

JOURNAL *of the* CALIFORNIA HORTICULTURAL SOCIETY

VOLUME I • NUMBER 3

JULY 1940

CONTENTS

	PAGE
The Daffodil Conference	135
Daffodils for the Average Gardener in California By J. A. McDonald	137
Daffodils for the Advanced Amateur in California By Kenyon L. Reynolds	141
Daffodils in the Pacific Northwest By Grant E. Mitsch	146
Some Notes on Rock Garden Daffodils By Drew Sherrard	150
The Use of Daffodils as Garden Decorations By Lockwood and Elizabeth de Forest	154
The Woodside Project in Popularizing Daffodils By Mae Vrooman Forbes	157
Daffodil Diseases By Frank P. McWhorter	159
Breeding Daffodils in Oregon By E. N. Hornback	164
A Few Random Daffodil Notes from Southern Cali- fornia	169
By S. Stillman Berry	
The Afternoon Session	176
The California Horticultural Society Rock Garden Dis- play at the Oakland Spring Garden Flower Show. By P. H. Brydon	203

Published by the

**CALIFORNIA HORTICULTURAL SOCIETY
SAN FRANCISCO, CALIFORNIA**

CALIFORNIA HORTICULTURAL SOCIETY

OFFICERS

President, SYDNEY B. MITCHELL

Vice-Presidents

VICTOR REITER, JR.
P. H. BRYDON
ROBERT E. SAXE
H. M. BUTTERFIELD

Secretary

CORA R. BRANDT
485 California Street,
San Francisco
Tel. Douglas 7575

EXECUTIVE COUNCIL

SYDNEY B. MITCHELL	MRS. DAVID BROWN	H. G. REINECKE
VICTOR REITER, JR.	S. H. THOMPSON	P. H. BRYDON
ROY L. HUDSON	MRS. J. D. SCANNAVINO	A. F. SHULTE
ROBERT E. SAXE	DR. C. C. BERWICK	ERIC WALTHER
H. M. BUTTERFIELD	WALTER B. CLARKE	CORA R. BRANDT

PERMANENT COMMITTEES

PLANT MATERIAL COMMITTEE

P. H. BRYDON, *Chairman*
ERIC WALTHER
H. M. BUTTERFIELD
W. E. SCHMIDT
JACK WHITEHEAD
DUNCAN S. MUNRO
MRS. B. O. CLEAR
NORVELL GILLESPIE
MONRAD JELSWIK
AUGUST EGLI
MRS. EVERETT J. BROWN
MRS. HAZEL M. RIESE
H. G. REINECKE
STEPHEN L. VISTICA
SIDNEY STEIN

SUBCOMMITTEE ON NATIVE PLANTS

DR. C. C. BERWICK, *Chairman*
MRS. M. L. KELLY
JEAN BOYD
DORIS GOODMAN

SHOW COMMITTEE

P. H. BRYDON, *Chairman*
VICTOR REITER, JR.
DR. JOHN C. WILLIAMS
DR. C. C. BERWICK
ERIC WALTHER
DUNCAN S. MUNRO
ROY L. HUDSON
ROBERT E. SAXE
MRS. H. I. SCHNABEL
ALBERT WILSON
G. NIEDERHOLZER

AWARDS COMMITTEE

H. M. BUTTERFIELD, *Chairman*
ROY L. HUDSON
TOICHI DOMOTO
MRS. J. D. SCANNAVINO

MEMBERSHIP COMMITTEE

A. F. SHULTE, *Chairman*
MRS. P. W. SHATTUCK
MRS. JEROME LANDFIELD
STEPHEN L. VISTICA
ALBERT WILSON
COL. JOHN P. TERRELL
MRS. HENRY DAVIDSON
MRS. MARTHA PHILLIPS
MRS. HAZEL M. RIESE
MRS. C. C. DERBY
O. E. HOPFER

PROGRAM COMMITTEE

ROBERT E. SAXE, *Chairman*
MRS. CABOT BROWN
H. M. BUTTERFIELD
E. O. ESSIG
DR. ANN MARTIN
H. EARL THOMAS

EDUCATION COMMITTEE

P. H. BRYDON, *Chairman*
ERIC WALTHER
MRS. M. A. BOISSERÉE
MRS. W. G. BRENDL
HOLLIS M. GRAY
JACK WHITEHEAD

LIBRARY COMMITTEE

ROSE F. MITCHELL, *Chairman*
MRS. A. ROSENBERG
MRS. E. O. ESSIG
DR. WALKER M. WELLS

PUBLICATIONS COMMITTEE

SYDNEY B. MITCHELL, *Chairman*
O. E. HOPFER
DR. SAXTON T. POPE, JR.
VICTOR REITER, JR.
ROSE F. MITCHELL

JOURNAL *of the* CALIFORNIA HORTICULTURAL SOCIETY

Volume I

July, 1940

No. 3

THE DAFFODIL CONFERENCE

Under the authority of the Council of the California Horticultural Society a Committee on Daffodils, Tulips, and Spring Flowering Bulbs was created in February 1940, with the President of the Society as chairman. On March 16 an all-day conference on daffodil growing and breeding was held by this committee. Attendance was limited and by invitation only, as not only were the facilities for meeting limited, but it was felt that the best results would be obtainable with a small group relatively expert in this subject, and that as the papers and proceedings would be published in the Society's Journal, all would ultimately derive the maximum benefit.

Thirty daffodil growers, amateur and professional, from as far south as Pasadena and as far north as Vancouver, B.C., attended the conference in Giannini Hall, University of California. Not all were members of the Society, though the majority were. All papers were read at the morning session. The afternoon was given up to discussion. This, taken down by a stenotypist, transcribed, and later considerably edited, will be found following the papers. No formal flower show was held, but Mr. and Mrs. Kenyon Reynolds of Pasadena brought to the conference a fine collection of named varieties and seedlings, beautifully staged in an arrangement of black steps and backgrounds, a lesson in display to all who saw it. Others who contributed a few flowers were Drew Sherrard, Oswego, Oregon; Dr. S. S. Berry, Redlands; Joseph Urmston, San Marino; and Sydney B. Mitchell, Berkeley.

The attendance roll follows:

Buzzine, Mrs. Louis, Ignacio, California
de Forest, Mr. and Mrs. Lockwood, Santa Barbara, California
Forbes, Mrs. Cleaveland, Redwood City, California
Furniss, George B., Oakland, California
Gillespie, Norvell, San Francisco, California

Heyer, John W., Pasadena, California
 Hornback, Earl N., Sandy, Oregon
 Jory, Stafford L., Berkeley, California
 Kellam, Frederick B., Santa Barbara, California
 Laing, Gordon B., Oakland, California
 Leach, Frank A., Diablo, California
 McDonald, J. A., Niles, California
 McLaughlin, Mrs. A. C., Pasadena, California
 Main, Arthur B., Santa Cruz, California
 Mitchell, Mr. and Mrs. Sydney B., Berkeley, California
 Olson, Mr. and Mrs. Ronald L., Lafayette, California
 Phillips, Mrs. Martha, Petaluma, California
 Reinelt, Mr. and Mrs. Frank, Capitola, California
 Reynolds, Mr. and Mrs. Kenyon L., Pasadena, California
 Rogers, Eliot, Santa Barbara, California
 Sanborn, Mrs. A. H., Chico, California
 Valinga, Peter, Burlingame, California
 Verner, E. A., Berkeley, California
 Verner, E. H., Burnaby Lake P.O., British Columbia
 Wheeler, Willis H., Alameda, California

PAPERS

- "Daffodils for the Average Gardener in California," by
 J. A. McDonald, Niles, California
 "Daffodils for the Advanced Amateur in California," by
 Kenyon L. Reynolds, Pasadena, California
 "Daffodils in the Pacific Northwest," by Grant E. Mitsch,
 Lebanon, Oregon
 "Some Notes on Rock Garden Daffodils," by Drew Sherrard,
 Oswego, Oregon
 "The Use of Daffodils as Garden Decoration," by Lockwood
 and Elizabeth de Forest, Santa Barbara, California
 "The Woodside Project in Popularizing Daffodils," by Mae
 Vrooman Forbes, Redwood City, California
 "Daffodil Diseases," a letter, by Frank P. McWhorter, Cor-
 vallis, Oregon
 "Breeding Daffodils in Oregon," by E. N. Hornback, Sandy,
 Oregon
 "A Few Random Daffodil Notes from Southern California," by
 S. Stillman Berry, Redlands, California

DAFFODILS FOR THE AVERAGE GARDENER IN CALIFORNIA

By J. A. McDonald

In preparing this paper, I am approaching the subject from three angles. First, from the standpoint of what the general public likes as evidenced by what it buys; second, from my own viewpoint as to which of the moderately priced daffodils are most desirable; third, and perhaps most important, from the standpoint of making a selection based on permanence and good percentage of increase under average conditions. A fourth factor that might be given consideration is the time of bloom. The selection of varieties I shall discuss is intended to give bloom from January to April.

The average gardener prefers to pay not more than \$15.00 per 100 for daffodils. The largest selling daffodil today is "King Alfred," which ranges in price from around \$8.50 to \$12.50 per 100 bulbs. It is the yardstick by which the average gardener measures all other varieties. As the price of newer varieties moves down into the price range of "King Alfred," their popularity increases rapidly. When "John Evelyn," for instance, dropped in price so that it could be had at less than \$15.00 per 100 bulbs, it jumped from about thirtieth to fifth place in our list of best sellers.

This list of daffodils will, therefore, be kept of those varieties which are priced somewhere near "King Alfred."

To start off the season in January or earlier, one should plant some of the Tazettas. Personally, I would select "Soleil d'Or." Its color at any other time of the year might be considered garish, but this strong color is needed to offset the general dullness of gray, brown, and green tones prevailing in January. The Tazettas do best when planted in full sun and allowed to dry out well in summer.

Second on my list is "February Gold," a cyclamineus hybrid. This year it started blooming in January and continued in flower till the end of February. It is a healthy variety but its rate of increase with us is not so rapid as that of some other varieties.

Before "February Gold" is through blooming, the Campernelle jonquils start, and established plantings will continue in flower for six weeks. Their rate of increase is rapid. A planting of double-nose bulbs in our garden increased in four years to average better than 25 flowers to

each clump and one clump produced 53 individual flower stalks. *Jonquil odorus* "Orange Queen" has practically the same habits except that its rate of increase is perhaps slower.

Next on my list comes "Helios," an *Incomparabilis*, not new, having been introduced by Engleheart in 1912, but not widely known. It is not so fine a flower as many of the later varieties, but its good color, the upright position of its blooms, its earliness (with us about 10 days ahead of "King Alfred"), and its rapid rate of increase make it an excellent variety for the average garden. To get the best blooms lift and divide it every third or fourth year.

To many gardeners the daffodil season really begins with "King Alfred." In our southern Alameda County garden it flowers in late February and early March. The length of its stems and the size of its blooms work for its downfall if it opens in a period of heavy rains. "Aerolite," which is several days earlier, holds up longer than "King Alfred." It has a better formed perianth and softer coloring. The stem is much shorter, however, and it doesn't catch the popular fancy as "King Alfred" does. "Hector Treub" is a fine "King Alfred" seedling, a little shorter, later, and lighter in color than its parent. "Tresserve" is larger, later, and also lighter in color than "King Alfred." In a cool, lightly shaded garden it is fairly permanent, but planted in full sun and allowed to bake in summer, the bulbs are likely to break down in a few years.

Good bicolor trumpets are rare. "Spring Glory" is the most popular in the moderate-price range and few large daffodils are more charming for garden decoration. They are, of course, likely to bow their faces in the dirt if heavy rains come on them. They do best where the bulbs have shade in summer or a cover crop of annuals to keep them cool. Deep planting also helps to make them more permanent. "Silvanite" is the best bicolor we have had as to color, form, and permanency, but the price is still out of the range we are now discussing.

The best white trumpet daffodils are still fairly high in price. "Mrs. E. H. Krelage" has a fine flower and is not too expensive, but the novice should remember that its trumpet is as yellow as that of some bicolors when it first opens and that it gradually fades lighter. Plant the bulbs deeply and keep them cool to get permanent results.

The early Leedsii, "Silver Star," is a fine variety for the price. "Tunis," which is better, is still too high in price for general planting. Given a location under deciduous trees we find that "Silver Star" increases nicely and is permanent. "Lord Kitchener" is later, cheaper, and less striking than "Silver Star" but more permanent under adverse conditions. "Hera," a short cup Leedsii, is remarkable for its healthiness and rapid increase in California gardens. It flowers late and the blooms droop but the texture is excellent and the flowers last well. "Hera" produces good seedlings when used as a seed parent with pollen from more expensive daffodils.

The Incomparabilis, "John Evelyn," is deservedly popular and is another variety which beginners in hybridizing can use as a seed parent. "Croesus" increases nicely, and since its flowers are held well above the foliage it makes a nice spot of color. "Lucinius" is a good, inexpensive, clear yellow Incomparabilis and one of the last to bloom.

Barrii daffodils as a class are not very good here. The sun fades, and often burns, the red cups. "Firetail" is outstandingly good with us, however; increases rapidly and holds the color of its cups fairly well. The flowers are borne well above the foliage. "Diana Kasner" is very late and at this date (March 16) is not yet in flower. Its blooms are partially hidden by the heavy foliage but it thrives in spite of hot weather.

"Golden Sceptre" is the least expensive of jonquil hybrids; very hardy and produces a lot of bloom. "Buttercup" has better form and texture. *Tullus Hostilius* produces more flowers than any other daffodil we grow. The typical jonquil fragrance is carried by all these hybrids and this quality, combined with good color and graceful size, makes them most suitable for cutting. Their flowering season is a week or ten days longer than that of most larger daffodils.

"Poet Narcissi" require a long growing season and late planting is often responsible for poor results with this group. When once established, however, they do quite well and are reliably permanent. *Ornatus maximus* is an old sort that is good and cheap. It hasn't as fine a perianth as "Rupert Brooke," "Edwina," and "Snow King," which may now be had at very moderate prices. "Actaea" is by far the best Poeticus we have grown. It is fairly early, large, strong

stemmed, and broad petaled. It apparently likes California climate. At present it is just above the price range under discussion.

In the Poetaz group "Klondyke" and "Admiration" are popular, especially for cutting. "Medusa" and "Glorious" resemble the Poeticus side of their family and are beautiful when lightly shaded so their red cups do not fade too quickly.

The Triandrus hybrids thrive in California gardens. "Moonshine," a late blooming variety, and "Thalia," about two weeks earlier, are the best moderately priced ones we have grown.

For those who want to try a few slightly more expensive varieties we recommend "La Vestale," a white trumpet; "Carlton" and "Golden Pedestal" in the Incomparabilis group; the Leedsii, "Tunis"; "Peggy Bauer" and "Sunstar" in the Barrii group and the jonquil hybrids "Numa Pompilius" and "Chrysolite."

Of course, no keen amateur is ever satisfied until he gets some of the newer varieties such as "Fortune" and "Beersheba," especially if he gets started in hybridizing. The varieties I have discussed will give him, however, a good foundation for daffodil growing and include practically all classes so that he may learn in which direction his interest may eventually be directed.

DAFFODILS FOR THE ADVANCED AMATEUR IN CALIFORNIA

By Kenyon L. Reynolds

Extending the discussion of culture and selection of varieties of daffodils to cover the interests of advanced amateurs means taking the lid off the price limit. Do not misunderstand this statement to mean that good cultivation is expensive or that high price gives assurance of quality in a bulb. However, the advanced amateur owns or wishes to own a collection of the choicer varieties and wishes to grow them in a way which will insure the best possible results. He may not afford to own this piece of equipment or that expensive variety, but they are both in his field of interest. He may borrow the one and time will remedy the price of the other.

There is little difference between advanced cultivation of daffodils and average cultivation. One thing, however, which the advanced gardener should have is a bed which can be set aside exclusively for the cultivation of daffodils. Here one can observe all the recognized items of good practice such as deep digging, frequent cultivation, proper fertilization, heavy watering while growing, light watering while dormant, complete maturing of foliage, careful observation and roguing for disease. In such a bed the bulbs should be located with geometric accuracy or marked. If a bulb fails to put forth leaves at the proper time it should be removed and the hole disinfected. Any plant which shows obvious symptoms of disease should be removed and destroyed, isolated, or sent to the Bureau of Plant Pathology at Sacramento for examination.

