodil Society. Having purchased what he felt to be the best breeding stock of the leading commercial breeders in the British Isles, Mr. Board has, with care and by raising large numbers of seedlings, got a mass of topline flowers especially in the white kinds which rank as personal favorites. It was Mr. Board who purchased from Guy Wilson such outstanding seedlings as the pink Passionale and the white Homage. He has had the benefit of such flowers in his breeding stocks for quite a number of years now. Recently a large number of his seedlings have been christened and more may be expected to be seen and heard of them soon. Previously the very late climate of that part of Derbyshire together with the pressure of breeding work has precluded any attempt to show flowers of his raising in London.

Gray. Alec Gray is famed for his miniatures. Each year crowds gather in front of exhibits of his charming small-flowered daffodils. There are many enchanting things that are quite distinct from other types and make a welcome addition to our gardens. His little jonquil hybrids like Bobbysoxer and Stafford are grand plants as well as being perfect little round flowers. Xit, in its pure white form, is altogether delightful and elfin. But perhaps the most successful of his flowers in the garden is Tête-a-Tête, the cyclamineus hybrid with tazetta blood in it. It opens very early in the year and lasts for weeks in good order with one or two or three flowers of gold and tangerine on 6 to 9 inch stems. A bulb soon produces a cluster of flower stems.

Dunlop. W. J. Dunlop grows his flowers on the opposite side of the same valley in Northern Ireland where Guy Wilson lived. He has raised many outstanding flowers and has perhaps not had quite the full credit for his work owing to the fact that the late flowering season and the long distance make it difficult and sometimes impossible to show his things in their best condition at the London shows. He has worked with all types within the Big Three divisions, early successes coming from his crossings of the small-cupped red and whites. Folly × Hades gave among others the delightful Enniskillen, while Glenwherry and a number of other fine flowers came from the rimmed Isola × Sunstar. As he grows Irish Splendour, it is outstanding, probably the best *3b* yet seen. It has large flowers with broad white perianths and wide flattish cups of solid red. His bicolor trumpets have been most successful as show flowers and garden plants. I think highly of his Ballygarvey as a garden plant; it blooms so freely and grows so well with its well-formed white and deep chrome blooms. His Newcastle has for some years been accepted as the best *1b* for exhibition and it is certainly a fine flower. His Downpatrick with a paler trumpet is perhaps even more pleasing in form. A number of his white trumpets like Stormont and Longford are in the same class as Mr. Wilson's, while yellow and reds like Elmwood, Craigywarren, and Holly Berry are excellent things. The red and gold Moneymore is a geometrically designed flower in the deepest gold and orange red, a perfect delight to see. Some of his lemon flowers in both trumpet and large-cup proportions are cool and altogether pleasing. Ormeau is a large cup which has become very popular as a garden plant and a show flower in a class where Galway has played the dominant role previ-

ously. Ormeau is much more large-cup in character. Its form and its rich gold are perfect.

Later Breeders. To Cyril F. Coleman we are very much indebted for the cyclamineus trio, Charity May, Dove Wings, and Jenny. Now we are seeing others of his raising entering the show bench competition and the catalog lists. Clown is an unusual cyclamineus hybrid in cream and deeper yellow, while Kitten is a nice gold and tangerine one.

There are quite a number of other people successfully crossing daffodils in the British Isles. Dr. Pickles, near Oxford, has devoted much of her work to the pinks and has now a series of well-colored and finely formed ones. The late G. H. Johnstone raised the pleasing *3b* Green Howard, and many most attractive flowers among which some of the best were the pinks. His Famille Rose is an excellent large-crowned kind of good size, form, and clear color. Besides being a good flower itself, it much increases its value by blooming two or three weeks before the next earliest pink. His Roman Tile, with a pink crown edged with pink red, is a distinct and attractive flower. C. R. Wootton has bred flowers of all kinds, although his jonquils Golden Incense, Tittle-Tattle, and Pin Money are the ones that have met with the greatest welcome. Sir Frederick Stern's flowers include the yellow large-cup Amberley, the *2d* Handcross which is a tough, attractive garden flower, and a series of tiny fellows that we all hope will make their way into commerce in years to come. Denis Milne has a number of reddish-petalled kinds to his credit as well as the splendid garden flowers, the gold and scarlet Matlock and the white trumpet Riber.

Jefferson-Brown. My own seedling beds are mostly in early stages of development, but we have a number of things of which we think highly. A series of bicolor trumpets looks promising; Tradition, the first of these to be shown, got an Award of Merit in 1965. We have one or two excellent Easter Moon seedlings and a yellow trumpet which is certainly the best *1a* we grow or have seen for quality. We have a charming little cyclamineus hybrid like Jenny but a very clean reversed bicolor. There are also a number of variously colored jonquil hybrids that look very pleasant growing together. At present we are working in many directions in our breeding programs, but we are, of course, using the red trumpet Brer Fox and some other red trumpet seedlings.

The breeding outlook is bright here. The stage that the pinks have reached does not allow good color to excuse poor quality. Some pinks show hints of lavender. More and more pink trumpets are appearing in the seedling beds. One or two yellow-petalled pinks have flowered. The red trumpets are here and will obviously become part of the show scene in years to come as a series of these are bred up to the highest standards of grooming and quality attained in other sections. White and red, and white and orange trumpets are obvious developments in time. But while these may be some time arriving, strains of flowers both yellow- and white-petalled will be sure to come with longer crowns. Of the smaller-flowered divisions, the cyclamineus hybrids are increasing in number steadily and these are proving relatively easy to breed. The interest in the daffodil is increasing year by year and despite the difficulties in starting to breed plants that take five years to reach flowering, there are signs that a steady flow of newcomers is taking up this most rewarding pastime.

—18— Daffodils in the Netherlands

THE OLD PERIOD

When the subject of flower bulbs in general arises one can always expect to find the Netherlands playing a role; in some instances a dominant one and in others a minor role, but always making some meaningful contribution. In the field of daffodils, Holland has had a long and rather interesting history that goes back to the 16th century. Any effort to research this era brings one inevitably to the monumental historical work of Ernst H. Krelage who himself played an important part in the development of the daffodil trade in Holland. This volume of 791 pages, entitled *Three Centuries of Flower Bulb Export,* was published in 1946 and covers the story of flower bulbs in Holland up to 1938. It would be rather presumptuous to relate the contributions of the Netherlands to the development of the daffodil bulb without at the very outset giving full credit to Ernst H. Krelage as the source.

The history of the daffodil in the Netherlands can be divided into two periods; the "old" and the "modern." When one speaks of two periods it is usually difficult to pinpoint an exact date as the end of one and the beginning of the other. Roughly one could set the date as 1880 and if we permit ourselves broad license, we can become more specific and designate 1884, the year of the Daffodil Conference in London, as the turning point.

The earliest detailed description of daffodils in the Netherlands can be attributed to Mathias de L'Obel and Carolus Clusius. The latter described the existing species with such exactness and clarity that one could, in most instances, identify a daffodil with reasonable certainty. It is de L'Obel, however, who contributed most to the early development of the daffodil in the Netherlands.

The bulb trade in Holland, as early as the latter half of the 16th century, actively dealt with forms of trumpet daffodils many of which were native to Western Europe. *N. bulbocodium* and *N. poeticus* were also actively traded at that time.

In 1561, de L'Obel first imported *N. tazetta* into Holland from Languedoc in Southern France. Shortly thereafter a double form of bunch-flowering narcissus, Double Roman, was brought in from Constantinople where it was apparently cultivated. At about the same time Paperwhite or "totus albus" came in from southern France. Many were the varieties and related forms of "cluster" (polyanthus) daffodils that contributed to the large selection under cultivation by the Netherlands bulb growers. The catalog of Dirk and Pieter Voorhelm issued in 1739 listed 50 varieties among which were "Bazelman jaune," "Bazelman major" and Soleil d'Or.

Nine of these varieties were still offered in 1788 in a catalog issued by a successor firm, Voorhelm & Schneevoogt, who at that time listed 54 varieties of polyanthus daffodils. Apparently this was the high point for this type of daffodil because in 1791 we find J. Rosenkrantz & Son listing 137; in 1802, D. Duurman & Son with 97; and in 1808, Veen Bros. with 83.

Polyanthus daffodils were ideally suited to be grown in pots and were mostly in demand in the 17th century for that purpose. This was particularly true for the Double Roman. This variety could not be cultivated in the cold wet climate of the north and had to be imported from Southern France. The first advertisement for these bulbs ap-

peared in a Haarlem newspaper on November 30, 1779. Simon Groenewoud offered "genuine new double Marseillian daffodils, clean bulbs, known for their lovely aroma, very suitable for glasses and pots, 6 Stuivers each." This, incidentally, was a rather steep price for a daffodil. The following year the price was down to 5 stuivers and when other firms such as A. & C. van Eeden and Mattheus van Eeden entered the trade the price went down still further to the "usual price" for other varieties and types. The Double Roman remained in demand up until about 1910 when it was replaced almost completely by Paper White and Soleil d'Or.

Since the tazetta was sensitive to cold weather it required substantial winter protection and was considered a rather risky plant to grow. As a result, its culture in most countries was rather limited and the Holland flower growers had the field pretty much to themselves. As could be expected prices varied substantially in accordance with the severity of any given winter.

During the latter part of the 19th century the demand for tazettas for indoor forcing began to dwindle. This was due to the fact that during the winter large numbers of cut flowers began to appear on the market from the Scilly Islands. In addition, Southern France shipped substantial quantities of Paper White and Soleil d'Or flowers to the northern countries. Other important reasons for the slackening of interest in the tazetta was the increased demand for trumpet daffodils and the introduction of the new poetaz class.

Although the use of the tazetta by florists in Holland diminished, the Dutch flower bulb trade became increasingly active in selling primarily Paper White and Soleil d'Or bulbs all over the world. In the early years of the 20th century over 50,000,000 Paper White were sold and shipped annually to the United States by Dutch flower bulb exporters.

The concentration by Holland during the "old" era on the tazetta should not imply that other types of daffodils were neglected. The most famous is, of course, the double Van Sion (Telamonius Plenus). This amazingly durable variety dates back to 1620 and was first introduced by Vincent Sion. Somehow, it was listed as V. Sion and it was inevitable that everyone soon forgot what the "V." signified. As could be expected V. Sion became Van Sion and for some people Von Sion.

The catalogs of the 18th century, as a rule, listed only about 6 to 10 varieties of daffodils in addition to the very large number of tazettas. Usually there would be 1 or 2 single daffodils and some doubles. In addition three varieties of jonquils (small and large flower, and double) were also to be found. Ever present were the double Van Sion, Incomparable, Albus Plenus Odoratus, and Orange Phoenix. In mentioning this last variety one cannot help but surrender to a humorous thought. (Not as humorous perhaps to the daffodil devotee as it is to the novitiate.) A recent article on the proper names for daffodils contained the solemn admonition that it was improper to refer to a variety as *albus plenus aurantius* or as Orange Phoenix and that the correct name is Eggs and Bacon. Perhaps there is still hope for the Average Man in the field of daffodils!

Except for the polyanthus daffodils, the early part of the 19th century saw daffodils rapidly lose public favor. In a complete handbook, such as the 1838 edition of *The Flower Garden,* only a few lines in small type were devoted to narcissus without any listing of varieties, but solely a reference to:

> "Narcissus, many species and varieties, such as the Jonquil, daffodil, etc."

THE MODERN PERIOD

Although this chapter seeks to describe the contributions of the Netherlands to the development of the daffodil, it is impossible to eliminate the close connection between Holland and England. For centuries the daffodil hybridizers, fanciers, and tradesmen of these two countries have had very close connections even though they seemed, at times, to go in different directions pursuing different goals. At the outset we referred to the "modern" era of the daffodil in Holland as beginning in 1884,

the year of the first Daffodil Conference held in London. Actually, the first movement began some years earlier.

Of the many important British horticulturists in the 19th century, we can safely select two as having had the greatest effect on the Daffodil Renaissance: Peter Barr and Edward Leeds. Many readers are no doubt familiar with the famous letter of April 21, 1874 written by Peter Barr to E. H. Krelage and Son in Holland:

> There lives in our country an old gentleman called Mr. Leeds. For 30 years he has been crossing and seeding Narcissus, with the view of producing new forms and to a certain extent he has succeeded, as Mr. Polman Mooy can inform you. There are bicolors, majors, poeticus, incomparabilis, all shades from white to yellow and intermediate forms between incomparabilis and montanus and many other very unique crosses. Now this said old gentleman is getting very infirm and wants to sell his collection. He has a large quantity of bulbs and they are all to be given up to the purchaser for the sum of one hundred guineas.
>
> Now Mr. Polman Mooy has entered his name as a subscriber of 10 guineas. We have done so too and three other gentleman amateurs have likewise put their names down for 10 guineas each.
>
> Now as Narcissus are on the ascendant, shall we put down your name for 10 guineas? We believe it will be a very good speculation and another thing, we believe that, if the collection is not very soon bought, it will be destroyed, as the old man has put it in his will, if not sold before his death, it is to be destroyed. Drop us a line.
>
> Yours truly,
> P. Barr

The result of this letter was that half of the stock was purchased by Peter Barr's firm, Barr & Sugden, and the balance by Polman Mooy of Haarlem, P. van Velsen & Son of Overveen, and three British amateurs. E. H. Krelage & Son refused to go along because they were not entirely satisfied by the proposed division of the stock. Peter Barr turned over his share of the stock to de Graaff Bros. for propagation. The van Velsen firm incidentally sold its share at public auction on May 14, 1888 and realized around 15,000 guilders for a little more than an acre of bulbs. The result of the auction was a surprise for everyone since daffodils had never before achieved such a high price in Holland.

In the early 1880's the public approach to the daffodil improved greatly. This change of attitude was no doubt partially due to the current aesthetic movement which eliminated the prejudice against the color yellow and began to show appreciation for the natural grace of daffodils and the many possibilities for their use in gardens as well as for interior decoration. The efforts of Peter Barr and his friends to popularize daffodils were finally rewarded by the convening of the first Daffodil Conference in 1884.

The Netherlands bulb growers had prior to the Conference worked closely with their British counterparts to further the revival of the daffodil and had begun to increase and broaden their assortment of varieties. They naturally supported the 1884 Conference and sent E. H. Krelage as their representative. The *Gardeners' Chronicle* of April 5, 1884 reported:

> "This meeting was entirely and unanimously in favour of giving vernacular names to what we may for brevity's sake call garden varieties. This practice was recommended by Mr. Krelage, the eminent Dutch horticulturist who advocated it in an English speech of remarkable force and fluency. Practical man as he is, he further insisted on having these names short. An excellent start in this direction was made on Wednesday, when the whole of the flowers exhibited were renamed in accordance with these principles."

Two companies were considered to be the foremost daffodil specialists in Holland towards the end of the 19th century. E. H. Krelage & Son in 1889 issued the first catalog in Holland devoted exclusively to "Narcissii." De Graaff Bros. occupied first place on the Netherlands scene so far as the introduction of new varieties was concerned. This firm in 1887 introduced and exhibited two great daffodils: the yellow trumpet Glory of

Leiden and the white Mme. de Graaff. Both were awarded First Class Certificates and offered for sale in that year at £5 each. This rather steep price was realized despite the fact that such varieties as William Backhouse's Emperor and Empress were in 1870 being offered for a mere 2/6 per bulb.

Many varieties of daffodils that were found growing wild in Holland were added to Holland growers' collections. Most of them are now completely forgotten, having been replaced by improved varieties. One of them, however, deserves special mention. This was Golden Spur which had been found in the wild state on the estate of the Prince Van Wied in Wassenaar. In 1889 the variety was registered by the daffodil committee of the Royal Horticultural Society and because of its excellent qualities for early forcing achieved the status of a leading commercial variety. Although originally prized for florist use, this variety was apparently a "natural" for garden use. Naturalized plantings of this variety can still be found thriving in such tough climates as Iowa, Nebraska, and other States in the Midwest.

By the turn of the century Holland bulb growers began to pay increasing attention to the propagation and sale of daffodil bulbs. In addition to seeking to expand their collection of varieties they concentrated on volume production of certain desirable varieties so as to adequately supply the wholesale trade all over the world. The soil around the town of Sassenheim proved to be ideally suited for the cultivation of daffodil bulbs and this aspect of flower bulb growing soon centered in that area.

THE PRESENT CENTURY

It is at this point that the Holland daffodil growers, in a sense, parted company with their British friends. In England the concentration seemed to be on the hybridization of new varieties for show purposes. The Dutch, on the other hand, sought varieties that had qualities that would make the bulbs suitable for sale in large volume in foreign lands. Both groups were eminently successful in achieving their own goals. Until quite recently Holland daffodil growers sought to satisfy the needs of commercial flower growers. Now the emphasis is being placed on varieties for use in the garden. During the first half of the 20th century Holland secured and held the premier position as a volume supplier of daffodils on the world markets. Although the number of daffodil bulbs grown in Ireland and England increased, Holland bulbs were generally preferred for their firmness, their health, and uniform size. The difficult and trying years of 1926-38, when the United States imposed a plant health embargo, hurt Holland, but the Dutch bulb growers still remained a major factor. This, despite the fact that many Dutch growers relocated in the United States and helped build the American production of daffodils.

We can speak of the Holland bulb growers as if they were a closely knit entity, but we should not overlook the tremendous contributions made by individuals and firms. There are a substantial number of such people who, since 1900, have labored hard and well to advance the culture of daffodils. Several growers introduced outstanding varieties that could hold their own at the shows regularly held in London and other areas in England.

We need only mention a few to illustrate the point. In the area of trumpet daffodils we can cite E. H. Krelage & Son for Mrs. Ernst H. Krelage (1912); G. Lubbe & Son for Unsurpassable (1929), Rembrandt (1930), Gold Medal (1938), and Grape Fruit (1939); A. Frylink & Sons for William the Silent (1938); P. van Deursen for Mt. Hood (1937); van Tubergen for Mulatto (1931); and for the closest rival to King Alfred, Warnaar & Co. for Golden Harvest (1927).

So far as the other classes are concerned, we should particularly note the following firms for introducing varieties that were true landmarks:

De Graaff Bros.	—February Gold (1923)
	Shot Silk (1931)
	Kentucky (1928)
	Moonshine (1927)

M. van Waveren & Sons	—Thalia (1916)
R. A. van der Schoot	—Cheerfulness (1923)
J. B. van der Schoot	—Geranium (1930)
G. Lubbe & Son	—Actaea (1927)
P. van Deursen	—La Riante (1933) —Verger (1930)
Warnaar & Co.	—Aranjuez (1933)
Albert Vis	—Laurens Koster (1923)
J. W. A. Lefeber	—Selma Lagerlöf (1938)

The story of Holland's contribution to the culture of daffodils would not be complete without paying tribute to the "grand old man" of the Holland flower bulb industry; that gruff but kindly gentleman easily spotted by his beret and his beard; Prof. Dr. Egbertus van Slogteren. The professor began his professional career in 1917 and his very first assignment was in connection with a daffodil disease. Under his leadership the Flower Bulb Research Laboratory was established at Lisse, Holland and grew over the course of years so as to achieve an international reputation in the field of bulb research.

