



*The 1963
American Daffodil
Yearbook*

The American Daffodil Society, Inc.

The
American Daffodil
Yearbook
1963

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AMERICAN DAFFODIL SOCIETY, INC.

MRS. E. E. LAWLER, JR., *Secretary*

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Mrs. Goethe Link, second vice-president, Willis H. Wheeler, president, and John R. Larus, first vice-president, at the annual convention in Nashville. They are admiring an arrangement made by Mrs. Victoria Pearl Fort.

Journey With Daffodils

EVE ROBERTSON, Taylors, South Carolina

Now, in August as I look back, I ask myself the question: What made the London daffodil show so wonderful? First of all, the fine quality of flowers displayed, a large hall with ample lighting, tiered tables, uniform containers well apart from each other, with every flower therein placed to advantage without touching or leaning too far aside. This, with well-groomed flowers and uniform labeling provides the viewer with a complete sense of satisfaction from beauty of growth and exhibition.

Could I not remember the joy I felt in meeting so many people, of whom I had read and heard? I shall feel regret at not having time to make better detailed notes of the show. That, you will get from the R.H.S. Yearbook.

The displays of the commercial growers which included Mrs. Richardson, Mr. Dunlop, and Ballydorn Bulb Farm of Ireland, Mr. Gerritsen and Mr. deJager of Holland, Mr. Alec Gray and Mr. Jefferson-Brown and Guy Wilson Ltd. of England, were against the walls. Among these flowers were the best of old and new daffodils. They were all so well-grown and of such intense coloring I found it difficult at times to realize they were real. I did wish there had been a few less flowers in these displays, as they seemed a bit too crowded.

The rest of the hall was taken up with the competitive classes. The best flower in the show was Newcastle, raised by Mr. Dunlop and grown by Mrs. Richardson. This handsome flower was one to keep me going again and again to admire it.

In the classes for new varieties raised by the exhibitor, Mrs. Richardson won the Englehart cup in Class 101 for twelve varieties. These were just about as near perfection as anything could be. Mr. Blanchard came second with another fine group of flowers. Due to incompleteness of my notes you'll have to wait for the Yearbook for Class 102 for six varieties. Class 103 for three varieties was won

by Mr. J. S. B. Lea with superb flowers of Kildonan, Suilven, and Fionn. Mr. W. O. Backhouse came second with his startling new *red trumpets*, Red Curtain, Brer Fox and Deseado. Class 104 for one variety was won by Mr. Jefferson-Brown with a little doll from *dubius* × Chinese White. It was a tiny white and carried three flowers to the stem. I couldn't buy it, as he has only one bulb. Mrs. Richardson won Class 105, six varieties not in commerce, with excellent flowers, among them a red and white, No. 247, which had more substance than any flower I ever saw. Class 106, three varieties not in commerce, was won by Mr. Peter Lower with exceptionally good flowers.

The Guy L. Wilson Ltd. commercial group contained two exceptionally nice new flowers, 2c Knockbane and 1c Cormeen.

In the miniature classes Mr. Blanchard showed many charming little hybrids. I especially remember seedlings 50/62 D, E, and F. I can't describe them, but I liked them so much my notes said "try to buy." I saw another seedling 836/39 from Mitylene × *cyclamineus* raised by Mr. C. F. Coleman, with the "try to buy" note.

Class 155, twenty-four varieties, three stems each, for the Bowles Challenge Cup was won by Mr. D. A. Lloyd. What a class! What a group of fine flowers!

It was no small amount of pride and joy I felt in seeing flowers raised by our own Mr. Grant Mitsch of Oregon winning in the London show. His Daydream won first place, and Lunar Sea won twice, in the open class and in the amateur.

During a let-up from the show Mr. and Mrs. Reginald Wootton asked me to tea. There I met Mrs. L. M. Gibbard, a dear lady of eighty-two years who had in recent years won the Grenfell medal for a group of water color paintings.

Mr. J. S. B. Lea gave a very informative lecture on daffodils the first afternoon of the show. It is carried in the R.H.S. Journal for August '62.

It was a great show, and almost more than one can absorb with the meeting of many people, and trying to get some pictures. One of the deJager men very kindly assisted me in making some pictures, as I'm no photographer. All together, I think I just floated around in a state of bewildered ecstasy.

A few days after the show, one morning I went on deck of the ship to see the sun rise on serenely peaceful, clean-looking Ireland. It is a gem of a country and I experienced a great thrill as we sailed into Dublin. From there I was soon on my way to Waterford.

On arriving at Mrs. Richardson's, after a hearty welcome and a few minutes relaxation, I was shown the flowers by Mr. Allen Hardy of London, a well-informed daffodil enthusiast. We spent nearly an afternoon admiring, comparing, agreeing and disagreeing, and in general, enjoying to the fullest the unearthly beauty of the flowers. So many were of high quality, I shall be able to mention only a few.

In Division 1a Yellow Image and Golden Rapture showed nearly perfect flowers, as did seedling No. 536, which my notes say, was very large and perfect. Lord Chancellor, and Alpine Eagle (with its creamy buff trumpet) were fine 1b's. Stately Chamonix looked icy white and so did No. 709 which was very smooth and the largest yet in Class 1c. No. 374 and No. 445, both very smooth 2a's without red, will probably outclass Galway. Good 2a's with red were plentiful. I recall Falstaff, Leander, Vulcan and No. 543 which had a hot red cup and more than a warm red glow in the perianth. There were so many fine flowers in Division 2b, it's difficult to leave out any. Without red were Pontresina, Deodora, Infatuation and Irish Minstrel. 2b's with pink cups included flowers of which we dream, yet very real and very fine were Rose Royale, Salome, Merry Widow and Romance (for which there are twelve people with checks in outstretched hands waiting impatiently for eight bulbs to increase). Another one we kept watching, so new it hadn't been numbered, was beautifully formed and quite smooth, with a flush of pink, and we felt sure it would be pinker. It was so large we just called it the "big one." Look out, if it turns pink!

Coming now to the overwhelmingly large group of red-cupped 2b's, one could get lost forever studying these. Just to give you a small idea, as Mrs. Richardson and I stepped into a garden house for a few minutes rest from the garden, Messrs. Allen Hardy and David Lloyd of London, guests at "Prospect House," were setting up a display of the twelve best open at that time. Mr. Lloyd said, "Well, here they are." I stared and stared some more, and knew it would it be a long time, if ever again, I saw a group as good. Looking to the discards, one could see any number of fine flowers. Among the top twelve were: Rameses, Hotspur, Norval, Orion, Lorenzo, Royal Regiment and others under number.

Lemonade, with its unusual greeny lemon color was a refreshingly cool 3a. Clogheen, with yellow cup, Merlin, with flat yellow crown edged bright red, Rockall with blazing red cup, and Ariel, oh, Ariel! with similar to Green Island formation and Blarney coloring, were 3b's of exceptional beauty. When I first saw Ariel in London,

I knew I couldn't carry on much longer without it.

There were entrancingly beautiful flowers in Division 3c of Cascade, Benediction, and Verona, which had special appeal for me, as did No. 423 which my notes say was a really white Foggy Dew.

One is literally amazed when looking at the doubles. There, one sees good formation, great size of flowers, strength of stem, and clarity of color which soon will, I'm sure, entreat more growers to plant doubles. The yellow and orange Bali Ha'i, Tonga and Hawaii were large and of intense coloring. Acropolis deserves its rating and there are others, perhaps No. 563, or No. 653, which may be even better.

As we visitors effervesced, Mr. Goldsmith, the manager, could be seen here and there making crosses, and would occasionally join in for a steadying remark. I asked him if he always looked to the future, or did he stop sometimes to appreciate the present, and he answered, "Oh, I stop now and then and just love them, every one".

Mrs. Richardson is a very gracious hostess, and left nothing undone to see that my visit there was a highlight of my trip.

The countryside from Waterford to Ballymena was lovely with quaint cottages, church steeples, unending gray stone walls across the fields and around most of the homes. Great fields and mountain sides covered with yellow blooms of gorse gave the landscape a lively appearance. There's no cottage or railroad station without a garden, and all of them contained daffodils.

The conductor on the bus didn't have to tell me when we came to Mr. Willie Dunlop's place at Broughshane, North Ireland. There were large fields of daffodils in all their glory, which assured me it was "Dunrobin." He thought they were having a heat wave, but I, knowing what heat waves can be, thought the weather just fine for viewing his wonderful flowers.

Among good flowers in Division 1a were Armagh and Portadown of silken smoothness and two nice ones for garden, Limelight and Lemon Fancy with soft, cool greeny coloring. His 1b Newcastle was of exceptional form and quality, and Downpatrick was probably as good. Both belonging to Division 1c, Longford and Storemont were good, with Longford beautifully proportioned. 2a Ormeau was unusual in its orange color all over and was rather smooth. Red cups Hollyberry and Moneymore showed great depth of color, also Craigyarwarren, which is near perfection in its formation.

2b Irish Charm and Bellevue were striking garden flowers with their cups of apricot-orange, giving relief from the usual. Dun-

murry is a boldly contrasted flower and a very smooth one. Pink Isle is one of the neatest flowers anywhere and its cup is of clear pink. Roselight is even brighter pink and a finer flower.

There's a wealth of 2c's at "Dunrobin." Erinvale, his newest, is an exceptionally white flower. Also very white were Templepatrick and Whitehead. For pleasing formation and balance nothing is nicer than his neatly formed Brookfield.

The sulphur-yellow of the perianth and the white of the crown together with size and smoothness make Rathcoole another good 2d. The delicate coloring of 3b's Greencastle and Greenmount with greenish cups and orange and lemon rims render them in position for much admiration. The red-cupped Irish Splendour, has great size, excellent proportion, smoothness and color, which makes a great contribution to its class. The 3c Millisle with its nearly flat white crown and deep green eye is also a fine addition to a well-loved class.

I especially enjoyed the visit to the flower packing shed. Large fields of standard varieties are grown just for cut flowers. The bunching, so every flower could be seen, is surely an art. In the cold moist shed they were of startling brilliance and such crispness it seemed they must retain their beauty for a long time.

It was a wonderful visit with Mr. and Mrs. Dunlop and their two little boys, who seem to be following in their dad's footsteps with love for the daffodil.

One afternoon Mr. Dunlop carried me to see the flowers of Mr. Tom Bloomer. His garden is immaculately kept, and contains many fine plants other than daffodils. There was a border at least two hundred feet long of seedlings, which followed a walk from the front entrance through the garden to a stream. I saw in here some which I think would do well on the show bench. Perhaps he will some day name and introduce some.

While at Broughshane, one morning I found myself sadly strolling around "The Knockan," and of course regretting that I hadn't made this trip years ago. The place was being prepared for the new owner, a relative of Mr. Wilson.

One of the gardeners showed me around the curing sheds and greenhouses, and occasionally could be seen a stray daffodil which was still happy there. It was good to see the home where he lived a beautiful life and created his magnificent flowers which have enriched ours.

I was thrilled when one of the men there gave me a picture of

Mr. Wilson they had found while cleaning. It was made when he was about fifty years old and must have just returned from the daffodils, as there was a notebook in his hand.

Back in Broughshane I had a few minutes with Dr. and Mrs. Strawbridge. He was Mr. Wilson's pastor. Their garden contained many daffodils from Mr. Wilson, and as we sipped tea together, they spoke of their long friendship with him, and his devotion to the church.

The last day I was with the Dunlops we called Mr. Fred Board in England, to be informed that the flowers were going over fast. Consequently, I was unable to have as much time for the Antrim coast road as I'd hoped. However, my last day in Ireland was spent on the wonderful scenic drive from Port Stewart by Giant's Causeway, Ballycastle, Cushendall, Larne and back to Ballymena.

Snuggled in a long valley and reaching up the mountains on both sides is Darley Dale, Derbyshire, England. Mr. Board's home, "The Winnatts," hugs the side of a mountain, looking across the valley to mountains opposite, and embraces one of the most magnificent views I saw anywhere.

In terraced gardens sloping from the front of the house are the daffodils, and what daffodils! Before leaving home I was informed he had the finest collection in England and thousands and thousands of seedlings.

As Mr. Board showed me around I became curious about a planting enclosed with burlap fencing, and was told, "We'll get to those in time." His planting included all the best of the new and a few fine older flowers. The method of planting was unique. The beds ran up and down the hill, and were narrow enough to easily reach across, making labeling, crossing or close examination easy from either side. The paths were covered in black plastic over which was a ladder-like path made of heavy slats of convenient stepping width, held together by wire at the ends. It prevented paths from packing and made a rather strong support for walking which could not slip.

A planting like that in many areas would have all the soil washed away, but not so there, as the rains are usually gentle. The effect was breath-taking when viewing a plot from below. Every flower could be seen right in the face which made it easy to evaluate them.

Finally, after seeing everything else we were approaching the enclosed area, and as he said, "Now we can see these" my suspicions were confirmed by the wry grin on his face, and I knew that here were his jewels.

Among this group were hundreds of flowers to which he had attached a blue, red or yellow tag. This is to identify his best and nothing else gets attention. It was an exciting experience looking over this lot of flowers. Perhaps one hundred seedlings were entered in my notes, but space will allow mention of only a few, and I find myself short on descriptions that would do justice.

No. 380 (Brookfield × Wedding Bell) was a really good 2c, and nearly as good as No. 445 (Dover Cliffs) from Brookfield × Empress of Ireland, which had broad overlapping perianth, not very wide, neat cup, and was of perfect balance, faultless quality and pure whiteness. I think this is the best 2c I have ever seen. No. 461 (Wedding Bell × Empress of Ireland) was another excellent white. No. 919 (Vigil × Castle of Mey) was so good it must have been what he'd hoped for from two flowers so lovely. No. 516 (Easter Moon × Homage) of Division 2 had wide overlapping perianth, with delicious cool green in the neck and on the frill of the white spreading cup. No. 756 (Armada × Vulcan) was a brilliantly colored 2a of satiny smoothness. No. 1403 (Irish Rose × Rose Caprice) was a very beautifully formed flower and had a luscious deep pink cup.

I remember seeing some handsome yellow trumpets, but failed to have my notes in order about these. So many thousands of seedlings were coming along in all stages of growth, I promised myself I'd see them again some day. I feel sure, as time goes on, we'll find this breeder, of whom we've heard very little, is slowly but surely with meticulous care and discerning taste, carving himself a place among the great.

There were a dozen or more flowers of which Mr. Board had bought the entire stocks from other breeders. Two that were raised by Mr. Guy Wilson, which I hope you'll soon know intimately, are Birthright and Queenscourt. Both are 1c's and of icy whiteness, marble-like texture, which make them just right, with neither too much here, nor too little there.

The hospitality of Mr. and Mrs. Board could not be excelled. We dined at a number of old inns off the beaten path, where we enjoyed delicious food and uninterrupted exchange of ideas about daffodils, and highlights of personalities, English and American.

With a visit to "Inverewe" gardens, on Scotland's west coast, in view, I went by Inverness. It was an all night ride, but the view from my window early the next morning compensated for it. Long green valleys with lakes and trout streams and rock-studded snow-

capped mountains above them, assured me Scotland was as beautiful as I'd heard.

After settling in the hotel at Poolewe for a short rest, I walked over to "Inverewe" the fairyland garden planted by the late Mr. Osgood Mackenzie. This garden, made in an area where there is little else than bare mountains, peat bogs and wild rocks, from imported trees and plants and some imported soil, must be studied to be fully appreciated. There are plants or trees from practically every country in the world, growing as contentedly as they do in their native habitat.

The rhododendrons were spectacular, with many of them higher than houses and covered with blooms from white, through all shades of pink, red and mauve, also yellow, yes, a real yellow.

Many daffodils were naturalized along the paths and into the woods. They ranged from quite old, some I didn't know, to Ceylon and Cantatrice looking their loveliest in the shadows of taller plants. They reached to the extreme tip of Am Ploc Ard (Gaelic name for the high lump) high above Loch Ewe, where I rested awhile on a rustic bench. As I looked around, clearly visible far below me was a patch of daffodils so close to the water that I was reminded that they "might gaze at themselves in the stream's recess, 'till they die of their own dear loveliness." This day was May 12th and thousands of daffodils were just far enough advanced to see the buds.

When I came to the peace plot I bowed my head in thankfulness for the man with the vision and determination to create this garden, and my opportunity to enjoy it.

Reluctantly, I left "Inverewe" on Saturday as no bus ran on Sunday, and too, I'd hoped to make the boat from Kyle of Lochalsh to Mallaig, where the railroad stopped and there was no Sunday boat, else I'd be in those parts over the week-end. As Alfred, the bus driver, brought us out I realized the great service he was rendering his fellowman. On the bus were mail, packages, baby chicks, tins of goat's milk and just about anything the very few people living up there wished to buy or sell. He must have used every muscle in his body, squirming in and out of the bus so much, and even though it was very cold and disagreeable, it was a lovely day for Alfred and he greeted everyone in that manner.

As I had feared, I missed the boat, but later was glad. From Kyle of Lochalsh I took a boat to the Isle of Skye. If any scenery could surpass in beauty that I'd already seen, this was it. Known as the Misty Isle, where one seldom finds the visibility good, it was in

view all the way on this clear, crisp, fairly calm afternoon. As we sailed on the clear blue water between the island of Raasay and Skye to Portree, I knew I had never before seen such a panorama of magnificent color and formation in water, mountains, clouds and sky.