For the safest cultivation of choice varieties, every bulb brought into the garden should be given the regulation four-hour hot water bath followed by a fungicide dip. This is a controversial suggestion which may be challenged by many commercial growers because this procedure will almost certainly have some injurious effect upon the first following crop of flowers. However, it is put forward only for advanced amateurs. I contend that if this procedure were followed by all those who attempt to grow really choice collections of bulbs, it would do more to promote the fancy of the daffodil and the ultimate widespread interest in growing, showing, breeding, and buying of the better sorts of bulbs than any other single possible means of protection.

Nearly every grower of daffodils who qualifies for designation as an advanced amateur will, sooner or later, be interested in growing bulbs from seed. Consequently his selection of varieties is influenced by genetic properties as well as the ordinary requirements of form, color, quality, and vigor. It is a misfortune that we have so many named varieties to confuse our selection. One can hardly expect to know more than a few hundred names, but what are they to qualify one to select from among over eight thousand varieties. It does have this merit: one need never be ashamed of failing to know a particular variety. My advice to every grower is to try to be a selector rather than a collector of varieties. Add a few every year, but also discard a few which you may have outgrown. Try to see a variety before you buy it, but failing that, read about it from several sources. Own copies of the Royal Horticultural Society, Classified List of Daffodil Names and Daffodil Year Book. The former is a shilling, the latter six shillings each year. The American Horticultural Society has also published useful daffodil year books. Try to avoid allowing your collection to become clogged with varieties you do not really enjoy. As your acquaintance expands, cultivate your own taste in varieties and defend your own likes. Your own particular garden and your own growing technique must be the final proving grounds for the varieties which you should grow.

For your California consideration I have prepared a list of varieties. It is by no means complete, but is modified according to southern California behavior. Time permits only the briefest mention of some of these varieties.

Yellow trumpets always include forty-one-year-old "King Alfred," though "Aerolite" and "Royalist" are just as early and more prolific. "Godolphin" produces seedlings better than itself and has a liking for California. "Mortlake" from Australia has great substance and form. "Dawson City" has much to recommend it.

White trumpets are a little temperamental, but "Beersheba" is reaching a price where it may be tried again when unsuccessful at first. "White Conqueror" has much substance and survives better than most.

In bicolor trumpets try "Gregalach" for size with beauty, "Jack Spratt" for clean color, and "Halfa" and "Effective" for substance.

The Incomparabilis division offers the widest range of choice. In self-yellows "St. Issey" and "Crocus" stand out for color, length of stem, and vigor. "Havelock" and "Trennoon" are both excellent for form. The most for your money is to be found in "Lucinius." Every breeder should have "Soult," "Pilgrimage," and "St. Egwin." One red-and-yellow which is beautiful rather than startling is "Aladdin's Lamp." Every collection must eventually contain "Fortune," but it can be overrated. Some of the red-cups do not always develop their color in California, but "Carbineer," "Marksman," and "Cornish Fire" have occasional good seasons. "Pepper" can be depended upon for red with a punch. That goes for its seedlings too.

First among bicolors are "Nissa" and "Penvose," both indispensable to hybridizers. The latter transmits interesting color as well as good form. "Folly" may be hard to grow, but should be tried. "Kennack" is especially decorative in artificial light. "Bodilly" has clean color contrast.

Many *Barrii*'s seem to dislike our hot summers. There is not one yellow in my list except "Pentreath" and it should follow "St. Egwin" of the *Incomparabilis* division. Local hybridizers should work on yellow *Barrii*'s.

"Quetta" is a favorite of the bicolors. It increases well, is vigorous and healthy. Everyone should continue to grow "Firetail." After failing with it for several years, I planted it in half-shade in sandy soil and produced perfect blooms of it four years in a row. "Coronach" and "Ellen Ney" have excellent form.

Good *Leedsii*'s are becoming legion. Some of the higher-priced varieties are temperamental, but "Naxos," "Slemish," "Carnlough," and "Brunswick" should be tried at least once by every enthusiast. Use all their pollen and you will be well repaid even if you should lose the original. The easiest and the most vigorous is "Tunis." It is easy to admire too. "Tullia" and "Queenly" are choice small-cupped *Leedsii*'s.

All *Triandrus* hybrids seem very sensitive to mosaic in southern California, but some bloom well in spite of it.

The *Cyclamineus* hybrids offer a most interesting field for the breeder. Dozens of good rock-garden varieties should emerge from these crosses.

Jonquil hybrids are also sensitive to stripe. "Lady Hillingdon" seems fairly resistant. Furthermore, it is one

variety in group seven which is not entirely sterile. "Solleret" also sets seed occasionally.

It is still hard to find a better Poetaz than "Medusa." It stands the sun much better than "Glorious."

Most of the beautiful Poeticus hybrids soon disappear in my garden. "Snow King" and *Ornatus Maximus* are the most tenacious.

If doubles must be grown, "Cheerfulness" and "Mary Copeland" are recommended.

Last and least are the tiny species. Let me urge every fancier to try constantly to grow them. Many grow easily from seed and some increase enormously from offsets. They will always add interest and pleasure in every collection.

DAFFODIL VARIETIES RECOMMENDED FOR THE
ADVANCED AMATEUR IN CALIFORNIA

- | | |
|-----------------------------------|------------------------------------|
| 1-a. <u>Yellow Trumpets</u> | Marksman |
| Aerolite | Pepper |
| Dawson City | St. Egwin |
| Godolphin | St. Issey |
| Honey Boy | Soult |
| King Alfred | Trenoon |
| Mortlake | |
| Royalist | |
| 1-b. <u>White Trumpets</u> | 2-b. <u>Bicolor Incomparabilis</u> |
| Beersheba | Bodilly |
| Eskimo | Folly |
| White Conqueror | Hades |
| White Emperor | Isidoor |
| | Jean Hood |
| | Kennack |
| 1-c. <u>Bicolor Trumpets</u> | Nissa |
| Effective | Penvose |
| Gregalach | Red Abbot |
| Halfa | Rewa |
| Jack Spratt | Seabank |
| | Polindra |
| 2-a. <u>Yellow Incomparabilis</u> | 3-a. <u>Yellow Barrii</u> |
| Aladdin's Lamp | Pentreath |
| Carbineer | |
| Copper Bowl | 3-b. <u>Bicolor Barrii</u> |
| Cornish Fire | Coronach |
| Crocus | Ellen Ney |
| Dick Wellband | Firetail |
| Fortune | Lady Kesteven |
| Havelock | Mr. Jinks |
| Killigrew | Niobe |
| Lucinius | Ottawa |

- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Pera
Quetta
Sunstar</p> <p>4-a. <u>Leedsii</u>
Brunswick
Carnlough
Cicely
Daisy Schaffer
Diplomat
Duncan
Lily of Rotherside
Ludlow
May Molony
Mrs. R. O. Backhouse
Naxos
Niphetos
Poldhu
Slemish
Tenedos
Tregantle
Tunis
White Maiden
White Sentinel</p> <p>4-b. <u>Short-Cup Leedsii</u>
Hera
Mystic
Queenly
Tullia</p> <p>5. <u>Triandrus Hybrids</u>
Moonshine
Pearly Queen
Silver Chimes</p> | <p>6. <u>Cyclamineus Hybrids</u>
Beryl
February Gold
Pepys</p> <p>7. <u>Jonquilla Hybrids</u>
Golden Perfection
Lady Hillingdon
Lanarth
Polmesk
Solleret
Trevithian</p> <p>8. <u>Tazetta Hybrids</u>
Medusa
St. Agnes</p> <p>9. <u>Poeticus</u>
<i>Ornatus Maximus</i>
Snow King</p> <p>10. <u>Double</u>
Cheerfulness
Mary Copeland</p> <p>11. <u>Species</u>
<i>Bulbocodium Cantabricus</i>
<i>Bulbocodium Citrinus</i>
<i>Bulbocodium Conspicuum</i>
<i>Canaliculatus</i>
<i>Cyclamineus</i>
<i>Jonquilla Simplex</i>
<i>Juncifolius</i></p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

DAFFODILS IN THE PACIFIC NORTHWEST

By Grant E. Mitsch

Quite a number of phases of daffodil growing might be considered under the title applied here, but a comprehensive survey of the many angles attached to the business and pleasure of growing these most interesting of early spring flowers would be beyond the scope of this paper. Doubtless nowhere else are daffodils grown so extensively and with such an interest as in the British Isles, where they seem to grow to perfection. The Pacific Northwest is frequently referred to as having a climate similar to that of Great Britain, and while we have perhaps somewhat warmer and dryer summers, it is likely that daffodils do at least as well here as in any other section of the United States.

The Pacific Northwest being the major bulb-producing center of the country, it would seem logical that it should be a center of interest in the testing of new varieties. Be that as it may, there seem to be comparatively few individuals here who are growing any great number of the recent novelties. A few of the large commercial growers have trial grounds where recent introductions are tested. It might be argued that not many of the new things will ever reach the commercial field, and while this is doubtless true, yet without experimenting no progress will be made. The true fancier, however, usually gives space to many varieties which have no particular merit commercially and he grows daffodils for their own intrinsic beauty, regardless of their possibilities in the channels of trade. He may also grow to exhibit, and what makes a good exhibition flower may be a flat failure on the market. Of still greater importance, he grows a wide selection of varieties in the interest of hybridizing, for a variety which may not be quite "good enough" may be a valuable asset to his breeding stock.

Since my own interest has to do primarily with novelty daffodils, a few notes as to their performance and my impressions and preferences will be the basis of these remarks.

Early flowers are much sought after and perhaps with more reason in daffodils than in others, as they are about

the first important bulbous flowers to bloom. The first blooms are most welcome harbingers of spring. True, some of the species, notably the bulbocodiums, may rush the season somewhat by making their appearance in midwinter, but the larger hybrids seldom come on until spring is really on the way.

The yellow trumpet section includes most of the earliest flowers, and although "King Alfred" is still considered the best early variety, there are several rivals appearing that bloom from one to two weeks earlier. Most of the extra-early flowers have been deficient in substance, color, form, or strength of stem but these faults are gradually being eliminated. "Magnificence" is one of the earliest, and although it lacks somewhat in height and refinement, it has much to recommend it. The less well-known "Goldbeater" seems quite as early and is taller and of better form. Moreover, it has great depth of color, being a rich pure golden-yellow, deeper in tone than "King Alfred," and with a larger flower. A few days later comes "Diotima," a giant, very tall, well-formed, medium yellow self, and "Elgin," a pure, deep rich yellow possessing perhaps the finest texture and most finished, velvety textured, well-flanged trumpet of any variety I grow. The perianth is not quite as flat as one might desire but otherwise this is one of the finest yellow daffodils. In a few more days "King Alfred" with its multitudinous retinue comes on the scene. "Godolphin" is another pure yellow of excellent form, size, and habit. A rival of "Diotima" in size and a most imposing although not quite as tall a flower is "Ben Hur." "Statendam," "Aubrey," and "MacMahan" are all huge but not quite so finished in form as those already named. With a most showy flaring trumpet, sometimes three inches across, "Kandahar" makes its bid for attention, and of course, "Megaphone" might be presented as an example of extreme development of the trumpet until novelty rather than beauty is ascendant. "King of the North," "Alasnam," and "Aerolite" all bloom about the same season as "King Alfred" and the last two are particularly suitable for cutting. A little later "Sorley Boy," "Fortress," "Principal," and others come on. The last mentioned is a very nicely formed flower. "King of May," a large shapely flower, ends the yellow-trumpet season.

White trumpets in general do not come quite as early as

the first of the yellows but a few come on about as soon as "King Alfred." Of these, "Beersheba" is becoming the best known of recent introductions, and while we do not get the height here attributed to it in parts of the British Isles, it is truly a magnificent thing. A vase of "Beersheba" just cut today, March 12, while not yet showing the purity it will exhibit in a few days, only serves to justify my recollections of its immaculate beauty in past years. "Corinth" is a rather similar flower with still better substance. While a little smaller, "China Clay" is of most exquisite form and texture with substance that would suggest it had been carved from white marble. Larger than any of these is "Moray" which, although lacking a little in the character displayed by the varieties mentioned above, is one of the best of the giant white trumpets, becoming very white as it ages. "Ada Finch" is a little earlier than any of the others and is a very large flower and one of the most showy whites. It has a huge well-flanged trumpet which opens lemon-yellow and fades to cream. Its main fault is that the stems are hardly strong enough to hold the immense blooms in wet weather. Perhaps if I am partial to any one class it may be the white daffodils. "Naxos" and "Askelon," "Nevis" and "White Emperor," and others might be described were time available. As yet "Kanchenjunga" has not bloomed in my garden but I am hoping soon to have an idea as to its merit.

Bicolor trumpets of quality are rather rare and very few of these have found their way into my collection. "Sincerity" is one of the best of these but thus far has not had very large flowers nor tall stems. "Findhorn" and "Rosemorran Giant" are others of quite good quality.

An entire paper this length might be devoted to the incomparabilis varieties, as this section has many meritorious kinds. Of course, the first one to come to mind is "Fortune," which is truly a great variety and a real achievement. Before me as I write is a vase of "Fortune" and one of its descendants, "Whiteley Gem." The rich orange of their cups is especially noteworthy this year. "Whiteley Gem" is considerably the smaller of the two and the orange of the cup does not run so uniformly to the base but is more intense at the edge, and since it blooms a little earlier, it is very desirable. Among "Fortune's" numerous progeny are several other outstanding things. "Fortune's Crest" is a large flower of brilliant col-

oring and is an early bloomer. While "Hugh Poate" did not show much color the first year here, that seems characteristic of some varieties. Nevertheless, it was a well-formed large flower having broader perianth segments than its noted parent. Several others such as "Fortune's Sun," "Fortune's Bowl," and "Bokhara" look good. Among other outstanding new ones are "Cheerio," which looks especially fine, "Porthilly," "Trevisky," and "Adler." "Scarlet Leader" is an extremely showy variety. In the all-yellow *Incomparabilis*, "St. Egwin," "Trenoon," "Carlton," and "Crocus" are varieties which I would not want to be without. Another fine all-yellow early bloomer is "Malvern Gold." Among the bicolours "Polindra" is a magnificent thing.

In the *Barrii*'s we have some of the most brilliant bits of coloring of which "Lady Kesteven" and "Hades" show perhaps the most red. "Market Merry" is a gorgeous deep yellow with a rich red cup, and "Peking" comes late with its beautiful wide flat perianth and large flat orange-red cup, one of the most satisfying surprises of the season. Others might be mentioned but for lack of time.

Some of the most beautiful flowers are found among the *Leedsii*'s. Of these, the familiar "Tunis" holds the love of those who have seen it. Some more recent varieties surpass it in form but the buff apricot frill at the edge of its cup is so captivating that it will take a wonderful flower to displace it. "Brunswick" is a wonderful new one slightly reminiscent of "Tunis," with broad flat perianth. Among all-white flowers of this class perhaps none has taken more honors than "Slemish." Some years it does not come very large but it is certainly a beautiful flower. I am hoping this year to be able to compare it with "Truth."

While I have grown a number of varieties from other sections, they have been much less numerous than those in the sections alluded to above. This has been but a brief résumé of a part of the varieties grown here, but I trust it may inspire others who have grown only the older varieties to try a few of the newer things.

SOME NOTES ON ROCK GARDEN DAFFODILS

By Drew Sherrard

There is little need to explain the attraction of small things. All of us, even while we strive for the tallest delphinium, the largest sunflower, are susceptible to the charm of perfection in miniature, the lure of the little ones.

Perhaps that is why rock gardening has so many devotees. It offers gardeners a chance to own and display in the right setting all manner of small treasures. The lesser daffodils have a right to be considered among these, both the true miniatures, wild species and varieties, and a number of small hybrids.