The Royal Horticultural Society of England awarded him the Peter Barr Memorial Cup in 1938 for his work with daffodils. In 1955 the American Horticultural Society honored him with its citation and in 1959 the American Daffodil Society bestowed on him its first Gold Medal. Willis H. Wheeler, on behalf of the Society, presented the award to the Professor in Holland on July 30, 1959. Some of his words on that occasion bear repetition:

> "Outstanding among the contributions to the horticultural success of this nation are the things Prof. van Slogteren has done for the daffodil and the genus *Narcissus*. In the earlier years of this century the bulb and stem nematode threatened the daffodil cultures of this and other lands. The professor met this challenge and today the hot water treatment of daffodil bulbs is a standard procedure that gives us Dutch daffodils free of eelworm and certain other pests.
>
> "Later the professor and his staff turned their attention to other disease problems of the daffodil. For many years certain daffodils showed abnormalities of the leaves and flowers believed to be caused by virus infections. Various phytopathologists in several countries worked on this problem without definite success, but in the 1940's Professor van Slogteren and his laboratory gave us the answer. He was able to demonstrate by long and patient work that the diseases were caused by certain viruses, and he showed that they were aphis-transmitted. With this knowledge the bulb growers were better able to take the necessary steps to eliminate the trouble."

The work done by van Slogteren from 1917 until his retirement in 1958 contributed greatly to the development and preservation of daffodils not only in Holland but in every country where they are cultivated.

We are now well into the second half of the 20th century and Holland continues to play a major role in the daffodil culture. As in the first half of this century, as well as in previous centuries, the Netherlands pursues its goal of being the "flower bulb basket" of the world. It sees its function as that of providing a sufficient volume of commercial varieties needed and wanted by florists and gardeners in all countries. This does not mean that there are no longer Krelages, de Graaffs, Lubbes, and Warnaars seeking new and better varieties. That work will always continue because in most instances it is a labor of love and not motivated solely by a desire for profit.

Many articles have been written on the need for better garden varieties and we have no doubt they will appear. When they do, we can safely say that the Netherlands will again seek to produce enough of a volume to supply the gardens of the world. This, in essence, is the past and future of the Holland flower bulb industry.

—19— Daffodils in Australia

When Mrs. J. Lionel Richardson was conducting her tour in Australia and New Zealand last year, she described daffodil growing as a rich man's hobby. Most of us would subscribe to this contention. Indeed, our records reaching back for half a century indicate just how much the hobby has enriched the lives of those who have pursued it, but not necessarily those having well-lined pockets or substantial financial resources. A few were well off, and to them we are deeply indebted. They were able to replenish our stocks with the best and latest of the overseas creations and being men of generous disposition, they distributed their treasures far and wide. An attempt will be made to place on record the names of those who have contributed to the place which the daffodil occupies in the hearts of so many as our No. 1 spring flowering bulbous plant. "There be of them that have left a name behind them that their praises might be reported; and some there be which have no memorial." As one who has spent some time in research and examination of the records, I regret any oversight.

Few countries are the natural habitat of the daffodil and Australia is no exception; we have no wild forms. Much of this great continent consists of inhospitable open deserts—vast, dry, desolate, sunburnt, and waterless. Another great area is the salt and blue bush plains, windswept and exposed. Daffodils are grown extensively in Victoria and Tasmania; to a much lesser extent in South and West Australia and only in well-sheltered spots in New South Wales. I know of no plantings in Queensland. Tasmania is much farther south than either Adelaide or Melbourne and so is ideally situated for the production of high-quality blooms. Victoria ranks next with a more favorable climate than ours in South Australia where we have a grim struggle against adversity. Our friends in Perth have even greater problems. In short, conditions limit the growing of daffodils to the southern half of the continent, especially the southeastern corner and the offshore island of Tasmania.

Little use is made of daffodils as bedding plants in our botanic gardens, public parks and private gardens. Most people grow a few and some occasionally surprise us with a planting of Malvern Gold, Pilgrimage, Bodilly, or King Alfred. The red-cups are not used at all unless in some sheltered and well-favored locality. All such varieties burn very badly and so are disappointing. Here in the ranges, I am able to leave those with color on the plant when conditions are overcast. On the whole, my show flowers are opened under boxes or indoors.

Two plantings "in the grass" have come under notice. One is at Mount Lofty in the Adelaide Hills where several thousand Emperor and Empress have flourished almost unattended over a period of 20 years. They get filtered sunlight through, and later protection from, the strong-growing silver birches nearby. When I last saw them, they were providing a dense carpet of color, although the individual blooms were thin and weak. At Meadows in the southern hills, a planting of mixed seedlings and named sorts was made 25 years ago. The bulbs were from the suburban garden of the late G. Brookman. When he passed on, his brother lifted the stock and lined them out in his fields at Meadows; the planting covered about an acre. The memory of one of our first seedling raisers is perpetuated every year when the daffodil field is thrown open to the general public. A silver coin for the funds of Red Cross entitles each visitor to pick

as many flowers as are wanted. No doubt there are larger plantings in Victoria and Tasmania, but it had not been my good fortune to see them. Several catalogs list "varieties suitable for planting in the grass" and I understand that a ready demand exists for them. Our worst enemy is the hot, northerly wind which, at flowering time, sends the temperature over 80° and, after such an ordeal, there is little left of the daffodil bloom.

By the early 1920's, the growing of daffodils for exhibition had gathered momentum. In Victoria, West & Fell had established large plantings of both named varieties and their own seedlings at Casterton in the Western Districts. This was an ideal spot and they had ample country available. As the daffodil does revel in freshly ploughed grassland, their extensive stocks thrived and the firm was entrenched as the leading commercial undertaking in the Antipodes. When West passed on, the business was conducted by his son-in-law, Hubert Fell. He was a pleasant fellow and wrote encouraging letters to his many satisfied customers. I was one of them and my first purchases were from the "Swanley" gardens. Thousands of seedlings were raised here, some of them reached world fame: Golden City, Renown, Mortlake, Valencia, Jean Hood, Melva Fell, Ivo Fell, David West, Swanley Peerless, and Telopea. One of their first catalogs lists over 500 varieties, including 22 poeticus and a similar number of doubles. Among the named sorts are many of the novelties of that time and at very high prices—at least, such would seem to be the case—Fortress 80/-, Principal 80/-, Slemish £8, Caerleon, Aladdin's Lamp, and Carbineer, all at £6. Hugh Poate was available at £10 and King of Hearts for £15.

At Fern Tree Gulley, much nearer Melbourne, the late H. A. Brown was in hot pursuit as a commercial grower. He had chosen a well-favored and sheltered spot. He was a keen and zealous exhibitor and businessman and traveled to all the capital cities with displays and exhibits. On one occasion, he swept down on Adelaide and carried all before him, including the Centenary Cup, valued at £50. His best flower was Rubra, a 2*b* seedling which has been grown successfully all over the world. Others of his own raising to gain distinction are Lord Melbourne (1*a*), Lady Bonython (1*c*), the attractive Leedsii Canterbury Belle (2*b*), and the pink trumpet Pink-a-dell (2*b*). When Brown retired, he sold the property to Mr. and Mrs. J. Hancock. It has since become a dense housing area. The Hancocks bought the entire stock and moved to Kalorama in the Dandenong Ranges. The business has grown tremendously, and son Bob has taken over. With the help of his aged mother and casual help, the cut-flower market is supplied on a large scale, and their catalog lists over 1,000 varieties. The Hancocks have given us many outstanding flowers and the best of them in my garden are Isobella (2*c*), First Frost (2*c*), and Shiralee (2*b*). Scott Morrison and his friend, C. A. Nethercote, are no longer with us. The Morrisons have a commercial farm at Wandin which is under the direction of a son, Travers Morrison. The Heathcote seedlings are widely grown and a couple to have done well in my garden are Derrinal (1*a*) and Pyalong (1*b*).

Canon Rollo Meyer is credited with having produced the first pink, Maiden's Blush, but some years earlier the late Alister Clark of Glenara, in Victoria, had discovered a true pink which he named First Blush. This was the foundation of a tremendous family of pink-tinted flowers grown at Glenara. In 1948 Clark was awarded the Peter Barr Memorial Cup by the Royal Horticultural Society for his work among daffodils. He told me that he would have liked the citation to have said "pink daffodils." I saw hundreds of pinks in the Glenara gardens when I visited Clark in 1947. They were the pride and joy of his head gardener, John Sharp, who still takes an active interest in the daffodil. Clark was generous in his gifts of bulbs and among the best I have grown were Mabel Taylor (2*b*), Shot Tower (2*b*), Hugh Dettman (2b), and Better Half (2*b*). Another of his creations, Glenara Caramel (1*b*), was the outstanding flower both

for exhibition and the garden for many years.

The late Oscar Ronalds was the leading amateur in Victoria. Few of his seedlings were registered, but among the best were Golden Coin, a 1*a* similar to Kingscourt, Bridal Day (1*c*), Marble Queen (1*c*), and the wonderful pink cup, Tarago Pink. The late Group Captain Fairbairn raised many fine seedlings on his well-known grazing property at Skipton. His red-cups were of astonishing color and substance, and I was fortunate to receive many gift parcels from him. According to reports, he used new soil every year for his plantings and no doubt this would account for the quality of his blooms. He was one of the first to take blooms from the mainland to the Hobart (Tasmania) Show and was successful with them. The best of his seedlings in my garden have been C. O. Fairbairn (2*a*) and the remarkable Dawn Fraser (2*c*). Within a short space of time, Victoria had lost most of its leading exhibitors: J. Hancock, Alister Clark, Harold Alston, L. Brumley, and others who had helped to make the Melbourne Daffodil Show an institution. Michael Spry and Murray Gardiner have helped to fill the gaps and the former is said to have the best collection of seedling trumpets in Australia.

The late William Jackson arrived in Tasmania in 1898 and by 1924 he had put together a fine collection of daffodils. He was an acknowledged authority on all branches of horticulture and was a perfectionist. His contemporary and colleague was the late C. E. Radcliff. Together, these distinguished and eminent gentlemen quickly put Tasmania on the map and quality seedlings from their gardens began to dominate the shows. Jackson sent me his Corlo and Chromis, described as "short yellow trumpets" and in process of time, they, with Royalist, gave me a magnificent line and family of self-yellows. Radcliff was an excellent correspondent and wrote a weekly bulletin of news during the daffodil season. His Bonnington (1*b*) was our leading bicolor for many years. Bungana was an excellent 1*a*, Palmer a 2*a* resplendent in color, and, of course, there was his wonderful family of pinks: Dawnglow, Rosario, Karanja, (a bulb of which was sold for £50), Roselip, Pink Nautilus, Roselands, Woodlea, Rosebowl, and a host of others. He was awarded the Peter Barr Memorial Gold Cup in 1946 for his work in connection with the raising of pink daffodils. Other outstanding flowers raised by him were Nautilus (2*c*) and Portia (2*b*). At one time I had over 50 of his seedlings growing in my fields.

The son, William Jackson, Jr., has continued with his father's work at Dover, Tasmania, and has concentrated on the pink double. His 78/64 is described as "A full pink double without anthers or stamen. It has a pure white perianth with a deep pink, full double center which covers about ¾ of the perianth. Interspersed among the small pink petals that form the center are miniature white petals."

Tasmanian daffodils are absolutely magnificent in a good year. The favorable climate and long growing season, together with the years of patient effort on the part of breeders, have helped to bring the standard of their seedlings to the highest state of perfection. Breeders and exhibitors who have passed on and who contributed to the breeding program are J. H. Hinsby and the two stalwarts already mentioned. Others known to me are Campbell Duncan who gave us a host of fine seedlings; A. O. Roblin, raiser of the 1*c* Kilpa and the almost unbeatable 3*b* Caleen; S. J. Bisdee, for years one of the leading amateurs, his red and white Pirandello is one of the most colorful daffodils in my beds and his pink Lady Binney is winning in most of the shows; J. Erp who bred the now-famous pink Bon Rose, the highest-priced bulb in commercial lists; T. H. Piper up on the Northwest Coast who, with J. Radcliff, has dominated the Ulverstone Show with fine seedlings; and K. H. Heazlewood, the leading grower in Launceston.

It is just thirty years since I had my baptism into the Daffodil Show. I had watched a very old gentleman staging his blooms at the Royal Show and two of his flowers attracted my attention in a

stand of "36 Distinct Varieties." The flowers were Royalist and Beersheba and the gentleman, the late W. L. Summers. He exhibited daffodils for over forty years and had sown seed the year before he died in his 82nd year. I asked him how much a collection of bulbs would cost. His reply: "A small fortune, m'boy, a small fortune." Five years later I had a small collection and in 1940 I got my first major award, the Grand Champion of the Adelaide Show with Leedsii Grayling. At that time W. L. Summers, F. H. De Rose, H. Friebe (all these gentlemen have passed on), J. M. Peattie, Harold Parsons, T. Martin, and Bowley were the prominent exhibitors. The ranks have thinned tremendously, and the writer, with a neighboring orchardist, K. Jacobs, and H. Parsons, put up most of the flowers now. During the past two or three years, we have had one newcomer to the ranks in W. M. Blanden, a gentleman who has gained world fame as a raiser of gladiolus.

We named this property "Anstie Farm" after the old English estate at Holmwood, Surrey, where I was born. The Anstie Farm seedlings have given me cause for much rejoicing. Queen Ki (1*b*) has seldom been defeated on the show bench. Others are Cherette and Chemere, short trumpet 1*a*'s; Dalai, a classic 2*a*, and Prince Ki, a noble 1*a* on tremendous stems up to 30 in. in this climate and a wonderful garden plant. I might also mention My Valentine (2*c*) and a number of delightful white trumpets, including L. Lucas (after the Australian poetess), the successor to Cantatrice; and White Ki, a much larger and better Beersheba. I grow about 400 selected seedlings and 500 named varieties at Anstie Farm in washed-out, grey, gritty soil made fertile with liberal dressings of deep litter from the hen houses.

The late Guy Wilson was one of my many benefactors and told me of the importance of Royalist and Guardian in the breeding program. Nearly all my good things have resulted from the use of these two flowers, both as seed and pollen parents. Both give quality and purity of color. P. Phillips of New Zealand has kept me well supplied with all the good things from the Dominion, including the wonderful Kanga (1*a*) and the unique red-cups Rawene and Park Royal. This year he sent me Debutante, Easter Moon, Ark Royal, Vulcan, and a number of other recent introductions from overseas.

My daffodils have flowered much earlier in recent years. One cannot offer any explanation for it apart from soil temperatures at planting time. Varieties I once exhibited in early September are now well finished in mid-August.

Among overseas varieties prominent on the show bench here today are Kingscourt, supreme and overflowing with quality, but temperamental; Ludlow because of its poise, substance, and purity of color; Snow Dream, aristocratic and vigorous; Revelry, tall, upright, and colorful; Arbar, standing alone among the red and whites; and Salmon Trout. A magnificent example of this variety at the last Royal Adelaide Show confirmed it as the best pink ever seen here.

The records of our now famous Town Hall Show register the Grand Champion Daffodil for each successive year. Beersheba has taken the honors three times, Royalist, Grayling, and Queen Ki twice, and the following varieties once each: Camberwell King, St. Egwin, Good Dawning, Rewa, Principal, Cantatrice, Kingscourt, Maharajah, Cotopaxi, Narvik, Chemere, Dalai, Cherette, Robert Montgomery, Goldcourt, and the others, South Australian seedlings. This show has now been discontinued because of lack of support. It was a great disappointment to our Secretary, H. Kneebone, who held this thankless task for over 30 years and demonstrated his wisdom and skill as both promoter and organizer. He is now President of our Society, the Carnation, Daffodil and Sweet Pea Society, the oldest floricultural society in South Australia.

The Royal Adelaide Show is now the mecca for daffodils in Australia and generally considered to be the best flower show in the Southern Hemisphere. The exhibition continues for a week and fresh exhibits are made every other day. There are several suburban shows in South Australia where the blooms are

finished by mid-September and more numerous shows in Victoria where the season continues until the second week in October. Skipton is the best of the suburban shows.

In the 1946 *Daffodil and Tulip Year Book* of The Royal Horticultural Society, William Jackson wrote: "Each and every decade has its own joys and pleasures as well as its sorrows and disappointments. Among the joys and pleasures, I rate the raising of seedling daffodils very highly." I am in complete agreement with him and I trust that this account of daffodils as they are grown halfway around the world will help to sustain interest and enthusiasm among our most gracious and esteemed friends in America.

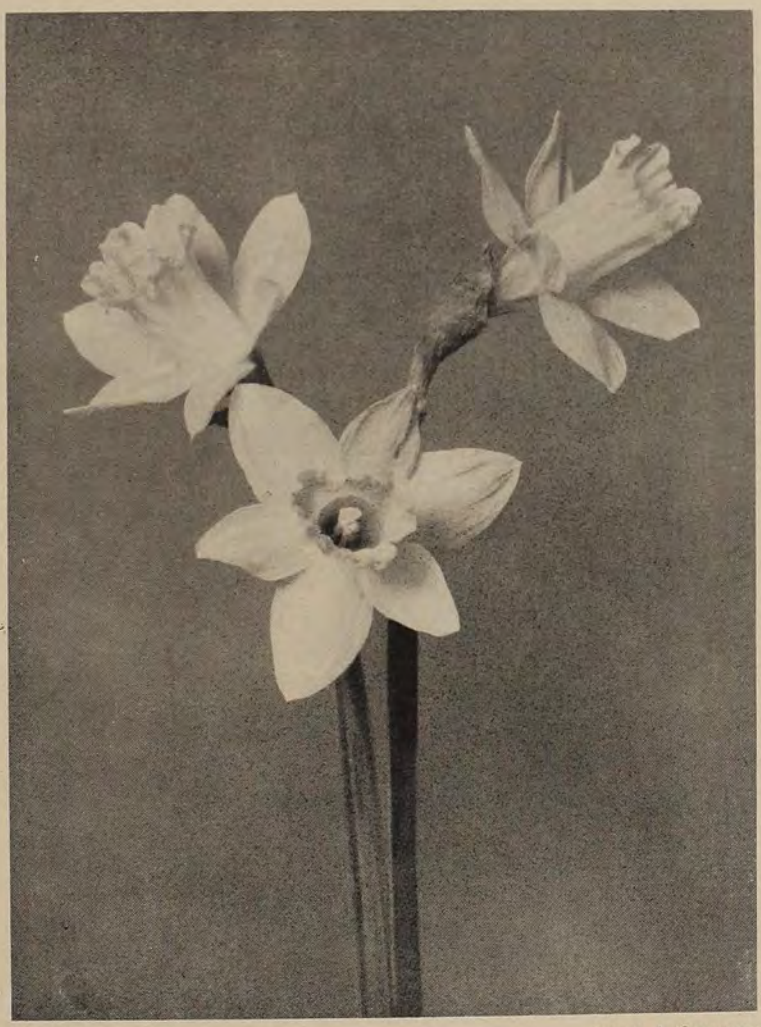

PLATE 53 LILIAN A. GUERNSEY

SPECIES *minor* VAR. *conspicuus*
Lobularis of the trade.

—20— Daffodils in New Zealand

It is difficult to say when daffodils were first grown in New Zealand as a serious activity, but it was in the 1890's that Sir H. Heaton Rhodes of Tai Tapu, just south of Christchurch, took up the pursuit in what was then a big way. His gardener, the late Arthur E. Lowe, commenced raising daffodils in 1895 and it was a seedling of his—Silver Plane, a flat-crowned Leedsii (*3b*) which was given to the late Guy Wilson when he visited New Zealand in 1929—that led to the great advance in the development of small-cupped daffodils. Wilson used it as a seed parent and from its seed produced Chinese White, that lovely flower which has been responsible for many of the small cups of today.