The week-end was a highlight of my trip. Miss Madge Robertson, who once lived on Skye and knew all the trails, streams and views, became my hiking companion on Sunday. Being seventy years young, she was still able to give me a tussle in following her for ten miles. We were never far away from daffodils. At old castle ruins and homesites, along the streams and in every cottage yard they could be found, and often complemented by the native wild flowers.

Finally, again on a train heading back to London, it was a nice experience to share a compartment with three charming people, Commander and Mrs. McEwing and their son from the little island of Muck (south of Skye) who also were going to London.

When Commander McEwing learned I had been to "Inverewe" he was pleased, as Mr. Mackenzie had been his personal friend. Soon after speaking of many other flowers he mentioned an interest in daffodils. As I had some catalogs, my hand viewer and slides available, we immediately got down to business. I think right then and there he was converted. He recorded the addresses of all the firms of which I had catalogs. The daffodils will probably do well there as Mrs. McEwing said only once in thirty years had the thermometer climbed to 80 degrees.

Commander McEwing wondered how he would keep the daffodils from blowing away, as the winds are terrific on Muck. I jokingly suggested he might work out something with rocks, as the people on Skye had managed to keep the roofs on cottages by large rocks (size of basketballs) attached to heavy wire which spanned the thatch roof near its edge. I hope some day the A.D.S. will hear more of daffodils on the little one-and-one-half-mile-long island of Muck.

Monday night I snatched some extra sleep, hoping to store enough energy to properly see the stupendous Chelsea Show, May 22. As I stepped from my taxi at a gate to the show, the crowd was so dense I could very nearly have gone along without putting a foot on the ground. An estimated fifty-five thousand saw the spectacle that day. There was something for everyone and daffodils were not omitted. There must have been at least six varieties.

For the great amount of pleasure I had visiting all these horti-

cultural interests I'm grateful. I express sincere thanks to the people in England, Ireland and Scotland who showed me many kindnesses.

As I leisurely strolled to the air terminal, about an hour prior to coming home, I thought back on the daffodil season. In late November, while visiting friends in south Georgia, there was Paper White. At home a few days later I had Nylon. Christmas at home was enriched by pots of Cragford, and from then until the outdoor flowers started opening, some were blooming in the greenhouse. My own season was rather nice, and then in early April, our wonderful Nashville convention. After that six more weeks of daffodils in England. That was nearly seven months of enjoying the daffodils.

I passed a flower cart before I reached the terminal and purchased a small bunch of Daphne, Cheerfulness and one I didn't know. I looked at them long and lovingly, thinking how happy it has made me to have the daffodil as my favorite flower.

Garden Use of Daffodils

FREDERIC P. LEE, Bethesda, Maryland

THE interest of many members of the American Daffodil Society, and perhaps a majority of the elite corps, is in daffodils for exhibition. I suspect the same may be said of our brethren of the British Isles. True, the annual American Daffodil Symposium lists under each of its twenty-two categories or "Items" two groups, daffodils for exhibition and daffodils for garden decoration. Curiosity impels one to wonder how many members casting ballots on daffodils for garden decoration actually grew primarily for garden decoration those daffodils selected by them. There is a suspicion, particularly with respect to daffodils listed under "Garden Decoration" in the first fourteen categories or "Items" that they were actually being grown by the balloter under "exhibition" conditions. They were either exhibition varieties that an exhibition grower thought would do well under garden conditions by reason of their vigor or varieties that despite obvious merits were thought to be lacking in the finer points essential to exhibition—lack of novelty, small size, too long or too short a neck, somewhat reflexed perianth segments, insufficient smoothness, inadequate overlapping of petals, and the like. The Miss Universes selected from year to year show great variation in their curves, coloring, pose, size, and smoothness and yet are considered as having as decorative a value at a garden party as on an exhibition stage.

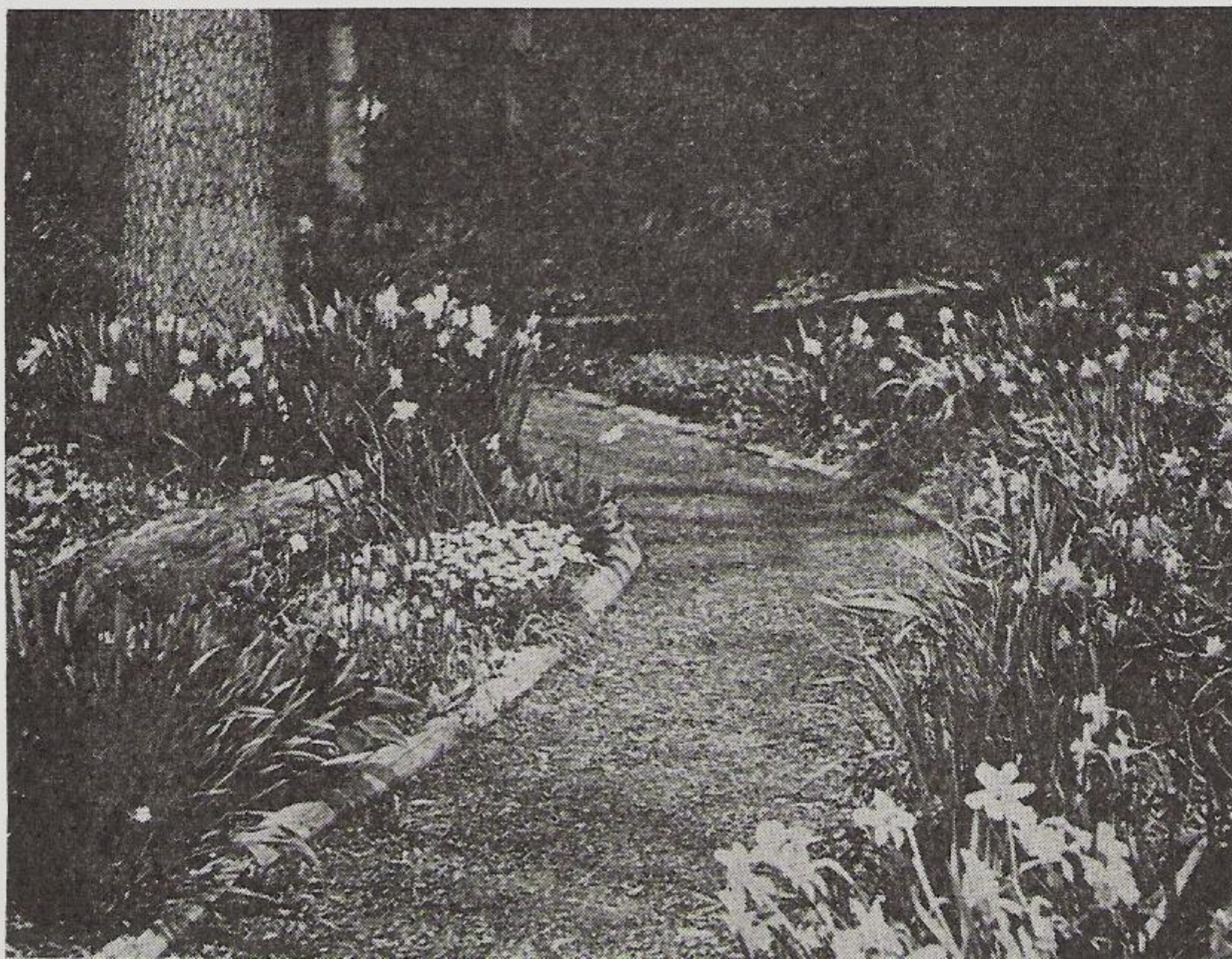
Estelle Sharp, in the 1960 Yearbook, said that, "Bulbs grown for show or cutting in rows, have no landscape value". This is so although they are usually grown in the sun and given the maximum attention as to soil, fertilizing, watering, and frost, wind, entomological and pathological protection. Daffodils so grown decorate no garden.

Daffodils when grown for garden decoration are more flexible as to site and cultural conditions. Contrary to the widely held impression, daffodils in the East, at least, do well in shade. The shade

may be that from deciduous trees whose branches usually have been trimmed high so that sun light filters through or the shade may be the partial shade of a more open location where full sun is had only in the morning or afternoon, not both. The garden soil may be light or heavy provided organic matter has been added to it in some such form as woods humus and litter or compost, and provided the soil is well drained.

In the garden daffodils are perhaps best used under informal conditions—in the foreground along paths or in the front portion of perennial beds. In each instance there needs to be a green background of medium height or low growing woody material that is in leaf at the time daffodils are blooming. In the Middle Atlantic states broadleaf evergreen plants such as the Chinese holly and its Burford variety, Japanese holly, particularly *Ilex crenata convexa* and the camellia-leaved holly (*I. altaclarensis camelliaefolia*) are suitable together with the lower-growing dwarf Japanese hollies Kingsville and Helli, and the dwarf Chinese holly (*I. cornuta rotunda*). Other suitable shrubs are Japanese yew, the hybrid group known as *Taxus media*, and such low growing yews as the dwarf Japanese yew, spreading English yew, Canadian yew and the cushion Japanese yew (*T. densa*). Evergreen azaleas have dimorphic leaves, that is, spring leaves and summer leaves. While the spring leaves are lost over winter the summer leaves will still be on the bushes at daffodil blooming time. Also Japanese aucubas in many leaf forms, holly osmanthus, drooping leucothoe, mountain pieris (*P. japonica*), the leatherleaf mahonia (*M. Bealei*), and many varieties of box are further examples. Other examples of conifers and

An inviting path in the Lee garden during the daffodil season.



broadleaf evergreens appropriate as backgrounds will occur to the grower familiar with the plant material in the gardens of his area. Large rocks and stone ledges and walls make excellent backgrounds.

Daffodils planted in the garden should be in groups of 3 to 25 of one variety and each group well separated from other groups. When planted in bays among the shrubbery or on curves or around corners where the effect of a large number of groups is not seen at one glance, adequate separation is obtained. The ordinary gardener, however, after his first success is anxious to add many new varieties with the result that groups crowd closer and closer together. Finally it becomes necessary to dig, separate, and replant the increased number of bulbs. Despite stakes, labeling or mapping, when groups are crowded, they invariably become mixed on digging and replanting. The writer freely admits being the victim of his own greediness for more and more different kinds of daffodils and would give much were it practicable to dig up all his daffodil bulbs and start over again with each variety well segregated. Quoting Estelle Sharp again, "Generally we begin by putting a few [daffodils] in flower beds. This is a good idea, but a word of warning is needed for the inexperienced. The love for daffodils increases by leaps and bounds. After a few years you have not only bought more bulbs, but also divided those you planted originally. The flower beds have become daffodil beds. . ." Daffodils are for garden decoration, not a garden in themselves.

It should be added that use of daffodils in the garden is not synonymous with use of daffodils in naturalizing, that is, in great sweeps of many hundreds or thousands of the same variety, in meadows, along stream banks or in the grass under trees. Use of daffodils in this fashion will be seen by members of the Society when they visit Edwin J. Beinecke's garden at the annual meeting in Connecticut next spring.

Miniatures and low-growing daffodils, including *triandrus*, *jonquil*, and *cylcamineus* hybrids are lovely in the garden. They are best tucked into niches among rocks, along stone walls or fences, or beside logs, or in any other corner that will accent, and at the same time segregate and protect, small plants.

Daffodils in the garden look forlorn and are no decoration after they have bloomed and the leaves begin to flop and turn brown. This occurs in late May and June in this area. Gertrude S. Wister, in the 1962 Yearbook, suggested the growing of ferns in the garden as one remedy. Some gardeners go to the trouble of tying the old

leaves together or even braiding them and laying them down as carefully and inconspicuously as practicable. This is an intolerable amount of work for the busy gardener who is growing any large number of daffodils in his garden. Also the pony tail effect has aesthetic vices as well as virtues, and when the leaves break or crack in the process, the bulbs are not benefited. Ferns grown alongside a group of daffodils, if the ferns are not of the dwarf sorts, will start unrolling their fronds after the daffodils have bloomed and will cover the dying daffodil leaves. Other plants that can be used similarly are the plantain-lilies (*Hosta*). There are many varieties, some not too well known. Siebold's plantain-lily (*Hosta glauca*) has large, gray-green leaves, 15" × 12" and the fragrant plantain-lily (*H. plantaginea*) is night-blooming, with large, heavily-scented, white flowers in August. There are also variegated leaf species as *H. undulata* and *H. decorata* and many others. One of the few hybrids, called Honeybells, has four-foot scapes of white late August flowers, faintly penciled lavender. There are many other varieties, and peculiarly the plantain-lilies all look well in informal, as well as in formal, settings. Astilbes may be used to bury the dead. And, of course, where there is plenty of sun, annuals, or perennials used as annuals, can be set out to cover the bare spaces, but they will not do so as quickly as the ferns, plantain-lilies and astilbes. The ordinary ground covers, such as the various ivies, the Japanese spurge, myrtle or periwinkle, Canada wild ginger, carpet bugle, Alleghany foam flower, various liriopes and ophiopogons, and epimediums are not suitable for this job.

Bulbs for decorating the garden need not, and should not be, limited to daffodils. The scillas such as the dwarf Siberian squill, the taller English bluebell (*S. nonscripta*), and Spanish bluebell (*S. hispanica*) are easily grown and present to far less degree the problems of dying foliage. Snowdrops and snowflakes (*Galanthus* and *Leucojum*), glory-of-the-snow (*Chionodoxa*) and crocus can be grouped along with daffodils to bloom during the spring season: also *Triteleia*. For blooming under the same conditions but at other times of the year are the various *Lycoris*, *Colchicum*, and *Sternbergia*. These have fall, winter, or early spring leaves, but the flowers appear in late summer or early fall. Growing them among the ferns near the daffodils is one solution for the lack of foliage at blooming time.

I have frequently seen daffodils grown for garden decoration and in shade that were of exhibition quality. For garden decoration

purposes they need not necessarily be of such quality, although vigor is desirable. Among the trumpets and large cups the cheaper Dutch bulbs are well suited for garden decoration and the triandrus, jonquil, and cyclamineus hybrids, poets, and species and varieties close to species, show their best in appropriate garden settings. In the South many of the old daffodils used for garden decoration are tazettas whose names have been lost.



Mrs. Michael A. Gallucci of Whittier, California, winner of the Patricia Reynolds Perpetual Trophy in the 1962 show of the Southern California Daffodil Society.

Mr. and Mrs. Kenyon Reynolds were daffodil enthusiasts and breeders in the Pasadena region before the Second World War. Mr. Reynolds had the bowl made, and for a number of years it was awarded for the best daffodil seedling in the spring show of the Pasadena Flower Association. The shows were discontinued at the start of the war, and soon thereafter, Mrs. Reynolds died. Mr. Reynolds gave the bowl to a friend to hold until it could be offered in an important daffodil show when he entered an abbey to become a monk.

In 1960 the growth of the show of the Southern California Daffodil Society led to its becoming the new custodian of the bowl. It was won by William H. Roesé of La Mirada in 1960 and 1961. Mrs. Gallucci, who is secretary of the society, won it with her exhibit of Fireproof, Binkie, Brightwork, Silver Chimes, Ceylon, Trouseau and Pres. Lebrun.

Report of a Committee of One

TOM D. THROCKMORTON, M.D.
Des Moines, Iowa

I WAS seated in the lobby of the Hermitage Hotel, talking "Daffodils," when the fellow from Illinois said: "You know, I've learned more from the American Daffodil Society in three years than I learned from the American X Society in ten years." The American X Society he named is a mature, staid, well-known plant society with its roots in antediluvian soil. The speaker was a gardener of wide interests, great curiosity, and with a "green thumb." Such a compliment to the ADS, and from such a source, deserved explanation. I asked him to dilate upon his remark. "Well, the American X Society considers that it has explored all the avenues. All productive ground has been turned over, and the forefathers of the X Society were gifted with infallibility. Any new concept is viewed with raised eyebrows.

"The American Daffodil Society is young, and as any youngster, it is uncommonly sensitive to new, different and untried approaches. Also, no hierarchy has been established. There is still a strong tendency to accept the product of scientific method, rather than repetitious statements whose chief foundation and currency are mere repetition."

This estimate of the American Daffodil Society compliments us individually, and as an organization. Surely here is an opportunity, afforded an organization only once, an opportunity to maintain an intelligent, questioning interest in all phases of daffodils: their history, their culture, their exhibition, and their future. Each of us must be ready, as a Committee of One, to observe and report. We must judge impartially, discard concepts found wanting, and be ever ready to "reopen a case" if new evidence becomes available.

Therefore, as a Committee of One, I would like to bring the following information to your attention:

Sex Linkage

It is high time that we discard the ridiculous concept that there are boy-daffodils and girl-daffodils. Daffodils, as all plants of this type, have no sex and hence no sex-chromosome. Daffodils, to be sure, are capable of sexual reproduction; but each flower has both male and female components. The attribution of certain inherited characteristics to a daffodil as a pollen or as a seed parent is a fascinating and recurrent bit of lore—but it is not borne out by any scientific observation or study. On the other hand, there are numerous controlled studies which show that crosses and reciprocal crosses are identical, within the mathematics of probability. There are occasional references in the daffodil literature which ascribe certain genetic qualities to seed or pollen parents. However, there is a considerable disparity in qualities linked to these prepotent parents by the various observers. The greatest gift any child can receive is to have *two* healthy parents. This is also true of daffodils.