I shall begin these notes with my favorite, the first miniature I ever saw, that delightful elfin thing, *Narcissus cyclamineus*, the cyclamen daffodil. Truth compels the admission that it is often a sulky performer, in gardens where for some reason it gets too little moisture. Collectors tell us it is found naturally in places where the soil is moist, but not boggy. Translated into garden terms, that seems to mean, "Place it in a low place where it will receive drainage from above, in soil that is of a texture that drains readily."

In Portland, Oregon, gardens it does well at the foot of well-watered rockeries, but an even better situation is beside a pool, where seepage may reach it. In my garden it gets no coddling, for it is a sunny, rocky slope. For this reason it never grows as tall as I see it in some gardens, but I like it as well, at five inches. The bright yellow flowers with long cylinder-shaped noses and tightly up-turned ears, appear in February and last about a month, though in sunnier climates I suppose the season of bloom would be shorter.

Taking a step backward in the year's processional of the miniatures, we find the Algerian daffodil or "White Hoop Petticoat," *Narcissus bulbocodium monophyllus*, in bloom in January. (I suppose that would mean Christmas in California.) Now January in Portland, being trickier than January in the Mediterranean region of Africa, we put this bulb into cold frames to avoid freezing. I do grow some outside, and most years they have bloomed successfully, in a sheltered south-

facing shelf of the rock garden, well protected by big boulders from the north and east wind. Here they are assured the good summer baking the bulbs want.

Though it is too tender for growing outside in the East or Middle West, it makes a good pot daffodil, and I should think would do very well in California, if sufficient moisture were assured during the growing season. Creamy white as it unfolds, the little loudspeaker soon turns pure white, a charming flower. We grow it in half-and-half black leaf-mold and sharp sand.

January sees also the first blooms of *Narcissus minimus*, a dainty yellow trumpet type. Too much of the good things of earth will make it too tall; I like it best when about three inches high. Left to itself it forms offsets and makes a little colony, just as the big trumpets do. I grow it in boxes sunk in the ground for coolness and concealment, to outwit the moles. If it does not lack for water during the ripening period, it makes abundant seed. To conserve moisture, if the weather turns too sunny at this time, I arrange a little shade for them. Then it is a race with the mice to see who gets the seed.

There are three little daffodils that I think of as the Three Bears of the rock garden. *Minimus* is the wee bear, *minor*, the big bear (height six to eight inches), and the middle-sized bear is *nanus*, which comes up to five inches, though its habit of blooming with its chin on the ground makes it seem shorter. As these notes are written in March 1940, it is cheerfully in bloom in a bed at the foot of a sloping rockery, though mud-splashed by the recent rains. I like its size, its proven hardiness, and its generous increase.

The later hoop petticoats differ from the early white one in preferring a moist place, so we give them a good deal of peat in their low-lying bed. *Narcissus bulbocodium conspicuus* is bright yellow and taller than *citrinus*, which has light yellow flowers. *Conspicuus* is easier to grow, and makes more rapid increase. *Nar. b. tenuifolium* has shorter stems and wider trumpets than *conspicuus*, which it resembles in color. We mulch our hoop petticoats with fir twigs, as they send up foliage early and sometimes get it frozen if left exposed.

First choice among the Triandrus group is usually *Nar.*

triandrus albus, the "Angel's Tears" daffodil. Its clustered, pure white, drooping bells with flyaway reflexed petals do look like tears, the tears the angels—the horticulturally minded angels—must weep when they look down upon the weeds in my spring garden. But alas for poetry! That name only commemorates the noisy grief of a little Spanish boy named Angel, spanked for his laziness by Peter Barr, who had employed him to collect wild daffodils.

Besides this one, there are *Nar. triandrus calathinus*, a lovely white flower, larger than *albus*; *pulchellus*, small creamy cups with yellow petals; and *concolor*, soft yellow.

Moschatus of Hawarth has a long, straight trumpet and forward-drooping petals, a charming white "sunbonnet baby."

There are miniatures of the jonquil type, fragrant, yellow, and shallow-cupped like the big jonquils. *Nar. jonquilla simplex* is tall, a foot or more, but miniature as to flower; *Nar. juncifolius* and its variety *rupicola* are true miniatures, a few inches high. The smallest daffodil known, and still quite rare in cultivation, *Narcissus scaberulus*, is of the jonquil group. I find the jonquils like light, sandy soil, fairly rich; and they demand more moisture here than the sun-loving *Bulbocodium monophyllum*.

People who love the old pheasant's eye and others of the Poeticus group, will find the same charm in the miniature *Nar. Watieri*, a starry, inch-wide white flower that is destined to be a favorite when it is better known.

And those who have known and cherished the old bulbs the Chinese cooks and laundrymen used to bring us, the Chinese Lily, will find again in miniature, those flowers in *Nar. canaliculatus*. Even the scent is the same.

To give space to the small hybrids in this paper is impossible, but a few of them are so outstanding as to require mention, at least. Of these I list first, the natural hybrid *Triandrus*, "Queen of Spain." Usually a bright yellow, it is rarely found in citron yellow, and the shape of its trumpet varies a good deal. "February Gold," though it does get too tall for my garden, is a delightful thing. So is "March Sunshine" another *Cyclamineus* hybrid.

Triandrus hybrids abound, but none are lovelier than "Thalia" and "Moonshine." "Ard Righ," an old-fashioned small yellow trumpet, and "W. P. Milner," a white, small trumpet, are still favorites for rock gardens, and I could always find a plade to tuck a group of "Orange Queen."

The culture of the miniature daffodil species is easy, once one gets rid of moles and learns to fight the daffodil fly. They are all possible to increase by offsets, but the best way to obtain a large supply is by seed. I sow them in early fall in boxes or raised beds. The seed come up in the following spring and it takes about four years to get bloom. What is four years to a gardener?

THE USE OF DAFFODILS AS GARDEN DECORATION

By Lockwood and Elizabeth de Forest

We have been asked to talk about the use of daffodils as decoration in the garden, and as the gardens we know best are in the southern part of the state we shall stand on the fairly firm ground of our own experience and knowledge and confine our remarks to how daffodils may best be treated in southern California gardens.

Imitating English and Eastern methods of naturalizing Narcissus in the woodlands or planting them in drifts to come up through a *Mertensia* or Forget-Me-Not ground cover is not the most effective way of planting in our part of the world. Where we have woodlands, they are apt to be composed of Live Oaks whose shade is so dense that daffodils will bloom there only one season; and as it is impossible to get a first-quality stand of either *Mertensia* or Forget-Me-Nots, there seems little excuse for maintaining poor copies.

For the real daffodil enthusiast there is perhaps no better way to display his treasures than by planting them in borders on either side of a long path, the width of the beds to be determined by the number of bulbs he feels he must grow. This arrangement makes the flowers easy to inspect and easy to cultivate. If it can be so managed that this path is used by garden visitors only when the daffodils are in bloom, then the gardener is indeed a lucky fellow. A path plan, such as this, is a very flexible one and can be adapted to suit any type of garden. In the beds bordering the path the different types of *Narcissus* can be segregated and placed where they will show off to very best advantage, taller stands to the back, shorter-stemmed varieties out in front, etc.; and as the various kinds increase larger and larger sections can be given over to favorites. In the meantime masses of less-expensive varieties can be planted between sections of high-priced ones so that a pleasing color effect can be achieved on either side of the path.

The "purist" and daffodil "nut" may insist on nothing but *Narcissus* in such a planting. The more normal gardener will want to edge his path with a showing of some low growing

annual—Virginia Stock or Sweet Alyssum. He will separate his various kinds of bulbs by sections devoted to spring flowers—Nemesia, Linaria, Violas, etc., and in some cases he may even use a ground cover of Violas or white Silene for the bulbs to come up through. Such a daffodil path, whatever way it may be treated, makes a memorable feature of the spring garden.

Gardeners who love daffodils but cannot get along without the other spring-blooming plants and bulbs will make a different type of garden. For instance, we feel that we want to combine our Narcissus with other spring bulbs such as Streptanthera, Babianas, Freesias, Ixias, Sparaxis, Leucocoryne, and Brodaea, which do so well with us and bloom right along at the same time. By framing our various favorite Narcissus with spring flowers we actually make a single bloom of some expensive treasure mean something more than one specimen sticking up through the ground. There is a creamy white Sparaxis hybrid that combines most beautifully with the white daffodils and adds contrast in form so useful in any garden picture. The blues of the new Babiana hybrids and the Leucocoryne work in well with the pale yellow daffodils while the brilliant salmony shades of the Streptanthera make dazzling contrast with the clear bright yellow sorts.

We also like to use trees and shrubs that bloom at the same time—deciduous Magnolias, Ceanothus, Chorizema, and the flowering fruit trees—to harmonize or contrast with our daffodils displayed beneath them. To our way of thinking daffodils and flowering trees go together like bread and butter; they are essential one to another, and it is indeed a dull spring garden that does not combine their seasonal beauty.

Surely for the fullest enjoyment of the species Narcissus and their hybrids one needs a rock garden of some sort or at least a sloping piece of ground where one can look up at these delightful flowers from a lower level. Then, too, rocks seem to set them off better than any other background that can be devised. Our mass of "February Gold" on its eye-level shelf, seen against the warm tones of our native stone, is the nicest picture our early spring garden affords. The colonies of *N. bulbocodium* in their rock pockets give an effect that would be entirely lost should they

be planted in front of the ordinary flower border. *Narcissus canaliculatus*, which blooms so profusely for us, means very little when it is just a mat of grass with a few stalks of miniature Chinese Lilies coming up through it, but when properly set in a rock pocket with a background of stone, its elfin flowers have a chance to show their real charm. Then, too, for the full realization of the delights of the Triandrus hybrids, "Agnes Harvey," "Moonshine," "Thalia," etc., one wants to be able to look up at their exquisite bells or miss a good part of their grace and beauty.

To conclude, then, we should say that every real Narcissus enthusiast should have three methods of displaying his flowers in the garden: the long path bordered by treasures and rarities where he can easily observe points of perfection and quality in the individual flower; the mixed planting with other spring bulbs and flowering shrubs and trees where he aims primarily for beauty of the spring picture; and the little rocky slope for growing his species and low-growing kinds. If he can plan his garden to include all three of these features, then spring is for him a time of continual excitement and rejoicing.

THE WOODSIDE PROJECT IN POPULARIZING DAFFODILS

By Mae Vrooman Forbes

In the summer of 1938, the Woodside-Atherton Garden Club decided to undertake a Daffodil Project.

The purpose was to assemble, in gardens of members, a comprehensive collection of varieties; to record the behavior of the varieties grown and to evaluate them for the special uses in this locality; to keep abreast of the horticultural work being done and to recommend to the Club members varieties for planting.

To make a start, we prepared a list of inexpensive varieties, easily obtainable, and mailed it to our members. We asked them to meet with the Committee and go over the list, and order the varieties they preferred to grow. We were late in getting our order in, and suffered many disappointments in not being able to get the varieties ordered. When we found that we could not get all the varieties we had ordered, we sent in a substitute order. Even that, in some cases, could not be filled. However, we did plant about thirty varieties that we had not grown before.

We also made the mistake of not sending each member a list of what she had actually ordered. When the bulbs were delivered we sent cultural directions and blanks on which to keep a record of the behavior of the bulbs. For the most part, the bulbs were successfully grown; and in March 1939, the Club held a daffodil meeting. Nine members exhibited specimen blooms. The California Nursery, Hyde's Nursery, and the Oregon Bulb Farms had sent comprehensive collections, and the members became quite enthusiastic over the project.

In 1939, profiting by the experience of the previous year, we had our meeting for ordering bulbs in May. Where in 1938, thirteen members had ordered 817 bulbs of 30 varieties, in 1939, twenty-one members ordered about 1,900 bulbs of 92 varieties. Profiting by a mistake of the previous year, when the bulbs were about due, the Committee sent each member a list of the varieties they had ordered. This was necessary, as often the choice of variety had been left to the Committee, the member indicating type desired and price range.

In March 1940, we will again have a show of our own grown flowers, and hope to have many more varieties exhibited than we had last year. We have made a cross file of varieties and of the members growing them.

As we go along in our project, we are wondering if we are approaching it in the way that will be of the most value to ourselves. For instance, we find it hard to evaluate varieties of yellow trumpets, if they are grown in different gardens. We may find that it will better serve our purpose if we can grow a comprehensive number of one kind in one garden. However, our first effort has been to make ourselves daffodil conscious, and we think we have made considerable progress along that line.

DAFFODIL DISEASES

By Frank P. McWhorter

Corvallis, Oregon,
March 9, 1940

Dear Mr. Mitchell:

I am in receipt of your letter asking about the investigations on daffodil diseases made by the U.S. Department of Agriculture and co-operating states. This letter summarizes the work to date.

American investigations on Narcissus problems have nearly always been co-operative between state and government because the American industry began in order to meet the emergency which a quarantine action against stem nematodes involved. The daffodil was obviously an efficient means for world-wide dissemination of a dangerous strain of the stem nematode, *Tylenchus dipsaci*. The original investigations carried out on Long Island, in Virginia, at Bellingham and Sumner, Washington, in Mississippi, and at the Oregon Experiment Station dealt almost exclusively with the development of a hot-water treating program to eliminate this worm and certain insect pests in American plantings. The results of this first program showed that economic control and sometimes complete control could be obtained by the 110° to 112° water bath for periods of 3 1/2 to 5 hours varying with the size of the bulb. In the warmer climate zones this treatment immediately led to a terrible dissemination of the Fusarium disease known as basal rot. With a diminution of nematode infestation, the basal rot problem became the number one problem for most sections of the country. I am describing the progress of basal rot investigations later in this letter. The American viewpoint in regard to nematode, at least in areas where climatic conditions were favorable to Narcissus production, aimed toward complete elimination of nematode. This viewpoint led to later refinements and variations in the original technique. The chief new refinement is the discovery made independently by Dr. Steiner and Dr. Wm. Newton that a pre-soak at temperatures around 70° would bring the nematodes out of dormancy into a condition that makes them highly susceptible to the lethal effects of hot water. This refinement has permitted complete control

in certain varieties where the large size and compactness of the bulb tended to shelter the worms against heat. Moreover, it overcomes the difficulty of destroying the external colonies of nematodes which form heat-resisting white crusts at the base of the bulbs. A second refinement consists in the utilization of vapor heat-treating rooms where tons of bulbs can be processed at one time and then dried by the mechanism used in distributing the vapor heat. This hot-vapor treatment applied to planting stock which is at odd years subjected to hot-water treatment accounts for the unbelievable freedom of hundreds of acres in the Northwest from this pest.

Coincident with the study of nematode control, two other disease conditions had to be considered. These are basal rot and virus troubles. Basal rot was introduced along with nematodes in the original bulb stocks. Unfortunately, the hot-water bath for nematode control proved a natural means for dissemination of basal rot and led to extreme losses in Eastern and Southern plantings. The original opposition to hot-water treatment originated because the growers mistook introduced basal rot for hot-water injury. Hot-water treatments do mildly affect the shape of flowers but the injury in itself is of no consequence to bulb growers. Extensive data has been accumulated to determine when to treat each variety to avoid injury and obtain good blooms from treated bulbs. On the other hand, basal rot uncontrolled can reduce five acres of a bicolor to half an acre in one year and there are many such cases on record. The first step in basal rot control involved the introduction of a suitable fungicide into the hot-water treating vat or as a separate treatment immediately after the hot-water application. Organic mercuries of the Ceresan group proved highly effective for this purpose but do not permit the complete control of basal rot. Complete control involves elimination of reinfection from all sources. In addition to dissemination during hot-water treatment, the fungus is able to spread from bulb to bulb within the bulb row or bed. Spreading during storage is entirely possible if humid conditions obtain during storage but most of the loss during storage relates to incipient infection which occurred during the growth of the bulbs. The basal rot investigations have continued on Long Island and concern chiefly these two latter means of spread, namely,

field and storage infection. It has proven very difficult to discover a disinfectant which can be applied to the bulbs during the storage process without at the same time unduly injuring the bulbs. Many chemicals have been tried and Dr. Haasis who is the chief investigator in this line of work is making progress. On the other hand, it has been found feasible to drill certain disinfectants in the bulb row to prevent spread under field conditions. Long Island conditions where land values are very high and bulb crops have a short haul to market seem to warrant expensive soil applications. A standardized method has not been worked out as yet but there is every prospect that this form of control will be recommended soon.