Early in this century, Robert Gibson of Manaia in the North Island was carrying on a commercial business in daffodils and, even with the poor transportation in those days, attended many shows and staged displays to create interest. On his death, his collection passed to his nephew, Alan Gibson of Marton, who became one of this country's greatest exponents of the daffodil. He attended every National Daffodil Show in both islands for over thirty years and was well known for his outstanding displays, both competitive and non-competitive. In addition, Gibson raised many fine daffodils including Milson and Harewood, two fine yellow trumpets, and Naples and Tekapo, two bright red and yellow large cups, the latter having a red-stained perianth. Gibson's stocks were later taken over by his manager, Ron Hyde, who continued until recently when poor health forced him to sell out, and his stocks passed into several different hands.

Two other growers of note commenced raising daffodils after the First World War: J. T. Gray who started in Dunedin, and George Lewis of Christchurch. Both achieved marked success and were at one time the leading raisers in this country. Gray introduced many fine daffodils, but his best known are Kanga and Lochin; the former a fine yellow trumpet which is still seen on the show benches, the latter a large white trumpet which was a big advance in this division but has now been replaced by some of the newer white trumpets which are equally as large and a purer white. Lewis was a great showman and won most of the principal classes in the South Island for a good many years. He was blessed with two large thumbs, and when he put his thumb on the perianth of a daffodil, it went flat and stayed flat. His flowers were large and well grown, and he spared no effort to give them the attention required to produce the finest show blooms. He had a large cellar attached to his bulb store in which he could store hundreds of flowers and, with the assistance of a refrigeration unit, was able to hold them over a long period. This gave him a big advantage over his less fortunate rivals at the shows.

When Lewis sold his stocks in 1943, nine men were employed in lifting and dispatching the orders, but the bulk of the better lots went to Davis S. Bell, also of Christchurch, who continued on similar lines and with equal success and is now raising daffodils in the country south of Christchurch. Bell uses no artificial fertilizers on his bulbs; all the beds are sown to green crops and this is dug in well before planting time. His flowers are large, of good quality, and are well staged on the show benches.

Others who have left their mark with seedlings they have introduced, include C. Goodson of Hawera, A. H. Ahrens of Masterton, and C. W. Pierson, a chemist of Te Aroha, who raised Malvern City—

one of the earliest and best market flowers in the world today. It is a fine yellow trumpet with an excellent stem, and it blooms as early as Magnificence and forces very well. It is believed that this was raised from Malvern Gold × Golden City, two Australian-raised varieties; the former a yellow large-cup and the latter a yellow trumpet. Both are early, but Malvern City is considerably earlier than either. Ahrens raised some very high quality flowers, probably his best known being the grand bicolor trumpet, St. Saphorin, which has won many prizes. Following Ahren's death in 1954, the bulk of his stock was acquired by J. S. Leitch of Masterton, who has produced some good flowers that have won in the seedling classes at the National Shows.

In the South Island, the late S. C. Gaspar at one time had a large area in daffodils and raised many good novelties; his stocks passed to Ron Abernethy of Mosgiel, who is continuing but in a smaller way. Not many women are credited with raising daffodils on a scale equal to that of the men, but Mrs. M. Moorby of Wanganui has been raising daffodils for over 35 years and has produced some excellent flowers. Unfortunately, very few have ever found their way into commerce and they have not received the recognition they deserve. One of her best is a large, saucer-shaped pink-cup by the name of Rosewynne. The crown of this flower is over 2¼ in. in diameter and has a wide frilled band of an attractive shade of pink. It is a most unusual flower and ideal for floral decoration.

New Zealand has been very fortunate in having a supply of the latest and best varieties from overseas with which to work, since the latest British introductions have always been regularly and promptly imported. At one time New Zealand was the best customer of the well-known Irish growers and at the same time had ready access to introductions from Australia and Tasmania where some of the best pinks have been raised. This factor, plus the number of enthusiasts, both amateur and commercial, who have raised seedlings here, has resulted in interest being maintained and has produced some very fine flowers.

In addition to the flowers already mentioned, the following have performed well for some time. The trumpets are represented by Palmino, a large golden-yellow flower raised by Ahrens. This is of smooth substance and good quality and has been a frequent winner at recent shows. Ken Burns of Timaru raised Clandeboye, a large white trumpet with a neatly formed roll at the mouth. In addition to St. Saphorin, Ahrens raised Kintamani, a fine bicolor trumpet which develops a cheesy-buff color in the trumpet as it ages. This is especially fine when grown in pots and opened in the greenhouse.

Gold Script, raised by Parr's Nurseries of Hobsonville, Auckland, is an all-yellow, large cup which has been one of the leaders in this division for some time. It is large, smooth, and of very thick substance with a conical-shaped, three-quarters' length cup with a straight edge. The whole flower is lemon yellow. Red and yellow large-cups have been plentiful, and Hyde has given us three noteworthy ones. Rawene has a bright red, open crown and lemon perianth; it has been most consistent. Park Royal has an overlapping yellow perianth of splendid substance and a very neat bowl-shaped crown with a one-eighth-inch band of cherry red at the edge. It is most useful in a class where red coloring is not predominant. Matamata is a very attractive pink-crowned 2*b*. The crown is an even shade of soft pink; the throat straight sided, slightly expanded, and neatly frilled at the mouth. The white perianth is smooth, overlapping, and of good quality. A more decorative and very striking pink raised by the late Alf Clark of Ashburton is Fontanalis, a round flower with large, flat white perianth and a large saucer-shaped crown with a wide band of pink around the margin. Although not a first-class show flower, it is an excellent cut flower and is most striking in a collection.

Two small-cups that have been performing well on the benches are Hampstead and Anacapri, the former raised by Clark and the latter by Bell. Hamp-

stead is a round flower with first class white perianth and a flat lemon cup banded with a narrow line of red. It has a good stem and shows itself off well. Anacapri is an equally large flower with more pointed perianth segments and a smaller cup with a wider band of red that is more frilled at the edge of the cup. Two decorative 2*b*'s raised by Goodson are Fairy Maid and Fairy Wonder. The former has a white perianth with saucer-shaped crown widely banded apricot salmon, and is most attractive. Fairy Wonder is earlier flowering, shorter in the stem, and has a pointed, milk-white perianth and a neat bowl-shaped crown that has a narrow band of apricot around the edge.

Contrary to popular belief, the reversed bicolor Binkie was not raised in New Zealand but may have been sent to America from here. It was raised in Tasmania by W. Wolfhagen from seed sent to him by Guy Wilson. It is fairly extensively grown here but is being ousted by improved additions to this division.

Double daffodils have not been easy to raise, at least until the advent of Falaise, although Pet, raised by S. C. Gaspar, is a very useful flower. It is well-formed, fully double and has pure white outer segments and small central white segments interspersed with bright yellow. Temple Bells, raised by Bell, is a very large, heavy flower with alternate rows of white and buttercup-yellow segments and is rather like a much-improved Irene Copeland. The highly scented Erlicheer has several, sometimes as many as 16, florets to a stem which are milk white and interspersed with small cream segments. The stem is thick, prominently fluted, and hollow. It is in demand for weddings as the florists thread the florets and use them for streamers for bouquets and other accessories. It lasts well and has a long flowering period; the foliage is usually the first to emerge and the last to die down.

The foregoing are but a few of the many good flowers raised here. Several more recent and higher-priced introductions are probably better flowers, but they are not yet generally available.

Daffodils are grown in practically all areas of New Zealand. There is hardly a place where a garden can be made that they will not grow, and practically every town and district has its annual spring daffodil show. These fall into two groups: those conducted by horticultural societies and those held by religious organizations. The latter are usually fund-raising events, and the welfare of the exhibitors and their flowers is of secondary importance. The horticultural societies generally conduct very good shows which have been well patronized in the past, although public attendance seems to be falling off, even if the enthusiasm of the exhibitors is not. The principal shows are the North and South Island National Shows which are held in September and rotate on a roster system to a different place each year. These shows are of a very high standard and are attended by a large percentage of the 400 enthusiasts who are members of The National Daffodil Society. There are four sections in these shows:

1. Open Classes for Collections.
2. New Zealand Seedling Classes—Open to All.
3. Single Bloom Classes—Open to All.
4. Amateur Classes for Collections.

The awards are numerous cups and bowls, medals, certificates, and cash.

Flowers may be put up before a panel of judges for an Award of Merit on a basis similar to the awards made by the Royal Horticultural Society. The Society publishes a year book which includes the results of the previous year's shows. These give the names of the prizewinners and the names of the flowers exhibited in each class, together with the number of entries. Articles of interest to daffodil growers are published when available and the proceedings of the annual meeting are also reported. A panel of judges is published and those on the list are expected to serve in their own districts as judges at smaller shows. Judges work singly rather than in teams.

—21— Daffodil Bulb Trade

Daffodil bulbs are produced for the commercial cut flower grower, the home gardener, the park and estate landscape worker, and for the fancier. In the southern part of the United States and on parts of the Pacific Coast the bulbs are planted for outside cut flower production, but in the northern part of the Middle West early flowers must be produced under glass. In either case the growers of flowers for sale need ample supplies of reasonably priced bulbs. In addition, those growing flowers under glass need daffodils suitable for forcing, since all daffodil cultivars do not force equally well. For many years the daffodil most widely used for such greenhouse forcing has been famed King Alfred, registered in 1899, nine years after the death of its raiser, John Kendall, who did not see it flower.

Daffodils for the average home gardener must also be moderate in price. His main interest is in having a colorful display with as little cost as possible. He is not too concerned as to whether the bulb he is buying is King Alfred, Golden Harvest, or Unsurpassable, although he may have heard the name of the first one at some time.

On the other hand, the daffodil fancier grows them as a hobby and frequently spends a considerable sum of money to buy the novelties for show purposes, for the pride of having something new, or for use in daffodil breeding. It is this specialist who publicizes the newer introductions by exhibiting them at recognized shows where these cultivars soon receive widespread publicity if they are successful on the show bench.

The professional landscape gardener who uses daffodils for color in the early spring gardens has a certain amount of influence on daffodil production. He, too, will tend toward the less costly bulbs whenever they will give him the desired color effect.

INFLUENCE OF CLIMATE ON COMMERCIAL PRODUCTION

The cultural requirements of the various divisions of the genus *Narcissus* have in a large measure determined where they can be most successfully grown on a commercial scale. Thus, certain narcissus of the tazetta group can be best produced in regions where the climate is similar to that of the Mediterranean basin. Normally the tazettas begin growth in the autumn and are seriously injured by severe winters. In contrast are the hardier members of the genus which do not send up leaves until early spring and need a prolonged cool growing season if they are to show a good bulb increase. Bulb areas in the Netherlands, the British Isles, and the coastal parts of Oregon and Washington afford such cool growing conditions extending for some weeks after the time of flowering.

Daffodil bulbs are at present produced commercially in several parts of the United States, the principal states being Oregon, Virginia, and Washington. Daffodil growing on a limited scale in Virginia goes back many years if we are to judge by what has been found growing on old abandoned estates such as Lee-sylvania Plantation. There, on the shores of the Potomac River in Prince William County, old daffodil Van Sion found a home on the estate first lived on by the owners in 1747. It was apparently sometime between that date and 1790 that the plantings were made since the house burned on the latter date and was not rebuilt. The descendants of those early immigrant bulbs still flower

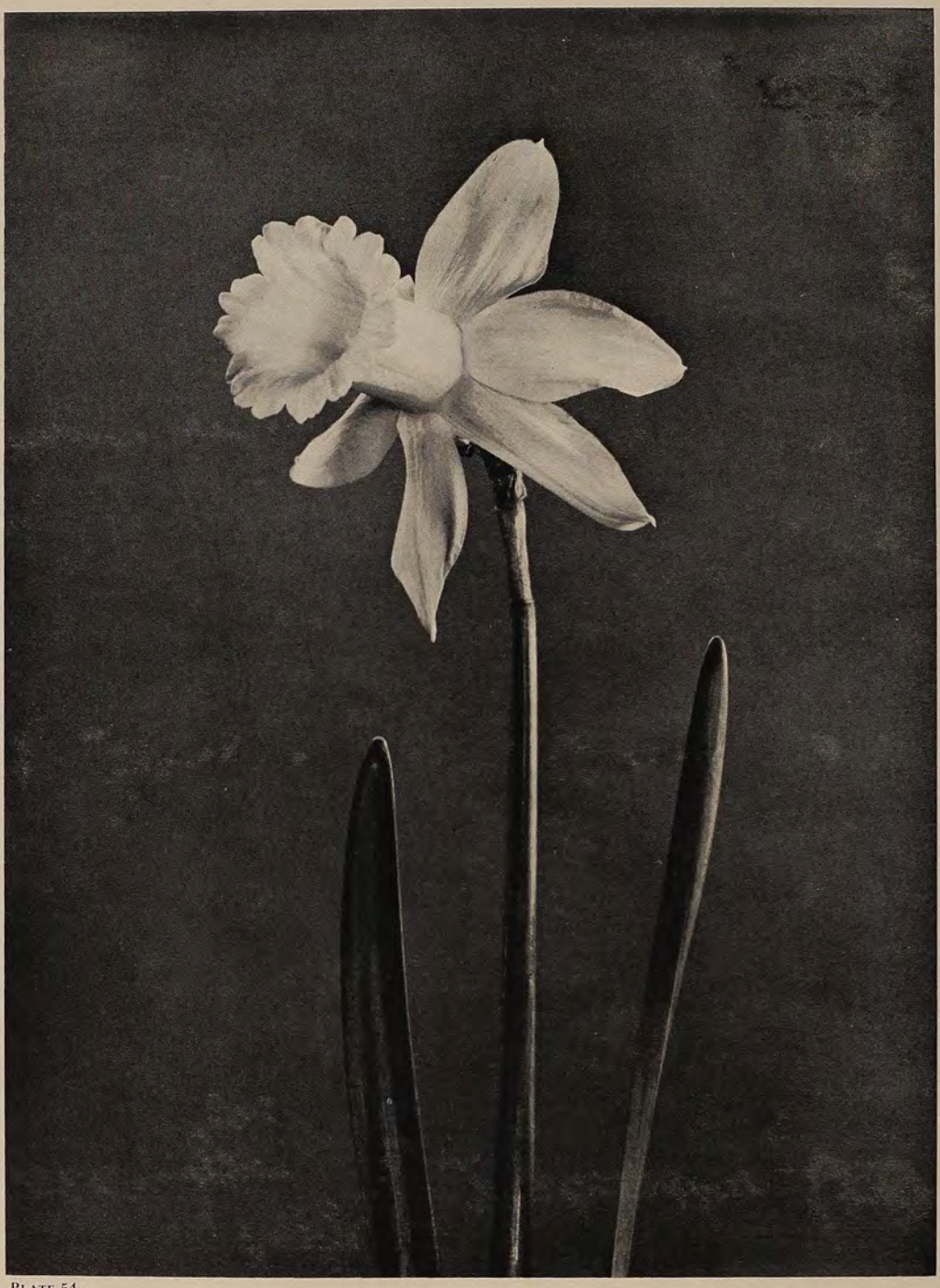

PLATE 54

PEEPING TOM
Cyclamineus (Div. 6a)

there although not too vigorously since forests now cover what was once cleared land. The old daffodils about these colonial plantations can truly be called "naturalized." Those at Leesylvania are of particular interest to the writer since they show no evidence of any virus infections. In contrast are the commercial plantings of this same variety in the countries where it is still produced on a considerable scale. Daffodil mosaic virus is quite prevalent in them, as it is in King Alfred and many of the other older daffodil cultivars. This same freedom from virus infection of certain stocks of Van Sion has been noted in parts of Italy where this cultivar has grown in woodland areas for many years. Certain commercial growers in other countries import stocks of that daffodil from time to time from Italy, to get a new start with virus-free bulbs.

FOREIGN BULB PRODUCTION

In considering daffodil bulb production in other parts of the world, mention can first be made of our neighbor, Canada. The Province of British Columbia raises a considerable quantity, Vancouver Island itself being reported as having 216 acres of daffodils in 1964.

Efforts to secure recent figures on daffodil bulb production in other countries met with varied success. In those lands where bulbs are big business, accurate figures are available. For example, the Ministry of Agriculture, Fisheries, and Food reports a total of 3,242 acres in England and Wales devoted to daffodil bulb production during 1964. In the same year growers in those countries grew cut daffodil blooms on 5,241 acres. Surprising as it may be to many gardeners those figures show England and Wales to be considerably ahead of their nearest competitor, the Netherlands. That country reported that in 1964 155,054,000 daffodil bulbs were grown on 2,923 acres of land. At the same time Dutch growers produced 75,000,000 cut daffodil blooms.

While the Irish daffodil breeders, both north and south, are famed for their remarkable daffodil introductions and their show successes at the London shows of the Royal Horticultural Society, their production of novelties is confined to a rather limited acreage. Because of their value such bulbs are given almost individual care. A specialist firm in Ireland proper cultivates about 1½ acres of such bulbs, exclusive of unbloomed seedlings. According to the Ministry of Agriculture of that country, a total of about 40 acres is grown there, mostly for cut flowers. A considerable part of that acreage is in West Cork where early daffodils are grown for export to Northern Ireland and the United Kingdom. In Northern Ireland a prominent daffodil raiser there grows about 4½ acres, both of new seedlings and novelties.

Information furnished by the French Ministry of Agriculture indicates most of that country's narcissus production is in southern France in the Var Department in the region of Ollioules. There the French growers devote approximately 173 acres to narcissus. Leading all others in the number of bulbs produced is Paper White Grandiflora, a form of *Narcissus tazetta* L., subspecies *papyraceus* (Ker-Gawler) Baker. A companion to this is another tazetta, Grand Soleil d'Or, but grown in lesser numbers. Two other cultivars, Fortune and King Alfred, complete the story in France.

To furnish a figure for the 1964 narcissus production in Italy, the Floricultural Experimental Station at San Remo consulted local growers and traders. In doing so they learned that 150 to 175 acres in Italy are devoted to producing the two tazettas, Paper White Grandiflora and Grand Soleil d'Or. The bulb production on that acreage is between 2,500,000 and 3,500,000. At the same time between 3,000,000 and 4,000,000 cut blooms are produced for commercial purposes.

Australia is known for the efforts of its daffodil breeders who have been quite successful. The Director of the Victorian Department of Agriculture was only able to give a rough estimate of daffodil production in the State of Victoria, the figure being about 6,000,000 bulbs annually from approximately 300 acres. At the same time flower sales

amount to about 20,000,000 stems per annum. A further estimate suggests that the total Australian production may be double that of Victoria.

While both Tasmania and New Zealand are known to grow narcissus, no one was willing to venture even a rough guess as to the acreage or production figures. Apparently much of the daffodil activity in those islands is carried on by amateur growers.

PRODUCTION AFTER WORLD WAR II

World War II, of course, stopped all European bulb shipments to the Americas, but soon after the end of hostilities they began again.