Character Linkage

Just because sex-linkages are impossible in daffodils does not mean that other hereditary linkages are not present or important. One has only to walk through a garden or daffodil show to know at a glance the approximate duration of the current daffodil season. Yellow trumpets are early-season; flat, white-faced flowers are late-season. Here is a real example of character-linkage. Early bloom is linked to yellow pigment and a long cup or trumpet. Late bloom is linked to white and to poeticus form. These genetic linkages are obvious to the glance; but there are other linkages, just as real, which are not casually noted. The "breakage" of certain character-linkages has made for many dramatic advances in daffodil breeding. As an example, the red coloration of *all* daffodils has had its origin in the poeticus species. How many generations, how many crosses, and how many back-crosses have been required to break the red rim from the poet's cup, and infuse it into Ceylon or Vulcan—or into one of Mr. Backhouse's new red trumpets?

Further, it has been shown that the red in a poeticus cup is also linked to a dominant gene which confines the red coloration to the rim of the cup. Therefore, in order to create Ceylon, the red color was split off from its white poeticus linkage. Also, the linkage of the red coloration to the rim was broken. Thus, the color was al-

lowed to suffuse the entire cup. In our tetraploid red-cupped 2a daffodils there is ample evidence that this "break" is perhaps not yet complete. Ceylon has never colored its cup completely, as grown in my garden. As a matter of fact, any season with adversely high temperatures will uncover the tendency of coloration to be confined to the rim of the cup. As the linkage of other characters is determined, yet other types and colors of daffodils can be forecast.

Polyploidy

Most modern daffodils are tetraploids. This means that the chromosomes present in the cell nucleus are in sets of four, distinct from most daffodil species with chromosomes in sets of two. The normal chromosome complement in species daffodils (tazettas excepted) is fourteen. Triploid daffodils contain twenty-one chromosomes, and tetraploid daffodils contain twenty-eight chromosomes in each cell. The sex cells, pollen and ovules, contain only half the normal complement of chromosomes. The process of fertilization combines these two chromosome groups into a single cell, totipotent, with a normal genetic complement, from which the entire new plant is to be evolved.

Before the turn of the century, most notable hybrid daffodils were triploid. This formation was not a natural turn of events, but resulted as the pioneer hybridizer crossed diploids. He then picked and chose the larger, more vigorous, and "different" plants from amongst his seedlings. Triploids are larger and more vigorous plants than diploids; by the same token, tetraploid daffodils are yet larger and more appealing than their triploid ancestors. Thus the reign of the triploid daffodil was short. This is fortunate, since at least partial sterility accompanies the triploid formation. Tetraploid daffodils are usually fertile, and may be crossed successfully with other tetraploids, or with the diploid forms.

Polyploidy has, among its primary effects, a tendency to give larger size and heavier texture to the flowers. The entire plant is thicker and of more robust appearance; and frequently the season of bloom is lengthened. Also, these plants tend to develop more slowly. Is it any wonder, then, that the continuing selection of the daffodil hybridizers has resulted in an assemblage of daffodils almost entirely made up of tetraploids? These tetraploids are optimum forms. Further polyploidy, such as hexaploid forms, are occasionally found. These are retrogressive, poor growers, and of

interest only to a geneticist—a hexaploid form may break triploid sterility.

But more important, in a way, than size, vigor, and health, polyploidy has allowed the development of “intermediate characteristics”. In the paired chromosomes of a diploid plant, dominant genes tend to prevail completely over their recessive counterparts. On the other hand, in tetraploids, the genes are in sets of four. In such a case, it is a most unusual dominant gene that can completely overcome the countereffects of three recessive genes—hence in polyploidy we have the mechanism for shades of color, and intermediate variety of form. The delicate nuances of our modern pink daffodils have resulted as intermediate forms. The red rim of the poet’s cup has been suffused throughout the cup of a large cup form. A hint of pale buff has been added, and the faithful call it “pink.” And that is only a beginning. As polyploidy allows us to attenuate the genetic make-up of the daffodil in many directions, so will a host of new flowers be born.

Hormones

When a vagrant breeze, a venturesome bee, or a curious daffodil breeder deposits a grain of pollen upon the receptive stigma of the ovary, the reproductive mechanism is triggered. This mechanism has its origin in eternity and its future in infinity, but today’s instant has been planned; and in turn is the basis for future planning. The pollen grain, with its burden of genetic information locked up in chromosomal bundles, is given an opportunity to share this information with a waiting ovule. The ovule has its own package of heredity carriers. As the male and female cells fuse to form a single fertilized cell, they share this genetical information and give rise to a seed which can form a plant unlike either parent, to a greater or lesser degree.

The pollen grain, the active partner, must seek out the passive female ovule. This it does by forming a pollen tube, which grows down the style of the ovary and delivers the tiny compact male nucleus to the large ovule, richly endowed with cytoplasm and a nucleus of its own. The mere reaching out of these pollen tubes sets up a hormonal action in the seed parent; the ovary swells and becomes receptive to advancing male gametes. Haven’t we all watched swollen seed pods, burgeoning with all the signs of pregnancy, suddenly collapse and stand revealed as sterile frauds—filled

only with tiny white unswollen ovules? In other words, a swollen seed pod is not necessarily a sign of fertilization; it is a sign of effective pollenization and indicates the pollen grains have formed pollen tubes.

Once actual fertilization has occurred, the seed and its contained embryo may flourish and develop to maturity. On the other hand, a miscarriage may occur. The embryo within the seed may die. A normal-appearing seed may be found, in a few weeks, to be an empty husk.

Cytoplasmic Factors

It is important that we realize the cytoplasm of *every* daffodil cell comes from the mother or seed parent. Visualize, if you will, the pollen tube penetrating the ovule and depositing its chromosomal strands of genes. Only nuclear material is brought by the male; the entire mass of the protoplasm outside the nucleus, the cytoplasm, derives from the ovule. Thus, although pollen and seed parent share alike in hereditary determinations, the seed parent alone produces the rest of the fertilized cell, and the cytoplasm of all cells subsequently derived from this seed.

An understanding of this cytoplasmic derivation may open the door to bedlam, or to a fuller understanding of the virus diseases and daffodils.

First let me talk about corn, because a more intense genetic study has been made of maize than of any other plant. It has been found that if plant A is pollinized by plant B (an unusual form), a vigorous, stable hybrid progeny results. However, the reciprocal cross, B \times A, results in a large portion of puny offspring, many of which do not survive. Yet if the pollen of one of these deficient children is back crossed upon plant A, a fine, healthy seedling results. This would seem to re-ignite the boy-daffodil, girl-daffodil argument again, but a second look will clarify the situation.

Whatever the mechanism, it does not involve the cell nucleus, the chromosomes, the genes, or Gregor Mendel. This new factor, with an hereditary influence, is bound up in the cytoplasm of the cell and is contributed as such only by the seed parent. This strange hereditary factor acts in many ways like a virus—a virus transmitted through the cytoplasm of the mother.

One of these cytoplasmic factors in maize has been worked out by Dr. William Brown. In corn, this factor causes abnormalities of

chlorophyll deposit, leaf streaks, and stunting of the plant. These factors are widely variable from plant to plant and from season to season. In other words, this virus-like factor with hereditary properties, predisposes the plant to an acute sensitivity to environmental influences. Thus the afflicted or diseased plant has widely variable symptoms, depending upon the weather and upon the season.

It is dangerous to draw parallels, but these symptoms of viral disease in maize sound exactly like the symptoms of viral disease in daffodils; i.e., pale glassy foliage, brightly streaked in cold weather and almost impossible to find during the warm days of season's end. Smaller plants result, susceptible to disease, and which just "piddle out"—a term any farmer understands. It also can be demonstrated that certain viruses act as genetic material in bacteria, changing the properties of the host dramatically. Further, certain real genetic factors in these bacteria may either counteract or enhance these viral influences.

It seems to me probable that virus resistance can be bred into or out of daffodils. How many viruses are involved and how many generations will be required I could not hazard—but it's time to make a start.

The New Daffodil Science

There are a wide variety of tools to the hand of the daffodil fancier. Sometimes it's just a question of using them; but on other occasions it's a question of recognizing these tools for what they are. Some useful aids are as follow:

1. **The facts:** It is always important to "get the facts." A friend of mine was warned that the use of oak leaves around daffodil plants would lead to disaster. Having an abundance of oak leaves and an inquiring mind, she has mulched her daffodils with ground-up oak leaves for the past two seasons. This has not only simplified the care of her plantings, it also won her a Gold Ribbon for Best-of-Show this last season. This is the sort of information we need; but it does no good if each of us, as a Committee of One, does not report. It is important that we each believe our own eyes, and give credence to our own experiences. If some gimmick works, use it! If a certain flower grows for you and pleases you—then that flower is for you! If a daffodil steps out of *Burke's Peerage*, but has all the class and character of an ill-formed foundling, remember that

there is no accounting for tastes, or for growing conditions. These are facts! Remember them! Talk about them! Spread the gospel!

2. **The records:** Keep records! Records may be kept in a simple garden diary or an elaborate card system, but write things down: the date of bloom, climate, good plants, poor flowers, diseases, the good crosses, the sterile crosses, different bulb treatments, *ad infinitum*. It is so easy to forget, and yet tomorrow or in 1970, some of these facts may solve a problem for all of us. Also, it is equally important to read the records. Learn the parentage of your daffodils. Which ones are healthy? The chromosomal count of many daffodils is known—are you interested? The Australians have a slick golden trumpet named Harewood—do you know anything about it? Get into a Daffodil Round Robin. Subscribe to the R.H.S. *Daffodil and Tulip Yearbook*. Start thinking and dreaming about daffodils. Thumb through those lists and catalogues.

3. **Chromatography:** This is a new tool, and one I intend to use. It is probably possible to determine the variety and amounts of pigment which give your daffodils color. This in turn should afford a much clearer picture of daffodil inheritance and bring to light chromosomal linkages only suspected, or completely unknown. If you can dry-clean a spot from your clothes, and use a blotter on an ink spot, you can do chromatography. Who will interpret the results? Don't ask me!

4. **Embryo culture:** Perhaps this one is for the professionals. It is possible to dissect the embryo from a daffodil seed and grow it on by using agar culture media. If it sounds like a *tour de force* for the sake of science, just think of those two years required for many daffodil seeds to even germinate. Embryo culture may furnish a useful short-cut. But more important, a number of important daffodil crosses habitually abort (the embryo dies) because the endosperm fails to develop. It should be possible to remove the embryos from these habitual aborters, at the proper time, and raise daffodils which are now impossible.

5. **Radiation:** Now that radioactive strontium is in the air we breathe, the water we drink, and the food we eat, it has become common knowledge that certain forms of radiation may have a genetical effect. Over a period of six years, I exposed a number of freshly dug daffodils to the cobalt bomb. Some died, some were badly burned but recovered in a few seasons, but no real recognizable mutation resulted. On the other hand, mutation is rare in

daffodils at best. I have toyed with the idea of exposing pollen to radioactive sources. However, I recently learned that marked and frequent mutations may be obtained in maize by exposing the pollen to a high energy source of ultraviolet light. I intend to try this in 1963. If a few viable mutations can be produced, a whole new line of heredity can be introduced into daffodil breeding.

6. Plant geneticists: Herein lies our best prospect for rapid ad-

vance in daffodil breeding. Skilled help is available, but we as individuals and as a society must do something to interest these professional geneticists in daffodils. I had some lengthy correspondence with the late Guy Wilson in 1954 over the application of genetics to daffodil hybridizing. He replied as only Guy Wilson could: "I do not know any raiser of daffodils who has carefully planned his work in accordance with Mendel's Law, and I have sometimes felt of late, as research has revealed more and more detail of the science of genetics, that those who like myself know nothing of this science, are groping in the dark at considerable disadvantage: but are we after all at such a disadvantage? I do not think that anyone is likely at this time of day to go back to work up from the original species in the hope of producing something better than our best modern hybrids; and I doubt if it would be possible to apply any system based on the laws of genetics to working on what are really mongrels which have behind them a long and rather muddled ancestry: this is a point, however, on which I am open to correction and shall welcome the opinion of others." Later in the correspondence, Mr. Wilson begrudged the five-year wait from seed to seedling in working toward better pink daffodils: "I don't think any of them have enough colour to become outstanding on their own account, but they may be useful stepping stones in further development if only one could live long enough to work it out."

Guy Wilson did not live long enough to work it out, nor will you or I. But if our problems should appeal to a few well-trained plant geneticists (they each have an enormous bump of curiosity) the problems will be solved by them and by the echelons to follow. Dr. Edgar Anderson did a marvelously interesting bit of research into the genetic background of the pink daffodil. I talked with Dr. Anderson this past spring; he is still interested in daffodils. Why did we daffodil fanciers ever let him off the hook? Guy Wilson bred beauty, form, and poise into daffodils; now it's up to Dr. Anderson and his colleagues to help us get vigor, adaptability, disease resistance, new colors, and perfume. As a Committee of One, I intend to keep after these people.

Hybridizers, Co-operation, and Records

ROBERTA C. WATROUS

*Chairman, Committee on Breeding and Selection
District of Columbia*

CO-OPERATION among hybridizers is not new; most daffodil breeders owe much to the advice and information given them by others, and exchanging ideas and experiences is one of the pleasures of any hobby. This report, however, is concerned with what is thought to be the first attempt to combine and study the current records of many hybridizers scattered over a wide area. In 1961 hybridizers were asked to report on certain phases of their experience: especially successful crosses, failures, self-seeding or open-pollinated pods, reciprocal crosses, and any crosses involving varieties in Divisions 4, 5, 6, 7, 8, and 10. Quantitative records were requested if available, otherwise simply reports of crosses made.

Twenty-two members responded to this request, most of them sending lists of all crosses made or attempted during the season, with number of seeds or of pods and seeds collected, instead of indicating which were considered to be particularly successful or disappointing. The first surprise was what seemed to be a rather low average of seeds per pod, compared with occasional very high yields. In order to study yields by varieties cards were made summarizing reports on all varieties used either as seed or pollen parent. Early in 1962 a letter discussing the information received was sent to all the hybridizers on our committee's list, and another request made for reports, this time stressing counts of seed per pod and relation of pods collected to blooms pollinated. At the time this is being written (August) 16 reports have been received; those of Miss Helen Grier, Mrs. Goethe Link, Mr. William G. Pannill, Mrs. Ben M. Robertson, and Mr. Willis H. Wheeler gave full counts of blooms pollinated and pods and seeds collected, making them es-

pecially useful for purposes of comparison. Others gave this information in some cases and counts of pods and seeds in others, and whatever information was available was transferred to cards and interfiled with those of 1961.

The limitations of such a card file are obvious. In many cases there is only one entry for a variety, and the fact that it produced a given number of seeds or was used as pollen in 1961 or 1962 is the extent of the information shown. It is only when the entries for a variety accumulate, and some show number of pods as well as seed, others even number the blooms pollinated, that we begin to get a picture of the variety as a seed-producing individual. A glimpse of the capacities for seed production among daffodils is given by the record pods reported: 83 seed from Bonneville \times Empress of Ireland in 1961, reported by Dr. Glenn Dooley, and 68 seed from Carita \times Fintona, in 1962, reported by Mr. Pannill. Compared with these figures most of the yields reported would seem low; Binkie and Green Island, widely known as excellent seed producers, averaged only 21 and 27 seed per pod collected, and the general average of all pods reported would certainly be much lower if calculated.

“Cold, wet weather” is the reason most frequently heard for failures, but “hot, dry weather” is also blamed. The few records seen showing weather and time of day when pollinations were made do not offer any sure guide, but two members have reported that on certain days nearly every cross attempted succeeded, and on others nothing at all. Perhaps systematic attention to such records would pay, especially if comparisons could be made on a fairly large scale. There are factors of timing and technique that vary with the individual breeder, and some may be more successful than others in promoting the production of well-filled pods. As far as I know, however, we have more opinions than scientifically tested knowledge on these variables, and as breeders we lean heavily on luck and the element of varietal performance as learned through our own experience and that of others.

Of the more than 500 varieties reported as seed parents and 300 as pollen parents in Divisions 1 to 3 and 9, those in the lists that follow seem to be most productive. Selection was not made according to strictly statistical comparisons; many more complete reports would be needed to make that possible. On the basis of what we have so far we can hardly say more than that these varieties have done very well for some of our reporters.

As seed parents:

1a: Gold Medal, Irish Luck, King of the North, Kingscourt, Lyonesse, Moonmist, Moonrise, Slieveboy, Stronghold, Wee Bee; **1b:** Ballygarvey, Little Beauty, Newcastle, Preamble, Pres. Lebrun, Straight, Trousseau, Zest; **1c:** Fairy Dream, Milo, Mount Hood, White Prince; **1d:** Lunar Sea, Nampa, Spellbinder.