In addition to chemical applications during storage, it has been shown that improvement of storage conditions and adjustments of temperature greatly reduce the losses from basal rot. Fortunately the summer climate in the Pacific Northwest is usually favorable to the health of the bulb and basal rot has not become the problem it is in other sections. It is fully realized by Northwest growers that basal rot must be eliminated from their cultures because when these bulbs are moved to other sections of the country, latent infections develop which would have been unnoticed in a cool, dry climate. For this reason, the chemical control is practiced in the Northwest just as it is in other sections of the country.

The control of viruses has been emphasized in the Northwest plantings where natural conditions permitted a relatively easy overcoming of other diseases. In the early days the presence of a virus disease called mosaic which was introduced from Europe was very apparent. This disease was abundant in European stocks because Holland growers and investigators failed to recognize it to be a disease. Recently, it has been proven on Long Island that this and other Narcissus virus diseases are carried by certain aphids which there feed on Narcissus. The means of spread in the Northwest has never been discovered and aphids can hardly be the vector. Spread does take place and the closer the plants, the greater the spread. Control of the disease in most varieties was brought about by roguing. It was found that the earlier the roguing the better the control. This method, however, was not satisfactory for those cases where

the variety averaged extreme percentages of disease. For example, the desirable early variety "Minister Talma" in average imported stocks showed 98 per cent diseased individuals. In these cases it proved more feasible to select out the healthy plants and use these as foundation planting stocks and then rogue the resulting planting. By this means one Northwest grower has obtained a planting of five acres of this desirable variety which now averages less than one mosaic plant per acre. The phenomenal success of this type of control in the plantings probably relates to the circumstance that the vector, whatever it is, is not usually abundant. We know this is true because careful records at this Station have shown that some years the spread is zero while other years it may be as much as 20 per cent in closely planted rows.

During recent years we have observed another virus disease which we choose to call Decline Disease, since if left uncontrolled the size of the bulbs and flowers tends to diminish. The Holland name for this disease is Zilverblad, which connotes "white streak," a name frequently used to refer to this virus condition. Mosaic causes streak-like redistribution of the green leaf pigments. The new virus is evidenced by purple streaks, by white streaks, and by a combination of these, but purpling in spots or streaks may result from some other cause. Many growers have started elaborate control programs to meet this new menace. Fortunately, the disease can be rogued to some extent in the bulbs by the simple process of planting only the large bulbs and taking precautions to destroy the small rounds.

What might be termed occasional diseases of Narcissus, from an economic viewpoint are the leaf spots and rots. The wet spring weather in the Northwest develops an extreme form of Botrytis blight which can destroy the foliage. The brown leaf spot known as Stagonospora which is common on Amaryllids in California and universal on Narcissus in America does damage. When conditions suggest the appearance of these conditions, the Penetrol-Bordeaux spray developed by Dr. Huber has proven highly effective as a preventative and is commercially applied on hundreds of acres of Narcissus within the state of Washington.

A somewhat rare disease of Narcissus is known as Ramularia blight. When the leaves push through the ground they

turn white as if covered with snow and the foliage is rotted. Experience has shown that continual moving of plantings and treatment of bulbs as for basal rot makes this disease relatively innocuous.

In summary of the above comments from the standpoint of work being done I would state that the basal rot situation is being intensively studied on Long Island. Satisfactory control for leaf spots has been developed in Washington state and that intensive programs on the viruses are being continued both here and on Long Island.

Very truly yours,

Frank P. McWhorter,
Plant Pathologist

BREEDING DAFFODILS IN OREGON

By E. N. Hornback

Our interest in hybridizing at the Oregon Bulb Farms dates back to the year 1929, with the first flowering of a magnificent collection of daffodils, largely obtained from De Graaff Brothers in Holland. This collection included not only all standard varieties, but also many novelties and unnamed seedlings which were sent over to be tested in this country. In 1933, we added to this collection the daffodils gathered by the late Mr. Franklin B. Mead, of Fort Wayne, Indiana, and in the following year we bought from Mr. R. F. Calvert, of Coverack Cornwall, England, from one to three bulbs of each of his named varieties. Altogether, we had at one time or another over twelve hundred named daffodils, but by rigid selection we have brought the number down to about six hundred. With such a collection at our disposal, we have an exceptional opportunity to do some breeding.

In the past few years, I have been in charge of this work, under the general direction of Mr. Jan de Graaff, owner of the Oregon Bulb Farms. Our early efforts were on a rather small scale and were not regarded very seriously until 1934. In this year the first batch of seedlings came into flower and, while there was nothing very exceptional among them, they were all interesting plants and we were encouraged to greater efforts, until at the present time we have many thousands of seedlings coming on from hundreds of different crosses.

In addition to growing hybrid daffodil seed, we also propagate large stocks of various *Narcissus* species from seed. These mostly come true, although there are occasional variations, or accidental hybrids. Some of these variations are exceedingly beautiful, but are, unfortunately, difficult to propagate asexually. Young, seedling grown, miniature daffodils are much more vigorous than collected bulbs, and are much easier to establish permanently.

As the result of several years of experimental work, our methods of growing hybrid daffodil seed have become more or less standardized. The first step is soil selection. This is done with great care from fields that have been known to

produce good crops of bulbs, and have since been fallow for two years. We have never had any results from using fertilizer, but have found that the addition of a moderate amount of clean river sand causes the little plants to produce an extra strong root system which results in better growth. Large lots of seed are planted in flats six inches deep, and smaller lots in six-inch pots. We plant about twenty-five seeds to the pot and find that they do better when they have company. During the winter, the seeds are kept in a cold frame and in the spring the sash is removed and replaced by lath, giving half-shade until the end of the growing season. When the foliage has ripened, the bulbs are dug and replanted at once in the open ground without being allowed to get dry. Some seedlings will flower the fourth year, and by the sixth year practically all of them will have flowered.

The process of crossing daffodils is so simple and well known that it needs no mention here. We follow the standard procedure, except that certain varieties used on a large scale as seed parents are not emasculated as usual. Records over a period of years have shown us that the percentage of flowers that become self- or accidentally fertilized in these varieties is too small to be of any importance. Complete records are kept of all the work done, as we consider this very important if the work is to be continued over a period of years. Far too many of our good varieties are of unknown, or uncertain, ancestry.

Our breeding program includes the attempt to produce some new commercial varieties as well as improved sorts for the garden. Considering the commercial varieties as a group, we find the yellow trumpet and bicolor types in most demand. This point has been largely overlooked by many hybridizers in recent years, and few American breeders take much interest in this group. Bicolors, in particular, have been greatly neglected. I believe this class offers the greatest opportunity for the production of new varieties, because of the lack of competition, and their commercial importance.

In the yellow trumpet class, "King Alfred" is still the leader in the commercial field. This old variety has so many fine qualities that it is difficult indeed to produce a seedling with all of its good points, much less an improvement on them. In general, we would like to have as a commercial variety a more refined flower without losing the hardiness, vigor, and color of "King Alfred." For garden use there

are at present many yellow trumpets that I, for one, like much better. We are using for both seed and pollen parents in this class, the following varieties: "Alasnam," "Aerolite," "Ben Hur," "Cleopatra," "Diotima," "Dawson City," "Fantin Latour," "Golden Harvest," "Megaphone," "Solferino," "Statendam," and others. Many yellow trumpets of recent date do not even compare with those introduced fifteen years ago.

In the white trumpet class, we have a fine collection of new varieties from both English and Dutch sources, which includes stocks of such varieties as "China Clay," "Everest," "Jim," "Rosabella," "Roxane," "Sublime," and "White Conqueror." In addition, large blocks of "Ada Finch," "Mrs. R. O. Backhouse," and other fine sorts are available in quantity for large-scale crossing. We have been especially interested in pink trumpets and pink Leedsii and have used them a great deal in the last three years. All, except "Mrs. R. O. Backhouse," are free seeders with us, and even this difficult one can be induced to set seed, if care is taken. This variety is most receptive to pollen the second day after the flowers open and, while we have successfully used a great variety of pollen on it, the most potent seems to be "Rosary" and *Triandrus calathinus*. Also, we have made large-scale crosses of pink varieties on "Beersheba," "Ada Finch," "Daisy Schaffer," "Gertie Millar," "Tunis," and "Betsy Penn," in hopes of producing a pink with more size and better form.

This year, for the first time, several thousand seedlings are flowering at our farms. Among them are some crosses between "Ada Finch" and other early trumpet types. Several of these are very fine large bicolors and white trumpets, flowering as early as "February Gold," and we are greatly interested in their possibilities for breeding.

In the bicolor class, there is little material to work with at present. "Octavianus," "Mme van Waveren," "Robert E. Lee," and "Silvanite" seem to show some promise.

In the Incomparabilis group, we were very fortunate to obtain from De Graaff Brothers, some of the first plants of their new red cups, such as "Scarlet Leader," "Bertha Aten," and "Migoelet." All of these varieties have large, flat, deep red cups and overlapping white perianths. One of their best characteristics is the ability to hold their color well in the sun. From England, we imported an almost complete col-

lection of new "Fortune" seedlings, which includes "Fortune's Bowl," "Fortune's Crest," "Fortune's Pride," "Fortune's Blaze," "Fortune's Champion," and "Whiteley Gem." And, from another source (The Brodie of Brodie), we imported some of the best of his seedlings—"Coverack Perfection," "Copper Bowl," and others. All of these excellent varieties have potent pollen and all except "Scarlet Leader" and "Bertha Aten" are seed bearers. In this class, we also consider valuable for hybridizing such things as "Adler," "Allure," "Asmode," "Barbara Pratt," "Blazing Sword," "Flaming Torch," "Goldshell," "Mary Longstreet," "Mary Pickford," "Norfolk," and "Optima."

A great deal of our work in the Barrii class centers around the following varieties: "Effie," "Glad Boy," "Hades," "Lady Kesteven," "Peking," and "St. Egwin." "Lady Kesteven" we like especially well because it has the pure, blue-white petals of the Poeticus and a cup of startling brilliance. It is an extra-good seed parent.

The Leedsii group has always been a favorite with us. We were the first in this country to obtain stocks of such magnificent new Leedsii as "Daisy Schaffer," "Veronica," and "Betsy Penn." Later collections brought us quantities of "Tunis," "Suda," "Nissa," and many other interesting novelties, from both English and Dutch sources. Most of our work with these varieties has been on a fairly large scale and we wait impatiently for the time when these seedlings will flower.

I believe that we need greater variety in *Triandrus* and *Cyclamineus* hybrids, and at present we are crossing *Triandrus calathinus*, *cyclamineus*, and *Cyclamineus* hybrids on a variety of types. We also use pollen from some very pretty seedlings resulting from crosses between *Triandrus calathinus* and *concolor*.

In the jonquil, Poetaz, and the Poeticus classes, we have done little work. However, after many attempts, we have succeeded in getting seed from certain Poetaz hybrids previously considered sterile. "Fortune" was the pollen used mostly. Some work has been done using the unique Poeticus variety "Kentucky," which has a coffee-colored perianth tinged with apricot. This is done more for fun than for any serious objective.

In the past few years, we have collected from our fields

several double sports. One of these, found in a block of "John Evelyn," is especially beautiful and may be heard from in later years. A few of these mutations have normal sexual organs and we have plants coming on from both their seed and pollen.

I regret that space does not permit me to give a more detailed report on our work with daffodil hybrids. However, I wish to state that we are anxious to exchange ideas with amateur breeders and hope to see a more widespread interest in the subject among Americans.

The flowering season at our farms will be at its peak from March 20 to April 10, and Mr. de Graaff has asked me to extend an invitation to all who are interested to come and see what we are trying to do at the Oregon Bulb Farms.

A FEW RANDOM DAFFODIL NOTES FROM SOUTHERN CALIFORNIA

By S Stillman Berry

Professor Mitchell has been so kind as to ask me for some sort of an informal paper about my experience in growing and breeding daffodils. My excuse in acceding lies in the circumstance that although my experience may have been less extensive than that of others more qualified to speak, it has at least been different, because gained under different conditions. Even so I fear these impromptu jottings will better serve as an expression of disappointed regret that I am unable to attend this noteworthy conclave in person than as a serious contribution to knowledge. It is true that I have been growing daffodils in my present garden for a quarter of a century or more.¹ It is also true that once I discovered what a lovely thing a really choice daffodil could be, I was not long in trying my hand at raising a few seedlings. But a daffodil is such a slow and patience-trying thing to raise from seed in the first instance, and to work into a comfortably developed clone in the second instance, that it is a long time before the would-be breeder can consider himself as more than a stumbling beginner and a still longer time before he can exhibit a program of breeding in which it is possible to stress the fruits of hindsight as well as of—let us be charitable and say—foresight. Assuming that one may claim his diploma from the kindergarten class when he has brought his first batch of secondary (F_2) crosses to the flowering stage, perhaps I can qualify for your rostrum by saying that I am just about there. With a lighter soil than my naturally arid red clay-loam, I could no doubt have attained this dizzy eminence much sooner. But please remember that even though I commenced a seriously planned program of daffodil breeding as long ago as 1927, as now evidenced by my somewhat elaborate system of records, at which time I attempted some 59 different (and I am constrained to admit, somewhat ridiculous) crosses, and have not missed a year since in making as many

¹I still grow stocks of one or two varieties purchased from the Elliott Nursery (a delightful firm, in those days, to deal with!) away back in 1915.

pollinations as I could find time for, I have hardly ever succeeded in flowering a hybrid daffodil in under five years, while in some cases the process has required a full decade. I must further confess that at first my breeding efforts were not too definitely directed. Even yet they remain to a large degree catholic and opportunistic in that, more often than not, I find myself jettisoning the carefully elaborated dream of a winter evening to follow the more intuitive "inspiration" of the moment, or the exigencies produced by the opening of some new or unexpected flower, or perhaps the failure of an old one to behave according to tradition, or the depredations of a cutworm; but I think there are a few lines of endeavor which I am more and more coming to stress, and in some of which I am beginning to see rather definite results.

The hard conditions which my daffodils naturally have to bear, the failure of many of the old standard varieties, and some new ones (notably those coming from the sands of Holland), and the heart-rending struggle that I early had with disease (particularly with mosaic²), perhaps after all have been blessings in disguise, since they have led me to stress above all else in my seedlings and in the more frequent choice of parents for them, sturdiness, natural vigor, and resistance to or freedom from³ disease. No plethora of technical "points" in a flower can possibly make up for lack of the fundamental qualifications mentioned. Furthermore I will have to confess that in spite of my admiration for the wonderful perfection and geometric symmetry with which an extraordinarily able succession of British raisers has endowed the daffodil of today and tomorrow, my own feeling for its loveliness remains, as it does likewise for the Iris, quite unsatisfied by its use as an exhibition flower alone. I do not decry exhibition flowers as such—let us have them by all means; but at the same time I trust we may never permit ourselves to forget

² Not to mention at least four separate infections of eelworm, which in at least one instance cost me dearly to eradicate, but which I finally managed to conquer without, even to date, any evidence of its spreading.