Unfortunately, the war had created problems for the bulb growers. Their effective pest control program had been seriously disrupted, both through loss or destruction of equipment and through curtailment of pest control chemicals. Because of this some bulb importations arriving at United States ports from Europe had to be treated or refused entry. These pest difficulties were of course costly, both to the European shipper and to the United States buyer. Finally, to help solve their problem the very progressive Dutch bulb exporters' association and the Netherlands Ministry of Agriculture decided to invite representatives of the Plant Quarantine Division of the United States Department of Agriculture to join with representatives of the Netherlands Plant Protection Service in the inspection of bulbs before export. A formal agreement was negotiated outlining the duties and responsibilities of the parties concerned and the work began in the summer of 1951. To cover the cost the exporters deposited the necessary funds with the United States Department of Agriculture.

The agreement has been renewed in each of the succeeding years and the accomplishments of the arrangement have met with the approval of a majority of the United States importers. At the same time this country has gained in plant quarantine protection.

As the success of the bulb inspection in the land of origin became known, bulb shippers in other countries entered into similar agreements for United States bulb inspection before export, in the following order: Belgium, 1952; France, 1954; Italy, 1958; Federal Republic of Germany, 1959; and the Republic of South Africa, 1965.

BULB INSPECTION

Diagnosing the visible symptoms of ailing daffodils in the garden and the simpler methods of treatment which are within the capacity of most gardeners are discussed in Chapters 7 and 8. Government procedures in detecting and treating these and other conditions which may be found in dry bulbs imported from foreign growers often involve equipment and material not readily available to home gardeners. Nevertheless, a brief description of the methods of detection and treatment of pests and diseases used by the Federal Plant Quarantine inspectors should help to create confidence in the health of imported bulbs.

Bulbs are examined by United States inspectors working in collaboration with their counterparts in the countries just named. The men of the several countries are well versed in bulb production practices and know the pests attacking bulbs in each producing area. Those pests usually encountered in the inspection of daffodil bulbs are the narcissus bulb fly, the bulb and stem nematode, the bulb scale mite, and basal rot. It is gratifying to note that modern control methods in use since World War II have reduced the incidence of these bulb troubles. The growers of the various countries and the plant protection officials are to be congratulated on their accomplishments. The same can also be said of the officials and growers in the United States who have likewise made great strides in the production of clean bulbs.

The life cycle of the narcissus fly is described at length in Chapter 7, but, in brief, the eggs are deposited on the leaf bases of the plant in late spring. When the larvae emerge from the eggs they move downward usually following the outside of the bulb until they reach its

basal plate. They penetrate it, gradually working upward in the bulb as they feed and grow. In late autumn the maggot has attained full size and has nearly destroyed the heart of the bulb. The winter is passed in an inactive state in the hollowed bulb. In early spring it leaves the bulb, moves upward nearly to the soil surface, and pupates. With the coming of late spring the fully grown fly bursts the hardened pupal case and emerges to begin the cycle again.

Evidence of infestation can usually be detected by a depression or hole made by the young larva when it entered the bulb's basal plate. Exploration of such depressions or holes with a knife point shows whether it is merely a normal depression in the plate or is a hole penetrating into the bulb. A hole calls for a surgical followup and may save the bulb if done with care early in the summer. In the late summer or early fall, infested bulbs have developed another symptom, a softness of the bulb when it is firmly squeezed. Daffodil fanciers and other gardeners should check their bulbs before planting to eliminate every bulb fly larva and thus prevent the establishment of an infestation that may later require a great deal of control work each year. Commercial growers can, of course, eliminate this pest from infested bulbs either by fumigation or a hot water treatment. To prevent infestation they usually use a chemical dip.

The bulb scale mite is quite a different pest. While it cannot be seen by the unaided eye, its damage can be detected without magnification. It usually enters the bulb at the neck, working its way downward between the fleshy scales. To find them early in the season, the inspector forces the fleshy scales of the neck apart to look for the telltale brown scars resulting when the mites pierce the surface cells to feed. If the scarring is present a hand lens or a microscope is needed to confirm the presence of the mites. A second method of examination is to cut across the tip of the bulb nose, just below the point where the old leaves separate from the bulb. A quick examination of the exposed white scale flesh will show brown spots at points where the bulb scales touch each other.

In a mild climate and under glass, bulb scale mites can cause extensive bulb, foliage, and flower injury. Fumigation with methyl bromide or the hot water treatment will eliminate the pests. Unfortunately, few amateurs are equipped to do either. Whenever the mite is found during daffodil inspection in the foreign countries mentioned earlier, a treatment is required before the bulbs are allowed to be shipped to the United States.

Today the bulb and stem nematode is under good control in the lands producing narcissus bulbs for export to this country. It is greatly feared because of its destructiveness and because of the difficulty of eliminating it from soil that has become infested. In view of its importance as a pest, stern measures have been taken against it. As most daffodil growers know, the treatment is immersion in water at a temperature of 110 to 111.5° F. for three to four hours, the latter time being preferred for more certain results. If the treatment is given while the bulbs are still dormant little if any injury results. In fact, many growers have found that the treatment apparently stimulates bulb increase.

The foregoing covers three damaging animal pests of daffodil bulbs. To them should be added one very destructive fungus organism, *Fusarium oxysporum* Schlect., var. *narcissi* Snyder & Hansen. It causes the notorious "basal rot" of daffodils. The common name describes it well. The fungus remains in the soil for several years after its introduction, even though daffodils may not be in the ground for an extended time. It lives on whatever organic material may be in the earth.

Div. 1 daffodils seem to be the most susceptible although certain cultivars in Divs. 2 and 3 are also attacked. The same is true of daffodils in Div. 4 which are sports from daffodils in Divs. 1, 2, 3. Losses from basal rot are higher in warmer climates. Certain chemical dips have been shown to reduce losses significantly, but it is hoped breeding for resistance may eventually reduce the disease problem.

Bulbs in an advanced stage of infection are soft when squeezed. However, early in the season infections may only be found by a careful examination of the bulb base and the point where the bulb scales join the basal plate. In an early infection a careful scraping of the plate with a knife will show parts of it to be spongy and brown. At the same time, by carefully lifting the brown bulb scales at the point of union with the plate, the fleshy bulb scales will be uncovered. If basal rot is present the fleshy scales will be brown instead of white. In the fall the young roots of a sound bulb will begin to push out at the point where the plate and the fleshy bulb scales join. At that time any bulb on which that swelling is not taking place should be carefully examined since one of the first things basal rot does is to kill the young roots even before they start emerging.

No bulbs showing any signs of infection should be planted in the daffodil beds, although some gardeners have been able, by careful surgery, to remove an early infected spot and save the bulb. Any such bulbs should be planted away from the sound bulbs, in a place where water drainage from them will not go into the regular daffodil beds.

HANDLING BULBS IN UNITED STATES QUARANTINE STATIONS

The commercial lots of bulbs from the countries where United States inspectors work are not fumigated or otherwise treated upon arrival in this country. This is not true of bulbs brought in by parcel post under the green and yellow address labels issued with the permit by the Plant Quarantine Division. Those labels bring the parcels to a designated special inspection station where the bulbs are checked for basal rot and a possible nematode infestation. Then they are fumigated to kill narcissus fly larvae, bulb scale mites, or certain other lesser animal organisms. If nematodes are found and it appears the bulbs can be saved, they are given the hot water treatment before being forwarded to the permittee. Dead bulbs are destroyed.

This system of quarantine handling is especially valuable for the daffodil fancier. He is frequently buying expensive novelties and they usually arrive by parcel post from specialized growers in foreign countries, including those countries where the United States does no bulb inspection. The inspection forces of the foreign governments do a fine job when examining the bulbs for export, but there are times when an incipient infestation or infection will not be detectable that early in the season. However, a few weeks in a warm mailbag in the hold of a ship serves as an excellent incubation period during which the infestations and infections can become quite evident.

Inspection and treatment at the inspection stations are done with as little delay as possible. In nearly all cases parcels arriving on one day, go on their way the next, except those arriving on Friday; these may have to be held over until Monday. Those found to be carrying nematodes will be detained a little longer because of the necessary hot water treatment. When inspections are made and treatments are given, great care is used to assure there is no mix-up of labels, a thing of real importance to daffodil specialists.

It should be noted that daffodil plantings, in countries where the Plant Quarantine Division carries on inspection of dry bulbs, receive a spring field inspection. This work is done in collaboration with the inspection services of those countries. This cooperative effort has served to reduce the incidence of pests.

COMMERCIAL CULTIVATION

The cultivation of daffodils for the production of bulbs varies considerably from country to country. The famed Dutch beds have been in vogue in the bulb fields of the Netherlands for many years. They are of a width that permits a worker to reach the center from each side for weeding, flower picking, and other necessary work. In the past a tremendous amount of the bulb work in Holland was hand work, including the "digging" of the soil to prepare it, the opening of the bulb bed, the placing

of the bulbs, the covering of the bed with earth from the next bed, the spraying of the plants, the rogueing of the diseased plants and stray cultivars, the removal of the flowers, and finally the lifting of the bulbs. In Holland there have, of course, been variations in the procedure just outlined, but it has been the general way of doing the job.

In recent years some of the growers of Holland have removed the hedges that have for so many years served as windbreaks. That has been done to make it possible to mechanize some of the work. With that change have gone the old Dutch beds, to be replaced by long rows stretching the length of the fields. Small garden tractors and other mechanical contrivances have helped to eliminate some of the back-breaking hand labor.

In the Pacific Northwest and other bulb areas of North America, the Dutch bed method was used in the early years and of course required much hand labor. The bed method was soon superseded by the row method, bulbs being planted in furrows opened by a horse-drawn plow. Later, tractors replaced the horse, and so the Dutch bed method was retired. Placing the bulbs in the furrows was a costly procedure if done by hand. Therefore, the larger growers in the Pacific Northwest have built planting machines capable of planting two or even four rows at a time.

BULB SIZES

The bulbs planted by the commercial grower are of different sizes and shapes. Information on bulb structure and growth will help to explain this. A bulb is considered by botanists to be an enlarged underground growth bud. The basal plate is designated as the stem and the scales the enlarged and thickened leaf bases. When the daffodil bulb reaches a certain size, small buds appear in the axils of one or more of the bulb scales, just as buds develop in the leaf axils of a rose branch. The bud continues its growth until it finally separates from the old bulb and becomes a bulb of its own. When it separates it takes with it a portion of the scales of the old bulb and a part of the basal plate or stem.

The various sizes of daffodil bulbs known to daffodil growers are: 1) splits, slabs, offsets, or chips; 2) rounds; 3) double-noses; 4) wall-sided bulbs; and 5) broody or mother bulbs. A true mother bulb is one that has at least two offsets ready to be removed from the parent. A wall-sided bulb (a term used in the British Isles) is the parent bulb from which the easily removed offsets have been removed, leaving flat sides on the parent. The term is also occasionally used for a large offset with a flat side. This kind of bulb should produce large rounds or even double-noses in its second season. A double-nosed bulb is one capable of producing two flowering stems and usually results from a year's growth of a round. The double-nose is usually the bulb sold in the trade. After a year or two of growth it is a mother bulb.

A round bulb is just that; round in shape with no offsets. In nearly all cases round bulbs should produce one flower stem and with a year's growth should be a double-nose. Slabs, as they are usually called in the Pacific Northwest, are the offsets or pieces that have separated from the mother bulbs, either naturally or by hand. An occasional large slab may flower the first spring after planting and many of them will flower in the second spring. When dug in the second summer they will be rounds of varying sizes.

A commercial grower with a good knowledge of the bulb kinds just mentioned will plant them separately and will know within reasonable limits the sizes he will lift in one, two, or three years. When harvesting his mother bulbs and preparing them for replanting he keeps one thing in mind. In separating the offsets he does not force those still tightly attached to the mother. To do so may damage the basal plate of either the offset or the mother bulb. That damaged part is a fertile spot for the beginning of a fungal infection. He knows an offset is ready for removal when it and the mother bulb are completely separated by a dry brown scale. If there is

white scale flesh on the side where they are close to each other, they are not ready for separation.

BULB HARVESTING

In the early days daffodil bulbs were dug (lifted) by hand. According to *The Flower Bulb Industry* (Charles J. Gould, Washington Agricultural Experiment Station, Circular 318, October, 1957) it requires 12 man-days of hand labor to dig an acre of daffodil bulbs but an average of only four or five days by machine methods. Many of the machine diggers used in the Pacific Northwest have been designed and built by the growers. Uusually they are modified potato diggers. After being lifted out of the ground, the bulbs pass through the machine by various routes and land in trays which are stacked in the fields to dry.

When drying is finished the bulbs go to the sheds for cleaning, sorting, and packing for shipment. Cleaning in the Pacific Northwest is often accomplished by machines which are potato cleaners altered to make them suitable for use with daffodils. Much of the sorting or grading is done by Dutch-type machines, developed in the Netherlands through many years of practical experience. Shipments of daffodil bulbs are usually made in slatted wooden crates, the spaces between the slats providing air circulation to prevent an accumulation of moisture and premature rooting.

In the Netherlands, because of the smallness of the bulb fields, mechanical diggers are not too practical, so much of the daffodil harvest is still done by hand labor. As in the Pacific Northwest, the filled bulb trays are stacked in the fields to dry. However, the Dutch grower is less fortunate on the average than his counterpart in the United States. His weather is frequently less favorable for drying and he may finally be forced to move the bulbs into packing sheds for artificial drying if he is to meet shipping deadlines.

Growers in the British Isles handle their bulbs in much the same manner as do the Dutch and United States growers, and they are also at the mercy of occasional unpredictable summer weather, causing difficulties in lifting and drying the bulbs.

BULB MERCHANDISING

Daffodil bulbs, as well as other bulbs, are sold at the corner drugstore, the neighborhood supermarket, the dime store, the garden department of the big department store, the local plant nursery, the large general mail-order house, the mail-order concern dealing mainly in horticultural items, the wholesaler who supplies the retailers just mentioned, and the grower who sells his product to the wholesaler.

Prior to World War II many of the bulbs imported into the United States came in for forcing purposes or for use in planting on large estates and in parks. With the resumption of trade after the end of the war a new trend developed. Instead of arriving in large wooden cases, they began to come packed in small, gaily colored cartons, 5 or 10 or 15 bulbs to the box. These were the bulbs that began to appear in the various stores that would not have considered handling bulbs in bulk. And these were the bulbs that began to go home to suburbia, a box or two at a time, to make bright spots of color the next spring in a newly established real estate subdivision quite devoid of plant life following the enthusiastic efforts of the bulldozer. At first this merchandising method began in a small way, but it has grown vigorously in the years since its start.

Another bulb merchandising plan used by certain mail-order horticultural firms begins with the mailing of colorful catalogs to prospective buyers. Their orders to the firm are transmitted to a large bulb-packing firm in the Netherlands where each order is separately packaged. The address label, furnished with the order, goes on the package, it is weighed, and a United States postage meter sticker is applied to cover parcel post movement from the United States port of entry to the buyer. This and numerous other packages go into large shipping cartons which, in turn, go into the cargo hold of a ship and soon cross

the Atlantic. Upon arrival at the United States port, the cartons are delivered to the post office where the individual packages go into the parcel post for delivery.

But long before the bulb-shipping time has arrived, energetic English-speaking salesmen from the Netherlands and certain of the other bulb-producing countries arrive in the United States and other parts of the world to take orders. Competition is spirited. The big wholesalers in this country receive huge quantities of bulbs which are in turn sold to retailers. Some of the Netherlands firms have even set up their own branches in the United States, frequently run by members of the family who have migrated to the New World.

Daffodil growers in the British Isles and Antipodes send out attractive catalogs to wholesalers and to garden enthusiasts in this and other temperate parts of the world. Their orders are usually delivered by parcel post. Only occasionally do these producers of novelty daffodils travel outside of their own countries to solicit business.

The catalogs of European specialists are usually ready in April and May and should be requested at that time as the first step in placing an order abroad. Dealers in Australia and New Zealand issue their catalogs in October and November and bulbs are shipped during our winter. Handling these bulbs is discussed in Chapter 2. Overseas correspondence should always be conducted by air mail.

DAFFODIL SHOWS AND AWARDS

The leading producers of novelties rarely fail to attend the principal daffodil shows such as those staged by the Royal Horticultural Society in London. Competition at those shows is keen and a major award is worth a great deal as advertising.

At those same shows the novelties are judged for possible awards as exhibition cultivars. The winning of an Award of Merit (A.M.) or a First Class Certificate (F.C.C.) is an important accomplishment and can usually be depended upon to indicate the merit of a novelty. The awards to be won by a daffodil cultivar are listed in the *Classified List and International Register of Daffodil Names* published by the Royal Horticultural Society.

To designate limited awards the Society uses certain code letters: A.M. (e) and F.C.C. (e) are given to cultivars in recognition of their value as "exhibition" flowers; A.M. (g) and F.C.C. (g) are given for excellence in "garden decoration."

Across the North Sea in the Netherlands, the Royal General Bulb Growers' Society holds exhibitions in its Haarlem headquarters. Awards of Merit and First Class Certificates are given at those shows. Their awards are shown in the *Classified List* as "A.M., Haarlem" and "F.C.C., Haarlem," followed by the year the award was made. Both Societies occasionally make other awards. These are listed and explained in the introduction to the *Classified List* but are of less interest to non-commercial daffodil growers.

BULB SOURCES

Gardeners have two main sources of daffodil bulbs, local dealers and the specialists who are usually at distant places or even in a foreign country. The local sources of bulbs generally offer the daffodil cultivars of lesser cost. However, many of those cultivars are a good investment for the person just beginning the hobby of growing daffodils. By referring to other parts of this Handbook, the inexperienced gardener will find comments on the many different daffodils. Those comments will serve to guide him in making his choice from the bulbs offered in nearby stores.

By the time he has chosen and grown some of the less expensive cultivars, the gardener's enthusiasm will probably cause him to seek sources of daffodils not available locally. In Appendix C the interested gardener will find a list of retail dealers offering a wide variety of daffodils, both in this country and abroad. However, he will not find the name of a member of the American Daffodil Society living in his community who might be able to help out with a few surplus bulbs as a starter. By joining the So-

ciety, the gardener will be able to determine whether he has any daffodil-growing neighbors and he will receive the organization's publications.

Should the gardener decide to purchase bulbs from an out-of-state source he will have no difficulties. The shipper is required to be informed on the regulations governing the interstate shipment of bulbs. If the gardener decides to import, there is a simple requirement to be met. A permit must be secured authorizing the entry of the bulbs. To get it, write to the Plant Quarantine Division, 209 River Street, Hoboken, New Jersey 07030, asking for a permit to import narcissus bulbs. Be sure to state: (1) the country or countries of origin; 2) the number of parcels expected; and 3) the expected means of transportation. Also mention whether other importations are expected during the year. Experience has shown that parcel post transportation of foreign bulbs lessens entry problems when they arrive at U. S. ports.

To avoid delays, apply for the permit three or four weeks before the order is to be sent to the foreign shipper. If parcel post is to be the means of transportation, green and yellow mailing labels will be received with your permit. Send the mailing labels to the shipper with your order, but retain the permit itself. When sending the order stress to the shipper the need for pest-free and soil-free bulbs. Infested or diseased bulbs or soil-contaminated bulbs will experience difficulties at the time of entry. Cleaning and treatment will be necessary.