2a: Armada, Balalaika, Carlton, Ceylon, Delibes, Fawnglo, Glorification, Harrier, Malvern Gold, Narvik, Paricutin, Playboy, St. Egwin; **2b:** April Showers, Bizerta, Carita, Coverack Perfection, Daring, Farewell, Festivity, Frilled Beauty, Gold Crown, Green Island, Interim, Ile de France, Jubilation, Mabel Taylor, My Love, Pirate King, Rose Ribbon, Shirley Wyness, Siam, Stromboli, Tudor Minstrel, Wild Rose, Woodlea; **2c:** Bonneville, Easter Moon, Glenmanus, Ice Follies, Olivet, Snowline, Truth, Wedding Bell, Zero; **2d:** Binkie, Cocktail, Daydream, Nazareth.

3a: Ardour, Jezebel, Lemonade; **3b:** Accolade, Aircastle, Bithynia, Carnmoon, Coloratura, Fairy Tale, Green Hills, Hamzali; **3c:** Chinese White, Cushendall, Frigid, Stardust, Verona.

9: Actaea, Dulcimer, King of Diamonds, Milan, Smyrna.

As pollen parents:

1a: Cromarty, Kingscourt, Slieveboy, Ulster Prince; **1b:** Content, Frolic, Lapford, Preamble, Straight; **1c:** Empress of Ireland, Vigil, White Prince, White Tartar; **1d:** Entrancement, Lunar Sea, Nampa.

2a: Border Chief, Klingo, Lemnos, Paricutin, Rustom Pasha, St. Egwin, Tapestry, Virtue; **2b:** Accent, Arbar, Carita, Festivity, Fintona, Green Island, Interim, Interlude, Louise de Coligny, Mabel Taylor, My Love, Pineapple Cup, Radiation, Rima, Rouge, Stadium, Statue, Stromboli, Wild Rose, Zircon; **2c:** Dunseverick, Evening, Greenland, Pucelle, White Spire; **2d:** Binkie, Cocktail, Halolight, Limeade.

3a: Autowin, Jezebel, Lemonade; **3b:** Bithynia, Limerick, Matapan, Ortona, Rockall, Snow Gem; **3c:** Chinese White, Cushendall.

9: Actaea, Cantabile.

The attitude toward open-pollinated ("o.-p.") pods varies. Some breeders discard them, unless from varieties of particular interest. One member says that in her experience the open-pollinated pods consistently have more seeds than those pollinated by hand. We do not have her full records, but in comparing yields of the few varieties for which we do have reports of more than five each of open and hand-pollinated pods we found that the hand-pollinated pods averaged 14 to 21 seeds per pod, the open-pollinated pods 5 to 14.

These varieties were Guardian, Trousseau, Festivity, and Armada. Where the number of open-pollinated pods is very high the breeder may have to take special precautions to effect the crosses planned, although it has never been the general practice to cover pollinated daffodil blooms, and some breeders do not even remove anthers.

It is when we come to study the reports on crosses in Divisions 4 to 8 and 10 to 11 that the sharing of experiences promises to be most helpful. Falaise has won fame as a seed parent for doubles, and the search goes on for others and for doubles with viable pollen. Our records show reports of seed from Falaise, Mrs. Wm. Copeland, Riotous, and a "pink double sport," and pollen from Falaise, Shirley Temple (renamed Snowball), and Windblown. Numerous unsuccessful pollinations with Falaise, Snowball, and Swansdown were also reported by several breeders.

Among triandrus, jonquilla, and tazetta (poetaz) hybrids genetic complications cause an almost complete sterility, but occasional reports of varieties producing seed or pollen spur attempts to break this barrier. Among triandrus hybrids Honey Bells seems to be the only very promising seed bearer, and two of our group, after reporting failures with it in 1961, were successful in 1962. In his article in the 1961 *Yearbook* Mr. Venice Brink reported he had found viable pollen on Alope, Auburn, and Silver Chimes, and had secured seed from Auburn, Pearly Queen, and Shot Silk. In 1961 and 1962 we have had reports of pods with one to three seeds each from Acolyte, Alope, King's Sutton, Lemon Drops, Shot Silk, Silver Chimes, and Thalia. Most of the pods reported were from open pollination, and the same is true of the few pods reported from jonquilla hybrids: Kidling, Trevithian (12 seed!), and Trim. Golden Sceptre was reported giving some success as pollen parent. Poetaz varieties Aspasia, Early Perfection, Elvira, and Orange Wonder set seed (open-pollinated) for Mr. Brink alone, but the all-tazetta varieties Bathurst, Grand Monarque, and Soleil d'Or were used successfully by several reporters, usually as pollen parent. It is not to be expected that all the rare small lots reported will reach maturity. The factors that make them rare operate after as well as before the seed are formed. We feel, however, that it is better to report hopes now than to wait years for certainties; the more people who become interested in these problem areas the more chances for success in time.

There is much interest in cyclamineus hybrids, both in new crosses with *N. cyclamineus* and in using cyclamineus hybrids for further

breeding. The smaller varieties (diploids) often set seed rather freely, as do some of the larger ones known or presumed to be tetraploids. The triploid in-betweens are shy seeders. Varieties giving best results to our reporters have been February Silver, Garden Princess, Golden Lacquer, Jana, Mitzi, Orange Glory, Peeping Tom, Wanda, and Woodcock. Open-pollinated pods were reported from some of these and from Bartley, Charity May, Estrellita, Little Witch, and Snipe, and hand-pollinated pods from Charity May, February Gold, Jenny, Mite, and Roger, with a wide variety of pollen parents. Beryl, February Gold, February Silver, Garden Princess, Golden Lacquer, Jana, Little Witch, The Knave, and Wanda were reported as successful pollen parents in various combinations.

Nearly every reporter had made at least one or two crosses using species. In 1961 *N. triandrus albus* was used as pollen parent more than any other variety reported (27 crosses) and in 1962 *N. jonquilla* (38 crosses). Both gave a high proportion of successful crosses, often with very high yields. Species used less frequently but giving good results in some cases were *N. asturiensis*, *N. bulbocodium citrinus*, *N. bulb. nivalis*, *N. bulb. vulgaris conspicuus*, *N. cyclamineus*, *N. juncifolius*, *N. minor conspicuus*, *N. obvallaris*, *N. poeticus praecox*, *N. pseudo-narcissus gayi* Princeps, *N. pseudo-narcissus* Trumpet Major, *N. rupicola*, *N. triandrus concolor*, *N. triandrus loiseleurii*, *N. triandrus pulchellus*, and *N. watieri*. Others were used with occasional limited success, among them *N. bulb. romieuxii*, *N. calcicola*, *N. juncifolius*, *N. poeticus recurvus*, *N. poeticus verbanensis*, *N. pseudonarcissus* "Lent Lily", and *N. scaberulus*. The report of a pod with 9 seeds from *N. tenuior* × self was quite a surprise, as this ancient natural hybrid has been generally assumed to be completely sterile. Among the tazetta species and forms, in which there is so much uncertainty as to the names and status, seed were reported from "Baby Paper White" (*N. tazetta panizzianus*?) and from two lots of Paper White (*N. tazetta papyraceus*), one a form with broad petals. *N. tazetta aureus*, "Compressa", *N. tazetta italicus*, and Paper White were reported as pollen parents.

Varieties in Division 11 are of two types, the large "collar" varieties and the bulbocodium hybrids, chiefly miniature and winter-blooming. Varieties in the first group seem to be normally fertile both as seed and pollen parents, giving average to better-than-average yields in the cases reported. The small bulbocodium hybrids set

seed rather freely among themselves, one pod of 16 seeds even being reported from Taffeta growing in the open in northern Virginia.

The project so far has dealt almost entirely with varietal behavior in seed production, but if enough people are interested in keeping and sharing records, information can be collected on other aspects of daffodil breeding. Reports of beginners can be as useful as those of more experienced hybridizers, and we believe that those who form habits of careful record-keeping and close observation early in their careers as breeders will find they have helped themselves as well as others.

Mrs. Donald Linton, who was general chairman of the 1962 convention in Nashville, looking at daffodils in her garden. In the center background is Dr. Harold King, chairman of the Health and Culture Committee. Miller Thompson, on the right, chairman of the Test Garden Committee, does not seem to notice the rain.



L. P. Mains

The Advisability of Deanthering in a Breeding Program

JANE BIRCHFIELD, Ashburn, Virginia

PROBABLY in no other phase of plant breeding do we find the wide latitude of opinion, conjecture, and fanciful theories that we do in daffodil breeding. Even a relatively incomplete study of techniques, tools, and methods reveals almost as many variabilities among the breeders as we find in the daffodils themselves.

The necessity for and/or desirability of deanthering and protecting blooms is just one of the procedures about which breeders don't see eye to eye. And, even where there are points of agreement on following the practice, ideas on how and when to accomplish it vary widely. Among the late "greats" of daffodil breeding there was every degree and shade of opinion on the subject, ranging from The Brodie, who deanthered every bloom as it opened (and as a consequence his records have a validity and value that is unquestioned), to Engleheart, who thought that deanthering was comparable to a major operation on a human and preferred to chance an accidental pollination rather than risk harming the bloom.

William Jackson learned through observation, over a number of years, that except in the poeticus daffodils the possibility of open pollination was negligible in Tasmania. He never found more than a stray seed or so among hundreds of blooms. In other parts of the world, however, breeders frequently had reason to suspect that insect pollination was not only possible but quite probable. Even Lionel Richardson was known to admit on a number of occasions when asked what cross a certain flower came from—"Well, the book says Blank \times Blank . . . but *I* think a bee got there first!"

Among breeders presently working there is an equal range of theory and practice. Some raisers operate on the plan of "getting there fustest with the mostest"—hoping that if the stigma is thoroughly smothered with the desired pollen it will prevent any other

pollen being effective. Still others feel that the time factor is of main importance—get there with the desired pollen at the right time and there will be no danger from later, chance pollination.

When D. Blanchard first began hybridizing he deanthered all blooms worked. Now, other than when working with those species on which the tube must be slit and anthers removed to prevent self pollination, he follows the advice given him by Engleheart, “with better results in both the number of flowers that set seed, and the number of seeds per pod.”

Alec Gray, on the other hand, deanthers every bloom and while he does not provide individual protection for the flowers he works all varieties under glass. He stresses the importance of removing anthers at the right stage—to assure a protected cross but not arrest development of the flower, i.e., when the bloom is about half open.

Observations over the past several seasons led me to believe that while open pollination might be a negligible factor in Tasmania or Dorset, it could not be so considered in northern Virginia. (A conclusion that was strengthened by a population explosion of honey bees—and a photographic project, getting close-up studies of all kind of insects working on flowers.)

This season, for the first time, I decided to keep track of open pollination and see to what extent my suspicions might be valid. All varieties and species I did not plan to use in controlled crosses, plus blooms I was unable to work at the right time, were allowed to set seed. Each promising-looking pod was tagged and staked.

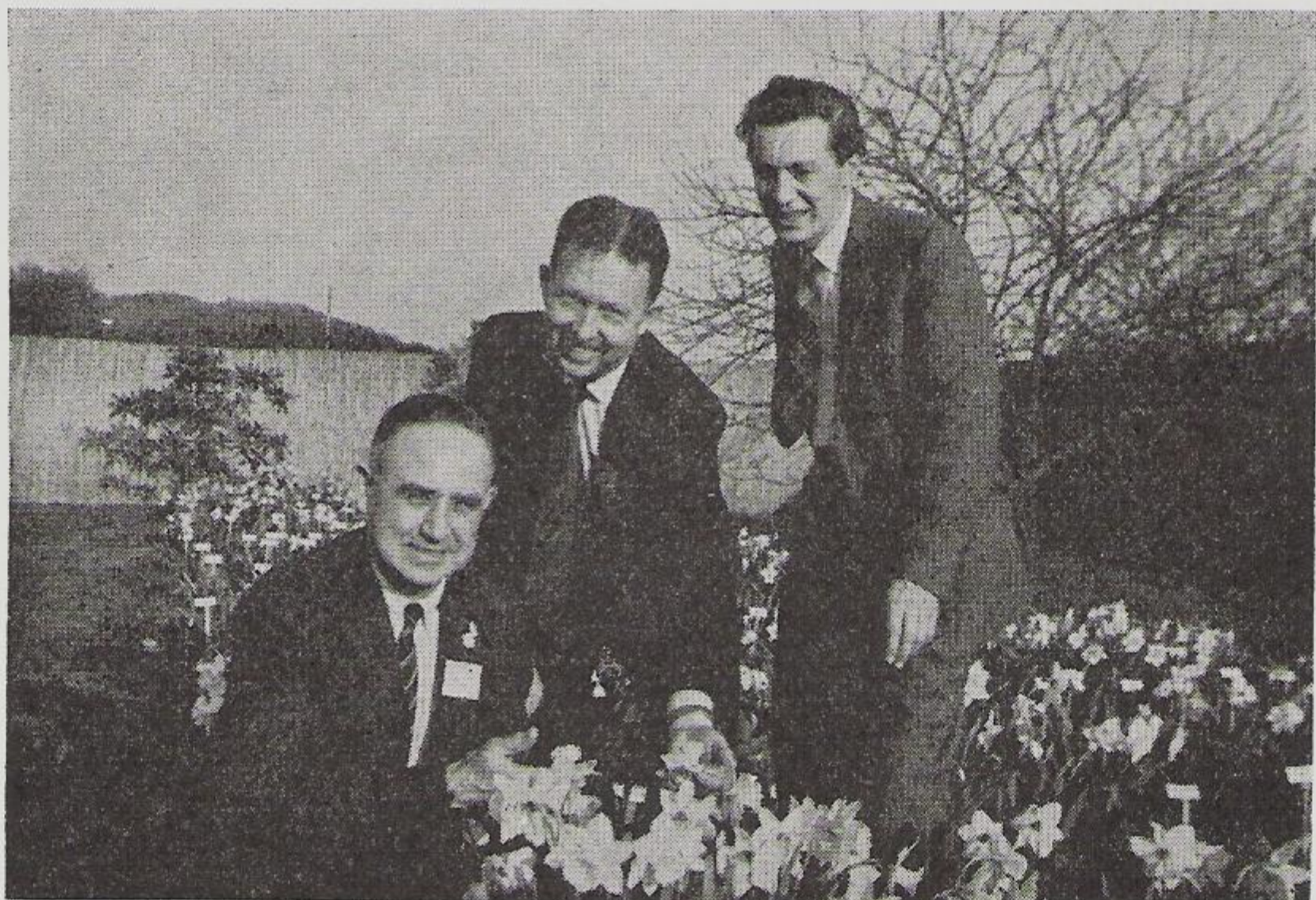
When seed was harvested and records completed, I found over sixty-five varieties and species had set seed by open pollination. A partial list, arranged according to date seed was collected includes: Taffeta, *romieuxii*, *asturiensis*, *cyclamineus*, Little Beauty, Lapford, *obvallaris lobularis* (of gardeners), Little Witch, Nor-Nor, Snipe, Well-born, Content, Maiveroe, Ada Finch, Scapa, Hunter's Moon, King Alfred, Galway, Binkie, Dungiven, King of the North, Truth, *calcicola*, *horsefieldii*, Trevithian, Chungking, *juncifolius*, Kilmorack, *minor conspicuus*, *Loch Maree*, *triandrus loiseleurii*, Pink Lace, *rupicola*, Spellbinder, Home Fires, Samite, Evening, *fernandesii*, Mabel Taylor, Dew Pond, Personality, Kidling, Wild Rose, Bithynia, Lisbreen, Polindra, *bulbocodium conspicuus*, Festivity, Cadence, Gentility, Rose of Tralee, Dunlewey, Milan, Fairy Tale, and Interim.

A number of daffodils that have set seed in former years failed to do so this season (date of bloom coinciding with unfavorable

weather could have been the deciding factor). Many others that might be expected to produce seed by open pollination were used altogether in controlled crosses or for exhibition or cutting.

Incomplete and inconclusive as this list is (it includes no daffodils about which there was any question of identification, including the many kinds that set seed in naturalized plantings) I believe it demonstrates the necessity for deanthering and protecting blooms that are worked if one is to have any assurance that controlled crosses are as recorded.

Certainly it has proved to my own satisfaction that the past time spent in deanthering and protecting controlled crosses has been well worth the effort involved.



Left to right—Wells Knierim, retiring president, Willis H. Wheeler, incoming president, and Michael Jefferson-Brown, who came from England to speak at the 1962 convention.

Daffodils in a Woodland Garden

ESTHER SEEMAN, Nashville, Tennessee

THERE is an ancient parable that says, "Do you have a loaf of bread? Break the loaf in two and give half for some flowers of the narcissus. For thy bread feeds the body indeed, but the flowers feed the soul."

And what can feed the soul more than daffodils harmonized with the grass, the rocks, the sky; daffodils beneath the trees, on a slope, along a path; daffodils, their beauty complemented, blended and heightened by companion shrubs and plants?

Our garden is a small woodland. There is a wet weather creek, a pine path, cedar bridges, and a playground area that says boldly, "Here is a place to play!" It is bounded at the back by a cedar fence and gate. Against the fence are hemlocks, with redbud trees banked by *Forsythia spectabilis* on one side of the path and pink dogwoods on the other.