³ Resistance to and freedom from disease are, alas, not quite the same thing.

that beauty itself is our true desideratum, and this is something that should not and can not successfully be cramped by category. There is still room, I am sure, for dignity of pose, for grace of carriage, for insouciant abandon, for purity of perfume, for luxuriance of foliage, and for the sweet whimsicality of the miniature. All this, I fear, must impress you either as so much platitudo or as unimportant personal opinion. So much the better then to turn to the question of more specific aims, the more important of which now segregate themselves somewhat as follows:

1. While few yellow trumpets are quite as poor settlers in gardens of my type as is the much too greatly exploited "King Alfred," nevertheless not very many of them are genuinely good garden plants. As the boldness and clear, full yellows of the trumpets are most necessary to give character to our plantings, I have made many crosses among them with the hope of securing varieties of merit better suited to our conditions than what are now available. Somewhere I have read that competent British raisers consider first-rate yellow trumpets the most difficult of all daffodils to attain and establish. This may well be, and they are very certainly among the slowest, but nevertheless I really feel that I am making some progress, and by another season or two I should have a wealth of seedlings of interestingly diverse parentage to guide me into further work. The most promising ones I can show to date are mostly derivatives of the wonderful Antipodean varieties, especially the magnificent "Golden Gate." I have long since discarded this variety, even for further breeding, since repeated importation of it has entirely failed to reveal any extant stock clean of streak. Some streak has likewise appeared in its seedlings, but I am glad to say that I have been able to save a fair number of good ones which have shown no trace of the trouble. "Sovereign" is another which in spite of its own susceptibility to this insidious trouble has yielded me sound offspring of character, and I now have many hundreds of seedlings coming on in which I have combined "Renown," "Mortlake," "Itonus," "Golden City," "Wattle," "Commander," "Terrica," "Milana," "Hallmark," and others of that class with "Hebron," "Godolphin," "Crocus," "Lord Antrim," "Honey Boy," "Elgin," and the ilk.

2. The pursuit of yellow trumpets has naturally involved me in a certain amount of work with white and bicolor trumpets, for the latter of which I entertain an especial warmth of feeling. Streak seems to be the special bugbear of the bicolors, perhaps because so many of them are descendants of the old "Weardale Perfection." I originally used that variety somewhat myself, but not any more, and I am trying to veer away from it as strongly as I can in further breeding, bringing instead into the pedigrees some of the wonderful British large-crowned 2B's and 4A's, such as "Bodilly," "Polindra," and "Nissa," and combining white trumpets and 4A's with yellow trumpets. Here "Golden Gate" on "Tenedos," "Beersheba" on "Golden Gate," and "Renown" on "Armistice" have all yielded some quite nice things, several of them plants of tremendous sturdiness and vigor.

3. Sun-resistant, highly colored crowns are a consummation all of us probably crave to have our finger in. Too many of the expensive newer British importations, after all one's sacrifice to secure them, either prove to burn at the edges under our sun and dry winds, or else, like "Folly," develop little intensity. Some of them color up fairly well in favorable seasons, hardly at all in others. Most of the highly advertised "Backhouse" varieties seem coarse to me and their tones crude, this with important exceptions of course. Some of the Australians are marvelously colored even here, but too often their perianths show imperfections which no doubt are worse under transplantation to a new clime than they are in their homeland, but again; once we have gone through the exasperating experience of getting the survivors acclimated after the revolution of seasons through which they must pass, we find some superb exceptions. In my earlier work with these, I had the great good fortune to happen on the old Australian variety, "Warflame," although it was only a "hunch" that caused me to use it as a parent. It was not long before my little clump went the way of all streak in my garden, but before this occurred I had accomplished quite a number of crosses, using both pollen and seed. Almost all the batches which have been carried through to the flowering have proved worth while. Hence it has not surprised me to read in reports from the Antipodes that "Warflame" has proved an important source of fine color in their newer and better

things. After several vain attempts to find healthy stock, I now have a few good bulbs of this going again and am using it further. When I first had it, "Bokhara" was the only plant of the famous "Fortune" strain within reach of my purse. I crossed this both ways with "Warflame" and got some superb things in the progeny, including some of the most magnificently colored crowns in my entire garden. The two best of these, both of which will probably have to be named, I have worked to the limit, saving every possible grain of pollen and crossing them with high-colored flowers of many different strains including "Hospodar," "Penquite," "Porthilly," "Fairy King," "Killigrew," "Garibaldi," "Border Queen," "Rouge," "Cornish Fire," "Marksman," "Market Merry," and of course one another. Surely at least one or two gifted children must arise out of all this fancy heredity!⁴

4. Perhaps most interesting of my fevers and one which still keeps my temperature high, since I have only enough suitable flowers to carry out a very limited number of the possibly profitable pollinations in one season, was the unexpected discovery a few years back that some of the named jonquil hybrids are at least a little fertile and yield viable seeds in this garden, whether they do anywhere else or not. Curiously enough the lovely "Lady Hillingdon," which my friend Kenyon Reynolds has employed with such delightful results in his beds of its progeny, has never yielded me so much as a single seed, but others of the group have done so, and I now have an enormous array of

* "Bokhara" itself is such a sturdy, healthy, dependable plant, so invariably good in performance, and so abundant a seeder, that as a parent I have ridden it pretty hard. This is the first year, I think since I have had it, that I have failed to use it. Its behavior as a garden plant is much better than that of the rather more elegantly finished "Copper Bowl," good as that variety always is. I fear that I am somewhat too prone to get a "crush" upon some one variety in this fashion, using it in so many combinations that I nearly ride it into the ground. One thing may be said for this procedure, however. I usually know a variety considerably more intimately when I am through, and rarely need concern myself with it again except on special occasions. A particular year my inamorata may be "Silver Plane," or it may be "Damson," "Market Merry," "Fairy King," or "Carnlough," and I have, of course, failed to establish complete personal immunity to the "Fortune" virus.

seedlings coming along where the precious jonquil strain is combined with such things as "Havelock," "Alroi," "Golden City," "Pilgrimage" (itself sometimes said to be in part of jonquil derivation), "Bokhara," "Merit," "Golden Delight," "Bodilly," "Marmora," "W. F. Gates" (an exceptionally smooth and clean-toned Australian 2A), "Trojan," "Carnlough," and others. My hope is that the depth of color, smoothness of texture, and sweet fragrance of the jonquil can be carried, at least to an appreciable extent, into larger flowers and plants of better habits of growth than many of those we now have, yet I must admit that the very few so far flowered have failed to reveal anything of great importance.

5. I have made a lot of more or less involved crosses with the shrewd design of chasing some pink out into the light somewhere, but results to date are no better than anticipatory. I still hope, but feel silence the part of discretion until success has condensed itself to some degree from the present mirage.

6. Small daffodils, especially where *Cyclamineus*, *Triandrus* in its varied forms, and *Jonquilla* have been utilized to furnish one or both of the parents, have always been most fascinating to me, and I always try to do at least a little in this line every year. So many of the crosses I try are difficult ones to manipulate that too often only failure results, but from those which have proved successful have arisen several of the most charming plants I grow. Pollen of *Triandrus albus* on that stand-by of an earlier day, "Bernardino," gave me a long line of winsome, pale elfin-flowers, everyone of them a joy. Many shared the susceptibility to streak of the two parents and were quickly eliminated. Many are of the well-known "Agnes Harvey" type and require no further comment, but several have proven quite good, and among these one utterly distinctive and dainty sprite, has been registered "Dancing Fairy." The flowers hang, one or two to the stem, the snowy perianth thrown up and back like the flanges of a Turkish bonnet, and the wide, clear yellow, fluted crown flaring out below like the skirts of a wee whirling dervish. I know no other named daffodil the least bit like it. Unhappily it is proving very slow to increase.

Another joyous cross, and one which I did not find it at

all easy to come by, has been Cyclamineus on a very dwarf-statured form of Jonquilla. The result has been a small series of happy, healthy little plants almost equally sharing the features of both parents, including the long, ears-thrown-back, Dodecatheon-like form of Cyclamineus and the intense color, clustering, and sweetness of scent of the seed parent. Most of the scapes throw two to three flowers each, but on one plant the number is five. They come into bloom over a remarkably long period (though in the main well ahead of the jonquil parent), and exhibit the most astonishing tenacity on the plant. For instance, this year the first flower of any of them opened on January 28, and this identical scape finally wilted only on the morning of March 11, having remained in bloom through storm and sunshine exactly six weeks and one day. Two of these treasures have been duly registered as "Golden Chimes" and "Happy Elf," and I fear that due to the differences shown in habit and period of bloom, I may have to name yet another pair of them. Another quite pleasant midget came out of "W. P. Milner" by Cyclamineus, and is to all intent a tiny pale IC, with the trumpet deeply fringed at the edge in the fashion of a Soldanella. Yet another interesting flower resulted from a cross of *Triandrus albus* on "H. M. the Queen Alexandra," which yielded only one single seed. It is a rather large, pendent, pure-white flower, with narrow pointed reflexed perianth-segments, and a long, rather flaring, bell-shaped trumpet. One yearns to see what else may lie in store.

THE AFTERNOON SESSION

MR. MITCHELL: We will start this afternoon's discussion with the reading of a letter from Dr. Stillman Berry of Redlands. This little Cyclamineus hybrid I have in my hand is one of his. (Mrs. Mitchell read Dr. Berry's letter.) We can always expect the unusual from Dr. Berry, and that is very evident from his contribution to this program. Dr. Berry mentions your success with "Lady Hillingdon," Mr. Reynolds.

MR. REYNOLDS: I might call attention to two of my seedlings that have "Lady Hillingdon" as seed parent, "Lady Hillingdon" by "Mrs. Nette O'Melveny" and by "Niphetos." The great merit of these has been that they have flowers of great substance and last longer than almost any flowers of similar type, due to the Jonquilla strain in the parentage.

MR. DE FOREST: Does *Jonquilla simplex* come into it at all?

MR. REYNOLDS: Dr. Berry's seedling shown here is *Jonquilla simplex* crossed with Cyclamineus pollen. There were ten or a dozen different ones that were all similar, varying from two to five flowers on a stem and extending over a blooming period of six weeks.

MR. MITCHELL: Perhaps you may be interested in this flower which I have labeled "Pilgrimage x Tenedos." Where this flowered there were no jonquil hybrids, no *Triandrus* hybrids, and I got out of that cross two different flowers of this jonquil hybrid type. I believe "Pilgrimage" is reputed to have some jonquil blood in it; I have seen that stated in print. It looks as though, by one of those queer throwbacks, this is a result of a background, somewhere or other, of jonquil. "Pilgrimage" is in some ways not unlike "Solleret," yet you would not recognize "Solleret" as a jonquil hybrid, with its single flower. While we are talking of these odd flowers, perhaps we can clear away this question of Tazetta crosses, that is, polyanthus seedlings. Dr. Griffiths some years ago, I think in the American Daffodil Year Book, suggested that Californian and Southern breeders work with the polyanthus crossed with the larger daffodils to see if we couldn't get a strain of sun-loving, very drought-resistant plants, of which, of course, "Silver Chimes" is an example, from "Grand Monarque" and *Triandrus*

calathinus. The parentage of "Silver Chimes" as recorded in the 1936 Daffodil Year Book is incorrect. This next flower is "Killara"; an Australian, a Mr. Selkirk, raised it at Sydney, New South Wales, from "Grand Monarque" and "Empress." I also have here a flower called "White Owl," which is quite attractive. The parentage given in the 1936 Daffodil Year Book is "Scilly White," a polyanthus, by "Minnie Hume," which is one of the parents of "Lord Kitchener." It shows what we can get; and these flowers are very happy in California. This is part of an Australasian importation that I made a couple of years ago. I wonder, Dr. Pope, if you will give us the results of your experiments in this line. Dr. Saxton Pope and I got together two or three years ago and I suggested that, as he was a young man, he could take up something that takes a long while to give results. We agreed that breeding on the polyanthus would be a long-time job.

DR. POPE: I forget at just what point my interest went over from white trumpets to the polyanthus. The year which Mr. Mitchell mentions was 1937, so I have a great deal of impudence in making a report in 1940. One can hold the Tazettas back in the icebox and get them in bloom any time of the daffodil season, by careful management. So I worked in pots, and I did hold them back successfully enough to have them bloom at all times and used them with a very wide range of things, just as they came. "Queen of Spain" would obviously not have worked in cases where I could attempt what I call the double-cross. I used both plants as pod-parents. A very important attempt to me was "Hera" with "Paper White"; crosses made in both directions many times, perhaps fifty plants pollinated. As I said, these were all potted plants, brought into the house to be free of any trouble, insect, or rain; I pollinized from the opening of the flower to the closing of the season. Seventy, eighty—a hundred times a day; it was a morning chore. The results were interesting. Out of many crosses, we got simply these: "Hera" by *Triandrus albus*; "Hera" by "Paper White"; "Paper White" by *Triandrus albus*; and *Triandrus albus* by "Paper White." Where "Paper White" was the pod parent, no seed germinated. In the reverse case, where *Triandrus albus* was the pod parent, it practically totaled the germination of two hundred-odd plants. While I got

nothing out of *Triandrus calathinus*, "Hera" was again a matter of complete germination. From that I learned that the *Triandrus* groupings were dependable; I don't attempt to explain why "Paper White" should develop seed failure. The second year I became beguiled with a greater concept of *viridiflorus* and *elegans* from Morocco, along with *Broussonetii* and other species. I thought I would reverse my process with the idea of catching the autumn bloomer. I was beguiled with bringing either precocity or greenness to the polyanthus stock. The bulbs came in from Holland with just about the last of the bulbs hot-water treated, and that was the end of that—none bloomed. I still maintain my anxiety to grow in the field of polyanthus. I would be very grateful for any suggestions or source of known varieties.

MR. MITCHELL: Have you any questions to ask Dr. Pope?

MR. MC DONALD: I'd like to ask Dr. Pope if he is fairly well up on the names of the old polyanthus. We have in the nursery five or six types called "Grand Monarque." They have various types of odor, from that of "Paper White" to that of the "China Lily."

DR. POPE: The only one I know is the one Mr. Mitchell referred to as "Grand Monarque."

MR. MITCHELL: It looks very much like the parent of "Silver Chimes."

DR. POPE: I'm sorry I can't take a blood test!

MR. MC DONALD: We have several varieties, if you would care to come and check up.

MR. MITCHELL: My gardener, who comes from the foothills back of Fresno, tells me that on his family's old ranch there are polyanthus varieties which have been there for thirty or forty years and have never been moved, and can hardly be dug out with a pickaxe. Dr. Pope, from the crosses where I think you said "Hera" was the seed parent and "Paper White" the pod parent, does the foliage suggest the mixture?

DR. POPE: Both refused. But the one that I have which is interesting is "Paper White," female parent, with *Triandrus albus* as the male parent. It looks *Triandrus albus*; it is smaller than "Paper White." Where "Hera" was the pod parent with *Triandrus albus*, the plant looked like "Hera," even in its second year. There was no doubt about that cross.

MR. HORNBACK: We don't grow polyanthus up North, but we

do have a couple of varieties that we don't know the names of. I can let you have a bulb of each.

MR. REYNOLDS: This is a field of endeavor which might be profitable in California, and I think Dr. Pope deserves credit for his attempts. I have one seedling here which is a cross of "Sunrise" by "Paper White" pollen. I used a great deal of "Paper White" pollen at first and that is the only cross I ever succeeded in germinating or getting seed from. I did get seed on "Paper White" which germinated and grew beautifully—and proved to be more "Paper White."

MR. MITCHELL: In the first Daffodil Year Book, I think it is 1913 or 1914, there are accounts of what they call in Australia *Tridymus* hybrids. These were attempts on the part of Australians, particularly Sydney breeders (it is warmer in Sydney than in Melbourne or Los Angeles or San Francisco) to get something that would stand the warm weather there, but apparently it was not continued, and many varieties have died out. Are there any questions about *Triandrus* hybrids? That, of course, is a very easy line of breeding. You can hardly, by the use of *Triandrus calathinus* pollen on any daffodil, fail to get an attractive little flower. Here is "Halfa" by *calathinus*. Here is "Kingdom" by *calathinus*. These are the only two that happen to be out at present. I have also "Brimstone Trumpet" by *calathinus*. This bloomed three years from the cross and is quite a pleasant thing. Of course, the crossing of almost any *Leedsii* with *calathinus* pollen will give you flowers like "Thalia"; sometimes better, sometimes worse.

DR. POPE: Is there anyone here who has been successful with growing either *elegans* or *viridiflorus*?

MR. REYNOLDS: I have seen it in Dr. Berry's garden.

DR. POPE: Can you tell me how it is grown?

MR. REYNOLDS: Simply out of doors, in a hot, dry garden.

DR. POPE: Do you remember the month in which it bloomed?