—22— Breeding by Amateurs

An amateur daffodil breeder may be defined as one who engages in the pursuit primarily for pleasure rather than as a business. His pleasure may consist of observing for himself the various stages of progress in developing seed pod, growing seedling, enlarging bulb, and, eventually, in studying the first flower to see how it reflects the characteristics of its parents. These pleasures are recommended to all daffodil growers, to increase their appreciation for the plant, whether or not they are tempted to make daffodil breeding a major interest.

Usually, however, these pleasures are incidental, and the motivation is the desire to produce new varieties "of one's own" that are better than those now available, or at least different from them in some way. As new varieties are being produced in increasing numbers in various parts of the world, this becomes more difficult each year, and the serious amateur may find that deciding on a suitable program is one of his most difficult tasks.

Anyone interested in daffodil breeding beyond the observation of the life-history of a batch of seed should know something of the elements of genetics and plant breeding. Daffodil breeding is complicated by heteroploidy and variations in chromosome numbers in species. Knowing why certain crosses are likely to fail will save many disappointments. One very helpful publication for beginners is *A Handbook on Breeding Ornamental Plants,* published by Brooklyn Botanic Garden as Vol. 15, No. 2 of its *Plants & Gardens,* August, 1959 and still in print for one dollar. Your public library may have others. Specific information concerning daffodils is most likely to be found in the publications of the American Daffodil Society and in the Daffodil and Tulip Year Books of the Royal Horticultural Society. Much of this information has been collected and codified in the Daffodil Data Bank of the American Daffodil Society, a project utilizing an electric computer to store and make available detailed information on daffodil cultivars and their family trees. The published compilation of 1965 lists more than 3,000 cultivars and many species and wild forms, giving available data on parent varieties, breeder, color, season, height, chromosome count, fertility, and date of registration.

Pollinating daffodils is very simple. Daffodils are bisexual, or "perfect," flowers; each contains both female and male reproductive organs. The female germ cells are formed in the ovary, which is below the perianth. From this rises a slender column called the style, which terminates in a faintly three-lobed extension called the stigma. Ovary, style, and stigma together are called the pistil. The male organ is called the stamen, and consists of a filament supporting the anther, which bears the pollen grains. The relative lengths of pistil and stamens vary in different species, and in some cases in blooms of the same species. In most daffodils the arrangement is symmetrical, with the six stamens surrounding the pistil rising straight from the ovary, but in the bulbocodium group the curved pistil and stamens are asymmetrically arranged.

Pollination consists of applying the pollen from the bloom selected as male (pollen) parent to the stigma of the one chosen as female (seed) parent. If conditions are favorable, the pollen grains germinate and pollen tubes grow down the style to the ovary, where the germ cells of male and female parents unite and seed develop. Experienced breed-

ers differ considerably in their methods of pollination, timing, and precautions taken to prevent accidental pollination instead of the cross planned. The methods described here are recommended for beginners who wish to be reasonably certain that the seed they collect have come from the cross planned.

The simplest cross is that between two varieties blooming within a day or so of each other. Select the bloom to be used as seed parent before it is fully open. At this time the pollen sacs (anthers) will not have opened to release the pollen. Using tweezers carefully remove these anthers to prevent self-fertilization. If the bloom selected as pollen parent is completely open and the pollen is visible on the anthers, remove an anther with the tweezers and brush the pollen onto the stigma of the seed parent. If the stigma appears dry and the pollen does not adhere, wait a day or more and repeat the process. The stigma should be slightly moist or sticky for best results. Use as much pollen as will adhere; this helps to ensure a good yield of seed. Much remains to be learned about conditions favorable and unfavorable to the germination of the pollen grains on the stigma, and it is a sensible precaution to repeat pollination one or more times. It seems to pay.

Mark the pollinated bloom by attaching a small string tag with the name of the seed parent, the sign "x," the name of the pollen parent, and the date or dates pollinated, using a soft pencil.

This simple method may be varied in many ways. Pollen may be transferred on a small brush (slightly moistened), on a glass rod (rubbed against wool to make the pollen adhere), or even on the point of a pencil. Sometimes, especially with small species, it is easier to work with the entire bloom than to attempt to remove an anther or transfer pollen to a brush or other carrier. Pollen may be stored in a desiccator, or frozen, but the beginner is advised to start with fresh pollen. Some breeders moisten the stigma with honey or sugar solutions to secure better pollen adhesion. Records may be much more elaborate, with age of blooms, time of day, temperature, and atmospheric conditions noted, in which case a notebook would be used, each cross numbered, and only the cross number used on the string tag. A few breeders cover the blooms of the seed parent to reduce the chances of insect or wind pollination, but this practice has never been generally followed in daffodil breeding.

Some pollinated blooms soon show that they are failing to produce seed. They shrivel completely, ovary and all. In other cases the ovary may remain green and expand for several weeks, only to turn yellow and then brown and suddenly collapse. Pods remaining green a month after pollination are more likely to complete the maturing of the seed, and these should be watched closely lest the pod crack open and spill the precious seed. The danger can be averted by enclosing the pods in squares cut from nylon stockings and held in place by short lengths of thin wire ("Twistems"). Thus protected, the seed may be collected after the pods open. If this method is not used, the ripening pod may be picked with a few inches of stem when it begins to turn yellowish at the tip, and allowed to complete ripening in an open container. When the withered bloom falls away the seed pod will soon open.

The number of seed to the pod may vary from one to 50 or more. Very small lots of seed or a high proportion of failures may indicate that the varieties chosen as parents are triploids, whose odd sets of chromosomes do not pair in the normal manner to form fertile germ cells or pollen grains. While chromosome counts are not available for all varieties, most of the larger modern varieties are believed to be tetraploids, except in Divs. 5-8. These, resulting from crosses between diploid species and tetraploid varieties, are usually triploids. In Div. 8 there is a further complication due to the fact that tazetta species have 20 or 22 chromosomes instead of the 14 of most of the other Narcissus species and wild forms. As triploids do occasionally produce fertile pollen and ovules, leading to fertile tetraploid plants and new combinations of characteristics, there is

much interest among amateurs in attempting crosses with them. In the case of triandrus and jonquilla hybrids there seems to be a sterility factor in addition to the obstacle of triploidy, making the discovery or development of fertile varieties in these divisions particularly desirable. First crosses between *N. triandrus* or *N. jonquilla* and tetraploid varieties are usually easily made, however, with good quantities of seed formed.

Environmental conditions also affect the success of pollinations, but opinions vary as to what conditions of heat, cold, and humidity are most favorable. It is said that pollen is usually more sensitive to unfavorable influences than the stigma.

Seed may be planted immediately or held until fall, depending on the attention to be given to it. Unless it can be protected from summer heat and danger of drying, it is probably safer kept in envelopes and planted in the fall.

The seed may be planted in rows in a seed bed or in pots, boxes, or other containers. A light, well-drained soil mixture is suitable, and the seed should be planted from half an inch to an inch deep. For small lots of seed, clay or plastic pots sunk in a coldframe are convenient; covering the rim of the pot reduces the danger of breakage. If separate containers are not provided for the different lots of seed, there may be some difficulty keeping the lots in order when the small bulbs are dug two or three years later. By this time they may be several inches below the surface.

The first shoots appear in early spring, and these should be protected from sudden severe drops in temperature. If a coldframe is used, it should be closed at such times. Mulching with a light material such as buckwheat hulls will help prevent heaving. The first shoots—and only one leaf appears the first year—should be kept growing as long as possible. A diluted liquid fertilizer may be given.

At the end of the second year the small bulbs are usually dug and planted in rows where they will remain until they bloom, two or more years later. Crosses from species or miniatures may be left three or more years if they are not crowded. It is advisable to replant all small bulbs without delay.

In the fourth or fifth year the first blooms will probably appear. The best ones should be marked and brief descriptions entered in the records. Any seedling bloom to be entered in a daffodil show must be given an identifying number which should be retained by the bulb or bulbs until the seedling is registered or discarded. Notes on disappointing blooms are often made also; sometimes a seedling will improve after the first blooming. After two or three years of observation it will usually be possible to discard a large proportion of the seedling bulbs, although this may mean merely transferring them to naturalized plantings or cutting rows rather than keeping them identified in nursery rows.

The amateur breeder who can exhibit his seedling blooms in daffodil shows is fortunate, whether or not the blooms win ribbons or awards. It is helpful to have the opinion of qualified judges and the reaction of the public. The breeder will remember, however, that show bench judging is based on only a single bloom; the value of the cultivar will depend also on its vigor and garden behavior.

Seedlings that are considered worthy of introduction should be registered while all the stock is still in the hands of the originator. (This term is used by the American Daffodil Society to denote the person who first blooms a seedling, regardless of who made the cross or planted the seed.) The Royal Horticultural Society, London, is International Registration Authority for narcissus, and the American Daffodil Society the American representative. (See Chap. 24.)

What are some suitable aims for the amateur breeder? When we consider that most of the development of modern daffodils has been the result of breeding carried out in climates very different from those of the original species, and different from those of most parts of the United States, it is surprising that there are so many varieties that succeed as well as they do here. Wherever the

full range of types is not equally successful the breeder has two first choices: to specialize in types that do succeed in the area, or to attempt to breed varieties that will extend the range. Thus in southern California one amateur breeder is working with the tender tazettas that have been so little used heretofore in breeding, while another is making crosses with poeticus varieties in the hope of producing one that will thrive in that hot climate. Breeding for better resistance to basal rot may seem too technical for amateurs, but this problem is not being specifically attacked at present by the trade or by government agencies; some amateurs may wish to tackle it. To some extent any breeding done where the disease is a serious problem may help.

Breeding projects for Divs. 1-3 will depend on the breeder's personal predilections, his optimism, and his available space. What are the chances of producing something distinctive and different from all the thousands of varieties already being grown in these classes? One in a thousand? Less? In certain areas the chances may be better; reversed bicolors, pinks, yellow-reds with strong color in the perianth, for instance. Even in these areas the amateur will be in direct competition with commercial growers who are working on a large scale, so important in making objective evaluations of new cultivars.

There are better opportunities in Divs. 4-8, where special genetic factors have limited efforts in the past. The recent interest in double daffodils has been spurred by the discovery of a fertile variety, Falaise. Some other double varieties that have been reported to set seed are: Gay Time, Mrs. Wm. Copeland, Pink Chiffon, Riotous, Snowball, and Windblown. The Thompson Prize has been established in the American Daffodil Society to encourage the production of a new fragrant double white daffodil similar to *N. poeticus* 'Flore Pleno' (commonly known as Albus Plenus Odoratus), but blooming more freely.

Triandrus hybrids have generally been considered completely sterile, but several amateur growers have reported occasional seed, usually open-pollinated. One seedling from Thalia × Evening produced seed which give promise of third-generation triandrus hybrids. Several years ago Grant Mitsch introduced Honey Bells as a fertile 5*a*, and more recently Harmony Bells and Silver Bells have been added to the list of available parents in this class. Much greater diversity in triandrus hybrids seems to be in the offing, and amateur breeders working with these cultivars will not be far behind the originators of the cultivars. Backcrosses with forms of *N. triandrus* might produce strains having the distinctive charm of the wild forms but greater vigor and permanence. Crosses with varieties in Divs. 1-3 will be expected to show the triandrus influence more subtly. Combinations with *N. cyclamineus,* with *N. jonquilla* or related species, or with poeticus cultivars could produce welcome variations in form and color. Although the new fertile triandrus hybrids are of particular interest now, crosses are still being made between *N. triandrus* forms, especially *triandrus concolor* and *triandrus loiseleurii,* and standard or miniature cultivars. Pink or red cups would be very welcome.

Until the early 1940's there was little variation in cyclamineus hybrids, and little interest in them. A single cross made by an amateur changed all this. In 1936 Cyril F. Coleman crossed Mitylene, a pale 2*b*, and *N. cyclamineus.* When Charity May, Jenny, and Dove Wings, progeny of this cross, appeared they were greeted with wonder and delight, and a new era began for cyclamineus hybrids. This cross inspired not only others with relatively short-cupped varieties in pale colors, but crosses with the brightest of yellow-red varieties. The new introductions in turn have been used as parents, bringing further variation in form and color, until the danger now is that the distinctive characteristics of the species *N. cyclamineus* may be lost.

The 6*b* Beryl was for many years the only cultivar with cup short enough to qualify it for that classification. Crosses

between Beryl and short-cupped or poeticus varieties have been made, but there is room for more.

Jonquil hybrids appear to be as prone to sterility as triandrus hybrids, but even here a new day seems to be dawning. Several years ago Grant Mitsch discovered a seed pod on one of his seedling jonquil hybrids. This cultivar, since named Quick Step, has continued to produce seed and some of its progeny, too, have proved fertile, so that before long we may see cultivars combining in various ways the characteristics of *jonquilla* and *triandrus* or *cyclamineus*, combinations heretofore possible only in first-generation crosses between the species themselves. Meanwhile amateurs continue to watch their jonquil hybrids for open-pollinated seed, and to make pollinations in hope of the rare seed. Kidling and Trevithian have each produced seed in different areas in recent years, and seedlings having Chérie and White Wedgwood as pollen parents have produced blooms in which characteristics of the pollen parents can be recognized. (With such unusual crosses the breeder can never feel entirely sure until the bloom appears.)

The species *N. jonquilla* continues to be used in breeding first generation jonquil hybrids, with reverse bicolors, pinks, and red-cups perhaps the most hoped-for results. Fragrance is an extra dividend to be desired.

In Div. 8 also recent developments have changed the situation. The poetaz variety Matador, introduced by Oregon Bulb Farms, appears to be fully fertile, and some promising crosses are being made with it. Perhaps a golden version of the popular triandrus-tazetta variety Silver Chimes will result. Aspasia, Early Perfection, Elvira, and Orange Wonder have been reported to give open-pollinated seed for an amateur grower in southern Illinois; as with other usually sterile types, any seed collected is of interest.

In the South and southern California tender tazetta varieties and forms may be used in new combinations.

The principal use of poeticus varieties in breeding nowadays seems to be in crosses with varieties of other divisions, especially Divs. 3 and 4. New poeticus varieties that would be suitable for warmer climates are to be desired, as are more early-blooming varieties. Combinations of poeticus characteristics and those of triandrus, cyclamineus, and jonquilla have not been very extensively exploited.

In Div. 10 *N. cyclamineus, N. jonquilla,* and *N. triandrus* in its various forms are the wild forms most often used in breeding, except for the production of miniature varieties. All of these combine easily with tetraploid varieties of Divs. 1-3, and usually produce triploid varieties that are sturdy and pleasing, even if not distinctive enough for registration. Crosses using the small members of the jonquil group, such as *N. calcicola* and *N. watieri,* are less dependable, often producing seed with abortive embryos.

Several amateurs have reported crosses with *N. bulbocodium* forms, or crosses with split-corona varieties, but it is too early to know whether there will be much interest in these unconventional types.

The breeding of miniature varieties is discussed in Chapter 23, written by Alec Gray, who has been responsible for most of the miniature varieties now available. This area is particularly suitable for amateurs to work in, as the smaller bulbs do not lend themselves well to the mechanized operations of large-scale growers. Breeders interested in the smaller daffodils will wish to take advantage of every opportunity to use any of the smaller species in combination with diploid varieties of small to medium size, or with each other. The progeny will not be as variable as that of tetraploid varieties, but there are still possibilities of producing small flowers of distinctive form and color. Those not distinctive enough to merit registration may still be welcome to add diversity to the garden planting or the desk-top arrangement. They lengthen the daffodil season, too, as they include very early and very late types.

—23— Tomorrow's Miniature Daffodils

It seems almost presumptuous for someone in England to write on miniature daffodils in an American publication, for there can be no shadow of doubt the widespread enthusiasm for small daffodils in the United States puts to shame the efforts of the small band of British growers who are really interested in them. The great amount of work put in by the committee of the American Daffodil Society embodied in its report on miniature daffodils in February, 1963, is proof of this. If further proof were needed, there is the founding of the Roberta C. Watrous Award; we have nothing whatever resembling it in England.

I am presuming to write these notes, however, because I believe I am right in assuming that some of us over here have been growing and, in particular, hybridizing miniature daffodils rather longer than anyone in the States, so that in the course of time we may have gathered some little store of knowledge on the subject which we can, perhaps, pass on to our American friends to their advantage.

I believe it is true that most of the small daffodils thrive better in America than in England. This is really not surprising, since all of them are either species or hybrids not more than two generations removed from the wild, and, therefore, climatic conditions in the United States are much nearer those of their native lands than the humid, constantly changing English weather. In these circumstances, there is probably little that the American grower can learn from us regarding cultural methods. It will, I think, be more useful if I discuss where, in my opinion, advances in the production of new varieties are most needed and most likely to be achieved.

Let us take the bulbocodiums first. These are a delightful, justly loved group, but they present considerable room for improvement. Firstly, they are the least hardy section, and, secondly, several sorts are by no means free flowering under ordinary conditions. I think that little advance is likely to be made by crossing with other groups; with one or two exceptions everything that has been raised by outcrossing with other groups seems inferior in beauty to the species. I think that it is only by intercrossing within the group that we are likely to make progress.

Although not plentiful nor easily obtained, there are several vigorous and free-flowering forms of deep yellow bulbocodiums in cultivation—some from high elevations in the Atlas Mts.—which are much superior to the ordinary commercial strains of *conspicuus* (*N. bulbocodium* subsp. *vulgaris* var. *conspicuus*), *obesus* (*N. b.* subsp. *obesus*), and others. What is needed most in the bulbocodiums at the moment are some really vigorous white ones; all the present sorts lack both hardiness and constitution, although they are some of the most beautiful of all daffodils. There would seem to be no reason why, if enough crosses were made between the most vigorous and free-flowering yellow sorts and white ones, such as *foliosus* (*N. cantabricus* subsp. *cantabricus* var. *foliosus*) and *monophyllus* (*N. c.* subsp. *monophyllus*), white forms with good constitutions should not turn up. Even if they did not appear in the F_1 generation, they might well appear if these were selfed or backcrossed.

Bicolor bulbocodiums of good contrast are also very desirable and can certainly be produced. I have raised some in the past, but have lost them, alas!

Small 1*a*'s (yellow trumpets) need not concern us very long. There are not many in commerce at the moment—although there are more than the A.D.S. approved list indicates—but they are the easiest group to work with, largely because they are all entirely fertile and intercrossing can go on indefinitely. The best forms of *N. asturiensis* must be the basic material. By crossing these with some of the larger trumpets, either species or hybrids, and backcrossing if the progeny is too large, many lovely little plants can be produced in a few generations without difficulty. I, myself, have many exquisite little yellow trumpets far in advance of anything now available. It is just a question of propagation, for, on the whole, they do not increase very rapidly.

With bicolor trumpets, the problem is the same with the small daffodils as with the large ones: to obtain good contrast. In the approved list only three are mentioned: Bambi, a poor thing apart from its value for naturalizing; Rockery Beauty, which may thrive in America but seems to have died out here; and Little Beauty. This last is a charming flower, but there is certainly room for more than one good 1*b*. They can be produced; I have one or two with better contrast than Little Beauty, but I have not managed to breed a smaller one. They are not easy to breed; crossing yellow and white trumpets generally results in a whole series of seedlings with colors right through from one parent to the other, including many charming pale shades, but very seldom any bicolors.