The sides are bounded by an evergreen privet hedge. The front gardens are enclosed by newly-planted hemlocks and deodar cedars and given solidity by a large white pine, magnolia, Austrian pine, mimosa, sugar maple, a good-sized elm, several hollies, a *Euonymus alatus compactus* that is not very "compactus," and rising over everything and everybody, a cottonwood tree.

Perhaps I ought to mention in passing, that nestled in and among these plantings is a one-story brick ranch-style house that serves as a retreat from the world of gardening and its responsibilities. The shrub theme around the house is carried out by boxwoods with an occasional nandina and ground covers of *Vinca minor*, euonymus, wild strawberry, and *Polygonatum multiflorum*. February Gold, *Narcissus obvallaris*, Nor-Nor, Wedding Bell, Sidhe, Gold Crown, Arbar, Air Marshall, Kiowa, Malheur, My Love, Tulyar, Rose-worthy and Pink Sprite are some of the daffodils planted here. Between the boxwoods, chionodoxa, crocus and Delft Blue hyacinths come up among the daffodils. There are minor features such as

birdbaths, feeders, birdhouses, cedar seats, curved redwood benches and numerous redwood tubs. The latter encircle the flagstone patio, and contain pansies in spring, caladiums in summer, mums in fall, and pine branches in winter.

This, then, is the backdrop against which the daffodils are planted. Lest the picture I have given sounds too pretentious, I hasten to add that the garden is small and the design informal. I wish I could say that I knew all about symmetrical and asymmetrical balance, focal points, scale, or line pattern before I began, but alas, I was too busy turning a dense woodland into a garden that could be dug, walked through, looked at, wept over and enjoyed. Always, I have tried to repeat planting material so that one gets the feeling of an insistent melody that becomes more and more pleasant as one hears it over and over again.

As I recall, I was not even aware that there were books that told one how to landscape. Certainly, this had its fortunate aspects, for there are times when ignorance breeds confidence. How one landscapes a garden depends on many factors. Problems of erosion, the tender trampling of children's feet, sun and shade, hardiness and drought resistance (both of the plants and the gardener), the contour of the lot and the personality of the house, historical accident (the things already there), and of course one's subjective idea of beauty—all help to create a garden design that is unique because it is so personal.

My oldest planting of nine years ago is that of the indomitable Beersheba which I originally entombed under a small grove of elm and ramshorn willow. The drainage is dreadful and the shade dense. Preceding it, the *Crocus tomasinianus* blooms close by under a dogwood. Several plantings of Red Emperor tulips in the background precede and overlap the Beershebas. Clumps of muscari and vinca add their hues of purple and blue. A short distance away, Fortune adds a bright yellow note. Later, Red Hackle, a white with orange cup blooms with the fragrant orange De Wet tulip along with the still-blooming muscari and vinca. *Lycoris squamigera* blooms here in August. In the background a bed of De Wets accompanies muscari, this time with the daffodil Scarlet Leader.

After the De Wets, the late rose tulip, Chappaqua, blooms boldly in this area. Wild violets have asserted themselves as a ground cover. Three or four steps behind Chappaqua there is a planting of the daffodils Trostan, Statue, Sligo, Dinkie and Shanach, that precedes it. It is interspersed with the lily-flowered tulip, White Tri-

umphator. In a foreground area, the daffodils, Bundoran, Ballyferis, Prince Regent, Somali, Coronach and Krakatoa are interplanted with the triumph tulip Elmus which follows on their heels. It is a bold cherry-red edged white with a ramrod stem and great resistance to wind and weather. Nearby, there is a grouping of the Darwin hybrid, Floradale, an early scarlet crimson, and the lily-flowered tulips, Golden Duchess, the pink Mariette, and White Triumphator. Due to the vicissitudes of nature, such as chipmunks, squirrels and field mice, the tulips need to be replenished from time to time, and the plantings do not always live up to one's expectations.

Not many paces away, my younger son has his garden under a large boxelder and adjoining the playground area. Here winter aconites and snowdrops begin the season joined by *Scilla sibirica*, Spring Beauty. *Crocus chrysanthus* and *Tulipa kauffmanniana* follow. Purple Remembrance crocus and white Peter Pan chime in, and Red Emperors then make their entry. The daffodils Bartley, February Gold, Beersheba, Foresight, Sundance, Thoughtful and Meadowlark come first, and are followed by Playboy, Effective, Clackamas, Red Ranger, Walt Disney, Robin Hood, Thalia and the pink cup, Azalea. In the background Delft Blue hyacinths and Trevithian sing out. Next come the tulips De Wet, gay Aureola, Orange Delight, lavender-blue George Grappe, the candystick tulip, and joining in, some earlier and others later, mertensia, *Dicentra spectabilis*, aquilegia, primroses, and lily-of-the-valley. Behind this entire planting are the redbuds and the forsythia. The former are underplanted with Fortune, Bodilly and Binkie followed by tulip George Grappe, while muscari grows beneath the latter.

On the other side of the path is a planting of the winged cyclamineus March Sunshine under a hackberry tree with a ground cover of vinca. This comes very early and can be viewed from the path in wet and soggy weather. It is a daffodil that in a grouping has a distinctiveness and grace that few others possess. Close by is a planting of the anemone de Caen Hollandia, a dazzling red. The tubers are soaked before planting in the fall and need to be looked upon as annuals. Hollandia follows the daffodils and lasts amazingly long.

In the background pink dogwoods bloom with Hollandia. They are preceded by the daffodils Birma, Grapefruit, Trevithian, Bizerta, Red Goblet, and Garland, later on by Kilworth, Indian Summer, Actaea, Thalia, and Interim. Cushendall and *recurvus* are the last to appear and bloom with blue *Scilla campanulata* Myosotis. A

group of Queen of the Bartigons, a dogwood-pink Darwin, provides the accent here.

Blooming at the same time as March Sunshine but well in the foreground is Peeping Tom, an intrusive fellow planted next to the pine path in the woodland. Its stem is ramrod and its color and pose satisfies a craving for intensity and boldness in the early spring. About six or seven steps away is an area bounded by boxwoods with a ground cover of vinca and euonymus. Here the daffodil Brunswick leads off to be joined by Firemaster, Greenore, Stoke, Gibraltar, Coral Island, Ludlow, Adamant, Caerleon, Cargan, Killaloe, Cotopaxi and others. Later come Blarney, Radium, Aleppo, Fair Colleen, Enniskillen and Glenleslie. Planted between the daffodils and succeeding them are the tulips Golden Duchess, Scarlett O'Hara, Mariette, White Triumphator and the dark lavender Reliance.

In and around the patio, in the shade of large trees, there are garden areas that attempt to achieve a succession of bloom. Earliest are *Crocus imperati*, *Galanthus*, winter aconites, *Scilla sibirica*, *Crocus dalmaticus* and the *Crocus chrysanthus* varieties Warley White, Blue Giant, E. P. Bowles, Moonlight, Snow Bunting and Cream Beauty. They are followed by crocuses Purpurea Grandiflora, Yellow Mammoth, Pickwick, Jeanne d'Arc and Queen of the Blues. The tiny *Narcissus asturiensis* blooms about this time with *Iris reticulata*.

Nearby, February Gold shows itself early in the season. Later La Bella, Bebop, Tresamble and Rosy Sunrise bloom with a white mass of *Arabis alpina* at their feet and *Chionodoxa lucilae* asserts its tiny blue voice. The tazetta, Geranium with its white and orange color effect goes well with the fragrant Bellona tulip and the purple of muscari. Here, too, *Narcissus gracilis*, *Phlox divaricata*, *Tulipa clusiana*, *mertensia*, the gold daisy-like doronicum, the feathery blue of *Anchusa myosotidiflora* (*Brunnera macrophylla*) red and cream primroses, the white bells of *Fritillaria meleagris* Aphrodite and lilac President Grevy create a luxurious effect. The crimson red azalea, Hinode-giri speaks loudly in another area. Aquilegia, heuchera, *Dicentra spectabilis*, *Iris cristata* make their appearance joined by *Lilium candidum*, rose sweet William, white phlox Miss Lingard, Betty Prior roses, wild bellflowers (called "chimney bells" here), and the "ever"-blooming *Arabis alpina*. Tubs of pansies and Peruvian lily (*Hymenocallis*) encircle the entire patio garden.

In the front, bounded on one side by a *Magnolia grandiflora* and

on the other by a Hume holly, is another garden planted with daffodils and ground covered by vinca. Red barberry and Golden Vicari privet show their color in early spring. Daffodils are planted under and around Betty Prior, Fashion and Carrousel floribunda roses and the buddleia Orchid Beauty. The former bloom in spring, summer and fall; the latter come into their own in mid-summer.

Red Emperors wake this garden up and Forerunner, Peeping Tom and Magnificence join in. Armada is interplanted with Delft Blue hyacinths. Soon to come are Foresight, Parkmore, Dove Wings, Ceylon, and later Wanda, Ulster Prince, Adventure, Red Devon, Golden Torch, Delibes, Galway, Spencer Tracy, Trim, Cutty Sark, Orange Monarch, Cheyenne and others. Later still come Misty Moon, Crete, Columbine, Reprieve, Corncrake, Portrush, and Glyn-ver. Shagreen, Bombay, Ultimus, Frigid, Tittle-Tattle and Golden Incense close the daffodil season. For additional summer bloom there are clumps of hemerocallis and coreopsis along with the roses. Four o'clocks (seven o'clocks here) cover the area where the Red Emperors once were. In the fall the pyracantha with their orange and red berries come into their glory. Elsewhere the sugar maple turns gold and the *Enonymus alatus* a deep rose. Pots of bronze and yellow mums are added. Winter sees the nandina, hollies, hemlocks, pines, cherry laurels and deodar cedars come into their own. This is the time of the year when the gardener becomes semi-dormant and awaits the quickening days of early spring with renewed enthusiasm and zest for the unfolding of another gardening year.

How Harry Does It

WILLIAM G. PANNILL, Martinsville, Virginia

ONCE or twice I have been highly complimented by the question "What do you do to your daffodils?" My answer has always been, "Whatever Harry Tuggle tells me to do."

Harry Tuggle has been growing daffodils for almost 20 years as his primary hobby. He has probably done more research and experimenting in daffodil culture than any other amateur grower.

I have never seen the bulb fields of Holland but I have seen the size of the products of the Dutch bulb growers and have heard of the phenomenal increase which they are able to obtain. I don't believe that even they get better increase or grow larger, healthier bulbs than does Harry Tuggle here in Martinsville, Virginia. The ADS members who visited his planting at the 1961 Roanoke Convention will agree that the size and quality of his blooms cannot be improved upon.

This will not be an attempt to describe him or his love for the daffodil but merely an outline of his methods and practices in daffodil culture. The following practices are certainly not the "easy way" to grow daffodils and might discourage the average gardener, but I am sure that the "old guard" daffodil grower as well as the serious beginner can learn something from them and I assure you the results are worth the effort.

When preparing new ground, he first outlines the proposed beds with railroad crossties which are eight to ten inches thick. Next he removes all of the dirt to a depth of eighteen inches below the ground level. To this dirt he thoroughly mixes large amounts of coarse sand and peat moss. This peat moss is the only organic matter used. He avidly avoids the use of manure or compost. It is felt that these two often recommended ingredients either carry fusarium basal rot spores or greatly encourage the development and spread of the disease by the abundance of nitrogen found in them. He also avoids the use of bone meal and recommends a low

nitrogen fertilizer such as 2-12-12 or 3-18-18. This fertilizer is worked into the root area at planting time.

After the sand and peat moss have been added to the soil, the bed is filled to ground level. The fertilizer is applied and thoroughly mixed in and then one inch of clean sand is spread over the entire bed. This sand not only provides extra good drainage at the root plate of the bulbs, but also prevents direct contact with the fertilizer in the soil mixture below. With a yardstick he makes slight impressions in the sand twelve inches apart and the bulbs are placed on these lines. This assures straight parallel rows and lessens the danger of cutting a valuable bulb in digging the next year. All of the bulbs are soaked for several minutes in a Mersolite solution before planting. The whole bed is then covered with the remaining soil mixture which brings the level of the bed six or seven inches above ground level and one or two inches below the top of the crossties.

At this point most of us rejoice that we have finished until next spring, but he begins soaking the beds and continues to do so until the ground freezes. Just after the first freeze, he covers the beds with a pine needle mulch about one and a half inches deep. When the first signs of foliage appear in the late winter or early spring, the periodic soaking is resumed. I use the term soaking rather than watering because they are not the same and do not produce the same results. Mere watering may wet the ground down to a depth of five or six inches. This does not reach the roots which have extended twelve to fifteen inches below the bulb. This soaking operation is continued through the blooming season and up until the foliage begins to die down.

Harry Tuggle digs his bulbs every year. Occasionally he has left a bed down for two years but admits that better results are obtained if the bulbs are dug annually and are allowed to ripen in storage. As the bulbs are dug, he again soaks them in the Mersolite solution before storing. His losses over the past five years have been less than one percent.

It is not feasible for him, as I am sure it is not for many of us, to rotate the daffodil beds as the commercial growers do. Since he cannot grow other crops or allow these beds to lie fallow for two or three years, he overcomes the objection of growing daffodils in the same place year after year by adding additional peat moss each year and by sterilizing the soil every other year with an application of chloropicrin (tear gas) or Vapam. The latter is much easier and

much more pleasant to use. Occasionally he supplements the potash in the fertilizer compound by applying a top dressing of sulphate of potash.

As stated earlier, it would be hard to improve upon the health and size of his blooms. He is now experimenting with Fritted Trace Elements containing manganese, iron, zinc, copper, boron, and molybdenum. "Colored cups" such as Kilworth, Narvik, and Armada have been planted in beds with and without these trace elements. It will be interesting to see if there is any noticeable difference in color of the blooms after the bulbs have had several years to absorb these elements.

At the first sign of any irregularity in bloom, foliage, or bulb appearance, he rogues and destroys the plant with no regard to price or newness of variety involved.

Over the years he has grown several thousand varieties. At present he is growing several hundred. He adds new ones each year and discards those which he feels have been superseded by improved introductions of the same type. A variety has to be a real favorite to rate more than one four-foot row in Harry Tuggle's beds.

I think that everything has been reported in detail; however, I am keeping him under constant surveillance and will inform the Society of any new developments.

The *Triandrus* × *Tazetta* Hybrids

L. S. HANNIBAL, Fair Oaks, California

PRESUMABLY *triandrus-tazettas* crosses should be called *trizettas* but I have no recollection of ever seeing this term in print, probably because *Silver Chimes* has been the sole horticultural representative of this hybrid combination. Rumors of other crossings may have been discussed in private, but reports have never reached print. It is likely that the experimenters who tried *tazetta papyraceus*, the Paper White narcissus, would not care to discuss the "Ugly Ducklings" which come from this particular crossing.

Actually, both Paper White and *tazetta panizzianus*, the dwarf cupped Paper White have been tried as pollen parents, and the latter was worse than the former, for the petals of the latter hybrid were thin and scrawny as well as being of poor substance. Needless to say, the choicest of the group was enough to shake the confidence of the most ardent breeder. However, out of the initial crossings it was found that microsurgery to deanthier the *triandrus* was not necessary, and that *triandrus* pollen would not strike on *tazetta*. But what was of more importance, we learned how to grow the *triandrus* without loss. These bulbs require perfect drainage and a long, dry summer rest. In the native state the bulbs must grow in dry, gritty scree. Here they thrive quite happily in a sandy soil containing some good black clay in five-inch deep redwood boxes. The bulbs can go some ten years without being moved or disturbed. Loss is negligible. Summer dryness is imperative. The only major precaution is to creosote the redwood boxes inside and out, and to let them dry for several months before using, to be sure that container decay will not interrupt the growing program.

After the experience of the "Ugly Ducklings" the writer took a good hard look at *Silver Chimes*, with serious thought as to the true parents. Obviously the *tazetta* parent had to be a pollen-fertile clone like *Grand Primo*, but what? Could the cup be yellow? When the next breeding season came around the *triandrus* flat came into

the house and pollens of a dozen different tazettas and poeticus were tried in rotation. The poeticus took without difficulty, but gave poor flowers. Much of the tazetta pollen failed, but strikes developed from "Compressa" and *tazetta aureus* and the seedlings flowered some seven years later. Both of these trizetta forms, if we may so call them, were perfect gems, but they were as unlike as day and night.

The "Compressa" hybrid bears some semblance to Silver Chimes. The blossoms are a bit more erect and the petals are well formed and stand out stiffly like the pollen parent. The trumpets are flared, light citron, and set a good contrast to the perianth. The long, stiff scape would make the plant ideal for the cut flower trade, but like "Compressa" the cross rarely produces an offset. Cuttage of the bulb will be necessary to encourage division.

The *triandrus aurantiacus* was the bulb which responded to the *tazetta aureus* pollen. Like all breeders, who hasn't dreamed of a Golden Chimes? The hybrid in reality is truly golden-flowered, but the scape throws seven or eight small blossoms of the genuine midget class. The coronas are not unlike *triandrus aurantiacus*, but the perianths appear more like the tepals of *tazetta aureus*, only these are well reflexed giving the flowering umbel the appearance of a cluster of dainty golden shooting stars. The tentative name of Golden Pleiads has been selected. The plant produces offsets readily, is quite hardy, and very free flowering. The blossoms and scapes are rugged enough to take considerable handling without damage.