MR. REYNOLDS: I think it bloomed in October. I would suggest that you get in touch with Dr. Berry. He is a very good correspondent. He is not at all fussy about the conditions of culture.

MR. MITCHELL: If there are no more questions we will make a new start by going back to the last paper of this morning, which dealt with the commercial breeding at the Oregon Bulb Farms. I am going to call on Frank Reinelt to

put before us his principles of breeding on a commercial scale, or commercial basis.

MR. REINELT: I shouldn't be talking because I raise only a few seedlings, so you don't have to take me literally. Further, I think it is very good that every one of us is of different opinions and registers different ideas; if all would think in the same channels it wouldn't be very interesting. My idea of commercial flowers differs from that of the commercial men. They raise something to sell; I think, on the contrary, we should raise something to be attractive and induce people to sell by educating them to buy. I have noticed that with several other things. I breed begonias, and commercial buyers will come and tell me, "You couldn't sell that." And I tell them, "All right, you will be buying it in three years." The public makes them buy it. But it's hard to get them started. Especially here. It seems that the trend is more for size and spectacular effect than quality. I don't mean to criticize anybody, because, actually, I think I could count the varieties on my fingers which I consider first-class plants for breeding. As a breeder, I don't expect to raise anything for twenty years that would be spectacular; but I expect that in twenty years I will be able to put up something that would be faultless according to today's standards. I don't raise daffodils commercially, I breed them only as I want new things. I am making crosses of very early varieties, to suit California conditions. I should like to get perfectly formed flowers the size and earliness of "Fortune," with pure white perianths and beautiful cups in all shades of color—I don't ask very much! Naturally, of those already existing, some will prove fine parents; I can see one or two here that I would like very much to have. But a great many of them we breed today because we haven't anything else, and because only a few flowers are perfect. I know that I will get a great many things which will not be worth while, but I got them for the fun of it. Of the commercial varieties that are on the market now, probably 50 per cent won't be seen any more twenty years from now. There is hardly one out of a hundred that will meet the standard. I think much of the breeding is just beginning. From some of the recent flowers, I can see where we are going to have some daffodils too large to be beautiful; the same is true of dahlias, where most of the huge varieties

are octoploids. Too large a flower will lose its appeal; but it is possible that we may have, in fifty years, daffodils the size of a lily—who can tell? What I think will eventually pay is, today, to raise a few good varieties and in the meantime educate the public; and when you have a few good varieties, gradually, as they get educated, give them better and better material. England has already educated the public. Here the people are quite slow, but once they get started they go very fast. The same thing happened with irises and with gladioli and so forth; many people get interested to the point that it becomes a passion with them. And I think they go much faster than the Europeans; the Europeans take it more as a sport and not as seriously as we do. We try to get the things tomorrow if possible, if not today. I think under California conditions we can speed up the flowering of seedlings.

What I propose to do, for my part, is combine strength with good form, absolutely regardless of color. The color will soon come. If you breed just color and disregard some other characteristic, you may eventually get the color, but you also carry the faults with you each time. Every little defect is what I think to eliminate by combining some of the best forms to make a complicated parentage; through selfing of these you may get far more variations than by continuous crossing. In crossing daffodils you have to wait five years for each generation, which is much harder than with, for instance, delphiniums, where you can count on having a new generation every year.

MR. MITCHELL: Mr. Reinelt starts off with a fine record as a breeder of tuberous begonias and delphiniums, and he is the one person who has succeeded in getting strains of both of these which come reasonably true from seed, possibly the greatest accomplishment, so I think he is entitled to venture the prophecies he made. While he didn't tell them to you, I am going to quote to you his ideas of what he considers first class. He wants in a daffodil a tall, strong stem, which will lift the flowers above the foliage. The seedlings of "Rewa" tend to do just that; "Golden Pedestal" also; they stand noticeably above the foliage. Another thing which Mr. Reinelt says we must have is short necks, because only with short necks can the flowers hold themselves up and keep their faces clean if we get two or

three inches of rain in February or March, as we sometimes do. After that comes the good strong flower with good substance and good form, and, in his opinion, last of all comes color, because color is a fluid thing and relatively easy to get. Perhaps we might have some comments on success with particular plants. As you know, in the 1936 Royal Horticultural Society Daffodil Year Book there are a lot of parentages given; but remember, these are for flowers which are happier in Ireland and in the south of England and in Scotland, and probably in British Columbia, Washington, and Oregon than in California.

FROM THE FLOOR: What are the parents which are likely to give flowers happier under our semiarid conditions?

MR. MITCHELL: You may remember that "King Alfred" is a difficult flower in the British Isles and in the eastern parts of the United States; it is, of course, very easy in California. Some years ago I imported some stock of a P. D. Williams seedling called "Tunis." I am sure "Tunis" is a "King Alfred" seedling, with, of course, another parent which gives it its color, because from it we have had selfs of pure yellow. The basis of the breeding which my wife and I have done has been on "Tunis," because it is so early, vigorous, and stiff-stemmed, though the flower is by no means perfect; the perianth is rather wavy and not what we might wish to have in a first-class exhibition flower. Can we have comments from those who have done some breeding as to success with different parents? Mr. Reynolds, I think you could contribute to this.

MR. REYNOLDS: Observation of my seedling beds would lead me to confirm your experience with "Tunis" as to vigor. You can look down the bed and always spot the place where the "Tunis" seedlings are, and those spots stand out in seed beds also, showing vigor of plant. As for getting a stem from "Rewa," which is "Bernardino" by "Fortune," I have several seedlings of the same parentage which show the same characteristics and have a very strong stem which stands up in spite of all kinds of weather.

MR. MITCHELL: Would you take "Tunis" and "Fortune" as, perhaps, basic flowers for breeding in California?

MR. REYNOLDS: I have always been reluctant to place "Fortune" at the top of the list. I admit it will give grand, vigorous seedlings, but it doesn't seem to have the refinement which appeals to me.

MR. MITCHELL: Mr. Reinelt, you have seen some of my seedlings of "Fortune" from crosses with "Havelock," "Tre-goose," "Cornish Fire," and an old flower called "Gen. Jurgens," which I would like very much to locate again, as I lost it. You have seen enough of them this season to comment on whether you think "Fortune" is worth using.

MR. REINELT: I think "Fortune" in California is still the most important parent. It, of course, doesn't give exactly refined seedlings or beautiful seedlings, but I think you need the blood of "Fortune" for earliness, strength, and length of stem. I have seen Mitchell's new seedlings and I can see what we can get out of them. It isn't the first generation, but the second and third, which interests me. I think if you begin with "Fortune," eventually the seedlings get finer, and you will have "Fortunes" in all colors. As it is, I bought more "Fortune" last year and intend to put it through the wringer, making only a few crosses in quantity. I believe if you pollinize a hundred flowers with the same pollen you get far better results than a hundred crosses with a hundred flowers. If you raise a thousand seedlings of a single cross, you are bound to get something good.

MR. HORNBACK: I agree. I didn't have much to breed with but I originally started by breeding "Golden Pedestal" with "Pilgrimage" and "Cornish Fire"; those three proved very good breeders, either on one side or the other. Again, "Naxos" and "Godolphin" give first-class seedlings if crossed with "Golden Pedestal"; "Naxos" has given trumpets and "Godolphin" first-class *Incomparabilis* seedlings. "Pilgrimage" gives beautiful seedlings by "Naxos." I pollinized a whole bed of "Pilgrimage" with "Naxos," and this gave me several hundred seedlings; if I had raised ten I might not have got a decent one. I marked seventeen to use in further breeding, and I think two are first class. If I had made the cross in small quantity, I mightn't have got them.

MR. MITCHELL: I made one cross of "Golden Pedestal" and from a single pod got the best flower we have ever raised, a perfect golden yellow, not of the orange tone of "Crocus," but pure yellow—tall stem, short neck, perfectly flat perianth, vigorous, clean foliage. That is a cross that almost anyone could make, because you can buy these two flowers for a dollar; so don't be discouraged and say

you must have "Broughshane," or "Kanchenjunga," or any other expensive thing. Out of that same cross came the nicest Leedsii I think we ever raised, almost a pure white, where the "Tunis" influence was stronger. Another very excellent cheap breeder is "John Evelyn." This name may raise fireworks here; there are people who just can't stand "John Evelyn" and say it is a fussy flower. Here in Berkeley last week a noted Middle Western daffodil grower and breeder said she disliked it quite heartily. We have a beautiful (to us, at least) short white trumpet from "John Evelyn" pollen on "Tunis"—not tall enough, because it should stand above the foliage better, but there is no question of substance or quality. I never expected to get it out of that cross; we deserve no credit for it at all. "Dawson City" gives beautiful quality in its seedlings. "Tenedos" by "Dawson City" has given us some very nice things. "Tenedos," in spite of being a rather coarse flower with a tendency to split, when bred with things of fine form, like "Dawson City" and "Naxos," gives very attractive pure whites and yellows. So there is no reason for being discouraged at not having these very expensive things; you may get good results out of any good flower. The most important thing is to have enough breadth of petal; you can't make a good dress or good suit of clothes if you haven't enough cloth. What you want is so much petalage that all your job is to flatten it out; but adding to it is something different, so that the narrow, starry flower is hard to work with. Even as lovely a flower as "St. Egwin" gives astonishingly thin petaled, starry flowers; but crossed with "Dawson City" it gave us something that may prove a commercial flower. But I don't want to monopolize this discussion; some of you must have questions or comments.

MR. REYNOLDS: I'd like to hear comments on self-pollinizing, as compared with crossing sister seedlings, or following Mr. Guy Wilson's procedure of using the same parent three or four ways in the parentage of a seedling; he recommends that in several articles in the Year Book, using parents of the same parentage.

MR. MITCHELL: Plant breeders recommend the practice of inbreeding.

MR. REYNOLDS: I meant as compared with self-pollinization. Is there any merit in using two flowers of the same parentage, rather than selfing either?

MR. REINELT: I think it is better to self-pollinize, but both methods are all right. By self-pollinization, the split-up will be more intense than by crossing sister seedlings. When you cross sister seedlings you tend to intensify their individual characteristics. The method of overcrossing, by mating the seedlings with their parents or vice versa, gives a quicker result if one wants to get certain definite characteristics.

MR. MITCHELL: On the same basis, you should abstain from using the same one over and over again if it has bad characteristics. For instance, we abstain from using "Naxos" twice; that is, if we have a "Tenedos" x "Naxos" seedling which could be further refined by putting "Naxos" on it again, we refrain from doing it because of the tendency of "Naxos" and its seedlings to get basal rot. So we have to look for something else that has the desired qualities, the reverse of intensifying.

MR. HORNBACK: Supposing you take two self-fertilized seedlings of "Fortune," both showing good characteristics, and these two sister seedlings are also self-fertilized, you get intensification much quicker than by crossing two separate varieties. That is pure-line breeding; if you can self one variety to shut out all the recessive qualities and then start breeding, you really make jumps ahead.

FROM THE FLOOR: Naturally, you select good ones.

FROM THE FLOOR: By selfing you get a higher percentage of poor seedlings also.

MR. MITCHELL: Professor Holmes, sometime professor of genetics in the University of California, was of the opinion that no depreciation of stock need result from inbreeding, providing you started with a good strong stock; that whatever you started with would be intensified—that if you started with a very fine stock you could get progressively better and better; that if you started with a very bad stock in some human families, the results became eventually socially deplorable. I believe from what he said that this is quite transferable to plant families—that there is no harm in breeding back and back if you are using good strong stock and not plants of bad habits. They have a hundred generations and over of experience in inbreeding with rats in the University of California; the experiment began at Columbia and continued here. There has been no deterioration of stock. There are no social questions involved in

breeding daffodils, so we can go ahead on genetic principles.

DR. POPE: The Ptolemys practiced inbreeding for over three hundred years without deterioration of the stock; the reverse is seen in some Kentucky families.

MR. VERNER: I am very much interested, but I have only been twelve years at it, and with us in British Columbia it takes seven years from seed to bloom; therefore I have no secondary crosses yet to speak of. The first I made were naturally rather risky crosses, "Tresserve" crossed by "Beersheba," for example. Probably my good friend Mr. Reinelt thinks that is a terrible thing to do. I started in hybridizing very enthusiastically. I crossed everything, both in- and out-breeding. I didn't do any selfing; I wish I had. I think in selfing we have possibilities that we much neglect.

MR. MITCHELL: That is true with me.

MR. VERNER: Of course, every year I have something new coming out. From Mr. Wilson in Ireland I got "Ace of Diamonds." That was my first red center; its seedlings have been very good. A very fine thing, but short in stem. I don't suppose I have more than two flowers in the whole lot that I would care to bring in to compete with Mr. Reynolds' form. The form in his seedlings is certainly excellent. I have some very good colors, though. One rather interesting thing, I remember when "Gallipoli" came out, a bold, almost barbarous flower, a great piece of color, and I thought that was really a very fine thing and crossed it; the results were very poor; but I had followed Wilson's advice. I think I used "Will Scarlett" and "Bernardino" and reproduced "Gallipoli." It may or may not be common to get identical flowers from identical crosses.

MR. MITCHELL: May I refer to a reciprocal cross of the same two parents, "Bernardino" and "Will Scarlett," namely "Corregio"? We used that, unfortunately, with a not very smooth flower, "Tunis," getting several quite pleasant seedlings. One, nicknamed "Citron Circle," was sent to the Pasadena show last year. Flowers of this cross have inadequate perianths, but they come with red, orange, or lemon frills to the cups; perianths are about as good as "Tunis." The recessive color back of them ought to make them good for breeding. Mr. Reinelt suggested that he get a lot of "Sunstar" and force it in his greenhouse, and that we use

"Sunstar" on the early flowers, because the Barrii's are weak here. And in a few years, if you come around to his garden or mine you will find all the early things crossed with "Sunstar," presumably blooming. It means combining broad perianth and strong color, but my guess would be that the best results would come when we self those flowers.

MR. VERNER: I hope to do that. In British Columbia our flowers are just beginning to open outside now, and it is very early spring; and yet I had one seedling, a very poor flower, indeed, open three weeks ago. It is like a very miserable "Golden Spur." It is of value simply because it is early.

MR. MITCHELL: May I raise an issue? Many of us are interested in the possibilities of raising better daffodils with pink cups of trumpets, that is, flowers with white perianth and more or less pink in the trumpet. The example of such a flower is, of course, "Mrs. R. O. Backhouse," but in that case you have a very poor perianth. It might be worth while putting on record what experience we have had; and I will start by saying that "Tenedos" has certain qualities of buffness in the cup which certainly can be brought to a mild state of pinkness by a proper selection of the other parent. "Tenedos" by "Tunis" has given us a flower with quite a bit of pink in it, last year almost a pure salmon-pink, but this year, as you will see if you come to our garden tomorrow, only a suggestion of pink. The pinkest flower we got was from "Seashell" (which I suspect of being a sister of "Mitylene") by "Rewa." That was a straight, pure salmon-pink cup; unfortunately it is very late and is not yet out. These flowers are really very subtle and delightful in their coloring. Has anyone had any other experience which might help in getting greater or lesser degrees of buffish pink? I wrote to two breeders of pinks in the Antipodes, but haven't heard from them yet; if I do so I shall quote from their letters in this connection, saying they just arrived too late.

Extract from letter of C. E. Radcliff, Hobart, Tasmania:

Re pinks. In 1931 I made a lucky find in some mixed seedlings crossed by "Mrs. Moodie" (Australian raised white trumpet). This was a quite pinkish apricot seedling, named "Pink of Dawn"; color right to the base, and good overlapping white perianth, but without a very long stalk and not a very rapid increaser. It was difficult to know what to

breed with it but I used "Rosary" and put its pollen onto "White Sentinel" and "Mitylene," also crossed it both ways with a seedling bred from "Pink 'un" x "Mrs. Moodie" and named "Pinkie," which came showing a very faint blush of pink in the cup, and I found that the pink persisted and was more pronounced. The "Pink of Dawn" x "Rosary" cross gave me a great improvement on either, which I called "Dawnglow"; the "Mitylene" x "Pink of Dawn" also gave some nice pink cups.