The situation regarding 1*c*'s is peculiar. The A.D.S. list gives only five, all six or more inches tall except Snug, and outside my own collection there is none smaller in this country as far as I know. There are, I think, two reasons for this almost complete absence of really small white trumpets; one is that few people have worked with them; the other is that they are very slow to increase. They are not at all hard to produce; I have many tiny white trumpets among my seedlings, but I never seem to be able to work up any considerable stock of them.

When I first became interested in daffodils (I hate to remember how many years ago!), the large white trumpets were all considered to have poor constitutions; today this has been overcome and many are as robust as their yellow brothers. It seems, however, that the small 1*c*'s are still more or less where the big ones were forty or more years ago.

The basic material of my small white trumpets has been the pale forms of *asturiensis,* Rockery White, and Rockery Gem. This last is a very sturdy plant, raised in Holland, of good form and substance, but just too large here to be considered a miniature.

Reversed dwarf trumpets are well within the range of the breeder; I have raised several, but so far they all have one fatal failing. In the large 1*d*'s, such as Spellbinder, the flower opens yellow and the reversed coloring does not appear until the bloom matures. With my flowers, the opposite happens: they open strongly reversed, but the color of the perianth fades as the bloom ages until the reversed effect disappears altogether.

Divs. 2 and 3 present the breeders of dwarf daffodils with their greatest challenges: the production of small red and yellow or red and white cultivars. As things are at present, if we want flowers with red in the cup that can be classed as miniatures—or what we breeders like to call red—we have to go to the cyclamineus or jonquil hybrids. For my part, I have only raised one cultivar with red or orange in the cup which can strictly be regarded as a 2*a*; this was Marionette which I have since lost but is still grown in America, I understand. In this plant, the orange red was confined to the rim of the corona, and, although the plant was very dwarf, the flowers were inclined to be on the large side.

Of course, the trouble is that if we cross ordinary red-cupped flowers with small self-yellow trumpets, we are halving the amount of red we are passing on to the offspring; the results almost always seem to be self-yellow or pale flowers, although sometimes one gets pale orange in the corona. It may

well be that we shall have to go right back to first crosses, to where breeders of the large flowers started a hundred years ago or more. By this I mean that we may have to use *poetarum* (*N. poeticus* subsp. *radiiflorus* var. *poetarum*), or something similar to get our color started. I have never used *poetarum*; I really have no idea why! The first results may very well be some miniature Will Scarletts, but at least that would be a beginning.

With the doubles, Div. 4, there is certainly virgin ground to be broken. What few doubles exist are all of unknown or chance origin. All lovers of daffodils know the spectacular results which have been achieved during the last few years, by the Richardsons, in particular, in breeding large doubles. There seems to be no reason at all why these beautiful flowers should not be scaled down to miniature proportions by using some of the very small species or hybrids for one parent. What more charming little flower is there than Eystettensis (Syn. *capax plenus*)? The *Classified List* is probably right in suggesting that it is a cross of *N. triandrus* × Telamonius Plenus (syn. Van Sion) or something similar. All it needs to be the perfect little daffodil is a better constitution.

In Divs. 5, 6, and 7 we can, I think, consider 5 and 7 together, since the problems facing the breeder are similar, while in Div. 6 the situation is quite different.

In Divs. 5 and 7, the problem is sterility in the F_1 generation; until this is overcome little real progress can be made; all that can be done is to keep making first crosses between the species and desirable new cultivars in other groups as they appear. I am quite sure that fertile F_1 triandrus and jonquil hybrids do occur occasionally in this country, but it happens so rarely that it can be ignored for all practical purposes. With different climatic conditions, perhaps they occur more frequently in America. I do not know, but if they do, then the breeder there may be in a position to make advances denied us over here. In this direction, it may well be that the scientist may step in and take a hand by devising some technique for producing fertile F_1 plants.

With Div. 6, things are quite different, since all cyclamineus and trumpet crosses are fertile. In addition, fertile pollen, and sometimes seed, can be obtained from tazetta or poeticus crosses; here again, more often in America than in England, I understand. It also seems, for reasons that I cannot explain, that it is easier to get orange, or orange red, into small cyclamineus hybrids; Beryl is an example. But perhaps Beryl may illustrate the point I made when talking about Divs. 2 and 3, that we may have to go back to the beginning; Beryl is *cyclamineus* × Chaucer, and Chaucer was an interspecies cross.

Cyclataz (*cyclamineus* × Soleil d'Or) is another red-cupped hybrid. In both these cases it is very interesting to note that there has been no watering down of the color; it is as deep in the hybrids as in the parents. On the one occasion when I had seed from Cyclataz (it selfed itself), two of the three seedlings which resulted had cups as deep in hue as Soleil d'Or. One of these seedlings, Tête-a-Tête, gives fertile pollen, but I have not yet flowered any of its progeny.

The problems involved in breeding plants—and animals also, I suppose—go much deeper than things like chromosome counts. I have never come across any explanation of the fact that whereas crosses between trumpet and triandrus species, both having the basic daffodil chromosome number of 14, never, or almost never, produce fertile offspring, whereas *cyclamineus* with 14, when crossed with some tazettas with very odd numbers, occasionally does. The extreme example of this inconsistency is *N.* × *dubius* (*juncifolius* × *tazetta*), with 50 chromosomes, which is very fertile both as regards pollen and seed and so are its offspring.

I can see no reason why, in America in particular, Beryl, Cyclataz, and my seedlings Tête-a-Tête and Jumblie, crossed with the dwarfer trumpets, etc., should not produce some very small, nicely colored flowers.

So far as I know, almost nothing has

been done to breed small flowers belonging to Div. 8; I mean, of course, miniature Poetaz. I know there are five in the American Daffodil Society list of miniatures, four of which are of my own raising. Halingy and Hors d'Oeuvre are, it is true, Poetaz in form, but they are really poor flowers as far as form goes; their only real virtue is their extreme earliness. Although Angie and Shrew are classified as Div. 8, few could guess from their appearance to which division they belonged. For various reasons, I have dwelt with Cyclataz under Div. 6.

There seems to me, however, nothing serious in the way of breeding some really typical dwarf Poetaz. The basic parent would have to be, as far as I can see, either Canaliculatus or × *dubius*, as these are the only very small tazettas. *N.* × *dubius* has been used to some extent and is the parent of Angie, Pango, Raindrop, and Icicle, but these last two are in Div. 5. I think that the real line of advance lies in crossing × *dubius* and Canaliculatus (especially the latter) with the best large tazettas and Poetaz. I feel certain that many of the Poetaz produce viable pollen. The weak point of Canaliculatus, at least in most places in England, is its addiction to increasing at an enormous rate but failing to produce any flowers. This trait may, however, disappear in the F_1 or F_2 generations. It is a line of breeding well worth following.

This brings me almost to the end of my story. Unless, which is quite unlikely, some wild dwarf forms of *N. poeticus* turn up, or, which is not much more likely, one of the garden poets mutates and produces a miniature form, nothing at all can be done with Div. 9.

There is, I believe, little more that can be done with Div. 11, save only the bulbocodiums as discussed at the beginning of this chapter. Almost all species crosses must, by this time, have been made many times over. Of course, since the number of possible combinations of genes between any two species is very great—it possibly runs into the millions—better forms than those which now exist may well appear from time to time, but I feel certain it is hopeless to expect any really new breaks; we know just about the sort of plants to expect from any interspecies cross.

I hope, however, that without having to rely in any way on hybrids between species, this commentary will have suggested the endless possibilities which exist for the production of new and ever more beautiful miniature daffodils. I also hope with all my heart that there are many daffodil lovers in America who will devote their talents to this most fascinating pursuit.

PLATE 55 ALEC GRAY

MARY PLUMSTEAD
Triandrus Hybrid (Div. 5a)

—24— Choosing and Registering Daffodil Names

The rules governing the naming of daffodils and the procedure for the registration of the names arises out of the International Code of Nomenclature for Cultivated Plants. The Code in substantially its present form was prepared by the International Commission for Nomenclature of Cultivated Plants, an agency of the International Union of Biological Sciences (a UNESCO unit). The Code was endorsed for horticulture by the 15th International Horticultural Congress at Nice, France in 1958.

The Code contemplates the designation by the International Horticultural Congress of international registration authorities for various genera of ornamental plants. That Congress in 1955 appointed the Royal Horticultural Society, Great Britain, as International Registration Authority for narcissus (daffodils). The Society is thus responsible for accepting new daffodil names and for maintaining permanent registration files for those names.

The Royal Horticultural Society first published a *Classified List of Daffodil Names* in 1908, and numerous revised editions at intervals thereafter. Following the Society's appointment as International Registration Authority for narcissus, it changed the name of the publication in 1958 to the *Classified List and International Register of Daffodil Names* and revised it in 1961 and 1965. The *Register* is kept up to date by publishing newly registered names in the *Daffodil and Tulip Year Book,* published annually by the Society.

REGISTRATION PROCEDURES

The American Daffodil Society registers daffodil names, and the new names so registered appear from time to time in *The Daffodil Journal* published by the Society. The registrar is Mrs. Kenneth B. Anderson, 4810 Palm Drive, La Canada, California, 91011. Application is made on a form obtained from the registrar. The application requires information as to the proposed name, classification of the flower in accordance with the Revised System for the Classification of Daffodils, name of raiser, year first flowered, diameter of flower and of corona, length of corona and of perianth segment, height of flower stem, season of bloom (as early, midseason, or late), color of perianth and of corona, the existing named daffodil variety that the plant and flower most nearly resembles and differences between the two, other outstanding characteristics, and parentage. Registration fee is $1.00.

Under the International Code of Nomenclature for Cultivated Plants, it is required that when an international authority and a national authority are both registering names for the same genus, the registration of a name by the national authority is subject to confirmation by the international authority. Therefore, the American Daffodil Society obtains this confirmation from the Royal Horticultural Society before acceptance of a name for registration. United States breeders and introducers will find it more convenient to submit new daffodil names for registration through the registrar of the American Daffodil Society, since they will be saved the trouble of confirming the proposed names. The $1.00 fee includes the charge for registration by both societies.

GUIDES IN CHOOSING NAMES

The International Code of Nomenclature for Cultivated Plants does not

legally oblige a breeder or introducer to conform to the Code in choosing a daffodil name, any more than it creates a legal obligation for him to register that name. It is in the interests of breeders and introducers and of gardeners and horticulturists, however, that the Code be observed and thereby confusion, mistakes, and deceit minimized.

The following guides are pertinent in choosing a daffodil name:

1. New daffodils should be introduced only as clones, susceptible of vegetative propagation. A garden form of a wild species, or a particular seedling bulb from a cross of wild species or of garden varieties, or a sport of a wild species or of a garden variety may be selected as the origin of the clone to be distributed and vegetatively propagated, as by bulb division. The originally selected plant and the aggregate of the plants descended from it by vegetative (asexual) propagation constitute the "clone."

2. The plant selected for propagation as a clone and naming should be clearly superior to varieties in existence. Seedlings not superior are best destroyed and certainly not named. If amateurs go in for hybridizing and especially for selecting and naming new plants, it is important that they be familiar with the many botanical species, varieties, and forms, and especially the garden clones now in cultivation. Too often amateurs have merely gone back over the route of older breeders. Too often a certain simple wonder beclouds their judgment in the face of their own new seedlings. Daffodils are selected, named, and introduced that are inferior or at most not really an advance on those at hand. Real novelties are not as easily come by as we might expect, nor are amateur hybridizers and introducers generally as knowledgeable and discriminating as we might hope.

3. Where the selection to be named is a seedling from a cross and indication of parentage is desirable, it may be done by use of a formula as: N. White Star (*poeticus* × Beersheba). In preferred American usage the female parent is written first in such a formula.

4. A daffodil already named should not be renamed. Renaming occasionally happens because of the difficulty with some foreign name, or because of some commercial advantage to be obtained from a new name.

5. The name of a new daffodil should be a common (fancy) name in English if the raiser or introducer is one of the English-speaking peoples. It should not be a Latin name or one in Latinized form. The name should begin with a capital letter and in print be in Roman type.

6. Do not duplicate a name already in the *Classified List and International Register of Daffodil Names* or in the *Year Book* supplements thereto. To avoid confusion it is well also not to duplicate names of daffodils that appeared in earlier editions of the *Classified List*, as that for 1954. In preparing subsequent editions of the *Classified List* the British omitted many earlier names as being those of varieties no longer in existence. However, a plant no longer in existence in Great Britain or Holland may well turn up in some United States, Australian, or New Zealand garden. Further, it is well to avoid duplicating a name that, while it has never appeared in the *Classified List* at all because of oversight in compiling the *Classified List* or failure to register, is nevertheless in existence and is a validly published name. "Validly published" means simply that the name has previously been published in some standard periodical, such as *The Daffodil Journal*, or in a catalog or check list mechanically printed, dated, and distributed without restriction.

7. Single-word names are best, two-word names should be the outside limit. Wherever possible, avoid A, The, initials, and titles from Mr. and Mrs. to Dr. and President; likewise, the names of states or countries alone, exaggerations, and similarities likely to cause confusion, as Ladybird and Lady Bird, or Ares, Aries, and Ariel.

8. No name of a living person should be used without that person's permission.

—25— Exhibiting and Judging Daffodils

The daffodil is an ideal flower for exhibition purposes and shows featuring them, either alone or with other spring flowers, are held wherever daffodils are grown. In the United States, the showing of daffodils is encouraged by the American Daffodil Society and shows which meet certain standards are approved by the Society and thereby become eligible to offer certain awards. Approved shows are judged by teams of judges who have been accredited by the Society upon satisfactory completion of a series of three all-day training and practice sessions, proof of growing not less than 100 varieties of daffodils, and after having gained certain experience as an exhibitor and as a student judge working in association with accredited judges.

Daffodil shows can be large or small, complex or simple, but the mechanics of holding one is beyond the purpose of this Handbook. However, selection of flowers for exhibition and the basis upon which they will be scored by the judges relate to the flower itself and are within our scope. The special culture of daffodils for exhibition purposes is described in Chapter 2. Gardeners who become interested in showing their flowers will find membership in the American Daffodil Society desirable, and it is required of all accredited judges.

CHARACTERISTICS

When choosing blooms for the show table, the grower should keep in mind that not all varieties have the combination of characteristics which makes the blooms suitable for the show table. Some varieties may be good growers and produce an abundance of bloom, but they may lack one or more of the qualities which make the judges take a second look.

An exhibition bloom should be shown at the most perfect stage of its possible beauty. The qualities which combine to make a daffodil of show caliber are good form, color, substance, texture, size, stem, condition, and pose. If any one of these qualities is poor, the full beauty of the flower is not achieved.

Form and condition are the two most important qualities. What might be considered good form for a certain division might be objectionable when found in members of another division; therefore, it is well to study the proper forms of all eleven divisions as classified by the Royal Horticultural Society. The drooping form of a triandrus hybrid or the reflexed perianth of the cyclamineus hybrid would be objectionable in trumpet or large-cupped varieties, depending on the amount of the characteristic present. Good form for an exhibition daffodil is that which most nearly approaches perfection for the division to which the bloom belongs. Regardless of division, nicks and mitten thumbs in the perianth segments and cupping of petals and sepals all affect form adversely.

Color depends on variety. Good color is one which is clear, bright, and glistening; muddy color and streaking are faults. In bicolor varieties the combination should be pleasing. As certain varieties develop, they reach a stage when the color is at that perfect phase at which the bloom will have all its possible beauty. This is the ideal stage for exhibition. Trousseau and the reversed bicolors are examples of varieties where color is critical and specimens should be shown only at the ideal stage.

Substance and texture are closely related. Substance is best described as thickness of the floral parts while texture may be likened to a fabric, coarse

or fine, rough or smooth, ribbed or crepe-like. Loss of substance usually affects texture. Ideal substance and texture might be described as perianth and corona crisp, smooth, and thick, with a sheen.

Size of bloom depends on variety. If size is slightly large for the variety, one usually attributes it to good culture, but if size is extra large, form may be affected and the bloom may appear floppy and coarse.

Pose should be typical for the division. If perfect pose for the division is a bloom held at right angle to the stem or slightly higher, then one which droops its head and fails to "look you in the eye" is somewhat less than in its perfect phase. A neck which is too long may cause a drooping pose, and a neck which is too short may produce an upright pose.

The overall condition of the exhibition daffodil should be as near perfect as possible. Mud, dirt, or rain-streaking should be removed with a soft brush wet with detergent in water and dried with cotton. Bruises should be avoided by careful handling.

The best method to use when choosing a daffodil for exhibition is as follows: first, know what is perfection for the variety, then mentally measure each characteristic against perfection. Unless the bloom has several good qualities, it might be better to leave it for decoration in the garden. Many fine garden varieties when at their best do not have enough good qualities to rate on the show table.

JUDGING

Exhibition daffodils are judged against perfection for the variety and not against one another. It is most important that judges know varieties in order to establish a mental picture of perfection for a particular variety. No judge can properly evaluate material which he has neither grown nor studied.

A good judge does not allow personal preference to influence a decision. A judge who does not grow doubles or split-corona daffodils because he dislikes them, has to put aside this feeling at the show bench and be as conscientious when judging one division as another. Miniatures should receive the same careful consideration as large blooms.

CONDITION. In judging exhibition daffodils, the scale of points adopted by the American Daffodil Society allows 20 points for condition.

Qualities which are considered under condition are age of bloom, which should be neither too young nor too old, and absence of minor blemishes, such as rain spots, sunburn, dirty marks, nicks, and splits in the crown or perianth. In close competition some of the fine points which may be considered are the condition of pollen sacs (anthers) and stigma, size of ovary, and condition and color of the sheath. The anthers should be creamy yellow with a fresh appearance. If the pollen is gone and the sacs are tan or brown, the flower is aging. The stigma should glisten with a small amount of moisture. If dry and shriveled the bloom is past its prime. The ovary, the immature seed vessel which is found directly behind the bloom, should not be unduly swollen. The sheath should be present and should be light brown.

FORM. Form of bloom receives 20 points. The judges will expect the flower to have six even overlapping perianth segments and the inner whorl or petals should overlap the outer whorl or sepals in a regular manner. The cup or crown should be well balanced in proportion to the perianth and the segments should be flat, although a slight incurve or reflexing will not necessarily be penalized. A very slight incurve of petals is not a serious fault in certain varieties. When the incurve is so pronounced that the petals take on a definitely hooded effect, however, then form will be penalized. Some varieties normally have a slight reflexing of petals. *N. cyclamineus* and its hybrids would be deficient in form without this characteristic. The petals may be round, heart-shaped, or pointed, and in certain varieties slightly wavy, but the waviness should not be exaggerated. The cup or crown may be serrated, flanged, or frilled, but must not be ragged or split

except in a few cases of what are now known as the split-corona daffodils, such as Evolution. This is another illustration of the need for judges to know varietal characteristics.

Texture and Substance. Texture is the smoothness or roughness of the tissue structure of the bloom. Crepiness and ribbing are faults. Texture and substance receive 15 points. Substance is the firmness and thickness of the tissue structure. The first sign of loss of substance will be noted by the judges on the edges and tips of petals and will be characterized by thinness and loss of sheen and translucency. This is followed by browning of the edges of both the segments and corona. Loss of substance is often confused with condition, because the lasting quality of the flower is closely related to substance. Blooms with good substance keep well both on the plant and as cut flowers. The presence of sheen denotes fineness of both substance and texture.