In the light of some current discussions following the tazetta article of last year, it is apparent that far more tazettas are pollen fertile than previously realized. The first precaution obviously is to use a tazetta with good substance in the perianth in order to avoid any "Ugly Ducklings." Secondly, most pollens are quite inactive under 65° F, thus the flats containing the triandrus should be set in the house and kept near 72° F for several days to insure pollen strikes. One has the option of *triandrus albus*, *triandrus aurantiacus*, *triandrus concolor* or any other intermediate form as seed parent, and pollen parents such as Chinese Grand Emperor, Compressa, Grand Monarque, Soleil d'Or, *tazetta aureus*, and possibly Grand Primo.

Seed may be sewn in light, sandy-silt soil the following fall and tucked away in a cool, moist greenhouse to sprout. Local practice is to sow the seed in the permanent flats and leave them completely undisturbed. Occasionally there may be cause to rogue a hybrid,

but this should only occur after the plant has been permitted to flower for several seasons. Not all crosses will strike and some of the seedlings will be "bee mixtures" or seedling triandrus. The last are always welcome for additional breeding purposes. There is nothing like growing your own bulbs to have clean stock.

The trizetta hybrids are sterile since triandrus has a $2n=14$ and tazetta a 22-chromosome complement. Either parent having yellow pigment will donate it to the offspring. If both parents contribute yellow then the result is a brilliant golden yellow. The small stature and size of *tri. aurantiacus* carries over into the hybrid, but apparently this triandrus parentage exercises no control on the number of blossoms in the hybrid. *Triandrus albus* in turn definitely limits the blossoms to three or four. The limitation of blossoms is a fairly recent evolutionary development and is dominant in the F-1 crosses.

Current experiments with acenaphthene as a mutagen treatment on sprouting seedlings suggests that the trizettas will offer little difficulty to chromosome doubling. Perhaps fertile polyploids may be available some day. We fervently hope so as the hybrids would be a beautiful group to breed.

The Alkaloids of the Narcissus

Chemical and Medicinal Aspects

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THE genus *Narcissus*, belonging to the family Amaryllidaceae, has been known from earliest recorded time to possess physiological and therapeutic activity. In all probability extracts of *Narcissus* were among the medicinal preparations made from various genera of Amaryllidaceae that were used by the native Africans in the treatment of the various illnesses to which they were continually subjected, such as wounds, the sores of leprosy, ulcers, asthma, coughs and the many tubercular conditions.¹

The reputed effectiveness of daffodils in ancient times for the treatment of tumors is given in an excellent historical summary that is included in a recent laboratory survey made by the National Cancer Institute.² It contains an extensive bibliography relative to the original writings on the anti-tumor effects of the family Amaryllidaceae, on which the following account is based.

In the 4th and 5th centuries B.C. in Greece, Hippocrates recommended a suppository made from the oil of narcissus for the treatment of uterine tumors. Greek physicians in the 1st and 2nd centuries A.D. apparently used narcissus oil for softening indurations of the uterus and for treating certain uterine tumors. Also in the 1st century A.D., Pliny in Rome observed that certain daffodils, thought to be *N. poeticus* L. and *N. pseudonarcissus* L., were applied topically with honey and oatmeal for tumors.

The Arabians in the Middle Ages adopted narcissus oils and recorded that these preparations softened breast tumors and dissipated tumors of the ear. They also claimed that "cold" tumors of the meninges subsided when the oil was rubbed into the temples. About the 14th century, the claim was made that narcissus oil was a potent

emollient for calluses. The natives of Mexico, as early as the 16th century, believed that axihuitl, probably a species of narcissus, had the property of resolving tumors. A variety of tazetta, known as shui-hsien, was used by the Chinese in early times against tumors, and even within comparatively recent years they have employed topically a paste of the narcissus bulb to treat cancer of the breast.

The Alkaloids

The first report of chemical experiments involving daffodils indicates that Gerrard,³ in 1877, sought to isolate the active principles of narcissus plants in hopes of obtaining compounds of medicinal value. He subsequently isolated an alkaloid that he called narcissia, but he did not attempt to characterize it. Twelve years later Morishima⁴ isolated two alkaloids from *Lycoris radiata* Herb., which he named lycorine and sekisanine. In 1913, Asahina and Sugii showed that narcissia and lycorine were identical.⁵ Gorter's work in 1920 pointed out that lycorine is the principal alkaloid in most Amaryllidaceae species.⁶ It was not until 1934 that Späth and Kahovec⁷ showed that lycorine contains a phenanthridine nucleus and researchers until the early 1950's assumed that phenanthridine was the basic unit for all Amaryllidaceae alkaloids. Recent evidence shows, however, that only a small number of Amaryllidaceae alkaloids contain the phenanthridine ring structure. Representative structures are listed in Figure 1.

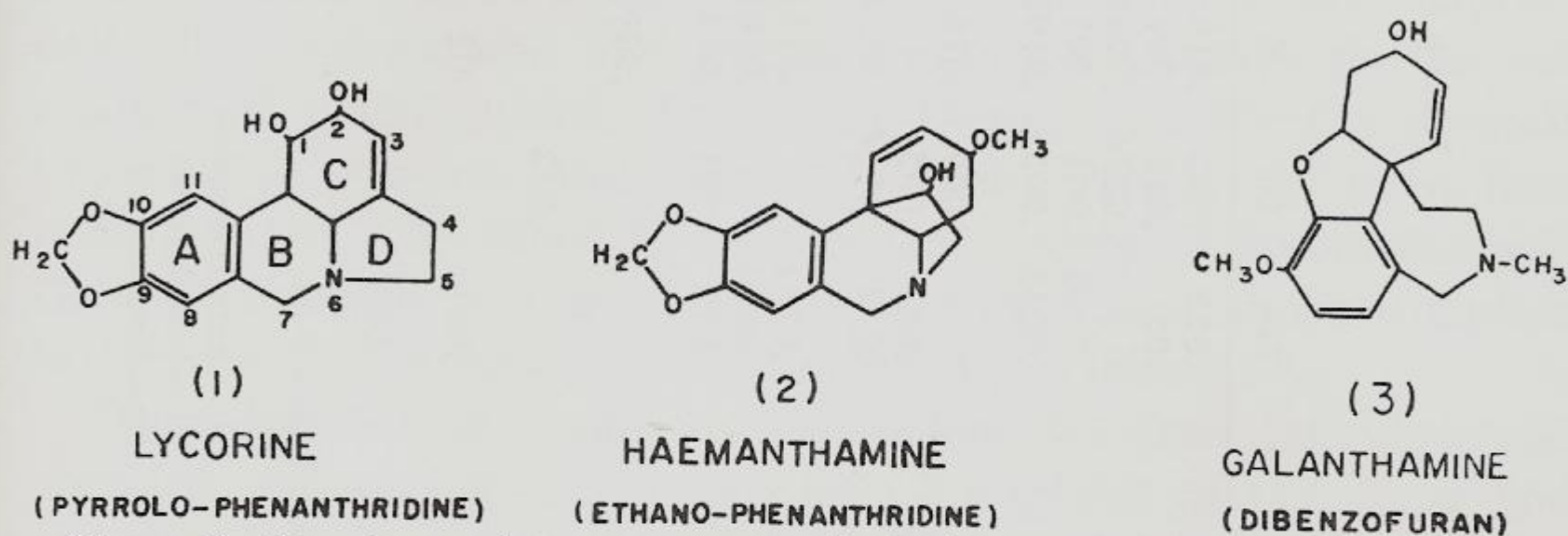


Figure 1—Structures of representative alkaloids found in *Narcissus* plants.
(Parenthesis indicates the chemical name of the ring system.)

The most significant evidence for proof of structure of the lycorine molecule was published as recently as 1954, through the joint efforts of research groups in Japan and Canada.⁸ Others who have made significant contributions to structure determinations include Boit,

Table I: Alkaloids Found in the Bulbs of the Narcissi¹⁰⁻¹⁵

Plant	Alkaloid, percent*														
	Gm	Gn	H	Ly	Li	N	Pl	Mp	Nd	HI	F	T	Nw	Hp	O
Covent Garden . . . . .	.023	.013	.019	.055	.0004	.013	.0007								
King Alfred . . . . .	.03	.012	.039	.001	.002	.006		.002							
Victoria . . . . .		.0376	.0064	.0024		.0056	.0002								
Oliver Cromwell . . . . .	.0002	.005	.001				.025								
Grand Maitre . . . . .	.0065	.0052	.0195	.038						.0091	.0039	.0039			
Deanna Durbin . . . . .		.009	.016	.039		.001			.001						
Daisy Shaffer . . . . .	.027	.035					.0005								
Helios . . . . .	.014	.0056	.0224		.0002		.0007			.0007					
Inglescombe . . . . .	.0742		.0154	.0014	.0168		.0056			.0007			.0055		
Texas . . . . .	.0044		.0209	.0671											
Van Sion . . . . .	.018	.001	.014	.0006	.031	.001	.0006			.002					
Thalia . . . . .			.009	.002	.011					.005					
Beryl . . . . .		.023		.023					.0012						
Geranium . . . . .	.001		.02	.005					.0002	.002		.005			
<i>odoros rugulosus</i> . . . . .	.083			.0008						.008		.023		.005	.006

*The percent is based on fresh bulb weight.

F — fiancine
Gm—galanthamine
Gn — galanthine

H —haemanthamine
HI —homolycorine
Hp—hippeastrine

Li —Lycorenine
Ly —lycorine
Mp—methylpseudolycorine

N —narcissamine
Nd—narcissidine
Nw—narwedine

O—oduline
Pl—pluviine
T —tazettine

Barton, Wenkert and their associates. Over the last decade, 55 of the 70 presently known alkaloids in the Amaryllidaceae family have been isolated and studied. The structures of a majority of these alkaloids have been established and many of the unresolved assignments of ring structure and substituent groups have been clarified.

The following general properties are most evident. Each alkaloid contains four rings, from 16 to 20 carbon atoms and one nitrogen atom. One of the rings is always of the benzene type. All the alkaloids have been found to be weakly basic. The alkaloids related to lycorine are usually light and heat sensitive.

The procedures concerned with isolation and identification of alkaloids from the bulb of the narcissus plant are quite exacting. A 1.0% yield of crude alkaloid, based on the total weight of the fresh plant, would be considered excellent by the natural product researcher. A pure alkaloid is said to be in abundance when present in the plant to the extent of 0.1%. Modern isolation techniques permit the isolation of alkaloids that are present in the plant in as low a quantity as 0.0001% of the plant weight. In a typical isolation experiment⁹ 7 kg. of King Alfred daffodil bulbs gave 20.205 g. (0.288%) of crude alkaloid as a brown gum.

Hans Boit¹⁰⁻¹⁴ of the Chemical Institute of the Humboldt University (Berlin) published a series of articles in which he reported the types and quantity of alkaloid present in a great number of narcissus. Table I shows the percentage of alkaloids present in representative varieties of narcissus. In general the largest amount of alkaloids can be isolated from the trumpet and the large-cupped daffodils. Inglescombe and *odorus rugulosus* contain the largest amount of galanthamine, Texas and Deanna Durbin the greatest quantity of lycorine, and King Alfred and Helios the most haemanthamine. "Van Sion" is an excellent source of lycorenine and Oliver Cromwell is a good source of pulviine. A more complete listing may be found in a review article by Wildman.¹⁵

There have been numerous discussions between botanists and chemists concerning the antagonistic disciplines of taxonomy and chemistry. A recent book, *The Eucalypts*, states that species of eucalypts may be morphologically indistinguishable, but can differ markedly in the composition of their volatile oils.¹⁶ This finding is most exciting in that it clearly indicates that differentiations of plants should not be based on morphological characteristics alone, but also on considerations of chemical composition. We feel the same way about the numerous varieties of *Narcissus*. Though many

daffodils are morphologically quite similar, their alkaloid content has been shown to vary considerably, both qualitatively and quantitatively.

Dr. Sydney Ringer¹⁷ reported that the alkaloids he separated from the flowering and the resting daffodil (*N. pseudonarcissus*) differed in their physiological actions. Ewins¹⁸ in 1910 indicated that the alkaloids isolated from the flowering and resting bulb were identical, but that the quantity of alkaloid produced by the former was approximately one-half that of the latter. Fitzgerald et al in 1958 found homogenized suspensions of selected *Narcissus* bulbs to have the greatest anti-tumor activity between July and December. Experiments repeated in March showed that there was a decided loss in this property.² Dr. H. S. King cites that in early spring aphids die when confined to daffodil foliage, but that after the leaves turn yellow aphids feed on the foliage.¹⁹ One could easily speculate that the chemical constituents of the daffodil vary in kind and quantity throughout the year.

Biosynthesis

The last fifteen years have witnessed outstanding advances in the understanding of fundamental biosynthetic mechanisms which lead to formation of carbohydrates, amino acids and lipids in plants. Leete believes that alkaloids make up a heterogenous class of natural products having only the nitrogen atom in common.²⁰⁻²¹ At this time we do not have a single acceptable hypothesis that can explain the biosynthesis of all alkaloids. The chemistry and metabolic routes concerned with the biogenesis of alkaloids are quite involved. To make it even more complex, we must bear in mind that various species of *Narcissus* may utilize different biosynthetic pathways to make the various alkaloids.

At first, chemists, speculating on the nature of biosynthesis of the alkaloids, fed likely precursors to plants in the hope that an increased yield of the alkaloid would result. The results of these experiments were not only inconclusive but misleading. Only by the use of isotopes has real progress been made. A carbon atom having an atomic weight of 14 rather than the normal weight of 12 emits particles which are radioactive and can be readily detected by sensitive radiation instruments. The carbon 14 atom is introduced into organic compounds that are postulated to be integral parts of the alkaloid molecule. These radioactive precursors are

administered to the plants by root-uptake and by injection into either the stem or bulb. In the root-uptake studies, radioactivity is found to disappear from the nutrient solution, most of the radioactivity going to the roots, 30% to the leaves, but none to the alkaloids. When radioactive precursors are injected into the plants, radioactive alkaloids are obtained.²² Recently Fischer³³ administered radioactive phenylalanine and tyrosine to Deanna Durbin. The alkaloids lycorine, pluviine, galanthine, haemanthamine and narcissidine were isolated and found to be radioactive. According to Suhadolnik³⁴ recent evidence indicates the phenylalanine combines with tyramine, formed from tyrosine, to give norbelladine. The latter is presently recognized as the direct precursor for lycorine.

By investigations such as these the fundamental chemical reactions going on within the narcissus plant are discovered. Knowledge of the mechanism of biosynthetic reactions is an important step in our understanding of the plant. Those interested in delving deeper are referred to references 22 through 34.

Medicinal Aspects

The presence of toxic alkaloids in daffodil bulbs has been widely known for many years. Cases of poisoning of humans by daffodil bulbs mistaken for onions have been recorded, the signs of poisoning being salivation and vomiting.³⁵⁻³⁶ Attention was called to the small amount of the bulb used, the rapid action of the poison and its resistance to heat on cooking. The alkaloid lycorine was implicated in the non-fatal action of the poison. Additional evidence that daffodil bulbs are toxic to mammals was furnished as a result of unusual circumstances during the First World War. In Holland the scarcity of cattle feed was accompanied by an overproduction of flower bulbs.³⁷ In nutrient value these bulbs rather closely resemble potatoes; they usually have less water, but their starch value is higher. To solve these problems, a study was undertaken to find whether or not they could be used as food for cattle. Cases of poisoning of the cattle were traced to the narcissus bulbs. The emesis noted was similar to that observed in humans who had attempted to use the roasted bulbs as a coffee substitute. Again the interesting observation was that the emetic action is not destroyed by heating.³⁸ In an investigation into the toxicity of known and unknown poisonous plants in the Union of South Africa, *N. jonquilla* L. was among the

plants that were definitely proved toxic to laboratory animals.³⁹

The pharmacological action of the alkaloid isolated from extracts of the resting daffodil bulb was originally reported to be similar to that of pilocarpine, whereas the extracts of the bulbs of the flowering plants closely resembled atropine in action. Morishima examined the physiological effects of lycorine and found that when given to dogs and cats in small doses it caused salivation and in large doses vomiting and diarrhea; death was caused by a generalized collapse. No effect on blood pressure was noted. The alkaloid was also tested on frogs and cats by Ewins,¹⁸ who obtained it from bulbs of *N. pseudonarcissus* and named it Narcissine (later proved to be lycorine) and was found not to have actions similar to those of either pilocarpine or atropine. These findings were in the main confirmed by Raymond-Hamet.⁴⁰

A most extensive study with plants and animals was carried out in Japan on the mechanism of the toxic action of lycorine and related alkaloids. When the seeds of *Vicia faba* were soaked for 12 hours in 0.5% lycorine or lycorenine solutions, detrimental effects on germination, growth and fruit-bearing resulted.⁴¹ Lycorine treatment decreased cell division of spermatozoids and produced 50-70% abnormal division. Lycorenine was not as effective as lycorine. When parts of *Vicia faba* were immersed in dilute solutions of lycorine for up to 24 hours, the root tip meristem showed many mitotic deviations such as inhibition of metaphase, tripolar mitosis and contraction and irregular distribution of chromosomes.⁴² The nuclear changes that are involved in reduction division of pollen mother cells were similarly abnormal.