"Pinkie" crossed by "Dawnglow" has now produced this year one I call "Rosario," and this has the most pink of any yet. It is a Leedsii with full overlapping perianth quite pure white. I have also one I call "Roselands," a border-line trumpet, and from "Pink of Dawn" by "Princess Betty" (from New Zealand) one I call "Roseberry," also with pink in it. "Dawnglow" never has much seed but its pollen is very fertile.

Although I am not certain of the cross that produced "Pink of Dawn," I know "Mrs. Moodie" was the pollen parent, and most probably the Leedsii I put it onto was a relation to "Lord Kitchener"; however, the result has been most interesting and satisfactory and I am sure that by continuing the crossing of the best I will get better pinks each year. Although I call them pinks, by comparing the color with the Royal Horticultural Society new color chart, the color of "Rosario" and "Roselands" comes under Carrot Red, No. 612/3, page 71. "Dawnglow" is slightly fainter but has the edge of its cup more of an apricot; No. 609/3, page 70, about matches it.

Extract of letter from Alister Clark, "Glenara," Bulla, Victoria, Australia:

You ask for some information as to the attaining of pink in my flowers. I am sorry to say I can tell you little except that my first real pink, which I call "First Blush," was a seedling from "Weardale Perfection." I dearly wish I could trace the pollen parent but I have no record and the other flowers in that lot were worthless. "First Blush" came in my "P" year and was "P 82." My "A" year was seed gathered in 1898, and that would make the "P" year 1914 and the flowering of "First Blush" five years later, 1919 or 1920.

It was the first true pink I had seen or heard of, but you may have known of some before then. When I say true pink I mean a flower that opens pink, not one that turns pink with age. Unfortunately, I have not been able to seed "First Blush" but I think most of my pinks are from its pollen.

I am in a dry district 16 miles north of Melbourne and with considerably less rain although so near. Mr. O. Ronalds of Gippsland (a wet district) tells me he has seeded "First

Blush," so it may be my fault or the dry district that has made me give up trying to use it as a seed parent.

In the "P" year I used pollen of "Apricot," "Poetarum," "Bernardino" amongst the named sorts, also numbers of my own seedlings, some of which had "Lulworth" as a parent. I also used a rich buff trumpet that I raised from Englehart's "Sir Evan," and I know it gave me many buff flowers with its pollen.

Many of my newer pinks seed well, and I have pure pink cups in "Blusher," "Royal Flush," and "Better Half," not trumpets but surely of great value as a step forward. "Royal Flush" appeared this year and I have great hopes of it. "Better Half" is smallish but of a very rich pink throughout such as I never dared to hope for.

I had better mention that "Suda" shows practically no pink in my garden, perhaps due to climate or soil. I am working on it with my pinks but have not flowered anything yet from it.

"Mrs. Backhouse" is very rich but hardly a real pink, and the results from it so far with me have been disappointing. That again may be my fault.

I expect you came to know of my pinks from the English Year Book, but I must point out that the remarks made by Mr. M. P. Williams about my pink daffodils were only made at a complimentary dinner given to him by the daffodil growers of Victoria, and it is hardly fair to pin him down to his exact words. Still, I think he liked our prospects of pink although he left before the best of them were in flower. Many of my "Glenara" seedlings show pink.

MR. GILLESPIE: Is colchicine of any use in bringing about these different colors by mixing up chromosomes?

MR. MITCHELL: I have talked with geneticists and their point is this: if you can get great variation by normal breeding in a plant family you are going down back alleys in working with any of these chemicals. You are going to get so many abortions, so many peculiar things; but the use of these new methods is most effective when it is almost impossible to get variation through crossing. Dr. Hilton of Vancouver Island had some interesting experiments with X-raying. He published the beginning of this experiment. I have the later story in letters; the results were so poor that he has not continued with the experiments.

MR. REINELT: I used X-ray when it first came out; I had an enormous lot of seed X-rayed at the University. I gave up because it led simply to a conglomeration of crazy things from which you couldn't expect anything. It is important only if you want to break up species. I think with

selective breeding you get ahead much faster than by breaking up any hybrid strain with X-ray; you get all the colors and everything you want if you continue long enough at it; by breaking it up you can hardly expect any improvement.

MR. HORNBACK: There might be some possibility of using this means to help in breaking up the sterility of the *Triandrus* hybrids.

MR. DE FOREST: Has anybody done any work on finding out which species or which hybrids bloom quickest from seed? Can you get bloom in two years from seed?

MR. MITCHELL: We have had a number of seedlings bloom in three years from seed.

MR. DE FOREST: Can you cut down the time?

MR. MITCHELL: Mr. Reinelt suggests that the early varieties, which, of course, have a longer season of growth, mature earlier and bloom often in their third year, while the late varieties hardly ever produce flowers before their fifth year. But of course there are exceptions. For instance, "Porthilly" and "Carbineer" are two mid-season varieties, a cross of which bloomed for me this year three years from seed. I have "White Sentinel" selfed blooming now at three years; "White Sentinel" by earlier things for the most part take five to six years.

MRS. DE FOREST: Isn't there some difference in blooming times of different years? There may be a certain sameness over a ten-year period, but we get some difference from year to year.

MR. MITCHELL: Has it been the experience of members of the conference that the order so often given in British catalogues is not wholly to be depended upon here? For instance, "King of May" is by no means a late flower with us.

MR. HORNBACK: It would depend on the forcing qualities of the particular plant. Some like warm weather and come up rapidly. Some years we get a different order of blooming.

MRS. DE FOREST: This season we had an extraordinarily hot fall, up into the hundred degrees; it was hot until December 15 in Santa Barbara. We got no rain until just before Christmas. It has been a late daffodil season.

MR. MITCHELL: That would be explained by Dr. E. van Slogteren, the Dutch plant pathologist, who, I think, stated a cool period is necessary for many of the daffodils to get to growing. What has happened in your case is

that the cooling has been so delayed that your flowers have not begun to grow until the temperature went down.

MR. VALINGA: I have tulips planted the first week of January some of which are in bloom now, whereas some planted a month or six weeks earlier are not blooming yet. Late plantings in cool ground often bloom earlier than early plantings in warm ground. Pre-cooling speeds the flowering season; pre-heating retards it.

MR. MITCHELL: That is a very interesting addition to our method of growing which we never suspected ten years ago.

MR. REINELT: I find in my little garden a "Fortune" bulb I imported, planted on the shady side, was three weeks earlier than another on the sunny side and only two weeks later than my bulbs which had been in the ground for two years unchanged through a cool autumn. Last fall I imported some late Leedsii varieties and planted them in a cool, shady lath house, transferring to a cool greenhouse in January. Some of them produced flowers very early in spite of the late planting, due chiefly to being kept cold. "Dreamlight," for instance, is now in bloom. I think if you want to force the late ones you should grow them as cool as possible in the shade under lath.

MR. MITCHELL: Mr. Reinelt gave me an offset of "Dreamlight" which I planted in a sunny place in my garden and the bud is not far above the ground now, which confirms this report.

MR. HORNBACK: We find that where daffodils have been brought from warmer climates the bloom comes earlier, but if I pre-cool the daffodils I get them earlier again. During the growing stage they come earlier if it is warmer.

MR. MITCHELL: Because they are ripened earlier. I understand that daffodils are grown and have been grown in Chico in former years, and in large variety. That is something I didn't know. We have a Chico daffodil grower here today and I would like to give her a chance to say something about their experiences up in that very warm summer climate, where you have, however, a good deal of winter rain.

MRS. SANBORN: This last fall was a very dry one; irrigating was kept up continually. I think the daffodils have been rather early this year; the water kept them cool. We have had some rather bad floods which wrecked things, and

we felt that was quite a test for them. It didn't affect them permanently.

MR. MITCHELL: Guy Wilson quotes somebody in Ohio as having eight feet of water over her garden in the middle of the season.

MRS. SANBORN: Due to the flood, we had the grandest "John Evelyns" and other flowers this year at the Daffodil Show. We have had these daffodil shows since 1921. I grow many varieties I have picked up here and there. I was curious to know about them and in later years I have gone to the California Nursery Company, where I could see and compare many varieties. Dr. David Griffiths came to Chico; he was quite a critic of our daffodils and helped us. Mr. White was the one who started our Horticulture Society there. We have many exhibitors in our shows. Around Chico one hundred to four hundred varieties of daffodil are grown.

MR. MITCHELL: This might be a good place to get varieties which have disappeared from the commercial market. Possibly "Beacon" might be found.

MRS. SANBORN: Not "Red Beacon," but "Beacon," and "Queen Mary"; I have them.

MR. MITCHELL: Have you any old Tazettas?

MRS. SANBORN: I think we had, years ago; we didn't pay a lot of attention to the names; we got them badly mixed. We have no way of finding out what they are. You might be interested in the way I work. We are out on acreage, and every time I transplant I put them on beds of new soil in which there has been alfalfa; they do beautifully in it. You talk about so many diseases in plants; that is something we seldom have. We did lose some imported from Holland years ago, but when we get them from the Pacific Northwest or West we have no trouble. For the most part we think daffodils are one of the toughest things and the most worth while. I stop watering in the fall; through the winter they get watered if there is no rain. They are hoed off in fall and in winter, but not again until after they have bloomed. We have no work in summer.

MRS. FORBES: Are they in sun or shade?

MRS. SANBORN: In absolutely full sun. I took a few Poeticus that are quite late to bloom up into the yard where they get shade, but the others are just as well out in the sun.

MRS. DE FOREST: Doesn't it get quite cold in Chico by the end of October?

MRS. SANBORN: No, we had the warmest kind of weather quite late this year; at the first of the year it is cold, but not very much below 25. Our worst hazard is smudge, and one night of that does ruin your flowers. We have to get our flowers by moonlight; anyway to get the flowers picked for the show.

MR. MITCHELL: How many of you have tried burning the weeds in the fall? We have been using a weed-burner to get rid of the first crop of wild oats and grass which inevitably come up in our beds. We have found that quite successful; perhaps the greatest help was burning over the seed beds, taking the weed-burner and going over them when the first crop of weeds came up, in November or December, before germination took place. You have to be careful and go over the bed two or three times; you can feel the soil never gets hot. It cuts down weeding of seed beds with no damage.

MRS. DE FOREST: We thought some of the trouble this spring was because the foliage had gotten badly burned at the wrong time. They were just starting to grow in December.

MR. MITCHELL: The condition most favorable to that is warm, moist weather. A lot of my seedlings were affected that way this spring. The trouble is caused by a parasitic fungus, *Stagonospora Curtisii*. The treatment recommended is spraying with Bordeaux mixture, which will stop the trouble, but usually enough damage has been done so that the year's foliage is lost and the bulb consequently loses a year of growth. When the conditions are favorable to *Stagonospora* it might be wise to give the treatment to valued seedlings or stock before the leaves are actually infected.

MRS. DE FOREST: I am amazed to hear Chico has its bulbs in full sun.

MRS. SANBORN: Ours couldn't be any drier.

MR. MC DONALD: Your ground is cultivated and loose. Sometimes a sandy loam gets hard, but it isn't like adobe.

MR. MITCHELL: It is most exciting that we may be able to get from Chico without importing such things as "Beacon." "Beacon" with me didn't bloom the first year, having been treated, and died the second year. I managed to get just a

little pollen. That, I think, is a very common experience. I did succeed in getting two pods before it gave up the ghost, one with "Tunis" and one with "Fortune." The "Tunis" cross gave us some seedlings which quite resemble "Mitylene" and "White Sentinel" and which I believe will be very useful for breeding, particularly since in a normal year they bloom two or three weeks before either "Mitylene" or "White Sentinel." "Mitylene" and "White Sentinel" are "Beacon" seedlings, but not with "Tunis" as a parent: Englehart never had "Tunis"; they are probably from "Lord Kitchener," which may be the explanation of why you get pink cups so readily in breeding from them. A letter from Guy Wilson which I had a little while ago states that both he and The Brodie have had excellent pinks by crossing "Mitylene" with a pure white seedling of Wilson's called "Evening."

MR. REYNOLDS: I have an "Evening" selfed from Guy Wilson.

MR. MITCHELL: Wilson also said he got excellent pure white flowers from "Evening." My impression of "uncrossed" is that it generally means "selfed" with the daffodil; I don't think it means accidental crossing with something else. We have had uncrossed "White Sentinel" and uncrossed "Tunis," perfectly obvious self-crossed flowers.

MR. DE FOREST: Let's get back to this business of cultivation. Do the Reynolds' go in for very heavy fertilization?

MR. REYNOLDS: I don't feel that my culture justifies me in making any recommendations, because I am not prepared to say I have the answer. I have used an excess of bone meal.

MR. MITCHELL: Underneath or on top?

MR. REYNOLDS: I try to get underneath, but it is almost impossible. In preparing the beds I put bone meal below. I have put in super-phosphate; just recently, I found that our beds seem to be very shy in phosphorus, nitrogen, and potassium, so we just mixed up a chemical fertilizer and tried it as an emergency measure.

MR. OLSON: I speak as the gardener, not as the hybridizer. I hope to be able to report to this group two, three, four, five, six, ten years from now on an experiment on this whole thing as regards depth of cultivation, type of fertilizer, time of planting.

MR. LEACH: While Professor Olson is making his scien-

tific experiment I recommend that you try this: dig the hole about knee-deep and in the bottom put about six or eight inches of soil and stir it up thoroughly; put about six inches of plain garden soil on top, place the bulbs and cover with plain soil. I also use potassium sulphide which has been dissolved in water, 1 ounce to 2 gallons, to water the bulbs in. I should like to see a number of those present try this on a few bulbs and see whether or not it is effective.

MR. MITCHELL: Your brother, I think it was, told me that you had "Beersheba" two feet high.

MR. LEACH: That was the year we had very heavy rains in January, February, and March. Many of my best daffodils were under a foot of water several times; but I never had had such fine stems and fine blossoms as that year. I think we have nothing to fear from excess of water on daffodil beds. "Beersheba" does well in my planting each year.

MR. MITCHELL: That confirms the experience we had in Stanford the year of the big rain, 1911. It began to rain on the tenth of January and we had ten inches by the end of the month. We were wise enough to be out of California; when we got back the boardwalk in our backyard was floating around, but we had thirty-inch stems on *Barrii conspicuus*. From considerable experience in growing daffodils I have found you can't give them too much water, that is in the growing season.

MR. HORNBACK: Coming back to this fertilizer question, I'd like to say that if Dr. McWhorter were here he could tell you; his theory is that there is absolutely no difference in the growth of the bulb or amount of flowers you get that year or next from using any fertilizer at all. What they want is more water.

MR. VERNER: I find a very pronounced difference as a result of fertilizer in the soil and have gone into it fairly extensively. I find best results, in our part of the world, from a mixture of a hundred pounds of raw bone meal and fifty pounds of fish meal and twenty-five pounds of muriate of potash dug into the bed at least a week, better ten days, before planting, and well under the roots. In untreated patches, I find the bulbs and flowers are smaller. I use a good, big, heavy sprinkling of the mixture; spread generously like sugar on porridge.

MR. MITCHELL: Are there questions about diseases? We have to face this problem; it is very trying to all of us; but what, for example, are the facilities for getting hot-water treatment for the amateur in our various sections. Of course some advanced amateurs like Reynolds have their own hot-water apparatus.

MR. VERNER: I have an old washing machine in which I put about 800 bulbs at a time, and it works very nicely. I have it alongside of an electric hot-water heater; I put the bulbs in and bring the water up to 112 degrees, hold it about 110 and a little over, perhaps, as it takes a little time to get the heat steadied down after pouring water in; the temperature drops considerably. Then I put an old blanket around the tub and it holds the temperature. It is a three-hour treatment.

MR. REYNOLDS: How is the public to be educated up to the better daffodils? Could we breed good flowers and then educate the public to demand them? After all, our interest in daffodils increases in proportion to the number of people interested in them.