Color. Color is given 15 points. The judges will not look with favor on streaking or muddiness; the color should be rich and pure. Some varieties are characterized by peculiar color qualities and the number is rapidly growing. Here again judges are expected to know perfection for these varieties, such as Jezebel and Rouge. Because vivid colors may not be sunproof, improper handling may result in washed-out coloring. Soil and weather also influence color. Bicolor varieties should have definite color contrast; there should be no doubt about the classification of a bicolor. Although some shading or staining of a deeper color is permissible at the base of the perianth, staining is not a good point in an exhibition flower as a rule, although Effective is a notable exception. It is expected that white trumpets will be white, although a hint of green at the base of the segments is tolerated and preferable to yellow.

Pose. The pose of a daffodil, or the angle at which the bloom is attached to the stem, receives 10 points. The pose varies with certain divisions. In the first four divisions with a few exceptions and in Div. 9 the bloom should be nearly at right angle to the stem and therefore vertical when viewed from its own level. Some authorities believe there should be some latitude in the angle of the flower to the stem and that a slight tilt either up or down is not objectionable. The neck should not be so long that it allows the flower head to droop, and it is possible for the neck to be so short that it produces a stiff appearance. Divs. 5, 6, 7, and 8 each have their characteristic pose which a competent judge will recognize. This question is becoming more important and complex each year due to inter-divisional hybridization.

Stem. The stem of a show flower must be strong enough to support the weight of the flower head, long enough to be in proportion to the size of the flower, straight, and not unduly thick. It should be green throughout; a blanched end indicates the flower was cut below the ground level. Such an area will not absorb water well after the flower has been cut and the life of the flower is thereby shortened. The official scale allows 10 points for stem.

Size. Another 10 points are given a bloom for proper size, according to variety. Other qualities being equal, the larger flower may expect the judges' nod, since it indicates better culture.

Other Factors. There are other factors which may be considered when daffodils are judged and which are not included in the official scale of points, but which experienced judges will have in mind when the competition is close. Balance and position of anthers fall into this category. There may also be added value in good balance between perianth and cup. This equipoise is difficult to define, since perfect balance may be found in trumpets as well as small cups. The length of the petals, width, shape, and general appearance must be considered in deciding whether there is any lack of grace in a bloom. Every part of a bloom should be in proportion to every other part. If an imaginary line drawn along the stem through the face of the bloom coincides with the midrib and tip of a major or minor petal at both top and bottom of the bloom, then the flower has "axis balance." This is a

fine point, but when judging becomes close, such minutiae are considered.

There is one more quality which is important on the show bench and that is the elusive virtue of refinement or good breeding. A survey of the blue ribbon winners at any show will demonstrate this point more clearly than words.

Judging by Container

Henry Dyer of Christchurch relates how he was invited to judge at a small show in the country and on arrival found that the district had just started out on its first daffodil show and the blooms were in all manner of containers. When he came to the yellow trumpets, there were two entries and Henry could not tell which was the worst. They were the same variety and both were slug-eaten and had evidently been entered by someone who "wanted to help the show along." One was staged in a beer bottle and the other in a whiskey bottle. In the judge's words: "I gave it to the one in the whiskey bottle."

Philip Phillips
Otorohaga, New Zealand

APPENDIX A
DAFFODIL LITERATURE

The list that follows is not intended to be comprehensive. It includes books and serial publications devoted entirely or in large part to daffodils as garden plants; some books, chiefly recent, in which there are chapters or sections with significant treatment of daffodils; and a few reference books. Students of daffodil history and nomenclature will find guidance in the bibliographies included in some of the general works on daffodils, as well as in the "References to Further Literature."

Publications of Societies

AMERICAN DAFFODIL SOCIETY.

THE AMERICAN DAFFODIL YEARBOOK. Arlington, Va. (etc.), 1956-1964. illus. Issued 1956, 1957-58, and annually from 1959 to 1964.
Includes the annual symposium on varieties and a wide range of articles of interest to members.

THE DAFFODIL DATA BANK OF THE AMERICAN DAFFODIL SOCIETY.
Des Moines, Iowa, 1965. 103 p.
Lists more than 3,000 cultivars and many species and wild forms, giving available data on parent varieties, breeder, color, season, height, chromosome count, fertility, and date of registration, as assembled by Dr. Tom D. Throckmorton and recorded in the Daffodil Data Bank (electric computer), at The Computer Center, The Iowa Methodist Hospital, Des Moines, Iowa.

THE DAFFODIL JOURNAL, vol. 1, no. 1, Sept. 1964— (current).
A quarterly publication for members of the Society.

AMERICAN HORTICULTURAL SOCIETY

THE AMERICAN DAFFODIL YEAR BOOK. Washington, D. C., 1935-1938 and 1942. illus.
These year books, edited by B. Y. Morrison, include a wealth of material relating to daffodil growing and daffodil personalities in all sections of the United States during the period covered. Many of the illustrations are full-size varietal portraits. The 1942 year book entitled The Daffodil Year Book was published in cooperation with the Royal Horticultural Society.

AMERICAN PLANT LIFE SOCIETY.

HERBERTIA, VOL. 13. NARCISSUS EDITION. Stanford, Calif., 1946. 186 p. illus.
Includes articles on Narcissus cytology, parentage records, breeding, and culture.

HERBERTIA, 1953, SECOND NARCISSUS EDITION. Arcadia, Calif. 1953. 124 p. illus.
Issued as *Plant Life*, vol. 9, no. 1, January 1953.
About half of this issue is devoted to articles on daffodil varieties, breeding, and culture, with illustrations.

PLANT LIFE, vol. 1, no. 1. Stanford, Calif., April, 1945. 26 p.
The entire issue is devoted to Narcissus.

CALIFORNIA HORTICULTURAL SOCIETY.

JOURNAL, vol. 1, no. 3. San Francisco, Calif., July, 1940.
Almost the entire issue is devoted to the proceedings of a daffodil conference held in Berkeley on March 16, 1940. Papers on various aspects of daffodil culture and breeding under California conditions were presented.

THE ROYAL HORTICULTURAL SOCIETY.

THE DAFFODIL YEAR BOOK. London, 1913-1940. illus., some col.

THE DAFFODIL AND TULIP YEAR BOOK. London, 1946- (current) illus., some col.
Issued annually 1913-1915, 1933-1940, 1946-date.
Articles both scientific and personal, illustrations, some in color, show reports from England, America, Australia, and New Zealand, and records of daffodil registrations and awards constitute a continuing history of daffodils and daffodil growers in the English-speaking world.

CLASSIFIED LIST AND INTERNATIONAL REGISTER OF DAFFODIL NAMES. London, 1965.
This is the 19th edition of the Society's compilation of daffodil names, with official classifications, names of breeders and introducers, dates of registration, and record of major British and Dutch awards. In addition to cultivar names the list includes names of species, subspecies and their varieties, and natural hybrids, followed by the authorities for the names.
Editions of 1908-1955 had title: Classified list of daffodil names.

WASHINGTON DAFFODIL SOCIETY

YEARBOOK, 1955. Washington, D. C., 1955. 36 p.
This was distributed also as a publication of the American Daffodil Society.

Some Books and Pamphlets on Daffodils.

BARR, PETER. YE NARCISSUS OR DAFFODYL FLOWRE, AND HYS ROOTS, WITH HYS HISTORIE AND CULTURE, &C, &C., WITH A COMPLETE LIST OF ALL THE KINDES GROWN IN ENGLISHE GARDINS. Embellished with manie woodcuts. London, 1884. 48 p. illus.

This small booklet may be considered a summary of daffodil knowledge in England at the time of The Royal Horticultural Society Daffodil Conference in 1884. The list of varieties (p. 33-48) was compiled from the literature as well as from living plants, and includes numerous names not identified with living plants.

BOURNE, S. E. THE BOOK OF THE DAFFODIL. London, 1903. 112 p. illus. (Handbooks of practical gardening XVI)

"The book has grown out of a paper on 'The cultivation of the Narcissus in gardens' read before The Royal Horticultural Society in the year 1900."

BOWLES, E. A. A HANDBOOK OF NARCISSUS. London, 1934. 248 p. illus.

"This book represents an attempt to collect information scattered in the works of earlier writers and to present it in a handy form, correlated with observations made on wild hillsides, in gardens and museums, and at flower shows. It embodies the experience gained during over thirty years' work for The Royal Horticultural Society and more than forty years as an active gardener.

"It is intended for those of the garden-loving public who like to know something of the botanical relationships and geographical distribution of the wild species, as well as for those who grow the choice garden-raised varieties for the sake of their beauty."—Preface.

The 26 plates are from drawings by the author.

BRUMBACH, WILLIAM C. THE ROMANCE OF DAFFODILS. New York, 1959. 47 p.

A personal account of the search for old varieties, chiefly in Virginia and farther south.

BURBIDGE, F. W. THE NARCISSUS: ITS HISTORY AND CULTURE . . . TO WHICH IS ADDED . . . A SCIENTIFIC REVIEW OF THE ENTIRE GENUS, BY J. G. BAKER. London, 1875. 48 col. pl.

The 48 hand-colored plates of Narcissus species and varieties are an outstanding feature of this book.

"Select descriptive list of authors, works of reference, and illustrated periodicals, containing valuable information and figures of the species of *Narcissus*": p. 89-91.

CALVERT, ALBERT F. DAFFODIL GROWING FOR PLEASURE AND PROFIT. London, 1929. 412 p. col. front., 236 plates.

This book covers many phases of daffodil culture. Included are chapters by many of the leading daffodil-growing personalities of the day, and an unusually full treatment of commercial aspects of daffodil growing. The plates illustrate a wide range of varieties.

CARTWRIGHT & GOODWIN. THE LATEST HOBBY. HOW TO RAISE DAFFODILS FROM SEED. Kidderminster, 1908? 60 p. illus.

Practical suggestions on methods and choice of varieties for breeding.

COLEMAN, CYRIL F. Hardy bulbs, vol. 2: DAFFODILS, TULIPS, AND HYACINTHS. Prepared in conjunction with The Royal Horticultural Society. London, 1964. 220 p. illus. (Penguin handbook 109)

Pages 13-147 and 92 illustrations are devoted to daffodils.
The author is a vice-chairman of The Royal Horticultural Society Narcissus and Tulip Committee, and a successful daffodil breeder and exhibitor.

GRAY, ALEC. MINIATURE DAFFODILS. London, 1955. 57 p. illus.

"The aims of this book are two-fold: firstly to try to give information on the growing of dwarf daffodils to those interested, and, secondly, to enable those who cannot attend shows, etc., where they can see the flowers for themselves, to select those which appeal to them and are most suitable for their purposes."—Introduction.

GRIFFITHS, DAVID. DAFFODILS. U. S. Dept. of Agriculture Circular 122. Washington, D. C., 1930 (slightly revised 1934). 73 p. illus.

Commercial daffodil culture under American conditions.

JACOB, J. DAFFODILS. London, 1910. 115 p. 8 col. pl. (Present-day gardening)

The author was secretary of the Midland Daffodil Society.

JEFFERSON-BROWN, M. J. THE DAFFODIL, ITS HISTORY, VARIETIES AND CULTIVATION. London, 1951. 264 p. illus., some in color.

In addition to the topics mentioned in the subtitle there are several special features. Appendix A gives a short summary of the cytological work of Abilio Fernandes concerning the genetic relations of members of the genus *Narcissus*. Appendix B is a list of specific names. Appendix C is a bibliography.

JEFFERSON-BROWN, M. J. DAFFODILS FOR AMATEURS. London, 1952. 96 p. illus., incl. 1 col. pl.

KIMBROUGH, W. D, AND HANCHEY, R. H. DAFFODILS FOR THE YARD. Louisiana Agricultural Experiment Station Bulletin no. 500. Oct. 1955. 16 p. illus., incl. 1 col.

Includes list of varieties tested and recommendations based on results of tests.

KIRBY, A. M. DAFFODILS, NARCISSUS, AND HOW TO GROW THEM AS HARDY PLANTS AND CUT FLOWERS, WITH A GUIDE TO THE BEST VARIETIES. New York, 1907. illus.

This was the first American book devoted to daffodils.

MATHER, JOHN C. COMMERCIAL PRODUCTION OF TULIPS AND DAFFODILS. London, 1961. 212 p. illus.

Deals with the production of forced flowers, outdoor flowers, and bulbs for market. The treatment of bulb troubles is particularly thorough.

QUINN, CAREY E. DAFFODILS, OUTDOORS AND IN. New York, 1959. 204 p. illus.

The first American book on daffodils in fifty years, this book reflects the increasing interest in daffodils and daffodil shows in various sections of this country, with emphasis on selection of varieties. Arranging and preserving daffodils are also treated.

ROSEWARNE EXPERIMENTAL HORTICULTURE STATION. NARCISSUS VARIETY TRIALS. Camborne, England, 1964. 109 p.

Data for about 700 varieties which could be of economic importance for flower and bulb production in the open. In tabular form under 17 headings deals with freedom of bloom, time of flowering, rate of bulb increase, vase life of cut flowers, measurements of foliage and flowers, and characteristics of pose, neck, and stem. Part II contains detailed description of flowers of same varieties.

Also of Interest

(Some more general books including significant treatment of daffodils).

ANDERSON, E. B. Hardy bulbs, vol. I: BULBS FOR THE OUTDOOR GARDEN EXCEPT THE LARGER HYBRIDS OF HYACINTHS, NARCISSUS, AND TULIP. Prepared in conjunction and collaboration with The Royal Horticultural Society. London, 1964. 176 p. illus. (Penguin handbook 108)

Pages 128-142 deal with *Narcissus* species and small hybrids, with 8 illustrations.

DIX, J. F. Ch. BULB GROWING FOR EVERYONE. London, 1957. 147 p. illus., col. plates.

Translated from the Dutch.

Daffodils are treated on p. 16-17 (history), 33-34 (pot culture), and 73-80 (outdoor culture). 16 popular varieties are included in color plates IV, XIII-XV.

GENDERS, ROY. MINIATURE BULBS. New York, 1963. 191 p. illus.

Originally published in England. Includes numerous references to small daffodils, and 7 illustrations from photographs.

GOULD, CHARLES J., ed. HANDBOOK ON BULB GROWING AND FORCING BULBOUS IRIS, EASTER LILIES, HYACINTHS, NARCISSUS, TULIPS. Published by the Northwest Bulb Growers Association. Mt. Vernon, Wash., 1957. 196 p. illus.

"This handbook was planned to assemble under one cover the main facts on growing, storing, and forcing of ornamental bulbs and to relate them in a manner useful for growers, dealers, forcers, and others connected with the bulb industry. The handbook is the logical outgrowth of the annual Bulb Growers' Short Courses sponsored by Washington State College, Northwest Bulb Growers Association, and the Washington State Dept. of Agriculture. . . . The authors are all specialists in their fields.

The section on narcissus, p. 99-138, includes chapters on culture, weed control, forcing, and various diseases and insects.

Grey, Charles H. Hardy Bulbs. London, 1937-38. 3 v. illus.

Narcissus: v. 2, p. 69-83. A listing of species and wild forms with descriptive and other notes on many.

Lawrence, Elizabeth. Gardens in Winter. New York, 1961. 218 p. illus.

Contains numerous references to winter-blooming daffodils, with illustrations from drawings by Caroline Dormon.

Lawrence, Elizabeth. The Little Bulbs, a Tale of Two Gardens. New York, 1957.

"Little daffodils": p. 46-80. The author's experiences with small species and hybrids in North Carolina.

Miles, Bebe. The Wonderful World of Bulbs. New York, 1963. 348 p. illus., col. plates.

Chapter 7, "A host of carefree daffodils": p. 103-128.

Prkinson, John. Paradisi in Sole Paradisus Terrestris. Faithfully reprinted from the edition of 1629. London, 1904. 612 p. illus.

Chapter IX, "Narcissus, The Daffodill": p. 67-108, including 9 pages of illustrations (woodcuts).

Names, in Latin and English, of nearly a hundred kinds of "daffodill" known in England in the early 17th century, with descriptions and notes on their season of bloom, place of origin, and history of the names. Included are some plants no longer classified in the genus *Narcissus*.

Rockwell, F. E., and Grayson, Esther C. The Complete Book of Bulbs. Garden City, N. Y., 1955. 352 p. illus., col. plates.

Chapter 11, "Daffodils": p. 124-150.

Synge, Patrick M. The Complete Guide to Bulbs. New York, 1962. 319 p. illus., includes color plates.

Narcissus: p. 232-255, pl. XVI-XVIII and col. pl. 25-27. The colored plates are from paintings and show 11 species and 18 modern varieties.

Wister, Gertrude S. Hardy Garden Bulbs. New York, 1964. 176 p. illus.

Chapter 5, "Daffodils": p. 56-91.

Dictionaries and Cyclopedias

(These books, generally available in libraries, include lists and brief descriptions of most of the wild forms currently in trade.)

Bailey, L. H., and Bailey, E. Z. Hortus Second. New York, 1941. 778 p.

Bailey, L. H. The Standard Cyclopedia of Horticulture (2d ed) New York, 1942. 3v.

The Royal Horticultural Society. Dictionary of Gardening. Ed. by Fred J. Chittenden. Oxford, 1951. 4 v. illus. *and* Supplement, 1956.

References to Further Literature

Atwood, Alice C. Daffodil Literature. The American Daffodil Year Book, 1935, p. 83-88.

This list was compiled from entries in the Botany Catalogue of the U. S. Department of Agriculture Library (now National Library of Agriculture). The entire subject catalogue has been printed and may be consulted in large or specialized horticultural libraries.

Coleman, Cyril F. Daffodil Literature. The Daffodil and Tulip Year Book, 1954, p. 74-80.

This article and the lists appended emphasize sources of information on daffodil history, nomenclature, and illustrations.

King, Harold S. Daffodil Bibliography (unpublished).

Dr. King, Chairman of the Health and Culture Committee of the American Daffodil Society, has accumulated several thousand references on all phases of daffodil information.

Scorgie, Helen C. Apples of Gold. The 1961 American Daffodil Yearbook, p. 12-16.

Appreciative comment on some favorite works on daffodils.

U. S. Dept. of Agriculture. National Agricultural Library. Bibliography of Agriculture. v. 1- 1942- (current)

Current listing of books and articles in publications received in the National Library of Agriculture. Subject indexes annually.