Lycorine brought about both acute and chronic changes of the blood cells of rats. The number of red and white blood cells of the rat decreased 30 minutes after subcutaneous administration of the alkaloid; recovery to normal occurred 24 hours later. The white cells were decreased more markedly than the red cells. On chronic exposure to the alkaloid, the red blood cells showed little change in number, but there was a marked decrease in the count of white blood cells.⁴³

In further physiological studies using rats, lycorine was found to affect spermatogenesis.⁴⁴ Immature rats injected with the alkaloid weighed 30 per cent less than the controls; the loss of weight in mature rats was not so high. Pathological findings included deleterious changes in the dental enamel, subcutaneous or submucous hemorrhages, gingival ulcers with hyperemia and hypertrophy of

the mucous membrane, and hypertrophy of the liver and spleen. The testis and ovary showed an absolute and relative decrease in weight with respect to decreased body weight. The effect of lycorine on the testes of mature rats differed from that on those of immature rats only in the degree of severity. The changes in the testes caused by the continuous dosage of lycorine were not lasting.

Certain of the symptoms and pathological findings in the lycorine-treated rats were indicative of scurvy (Vitamin C deficiency). Further studies on the ascorbic acid-depleting effect of lycorine in rats substantiated the fact that this alkaloid has a marked inhibiting action on ascorbic acid synthesis.⁴⁵

The alkaloid galanthine stimulates respiration and is hypotensive; it acts both through the central nervous system and directly on the cardiovascular system. In rabbits with experimental high blood pressure, galanthine lowers the blood pressure from 170-180 to 120-110 mm.⁴⁶

Galanthamine has anticurare properties, although it differs greatly in chemical structure from other anticurare drugs.⁴⁷ Neuromuscular transmission, which is inhibited by tubocurarine, is restored by galanthamine. Thus, the use of this alkaloid in neuromuscular impairment is indicated. The interaction of galanthamine and eserine, anticholinesterase substances, with cholinolytic and adrenolytic compounds in affecting the reticular formation of the brain stem has been investigated subsequently. The results of this study led to the suggestion that adrenergic and cholinergic influences play a part in the activation of the cortex through the reticular formation.⁴⁸

Claims have been made in Russia for the therapeutic use of galanthamine as an anticholinesterase drug in the therapy of myasthenia, myopathies, poliomyelitis, polyneuritis, traumatic motor and sensory disturbances and other nervous diseases.⁴⁹ The most spectacular of these claims is undoubtedly that concerning poliomyelitis, an account of which was published in the British press.⁵⁰

An extensive survey of the tumor-damaging or antitumor effects of plants of the family Amaryllidaceae has recently been undertaken at the National Cancer Institute.² Thirty-six genera were represented in their report. Aqueous suspensions or homogenates of the bulbs of nine genera, including the *Narcissus*, were judged active against test tumors in mice. As previously mentioned, the activity of the bulbs depended on the time of year when they were tested. The dried outer portions of the bulb were inactive. Further interesting findings related the antitumor activity to such other fac-

tors as storage, time of digging of the bulbs, and the plant foliage. The varieties of narcissus that showed the greater antitumor activity are Damson, Firetail, Pomona, Cheerfulness, Moonshine, Beryl, Geranium, Orange Wonder, Actaea and Red Rim. Geranium has been selected for further study and for isolation of the active principle or principles from the bulb.

A significant observation made in this study was that the pure alkaloids isolated from bulbs of several species and the alkaloidal fractions of bulbs showed very little activity against the test tumor. Of the pure alkaloids tested only lycorine had antitumor activity. However, the activity found in the aqueous extracts of the bulbs was not dependent of the content of this alkaloid. The National Cancer Institute investigators feel that at least two antitumor compounds, which are water soluble and do not appear to be alkaloids, are present in certain species of varieties of daffodils. One should note, however, that an antimalarial activity found by others in extracts of bulbs of a number of plants of Amaryllis family appears to be associated with the alkaloidal fractions.

Pharmacological studies of the alkaloids of the *Narcissus* have produced few materials that show promise of therapeutic usefulness. Only a fraction of the alkaloids that have been isolated from the *Narcissus* and identified chemically have been investigated, and of these only a few have been examined by modern pharmacological techniques. The program of the National Cancer Institute whereby alkaloids, alkaloidal fractions and aqueous extracts of various species of *Narcissus* were screened against experimental tumors may encourage others to exploit in like manner the alkaloids and other chemical entities of the *Narcissus* in the search for therapeutic materials to use in those illnesses for which no adequate treatment is available.

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The Daffodil Display Garden at the Arnold Arboretum

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THE daffodil display garden at Hillcrest Gardens of the Arnold Arboretum is a joint project of the American Daffodil Society and the Arnold Arboretum. It is planned and directed by a committee under the ADS Test Garden Committee and the daffodils are given by ADS members and their friends. The Arboretum prepares and maintains the beds and plants the daffodils. It also provides permanent labels.

Hillcrest Gardens, also known as the Case Estates, is in the town of Weston, about fifteen miles west of Boston. The daffodil display garden lies beneath a fragrant group of apple trees, white to deepest red, that are in full bloom at the same time as the daffodils. Here and there, scattered among the apples, are other small flowering trees dating from the days when this was a famous private garden.

Close to the daffodils on the north is a deciduous wood, leafless when the daffodils are in bloom. Naturalized flowers trail out along its edge and along the narrow dirt roads that wind through it. Mingling with them are irregular masses of old daffodils. Deep green leaves of rhododendrons contrast with these gay colors. Somewhere in the rhododendrons, a pair of mocking birds nests each year. These woodland roads are much used by visitors who, whether entering or leaving, are attracted to the daffodil beds nearby.

To the east, at right angles to the wood, is an imposing stone wall built by Miss Case through which an opening gives on the ground-cover planting. This green garden in its quiet beauty has a practical appeal to a large number of people. Many of the visitors to the daffodils come from this garden.

The first planting of daffodils followed the R.H.S. classification, with every division and subdivision represented. In most cases,

three of a kind were planted, but in the case of Division 11, single bulbs only were available.

So far, no separation beyond the subdivisions has been made, but in the near future it is planned to follow more or less the subdivisions used in our symposium in order to make it easier for members to compare those clones of like coloring. At present, there are not sufficient numbers of some of the color forms to make such a grouping feasible.

This garden differs from that at Wisley in that at the latter, the daffodils for testing are selected. The aesthetic value of the daffodils does not, therefore, have to be considered. In any consideration of plants for garden use, this is, of course of fundamental importance.

The ideal daffodil for the home garden has far more in common with the show daffodil than with the daffodil used for naturalizing. There are defects, however, that a show daffodil may have that will disqualify it as a desirable garden plant. The philosophy that underlies the selections for the daffodil garden awards of the R.H.S. committee is based on a consideration of these defects.

The daffodil that won highest award in the show may have been the only one in a group of one hundred in the garden that had show qualities. As a show flower, it won; as a garden flower, it is a failure. To a varying degree, other defects disqualify a daffodil for the garden, as scant bloom, fading or lack of resistance to bad weather.

It cannot, however, be stated too emphatically that, although the study in a test garden concerns chiefly the garden behavior of the daffodils, it is of the utmost importance that the clones studied are themselves worth growing. There are hundreds of good daffodils in the low price range.

For some time, the idea has attracted me of growing together typical introductions of the different prominent hybridizers, past and present. This would give in a visual form the history of the daffodil development, showing the part each hybridizer took in it.

It is unfortunate that the R.H.S daffodil yearbooks were suspended for so long during the middle years of daffodil development. In quieter times, there would have been a more adequate written record. A study of their introductions should give us a clearer picture of the daffodil hybridizers of those days.

In the spring of '61, Mr. Richardson wrote me that the garden should, he thought, include some recent introductions and that he

would send me such a collection in the coming fall. This wonderful gift, twenty-five of his newer introductions in eighteen clones, brought to mind the long-cherished plan for a hybridizers' collection, and Mr. Richardson's gift became the first unit.

Later in the fall of '61, Mr. Gerritsen, the Dutch hybridizer from whom the "collar daffodils" (Div. 11) had been obtained the previous year, sent to the test garden a gift of some of his introductions in the first three divisions. This made a second unit.

A third unit to this garden is already available. When the test garden was started, Mr. Mitsch presented to the garden many of his introductions, some of which together with others will be the start to which others will be added from time to time.

Aphids, Virus and Daffodils

HAROLD S. KING

*Chairman, Health and Culture Committee,
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THE man with a hoe sees much missed by one on a tractor, and the scientist learns most of all, for he adds experimental methods to observation. By superficial observation one might conclude that aphids cannot be much of a problem in a daffodil planting, for only an occasional wanderer is noted. But the scientist with his traps may prove that thousands to millions of aphids have crossed the planting in the course of a few hours. One not watching closely might miss seeing this transient migration.

Aphids are important to the daffodil grower since they are the main vectors of virus. If the vector is eliminated, the virus will be contained in plants already infected. When these bulbs are destroyed, there will be no reservoir of virus to start an explosive epiphytotic.

Suggestions have been put forward at various times that aphids can be controlled by the use of systemic insecticides. Demeton (systox) is most mentioned in this connection but is too toxic for use by the home gardener. The less dangerous dimethoate has recently been put on the market. These chemicals are absorbed into the plant, making its sap toxic to aphids. I have questioned whether, at levels that do not injure the plant, an aphicide, such as demeton, could be sufficiently rapid in action to kill an aphid before it can go on from sampling a virus-infected plant to inoculate another daffodil. If the aphid is merely test probing instead of feeding, the chance of its getting a promptly lethal dose from one probe seemed to be slim.

The source of my doubts was a briefing in 1957 by Dr. Max F. Day from Canberra, Australia. He stated that there are two methods by which vectors spread viral diseases, either mechanically or biologically. In the former the virus-contaminated mouth parts, acting

as a probe, are wiped off into the puncture made in a second daffodil. In the latter the virus multiplies in the vector and is introduced from the salivary glands into the puncture. It is the mechanical transmission, wherein the aphid functions as a "flying pin," that we have to avoid if we are to prevent the spread of virus among daffodils. Aphids are rarely found on daffodils, which they do not seem to like. In migrating they light on all plants indiscriminately and make a test probe or two to see if the plant is to their liking. If not, they do not stop to feed but move on. The aphid may have imbibed only a minute quantity of sap, but the punctured plant may have received a virus inoculation.

Dr. Day referred me to Dr. Floyd F. Smith of the Entomology Research Division, Agricultural Research Service, U.S.D.A., for additional details on the spread of virus by aphids. In our correspondence and conversation he corroborated the statements of Dr. Day. Dr. Smith, in addition, went further. He showed that *the use of systemics on daffodils not only is useless in controlling the spread of virus by aphids, but actually promotes such dissemination.*

By exploratory probing an aphid can pick up virus particles from the epidermal leaf cells on one daffodil and introduce them into cells of another within one minute. The distastefulness or unattractiveness of the host plant increases the restlessness and probing activity of migrating aphids, and hence their efficiency in transmitting the virus from plant to plant. Early in the season aphids die if confined to daffodil foliage. However, after the leaves turn yellow, aphids may feed in numbers under the bent-over foliage.¹ The introduction of systemics into host plants colonized by aphids increases their distastefulness. The aphids become even more restless and wander about before they die, several hours or perhaps a day later. Dimethoate is no more rapid in its systemic action than is demeton.

An attempt to keep a daffodil planting free of aphids is in Dr. Smith's opinion impractical. It is difficult to prevent, by the use of *any* insecticide, the rapid spread of virus in small plantings where great numbers of the aphids from potato or other crops migrate into or through the plantings.

L. Broadbent, from the Rothamsted Experimental Station, England, is equally emphatic. In the *Annual Review of Entomology*, vol. 2, pp. 339-354 (1957), he says that many experiments have

1. It is probable that this change in palatability of daffodils to aphids is due to a change of alkaloid content of the plant at maturity.

shown that no current insecticide can kill quickly enough to prevent infection by viruses. If the insecticide irritates, but kills slowly, the insect may move and spread virus to more plants than otherwise. He cites K. Heinze's observation that aphids probed more frequently than usual on plants recently sprayed with demeton, and that they transmitted virus more frequently to treated than to untreated plants. Broadbent concluded that virus diseases will remain uncontrollable by insecticides until the discovery of new persistent chemicals that will kill the vectors almost instantly.

Removal of infected plants before aphid migration,² destruction of outside sources of infestation and isolation of the plants from exposure to migrating aphids are recommended by Dr. Smith as more successful procedures for controlling virus spread.

Particular care should be taken to isolate virus-free stocks, such as seedlings, from any possible source of infection. The worst possible situation would be a planting of virus-infected bulbs located between an aphid-infested potato field and a bed of daffodil seedlings.

Further information can be found in (1) *A Review of Problems of Specificity in Arthropod Vectors of Plant and Animal Viruses* by M. F. Day and M. J. Bennetts, Commonwealth Scientific and Industrial Research Organization, Canberra, Australia, 172 pp. (March 1954), (2) *Insect Transmission of Plant Viruses* by Floyd F. Smith and Philip Brierley in the *Annual Review of Entomology*, vol. 1, pp. 299-322 (1956), and (3) *Virus Diseases in the Narcissus Trial at Wisley* by L. Broadbent, D. E. Green and J. B. Paton in the *Journal of the Royal Horticultural Society*, vol. 82, pp. 395-401 (1957). Discussion of a similar problem in connection with gladiolus is to be found in the September 1961 issue of *Gladio Grams*, published by the North American Commercial Gladiolus Growers.

2. A simple, safe and effective method for eliminating virus-infected daffodil plants is described by Harold S. King in *The 1962 American Daffodil Yearbook*, page 24.

Some Daffodil Pests and Their Control

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THE reason most people including myself enjoy growing daffodils is that they thrive, even when totally ignored. Cotton-tails in my garden destroy crocus about as fast as they emerge from the ground. Roses, unless treated regularly for Japanese beetle, black spot and powdery mildew are soon an unhappy, unthrifty lot. But good ole daffodils, I can plant them anywhere, and in spite of grass, weeds, poor clay soils and hard cold winters, I get a wonderful show. In fact, many of the blooms to my untrained eye appear to be bench, blue ribbon winners.

One of the big reasons daffodils do so well in my garden and in yours is that they are attacked by relatively few insects, diseases and other pests. "Oh," I can hear you say, and "that's what you think!" Suppose daffodils were like red clover, which is attacked by over 200 different species of insects feeding on every portion of the plant from the pollen to the nodules, or corn, which is attacked by over 250 species of insects. Daffodils are attacked by less than a dozen important pests, and for the home gardener only two or three of these are really important. I would like to discuss these for you and suggest how you might care for them in your home garden.

Among the most troublesome of the daffodil pests is the maggot of the narcissus bulb fly. We entomologists call it *Lampetia equestris* Fabricius when speaking of it in scientific writings. The bulb fly occurs throughout the United States wherever daffodils are grown. In New York it is most common on Long Island and southern New York, where daffodils are also most commonly grown. The bulb fly larva feeds on daffodils and other hosts as well. Some of these are *Muscari*, *Iris*, *Gladiolus*, *Scilla*, *Lycoris*, lilies and others. In general the bulb fly appears to prefer *Narcissus*. In home plantings infesta-

tion may reach as high as 50 to 75 percent of the plants although usually is more often in the 10 to 25 percent range. Commercial plantings, where control is generally practiced, infestations may only range from 1 to 10 or 15 percent.

The adult bulb fly resembles a bumble bee in color and flight habits. It may be seen on sunny, warm days buzzing and zigzagging low around your blooms, but instead of pollinating the blooms it is laying eggs. The adults are about $\frac{1}{2}$ to $\frac{3}{4}$ of an inch long and their black hairy bodies are encircled with bands of yellow, buff and orange. In New York the first bulb flies appear in late April or early May with the first daffodil blooms and continue to emerge during the entire blooming season. The flies mate and the female begins laying eggs. The tiny white eggs are laid and placed singly on the leaves at the base of the daffodil plant (at the neck) near the soil surface although they may be scattered on the ground or in cracks in the ground. The eggs hatch in a week to ten days or more depending on the temperature. The young legless larva or maggot burrows down along the side of the bulb and enters it at the junction of the roots and base of the bulb entering the basal plate through the root ring. Usually, there is only one maggot in each bulb although there may be two, three or even rarely more. The maggot feeds on the basal plate and then tunnels with its hook-like mouth parts up into the scale region of the bulb consuming much of the tissue. Here it passes through these different distinct sizes of maggot stages or instars as it tunnels back and forth and finally upward. The maggot which is now wrinkled, plump, and greyish-white to a yellowish-tan passes the winter in the bulb. In early spring, it resumes activity and burrows out of the bulb and up near the soil surface. Here the maggot pupates within its last molted skin which forms a hardened pupa called a puparium. The puparium is hard, rounded at the ends and dark brown to black. It has a breathing tube and a convenient escape hatch. The fly remains in the pupal stage 30 to 75 days or more depending on the soil temperature. The fully developed fly pushes out the "escape hatch" and works its way up onto the plant where it flexes and dries its wings before mating and starting its life cycle over again. There is only one generation a year although in some cases two years are necessary to complete larval development.