MR. MITCHELL: I can't say anything about daffodils, because I have no commercial experience in that line, but we were pioneers in growing the finer bearded iris. We built up a business, not through any foresight, but through having the flowers available. Now you can find good bearded iris all over the San Francisco Bay region and down the Peninsula. I would venture to say that the sort of thing that all nurseries are doing is what Peter Valinga is doing on a smaller scale, educating the people. Mr. Leach, how did you get into growing the better daffodils?

MR. LEACH: That is a long story. Having had 45 kinds of the best commercial varieties and lost them through fly infestations, previous to the embargo, my enthusiasm was renewed by a present of 16 of the newer varieties from Mr. Alex M. Wilson. By additional gifts from Mr. Wilson and purchase I now have about 50 of the better varieties. Paradichlorobenzene flakes around the plants, and cultivation as the foliage dies seem to give some protection against fly infection.

FROM THE FLOOR: Couldn't we have some fine bulb shows here in the spring?

MR. MC DONALD: That was our plan when we first started

with daffodils. The thing to do was to plant daffodils where people could see them. We are having our ninth Outdoor Bulb Show. We find when people can come out and see the flowers their enthusiasm is aroused and we get better orders. We can put a variety in the catalogue with all the glowing words I am capable of, and still can't sell them. This year in the garden, for the first time, we had "Fortune" and "Carlton," and we sold almost a hundred dollars' worth of bulbs in fifteen minutes. We could never have sold those through the catalogue. We try to get people to take a few of the good ones at a dollar or two dollars; say ten of these, twenty-five of these, and one or two of this. If the price is high, when you increase the sale the price will come down; it is a good investment. And going along those lines, we have half the bulbs sold before the catalogue is out. We feel the more good daffodils we can get out in gardens the more we will sell. We make a higher mark up on high prices than on low prices. On ten "Fortunes" the mark up is smaller than on ten "King Alfreds," but the more people see of the good ones the more they want.

MR. MITCHELL: When people buy irises and daffodils the commercial garden shows them what they haven't got, or how poor those they have got are, and what is available.

MRS. SANBORN: I wonder if our experience with the Daffodil Show would help. I have a big acreage and many visitors; if they are interested in a variety they inquire about it. We put a lot in cold storage before the show, and have a long period of blooming varieties on exhibit. The people see the names and inquire. There has been a tremendous increase in the number of people who will buy the high-priced bulbs, and all of them people who haven't a great deal of money to spend.

MR. MITCHELL: A great many people are discouraged when they lose bulbs from various daffodil diseases. If we could have real help in combating the daffodil's troubles we wouldn't lose so many of the buyers. What is most serious is basal rot and mosaic. The daffodil fly doesn't seem to be as serious in California as up north toward Seattle. Mr. Barnes of Vancouver suggested to me a layer of sand around the neck of the bulb to prevent infestation. He suggested naphtha flakes also, so that the entrance to the neck of the bulb be made difficult. In this country the

conditions are almost ideal for penetration into the neck of the bulb by the fly.

MR. GILLESPIE: Mr. Stewart of Washington, a grower of daffodils, suggests amateurs be more careful to plant six inches deep, not three inches. If the bulb is planted deeper in the ground it helps to keep flies away.

MR. HORNBACK: In Washington they are experimenting with an oil emulsion spray, combined with lead. In a couple of years they hope to have a program to keep the fly away.

MR. REYNOLDS: My experience has been that the fly is the easiest thing to eliminate. You can feel them in the neck quickly. We lose very little from the fly. The smaller fly is wholly a scavenger. You find bulbs affected with basal rot full of what seem to be maggots. That is the lesser daffodil fly, and Professor Essig, professor of entomology at the University of California, says that it is wholly the result of injury in diseases.

MR. HORNBACK: Quite a bit of injury comes from the greater fly, and it is the easier fly to follow and clean up.

MR. VERNER: I brought a daffodil fly in case you didn't have any. It is very dead; it has been in alcohol for about two weeks. From this you can see what we are fighting.

DR. POPE: I'd like to ask Mr. Reynolds how frequently he applies the hot-water treatment.

MR. REYNOLDS: That depends on the season. I have had one very disappointing experience this year. I treated a very large percentage of all my stock last summer, intending to kill the disease, and I treated for an hour and a half at 110 degrees and found tarsonimus mite in a great many bulbs I treated. Whether the eggs were trapped in air pockets and survived the hot water, or whether they were reinfested from some other source, I do not know, but it seems impossible that it could have been reinfestation to so great an extent. It is extremely serious. Next to mosaic, it is the most serious of all, and it is very discouraging this year to find it in bulbs that have been treated, particularly not to know where it comes from. It has been recommended to add one of the wetting agents to drive out the air from the bulbs. There is a substance called Aerosol made by the American Cyanide Chemical Company, which is said to be very effective in increasing the effect of the hot-water treatment.

MR. ROGERS: How do you distinguish the effects of the tarsonimus mite?

MR. REYNOLDS: It is sometimes hard to tell it from mosaic, but there is usually what looks like a certain amount of abrasion on the leaf, and a whitish, shiny striping on the surface of the leaf, and some distortion. The plant does not look vigorous when dug, there is usually some injury to the bulb, and eggs and mites are found.

MRS. DE FOREST: Can you see it with the naked eye?

MR. REYNOLDS: You can with the ordinary handglass of six power; they are pretty tiny with that.

MR. VERNER: 1/120 of an inch. We find the bulbs are extremely dry and of light foliage, and particularly there is roughness on the flower stem, almost all the way. When I suspect the plant of having it I feel the flower stem to see if it is like sandpaper. In British Columbia the mite causes more trouble than the fly or worm. The bulb tissue is eaten and becomes very dry and light, almost as if the bulb had been kept overheated.

MR. OLSON: Will that cause distorted stems? What is the treatment?

MR. VERNER: Yes. The first flowers on affected bulbs will be quite early, a week ahead of normal healthy bulbs. Treatment is hot water for an hour, with a dash of formalin added. But I can't say we have controlled it.

MR. MITCHELL: Is there something else that we have not covered?

MR. VALINGA: The Oakland Flower Show is too late for daffodils. Why can't we have a daffodil show in daffodil time?

MR. MITCHELL: My wife worked one time for an outstanding librarian; whenever a member of his staff made a suggestion to him, he said, "Fine; you go ahead and do it." I think Mr. Valinga's is a good suggestion; if someone will go ahead and do the necessary work, we can have a daffodil show.

MR. LEACH: Isn't the right person the President of the California Horticultural Society?

MR. MITCHELL: No; I want every spare moment and every bit of strength I have during the daffodil season for breeding. That is what interests me most. I have no particular interest in flower shows.

MR. REINELT: To my mind the difficulties are, in the first place, that there are not enough flowers to show, and in the second place, we all are in such diversified conditions that when one fellow's daffodils are at their best the others haven't started. We could put them in the ice-box; but even if we all combined we still are unable to put up an impressive show for the public.

MR. MITCHELL: There is a Daffodil and Spring Bulb Committee of the California Horticultural Society; working through that committee we could some time have a show.

MR. REINELT: I think maybe in ten years we will be able to stage a show.

MR. MITCHELL: I think that in three or four years, if some of our seedlings remain healthy, we can put up bowls of a dozen varieties at least. However, there are certain difficulties in showing seedlings. People see things they want, and nothing else will do them.

MR. REINELT: I find the best way of discouraging people from wanting new seedlings is by making prices that are prohibitive. Some ladies come in and see a plant which I have for breeding and don't want to sell. If I tell them a hundred dollars, they are satisfied; they won't buy it; and they bring people in to see it and say wonderingly, "That costs a hundred dollars!" Once in a while you may get burned. My wife had a plant which I was pollinizing for her and a lady asked me how much and I said ten dollars, and she said, "I'll take it"; I had to give it to her, whether pollinized or not. I think you will very rarely find that it is the commercial growers who aren't willing to show—the commercial growers are the backbone, and generally make displays for educational showing in their own classes.

MR. MITCHELL: I think you are quite right.

MR. REINELT: I think we all gain by having shows. I think the difficulty is that there are very few varieties outstanding here and whoever has them wants to breed them and not cut them. That is the difficulty, no one wants to show his rare things until there are more of them.

MRS. SANBORN: Do you want to interest the ordinary public? We people out our way have no judges, no prizes; everything is entered just for sport and to let the people see the flowers. It is a lot of work, but we just love those daffodils and we want everybody to like them as we do; but

it does keep you from pollinization and other work you should be doing.

MR. MITCHELL: Each one to his special interests.

MR. HORNBACK: If your purpose is public education, no one is more interested in the subject of commercial daffodils than commercial men. They would be glad to help and could be the backbone of educational exhibits.

MR. REINELT: There is commercial production up North, but their bulbs bloom when our show would be over. Perhaps they might have plantings in California.

MR. MC DONALD: I think one way to get around that show proposition through the California Spring Flower Show in Oakland is that we could get them one year in three or five to have the show early, featuring daffodils. In Chico it is a community affair and everyone is interested. Our best angle would be to work on the directors of the Spring Show to give us an early show once in a while. This year it is a late show.

MR. REYNOLDS: If the show could be held not later than the first of April, a successful show could be staged by holding the flowers in cold storage. Our Pasadena show last year was visited by 17,000 people. About half of the flowers were shipped from elsewhere and the other half were fresh flowers that were growing there at the time. There were about 250 varieties. We had a bench similar to the one I brought my seedlings in today, fitted with test-tubes. The bench was 48 feet long; it was filled.

MR. VALINGA: I have used cold storage for flower shows. The next show is the first week of May, and for that show we have to hold back our daffodils and hyacinths. I put my plants in pots and put them outside the first week of January in the rain for three or four days or more, so they were soaked; then I put them in cold storage until the first of April and then took them out and set them in shade at a temperature of around 40. I have never tried it on cut flowers.

MRS. SANBORN: We have put them at a little higher temperature than that, about 31 or 32, and they hold up just as well or better than when cut out of the garden.

MR. REYNOLDS: About four-fifths of the flowers we brought here today have been in cold storage, picked about March 7, and today is March 16.

MR. REINELT: I think pre-cooling before staging is very important. Mr. Main of Santa Cruz could have told you; I am sorry he isn't here this afternoon. He is a large shipper of daffodils and anemones; all his Eastern shipments are chilled 18 hours before shipping; they are put in water in the cold-storage room.

MR. MITCHELL: If you have nothing further to contribute, consider the conference adjourned. We invite you to come to our garden and see whatever we have.



General view of the rock garden display

THE CALIFORNIA HORTICULTURAL SOCIETY ROCK
GARDEN DISPLAY AT THE OAKLAND SPRING
GARDEN FLOWER SHOW

By P. H. Brydon

The California Horticultural Society's contribution to this year's Oakland Spring Garden Flower Show was somewhat of a departure from the traditional display of new and interesting plant material. Judging from the comments made by various garden enthusiasts, the absence of a section devoted to new and worth-while plants came as a surprise and the Show Committee was almost tempted to run a "double header" since one of the purposes of this Society is to stimulate an interest in better ornamentals for our California gardens. However, we felt that such an undertaking would be beyond the means and help at our disposal and, as a consequence, we directed all our efforts to a demonstration of rock garden and alpine plants in the hope our efforts would promote a greater interest in this fascinating phase of horticulture.

Last year, in the early part of November, the nucleus of the Show Committee met at the proposed site of what was ultimately to become our display. I can assure you the prospect did not look too promising. The group, consisting of Eric Walther, Victor Reiter, Jr., Dr. Williams, Robert Saxe, Dr. Berwick, Duncan Munro, Roy Hudson, and myself, were somewhat taken aback when we were confronted with a typical "below the tracks" vacant lot complete with bill boards, brickbats, old cement foundations, and the various paraphernalia that one associates with such a location. Upon consulting Howard Gilkey and his able assistant, Jim Peterson, we were assured that a "bull dozer" could work wonders in a few hours' time, and that a high fence would hide the unsightliness of adjoining lots. Before embarking upon the real work of construction, a model of the area was built and after a four hours' session with several pounds of modeler's clay the rough grade and outcroppings were decided upon. That was in early November, and for every Sunday, weather permitting, until the latter part of April, this committee labored with rock and soil to produce a rock garden which was one of the features of the Spring Garden

Show. We sincerely hope that our efforts were not entirely futile, and that the exhibit was convincing enough to create a desire for more rock gardens.

The illustrations taken by Mr. David H. Walker, Jr., show the contour and general design of our display. It was rather unfortunate that the back fence was so obvious, but that was a circumstance beyond our control and could not be remedied.

Illustration No. 1 is an excellent view of the stream and pool, and shows in the immediate foreground a group of *Primula Bulleyana* x *Beesiana*. To the left are specimens of *Darlingtonia californica*. In a rock crevice in the background may be seen a large rosette of *Saxifraga longifolia*. The top bank was planted to *Helianthemums* in variety, *Cistus cyprius*, and *Cistus purpureus*. On the slopes of the stream bed were masses of *Campanulas*, *Corydalis*, *Lotus*, and various other colorful rock garden plants. The bold outcropping which is seen in Illustration No. 2 represents our "supreme effort" physically and mentally. On the rock ledges may be seen growing *Sedum spathulifolium*. At the base of the rocks, running down toward the grass path, were planted hundreds of *Viola tricolor*. To the right, in Illustration No. 2, part of the scree slope is visible, but such an arrangement has to be seen on the spot to be fully appreciated because of the minuteness and shadings of the various plants.

In the foreground of Illustration No. 2 are the Alpine plants in pans and part of the slab garden. The Alpine plants in pans were arranged on large flat mossy slabs, and around the base of the slabs were growing various ground covers, such as: *Helxine soleirolii*, *Chrysanthemum tchihatchewii*, *Potentilla reptans*, various *Thymus* species and low-growing *Veronicas*.

To describe or even to list the 200 or more species which were growing in our arrangement is, of course, out of the question. However, there were one or two items which cannot be overlooked, since they were so outstanding. The collection of dwarf conifers exhibited by Dr. J. C. Williams was very choice, and certainly added to the appearance of our plantings. Roy Hudson was courageous enough to exhibit a "slab garden" which contained choice Alpine plants artistically arranged with granite rocks. He was also responsible for the arrangement and planting of the scree slope, which was situated to the right of the stream bed.



Close-up of stream in center of rock garden display

Mr. Robert Saxe, one of our most enthusiastic Alpine gardeners, was responsible for the display of Alpine plants in pans contributed by various members of the organization. While the growing of Alpine plants in pans is, at present, beyond the skill of the average gardener, it was a demonstration of what might be accomplished by those enthusiasts who have not a great deal of garden space, yet are desirous of growing a collection of plants which do not need a great deal of room.

The entire exhibit was the result of a commendable piece of team work on the part of the committee and, although the author of this article was chairman, it must not be assumed that he was responsible for the planning and construction. As a matter of fact, he was only one of the laborers and his contribution was mostly confined to the pick and shovel. I am sure that the committee will readily agree with me when I say that Mr. Victor Reiter, Jr., Dr. J. C. Williams, and Mrs. Schnabel were extremely generous with their time, ideas, and plant material, so much so that without these three members there would have been no rock garden.

The Society was exceedingly fortunate in having the generous and unstinted support of the following nurserymen:

1. California Nursery Company, Niles: Large specimen conifers, trees and shrubs
2. Hallawell Seed and Plant Company, San Francisco: Conifers and miscellaneous plants
3. Domoto Brothers, Hayward: Large specimen conifers, and one *Acer palmatum*
4. Victor Reiter, Jr., LaRochette, San Francisco: Miscellaneous rock garden plants
5. Peter Valinga, San Mateo: Collection of dwarf bulbs
6. Mrs. H. I. Schnabel, Berkeley: Miscellaneous rock garden plants
7. C. and A. Warren, Berkeley: Specimens of *Darlingtonia californica*.
8. Rock Garden Nursery, San Mateo: Rock garden plants
9. Perennial Garden Nursery, San Carlos: Rock garden plants

On going over the list of plant material in this display, I was somewhat surprised to note that of the 200-odd

species totaling close to 1,000 plants, at least 40 per cent of the plants were donated from the garden of Dr. J. C. Williams, San Francisco. From the nursery of Victor Reiter, Jr., we received another 40 per cent, the balance being contributed by various members and nurserymen.