APPENDIX B

APPROVED LIST OF MINIATURE DAFFODILS

Varieties of Garden Origin, Species, Wild Forms, and Wild Hybrids

Division
5*b* Agnes Harvey
10 *alpestris* = *pseudo-narcissus* subsp. *alpestris*
10 Angel's Tears = *triandrus* var. *albus*.
8 Angie
5*b* April Tears
5*b* Arctic Morn
10 *asturiensis*
10 *atlanticus*
10 Aurantiacus = *triandrus* 'Aurantiacus' (Hort.)
7*b* Baby Moon
7*b* Baby Star
1*b* Bambi
7*b* Bebop
10 *bertolonii* = *tazetta* subsp. *bertolonii*
10 *bicolor* = *pseudo-narcissus* subsp. *bicolor*
7*b* Bobbysoxer
1*a* Bowles's Bounty
10 *bulbocodium* (various)
10 *calathinus* = *triandrus* var. *loiseleurii*
10 *calcicola*
10 Canaliculatus = *tazetta* subsp. *lacticolor* 'Canaliculatus' (Hort.)
10 *cantabricus* (various)
1*a* Charles Warren
5*b* Cobweb
1*c* Colleen Bawn
10 *concolor* = *triandrus* var. *concolor*
7*b* Curlylocks
10 *cyclamineus*
8 Cyclataz
7*b* Demure
10 × *dubius*
11 Elfhorn
4 Eystettensis (Hort.)
10 *fernandesii*
7*b* Flomay
6*a* Flyaway
5*b* Frosty Morn
6*a* Greenshank
8 Halingy
5*b* Hawera
10 *hedraeanthus*
7*b* Hifi
8 Hors d'Oeuvre
11 Jessamy
6*a* Jetage
10 *jonquilla*
4 *jonquilla* 'Flore Pleno' (Hort.)
10 *jonquilla* var. *minor*
10 *jonquilloides*
6*a* Jumblie
10 *juncifolius*
4 Kehelland
11 Kenellis
7*b* Kidling
7*b* La Belle
7*b* Lintie
1*b* Little Beauty
1*a* Little Gem
7*a* Little Prince
10 *lobularis* = *minor* var. *conspicuus*
10 × *macleayi*
2*a* Marionette
10 *marvieri* = *rupicola* var. *marvieri*
11 Marychild
5*a* Mary Plumstead
6*a* Mini-Cycla
10 *minimus* = *asturiensis*
10 *minor*
10 *minor* var. *conspicuus*
10 *minor* var. *pumilus*
4 *minor* var. *pumilus* 'Plenus' (Hort.)
6*a* Mite
6*a* Mitzy
2*a* Morwenna
11 Muslin
2*a* Mustard Seed
10 *nanus* = *minor*
11 Nylon (hybrid group)
7*b* Pease-blossom
4 Pencrebar
2*a* Picarillo
7*b* Pixie
11 Poplin
10 *pseudo-narcissus* subsp. *alpestris* (syn. Lent Lily)
10 *pseudo-narcissus* subsp. *bicolor*
6*b* Quince
5*b* Raindrop
4 Rip van Winkle = *minor* var. *pumilus* 'Plenus' (Hort.)
1*b* Rockery Beauty
1*c* Rockery Gem
1*c* Rockery White
2*a* Rosaline Murphy
10 *rupicola*
10 *rupicola* var. *marvieri*
10 *scaberulus*
7*b* Sea Gift
5*a* Sennocke
8 Shrew
5*a* Shrimp
10 *simplex* = *jonquilla*
7*a* Skiffle
1*a* Sneezy
6*a* Snipe
1*c* Snug
7*b* Stafford
7*b* Sundial
7*b* Sun Disc
11 Taffeta
1*a* Tanagra
11 Tarlatan
10 *tazetta* var. *bertolonii*
10 *tazetta* subsp. *lacticolor* 'Canaliculatus' (Hort.)
10 × *tenuior*
6*a* Tête-a-Tête
6*a* The Little Gentleman
10 *triandrus* var. *albus*
10 *triandrus* 'Aurantiacus' (Hort.)
10 *triandrus* var. *cernuus*
10 *triandrus* var. *concolor*
10 *triandrus* var. *loiseleurii*
10 *triandrus* var. *pulchellus*
2*b* Tweeny
10 *watieri*
1*a* Wee Bee
7*b* Wideawake
1*c* W. P. Milner
4 Wren
3*c* Xit (hybrid group)

APPENDIX C

List of Retail Daffodil Dealers

The marketing of daffodils tends to be an individual or family enterprise, especially where new varieties are involved. Breeders usually handle their own varieties and only those of other breeders which are outstanding or non-competitive and essential to a well-balanced list. As a result successful breeders are almost forced to go into business if they are to find a market for their creations and gain any reward. However, continuance of these businesses is often dependent upon the health and enthusiasm of one individual; they begin quietly and may end suddenly.

The list which follows is of dealers who have expressed willingness to handle orders from American gardeners. Most of them are daffodil specialists, a few are bulb dealers, and one or two are general nurserymen. Unless an exception is noted, each has a catalog or price list. Those located abroad will forward orders by parcel post upon receipt of the usual import tags as explained in Chapter 21.

Obviously any list of dealers is incomplete and only momentarily accurate. No attempt has been made to include domestic sources such as Wayside Gardens, White Flower Farm, Park, Vaughan, or other dealers in seeds and plants who stock a selection of standard varieties as part of their general business.

Finally, there are numerous amateur breeders at work in all daffodil-growing countries. A few of their varieties are of the utmost importance, many are desirable regional varieties. In some cases, especially where they are good increasers, a commercial dealer may undertake to propagate and offer them. Other varieties, equally worthwhile, have no trade outlet and are distributed only as gifts, by barter, or some other private arrangement.

David Bell, P. O. Box 36, Templeton, New Zealand. Issues a 64-page illustrated and descriptive catalog; grows about an acre of daffodils by the organic method; introduces new varieties regularly; acquired stocks of George Lewis.

Broadleigh Gardens (Walter Stagg), Sampford Arundel, Wellington, Somerset, England. Purchased the stock of Alec Gray in 1964 and expects to continue sales in United States. Will offer future Gray introductions. Catalog of small daffodils and other small bulbs.

M. E. Brogden, Normanby, Taranaki, New Zealand. Grows about an acre of daffodils and releases new seedlings regularly; illustrated and descriptive catalog.

E. W. Cotter, 313 Hills Road, Shirley, Christchurch, New Zealand. Issues a descriptive and illustrated catalog; raises seedlings but only limited number released as yet; specializes in miniatures.

The Daffodil Mart, (George W. Heath), Gloucester, Va. The longest list of American-grown bulbs of both domestic and imported varieties; sells old varieties in bulk for natural plantings; specializes in miniatures. Retails cut flowers by mail.

J. H. Davenport, P. O. Box 870, Invercargill, New Zealand. Is growing over a thousand varieties; issues a price list; local agent for Jefferson-Brown.

Allen W. Davis, 3625 S. W. Canby St., Portland, Oregon. A hobbyist at heart who issues a mimeographed list and is one of the best domestic sources for the smaller daffodils.

P. de Jager & Sons, Inc., 188 Asbury St., So. Hamilton, Mass. The American office of an old Dutch firm; issues a large illustrated and descriptive bulb catalog; orders are filled in this country from imported stocks of English and Dutch varieties.

W. J. Dunlop, Broughshane, Ballymena, Northern Ireland. A neighbor of the late Guy Wilson; issues illustrated and descriptive catalog featuring his own and Wilson's novelties; one of the major hybridizers of exhibition varieties.

S. A. Free, No. 4 R. D., Tokomaru, Palmerston North, New Zealand. Has been hybridizing for many years and is prepared to supply some of his introductions to overseas growers but does not issue a list.

Murray Gardiner, Warragul South, Victoria, Australia. Supplies both retail and wholesale markets; hybridizer of exhibition varieties; publishes a list.

GATEWAY GARDENS, LTD., Bromyard, Herefordshire, England. Issues a small list of novelties.

J. GERRITSEN & SON, Voorschoten, Holland. Has a short general list but specializes in the new split-corona daffodils.

J. N. HANCOCK & Co., Olinda Creek Rd., Kalorama, Victoria, Australia. Operated by son of founder who died in 1956. Began with stock of late H. A. Brown; descriptive catalog of over 1,000 varieties; hybridizes and has introduced many varieties; source for species and miniatures.

R. E. HARRISON & Co., LTD., P. O. Box 1, Palmerston North, New Zealand. General nurserymen whose operations include standard varieties; large retail sales in window packages; general catalog.

J. HEEMSKERK, c/o P. VAN DEURSEN, Sassenheim, Holland. Publishes a descriptive and illustrated catalog offering a range of standard varieties and moderately priced novelties, singly and by the dozen.

W. JACKSON, Dover, Tasmania. Family business begun in 1920's by Dr. William Jackson; now operated by son, a retired M.P.; descriptive catalog; hybridizer with many excellent introductions; specializes in pinks.

MICHAEL JEFFERSON-BROWN, Whitbourne, Worcester, England. One of the younger generation of British hybridizers; attractive illustrated and descriptive catalog; specializes in wide range of exhibition novelties.

A. LADSON, Wandin North, Victoria, Australia. Illustrated and descriptive catalog offering a wide variety of standard and show flowers; hybridizes.

J. S. LEITCH, 97 High St., Masterton, New Zealand. Acquired stock of late A. H. Ahrens; raises seedlings; price list.

GRANT E. MITSCH, Canby, Ore. Leading American hybridizer with wide ranging interests; illustrated and descriptive catalog offering his own and the introductions of many other growers including American amateurs; his pinks and reversed bicolors have been widely acclaimed.

TRAVERS MORRISON (Heathcote Nursery), Wandin, Victoria, Australia. Another second-generation business operated by son of Scott Morrison; hybridizer with many introductions; issues descriptive catalog.

CHARLES H. MUELLER, River Road, New Hope, Pa. An importer of a good selection of standard and some novelty varieties from both Dutch and English growers; price list.

H. J. OHMS, INC., P. O. Box 3, Newtown, Conn. 06470. A second-generation importer of Dutch bulbs; price list.

P. PHILLIPS, Box 177, Otorohanga, New Zealand. Grows two acres for cut flowers and specializes in seedlings; has introduced several and holds stocks of J. T. Gray's latest releases; price list.

MRS. J. LIONEL RICHARDSON, Waterford, Ireland. Continuing the work of her late husband who was one of the outstanding hybridizers of exhibition varieties; illustrated and descriptive catalog of Richardson and other novelties.

MICHAEL SPRY, The Basin, Victoria, Australia. A leading professional exhibitor and raiser of most of the winning yellow trumpets exhibited in Victoria; issues a price list.

R. C. A. TOMBLESON, Private Bag, Gisborne, New Zealand. Raises seedlings and exhibits them at principal shows; does not issue a list but is prepared to ship overseas.

MARY MATTISON VAN SCHAIK, Cavendish, Vt. Mail order importer of Dutch bulbs offering standard varieties; price list.

SVEN VAN ZONNEVELD, 456 Collegeville Road, Collegeville, Pa. American representative of Dutch firm; illustrated and descriptive catalog of standard varieties.

WALLACE & BARR, Marden, Kent, England. Successors to Barr & Sons doing general nursery business, general catalog.

GUY L. WILSON, LTD., Marden, Kent, England. A division of the de Jager business which purchased the Wilson stocks; continues to offer Wilson varieties, to introduce some of his seedlings, and to enlarge the Wilson list with other varieties.

MATTHEW ZANDBERGEN, G. Zandbergen-Terwegen, Sassenheim, Holland. Wholesale and retail specialist with a good variety of the smaller daffodils on his list.

INDEX OF DAFFODILS BY NAME

Horticultural varieties (clones) are in roman. Species and botanical varieties and forms are in italics. Page references in italics are for illustrations. "syn." means "synonym for."

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GENERAL SUBJECT INDEX

PUBLICATIONS
OF THE AMERICAN HORTICULTURAL SOCIETY

I. Handbooks and Color Chart

1. PENSTEMONS, edited by Mrs. Edwin M. Babb and Miss Alida Livingston, Jan. 1951, 87 pp., *out of print*
2. THE AZALEA HANDBOOK, Jan. 1952, 148 pp., *out of print;* superseded by THE AZALEA BOOK, by Frederic P. Lee, 1958, 324 pp., *out of print,* and THE AZALEA BOOK, SECOND EDITION, 1965, 435 pp., price $12.00; Society members price $8.50.
3. VEGETATIVE PROPAGATION, edited by John L. Creech, Jan. 1954, 94 pp., *out of print*
4. HANDBOOK OF HOLLIES, edited by Harry William Dengler, 1957, 203 pp. *out of print*
5. CULTIVATED PALMS, edited by R. Bruce Ledin, Jan. 1961, 192 pp., *out of print*
6. THE PEONIES, edited by John C. Wister, 1962, 220 pp., price paper bound $3.00, cloth bound $5.00; Society members price paper bound $2.10, cloth bound $3.50
7. DAFFODIL HANDBOOK, Jan. 1966, edited by George S. Lee, Jr., 239 pp., $3.00 paperbound, $4.50 clothbound.
8. DAYLILIES, *in preparation*
9. NICKERSON COLOR FAN, price $7.50, Society members price $6.37—for horticulturists and flower show judges, based on the Munsell System of Color Notations

Each of the above books is today the authoritative, comprehensive work in the field.

II. Recent Comprehensive Special Articles

BLUEBERRIES:	*Blueberry Breeding: Past, Present and Future,* by George M. Darrow, Jan. 1960, 50¢
CROCUS:	*The Versatile Crocus,* by Owen M. Rogers, Jan. 1965, $1.25
CANNAS:	*History, Breeding, and Cultivation of the Canna,* by Joseph W. Donahue, April 1965, $1.25
DOGWOODS:	*The Best of the Dogwoods,* by Donald Wyman, Jan. 1962, $1.00
DWARF IRIS:	*Dwarf Bearded Iris,* by Walter Welch and *Dwarf Beardless Iris,* by Stephen F. Hamblin, Oct. 1958, 50¢
EUGENIAS:	*The Cultivated Eugenias in American Gardens,* by Edwin A. Menninger, April and July 1959, $1.00
EPIMEDIUM:	*Epimedium and Vancouveria,* by Frederic P. Lee, Oct. 1965, $1.25
ECHEVERIA:	*Echeveria,* by Eric Walther, April 1960, 50¢
FORSYTHIAS:	*Forsythias,* by Donald Wyman April 1961, $1.00
GOURDS:	*The Unpredictable Gourds,* by Ovid Shifriss, Oct. 1965, $1.25
HEATHS AND HEATHERS:	*Plants for a Winter Garden—Heaths and Heathers,* by Harold W. Copeland, Jan. 1965, $1.25
HYPERICUMS:	*The Ornamental Hypericums,* by R. L. Plaisted and R. W. Lighty, July 1959, 50¢
LIRIOPE AND OPHIOPOGONS:	*The Lilyturfs in Gardens,* by H. Harold Hume and B. Y. Morrison, Jan. 1963, $1.25
LYCORIS:	*Lycoris—A Progress Report,* by Sam Caldwell, April 1962, $1.00
LANDSCAPING:	*Designing an Environment for Man,* by Roger B. Thompson, Jan. and Oct. 1959, $1.00
MAPLES:	*Some Shade and Ornamental Maples,* by Curtis May, Oct. 1961 and Jan. 1962, $2.00
MUTATION:	*Nature of Plant Sports,* by Haig Dermen, July 1960, $1.00
VIBURNUMS:	*Ornamental Fruiting and Autumnal Foliage Viburnums,* and *Ornamental Deciduous Flowering Viburnums,* by Donald R. Egolf, July and Oct. 1962, $1.00
RHODODENDRONS:	*Rhododendron Species for the Small Home Garden,* by H. H. Davidian, April 1960, 50¢
ZEPHYRANTHES:	*A Preliminary Look at Zephyranthes and Kin,* by B. Y. Morrison, Oct. 1964, $1.25

Prices for the above articles include the entire issue of the *American Horticultural Magazine* in which the article appears.

Write: American Horticultural Society, Inc., 1600 Bladensburg Road, N. E., Washington, D. C. 20002

AMERICAN HORTICULTURAL SOCIETY

1600 BLADENSBURG ROAD, N.E.
WASHINGTON, D. C. 20002

Facts About The Society

The only National Organization sponsoring the interests of all American Horticulture.

A non profit organization for the benefit of the serious gardener.

All Officers and Directors serve without pay, and the material used in the magazine and forum is donated by the authors. No paid advertising appears in these publications.

The nation's leading experts in many fields of horticulture give of their time and knowledge to AHS members.

Membership Privileges

Four Issues of American Horticultural Magazine per year.

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Free Seed distribution each year.

Excellent lending library service by mail.

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Application is made herewith for Membership in the American Horticultural Society which will include receipt of the American Horticultural Magazine, the Gardeners Forum, and all other benefits of Membership.

MEMBERSHIP IN THE NAME OF .....

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REMITTANCE ..... FOR ..... YEAR(S). DATE .....

AMERICAN DAFFODIL SOCIETY, INC.

MRS. GROVER F. ROENNFELDT, TREAS.
1120 CRAIG ROAD CREVE COEUR, MO., 63141

Facts About The Society

The American Daffodil Society is an association of amateur gardeners and professional growers who organized in 1954 to share their knowledge of daffodils.

To help more people enjoy the unique rewards of growing more and better daffodils, the Society issues publications, sponsors research, conducts an annual symposium of favored varieties, encourages local daffodil shows, and offers awards.

Once a year the members gather for a three-day convention, to make new friends, to hear and talk with the leading growers, and to visit outstanding gardens and see the latest varieties in bloom. A school for judges is usually held at the close of each convention.

Membership Privileges

Quarterly Journal covering current activities.

An invitation to attend the annual convention of the Society.

An opportunity to become an accredited judge of daffodils.

Technical advice on all phases of daffodil culture and breeding.

Access to Kodachrome slide collection and the Society's library.

The privilege of joining in regional activities, exhibiting daffodils, and competing for A.D.S. awards.

The opportunity to belong to a Round Robin for the exchange of information on culture, hybridizing, performance, etc.

MEMBERSHIP DUES

☐ One year—individual	$ 5.00	☐ Sustaining	$ 7.50
☐ Three years—individual	12.50	☐ Contributing	10.00
☐ One year—family	7.50	☐ Life	100.00
☐ Three years—family	18.75	☐ Commercial—3 times any class	

Application is made herewith for Membership in the American Daffodil Society.

MEMBERSHIP IN THE NAME OF .....

ADDRESS .....

CITY ..... STATE ..... ZIP CODE .....

REMITTANCE ..... FOR ..... YEAR(S). DATE .....

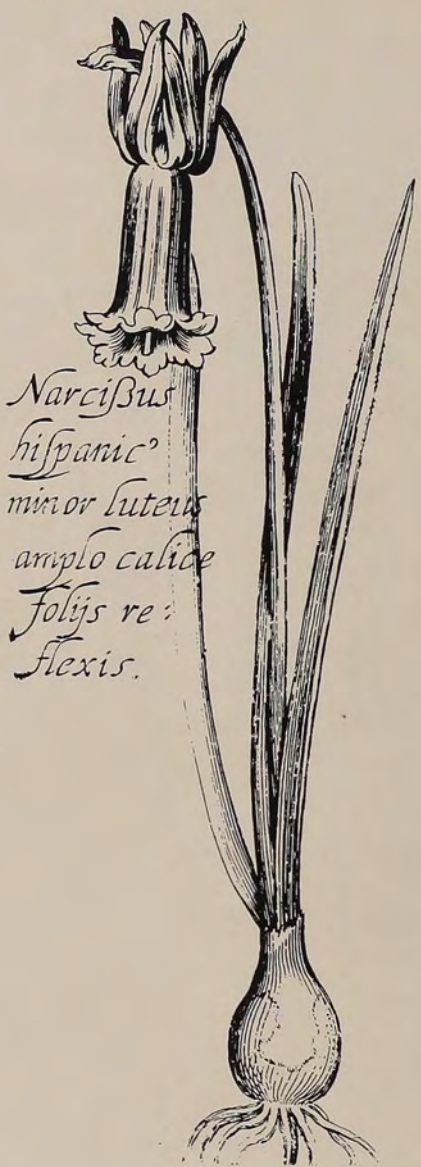

PLATE 56

CYCLAMINEUS

Illustration from *Theatrum Florae* (1633) and used by De Candolle to describe the species.