The best control of the bulb fly is based on protection of the bulb. A number of insecticides have given excellent results. Among these are aldrin, dieldrin, chlordane, endrin, heptachlor, Telodrin

and Thiordan. Others such as lindane, phorate and Systox will work but are either too toxic to the home gardener to use or may cause injury to the bulb. These latter insecticides are systemic and particularly effective on aphids and to a lesser extent on mites, leafhoppers and thrips which are involved in the transmission of virus diseases of *Narcissus*. Virus diseases are largely the concern of the commercial large scale growers and need not concern us here.

Commercial growers make up an emulsion usually of dieldrin or heptachlor using one half to one pound of toxicant in 50 gallons of water and adding a fungicide such as formalin at the rate of 1 quart or phenyl mercuric acetate (1 to 2 ozs.) to the water.

Dr. Harold S. King, Chairman of the Health Culture Committee, writes that phenyl mercuric acetate is difficult to get into solution and that it should be made into a thick paste with water and then enough hot water is added to bring it into solution. One must use great care, Dr. King warns, to avoid the fumes and keep the concentrated powder and solution from the skin since it causes dermatitis.

The bulbs to be treated are placed in wire baskets or loosely woven "onion bags" and then suspended in the emulsion ten minutes to an hour—usually ten minutes are enough. The bulbs are removed in the containers and hung to dry. They are now ready for planting. For commercial growers, I think this is a good practice, but for the average home gardener there are easier and much safer ways to treat the bulbs. Aldrin, dieldrin, chlordane and heptachlor may be fatal poisons if swallowed. Skin contact with the emulsifiable concentrate is dangerous. The fumes, vapors or spray mists can also be dangerous. If you wish to use the soak treatment, handle the insecticides and treated bulbs with sound rubber gloves, work in a well ventilated area, preferably outside, and after treating the bulbs take a hot, soapy bath and change into clean dry clothes including your shoes and socks. Plant and handle the treated bulbs only with tight rubber gloves.

Even though I am a professional entomologist and have handled literally tons of insecticides I prefer to treat my bulbs in the following manner. First I remove any loose scales and dirt from the bulbs, then I roll them in a powdered fungicide such as Ceresan or Arasan (others may be used) to protect against basal rot. Then I dig my holes or planting trench (for seedlings and bulbs for cut flowers). Using 5 percent granular formulations of heptachlor or dieldrin, I treat the bottoms of holes or trench. I find a teaspoonful

per bulb hole is just about right. The bulbs are set in place, lightly covered, and an additional teaspoonful is added on top of the bulb. Finally the hole is filled and tamped firmly. No dust, no fumes, clean and safe.

Some home growers might prefer to plant the bulbs in place and just prior to covering treat them with an emulsion spray of aldrin, chlordane, dieldrin, endrin or heptachlor. Others might prefer to use a garden duster with 5 percent dust formulations but for my money I'll take the granules. Granulated insecticides are just about dust free. They are free flowing, easy and clean to handle. I much prefer them to dusts or even sprays. Hand sprayers are notorious for clogged nozzles and leaky hose connections. I use a portable hand sprayer for aphids, thrips and mites but I don't like it and think a good, leak proof, easy-to-care-for one has yet to be built.

After the blooms have begun to fade, I like to run a hand-operated lawn fertilizer spreader over the plants filled with a 2 to 5 percent heptachlor, dieldrin or aldrin granules. These fall into the spaces between the leaves, stems of the plants and the soil. Here it leaves a good toxic residue to both the bulb fly larvae and the flies. Following such a bulb-treating program I have kept my bulbs free of such "soil inhabiting" pests as the bulb flies, lesser bulb flies, wireworms, Japanese beetle grubs and June beetle grubs.

Frequently narcissus bulbs are found just about rotted and full of maggots. These are often accused of being bulb flies when actually they are lesser bulb flies. Lesser bulb flies belong to the genus *Eumerus*, and there may be several species involved, but the most common of these is *Eumerus tuberculatus* Rondani, known as the lesser bulb fly.

Unlike the bulb fly, the lesser bulb fly prefers injured bulbs, particularly those injured by frost, nematodes or cases where basal rot has set in. The larvae do not infest sound healthy bulbs or dry bulbs in storage but only appear to be able to enter roots affected by decay and disease.

The eggs as in the case of bulb fly are small and white and are laid close to the necks of the bulbs; being deposited in groups of three to 15, closely side by side, in neat little clusters. The little maggots emerge from the eggs and enter the soft, decaying tissue. Twenty to a 100 or more may enter a single bulb—although usually 20 to 30 or 50 are the usual number. The maggots are legless, dirty yellowish and only about $\frac{3}{8}$ inch in size. They pass through a life cycle much as the bulb fly except that there are two generations a

year in parts of New York, and two and a partial third on Long Island. There is much overlapping of sizes and generations throughout the state.

The methods of control outlined for bulb fly are applicable with the lesser bulb fly.

According to Thorne, the bulb and stem nematode *Ditylenchus dipsaci* (Kühn 1857) Filipjev 1936 was first recorded in 1825 by Schwertz who described certain diseases of rye, oats, clover and other crops but did not observe the nematodes. His characteristic descriptions indicate that he had the eelworm but did not recognize it as such from the symptoms. The causal agent was uncovered in 1867 by Kammoldt. In the meantime Kühn in 1857 discovered *D. dipsaci* in teasel and described the nematode for that plant. He redescribed unknowingly the same nematode from other plants several other times as did other workers who assigned new and different specific names to populations on different plants rather than presenting good diagnostic characters so that the nematode could be recognized. Much confusion as to names remains to the present day. The nematode has a wide range of host plants ranging from daffodils to phlox, strawberry, red clover, alfalfa, onions, rye, potatoes, tulips, sugar beets and mint. In fact there are over 450 known host plants of 44 different families.

How can you tell if you have nematodes or eelworms? Leaves of badly infested daffodil bulbs bear elongate swellings called "spikkles." These can be detected by stripping the leaf between the thumb and finger. In later more advanced stages the spikkles become yellow or brown in center and may break down into small dead spots. In the late summer when the leaves are dead and the bulbs are mature, the nematodes will be found lying quiescent in the tissues. Entrance into the leaves is made from the bulbs, it is believed, through the stomata. Some of the nemas go down into the scales where the leaves originated. After the nematode colonies become established, they form brown spots in the bulb scales which become larger gradually until the entire scale is involved. In the more advanced stages, brown rings can be seen if the bulb is cut in two. The flowers and leaves from infested bulbs are deformed, usually stunted and often bear spikkles. Under very severe infestations the bulbs may fail to produce any blooms.

Nematode reproduction will continue during bulb storage and often bulbs may break down completely in storage. Badly decayed bulbs are not good homes for nematodes and the nemas often

emerge from the bulbs near the basal plate in a woolly-like mass which is spread by the shoes of workers or by machinery to clean bulbs. If infested bulbs are planted the nemas can migrate through the soil to other clean bulbs.

Other nematodes of the genus *Pratylenchus* are found in most soils of the Northeast. There is much confusion as to species and host plants with *penetrans* and *pratensis* being confused, even by scientists. *Pratensis* does feed on daffodils in the Netherlands and has been found in New York on grasses and legumes, widely distributed. I think it more widespread than *Ditylenchus dipsaci* but much less important to the daffodil grower. At any rate the chemical fumigation suggested for *dipsaci* will also destroy *Pratylenchus*.

Control of nematodes in bulbs is usually done using the hot water treatment which is said to have originated with J. W. Barr in England in the early 1900's. Later Ramsbottom in 1918 developed the 3-hour immersion treatment at 110° F. In the United States, this treatment failed to give the desired results in many cases, so a modification of the hot water was made in 1940 by Chitwood and Blanton who found that 1 pint of formalin added to 200 gallons of water greatly improved its effectiveness on nematodes. Later it was found that a warm water plus wetting agent presoak (75° F) prior to treatment improved its effectiveness. With your own bulbs be certain to remove badly decayed bulbs prior to treatment with hot water because with such bulbs 80 to 90 percent of the nematodes escape. Complete kills however can be made in bulbs with only slight infestations.

Nematodes can be controlled successfully in the soil using a soil fumigant. One of the best soil fumigants of several is Telone. It is a D-D mixture of chlorinated C₃ hydrocarbons, including 1, 3-dichloropropene, 1, 2-dichloropropane and related compounds. For sandy soils 25 gallons are used per acre but on heavier clay soils 30 or even 40 gallons are needed per acre. The fumigant is injected in small areas using a hand injector at depths of about 6 inches in holes spaced 10 inches apart. For light sandy soils and small areas, it may help to cover the treated areas for 48 hours with a plastic sheet or a canvas cover to prevent a too rapid loss of fumigant from the soil. If the fumigant dissipates too rapidly incomplete kills of nematodes will result. It is best to fumigate in July or early August when the soils are warm and allow a period afterward for the fumigant to leave the soil. One should allow a minimum of three to four weeks before planting to daffodils again. Since the fumigant

will cost \$65 to \$125 or more per acre depending on the type of soil treated and the amount of fumigant needed, it is obvious that treating large areas will be expensive. Commercial growers will want to rotate their bulb crops every six years. While volunteer bulbs are removed for the first three years, grain cover crops are usually grown. This is followed by three years of grain, hay or row crops during which time weed host plants of the nematode are kept to a minimum. Sanitation measures in your garden and storage areas are most important. Leaves and stems should be gathered and burned in the field. Care should be exercised where soil, fragments of infested bulbs, nematode "wool" etc. are discarded. There is no easy way for a home gardener to handle the nematode problem short of discarding all infested bulbs and practicing good sanitation. Fumigation of small areas is fine if a trained man is hired who knows what he is doing and has the necessary equipment to do it. Some success can be achieved by plowing, treating with a watering can, and rototilling the soil well.

The 1962 American Daffodil Symposium

HARRY I. TUGGLE, JR., *Chairman*, Symposium Committee
Martinsville, Virginia

THE symposium this year is based on reports from twenty-five states. We missed reports from seven states represented in 1960 and 1961. The Items have been further subdivided in Divisions 5, 6, and 7, and another Item added for varieties proven valuable in naturalizing. There was some complaint that the ballot was too divided, yet it proved beneficial. It pointed out to some growers how weak their collections were in certain Items, and emphasized the fact that some subdivisions are badly in need of rejuvenation or improvement. There is increasing recognition being given to the time required for numerous varieties to become settled or acclimated.

This year we have starred (*) those varieties which received forty-five points or more, our tabulation being based on three points for first choice, two points for second, and one point for third place on the ballots.

We are still anxious to obtain new reporters who grow large, representative collections and who have the critical acumen necessary for sound evaluation.

ITEM No. 1. Trumpet, lemon or sulphur yellow (1a)

Exhibition:

1. Moonstruck*
2. Luna Moth*
3. Lemon Meringue
4. Grapefruit
5. Hunter's Moon
6. Moonmist

Inver

Garden:

1. Mulatto*
2. Hunter's Moon*
3. Moonstruck
4. Grapefruit
5. Tintoretto
6. Lemon Meringue

Comment: Moonstruck is the most widely grown, but Luna Moth

has the finest flower, but a weak stem. Graceful Lemon Meringue is consistently good, strong-stemmed, long-lasting. Inver has pale lemonade color, and fades to reversed coloration. Limelight has been overlooked. Hunter's Moon, with poor pose and seldom smooth, is valued only for late bloom. Nearly all of these bloom before the peak of season.

ITEM No. 2. Trumpet, self-yellow or gold (1a)

Exhibition:

1. Kingscourt*
2. Slieveboy*
3. Arctic Gold*
4. Ulster Prince
5. Golden Rapture
6. Goldcourt

Garden:

1. Garron
2. Ulster Prince
3. Cromarty
4. Goldcourt
5. Arctic Gold
6. Lord Nelson

Comment: Arctic Gold, a medium-sized, deep gold of model form, has climbed rapidly in favor, yet recently acquired bulbs of it do not match those obtained in 1954. Are there perhaps two forms? Royal Oak can be relied upon for faultless blooms, while Golden Rapture seems to vary from year to year. Viking is a promising new, clear yellow. Fine Gold and Ark Royal are two nice, overlooked "earlies."

ITEM No. 3. Trumpet, white perianth, colored trumpet (1b)

Exhibition:

1. Preamble*
2. Trousseau*
3. Frolic*
4. Content
5. Effective
6. Ballygarvey

Garden:

1. Trousseau*
2. Effective*
3. Foresight
4. Content
5. President Lebrun
6. Preamble

Comment: Newcastle portends to be the high-water-mark in bicolor trumpets. Downpatrick on maiden bloom was disappointing. Preamble continues to give fine bloom but has weak stems for some. Trousseau lasts and lasts in the garden and showed its "catalog color" this season. Grant Mitsch's new Prologue is early, tall, of good contrast, and exceptionally long-lasting. There are two good bicolor pink trumpets: Mitsch's Rima, and Alpine Glow, which is a new name given to C. E. Radcliff's "Roslyn."

ITEM No. 4. Trumpet, self white (1c)

Exhibition:

1. Vigil*
2. Cantatrice*
3. Empress of Ireland*
4. Rashee
5. White Prince
6. Broughshane

Garden:

1. Beersheba*
2. Mt. Hood*
3. Broughshane
4. Ardclinis
5. Cantatrice
6. Mrs. E. H. Krelage

Comment: Durable, sparkling white Vigil has overthrown Cantatrice. And while Empress of Ireland may not be as white as some other 1c's it is settling down and giving majestic five-inch blooms smoother and more lovely than its photograph. Chivalry is a strong-stemmed, more polished child of Broughshane.

ITEM No. 5. Trumpet, reverse bicolor (1d)

Exhibition:

1. Lunar Sea*
2. Entrancement*
3. Nampa
4. Spellbinder

Garden:

1. Spellbinder*
2. Nampa
3. Entrancement
4. Lunar Sea

Comment: There is nothing new to report here. It has been accurately noted that none of these flowers are well reversed while fresh.

ITEM No. 6. Large Cup, self-yellow (2a)

Exhibition:

1. Galway*
2. Golden Torch
3. St. Keverne
4. Ormeau
5. Lemnos
6. St. Egwin

Garden:

1. Carlton*
2. St. Egwin
3. St. Issey
4. Galway
5. Golden Torch
6. St. Keverne

Comment: Little change in the line-up, except that Ormeau, a dependably smooth golden 2a with neat trumpet-like crown, is gaining. Another plug must be given St. Issey which is early, smooth, and has a green base to the gold color.

ITEM No. 7. Large Cup, red or orange, yellow perianth (2a)

Exhibition:

1. Ceylon*
2. Court Martial
3. Air Marshall
4. Armada
5. Narvik
6. Foxhunter

Garden:

1. Armada*
2. Rustom Pasha
3. Ceylon
4. Fortune
5. Home Fires
6. Aranjuez
Carbineer

Comment: Vulcan was reported as having the most vivid color seen, and almost perfect form. It has a long neck, but excellent pose. Patagonia is valuable for late bloom. Masai King is settling down and improving. Sealing Wax is a glorified edition of Red Goblet. Zanzibar and Firecracker have perhaps the deepest red cups, and Balalaika is about the best of the red wire-rimmed type. (It has done much better than Ringmaster). Kindled has brilliant cup and perianth color in late midseason. Bantam has a 2½" flower on 10" stem, with a good plant in proportion. It is clear yellow with a neat red rimmed cup, and is a charming intermediate type. Border Chief, Matlock, Home Fires, and Red Ranger remain noteworthy. We need a report on Arriba.

ITEM No. 8 Large Cup, yellow or light colored, white perianth (2b)

Exhibition:

1. Festivity*
2. My Love*
3. Green Island*
4. Statue
5. Tudor Minstrel
6. Deodora

Garden:

1. Brunswick*
2. Polindra*
3. Statue
4. Coverack Perfection
5. Gold Crown
6. Bodilly
Tunis

Comment: Festivity has outdistanced all competition. Tudor Minstrel can be superb, but tends to hang its head and to have a strongly reflexing perianth in our climate. Deodora is glistening white with a flat cup ribbon edged in cool yellow. In some areas this year there was some orange in the rim. With all parts rounded, Oratorio also makes a fine plant and received a nomination for "mother-of-the-year." Careysville is a first-rate flower but a bicolor

trumpet in character. Irish Minstrel has the heaviest substance in this group and fine form, but is prone to come with a cocked petal. Gold Crown, another bicolor trumpet in character, has Effective's coloration. Tullyglass is a larger, finer Greenore type, and Wood-green, coming very early, is better than Brunswick.

ITEM No. 9. Large Cup, red or orange, white perianth (2b)

Exhibition:

1. Arbar*
2. Kilworth*
3. Avenger
4. Daviot
5. Signal Light
6. Fermoy

Garden:

1. Kilworth*
2. Selma Lagerloff*
3. Duke of Windsor
4. Flamenco
5. Fermoy
6. Buncrana

Comment: Avenger is the best exhibition red cup now on the market. Libya (Kilworth × Cairo) has a deep red cup and was the most sun-fast of the novelties. Northern Light is a huge and better-colored offspring of Fermoy, while Victory is yet another of the Kilworth × Arbar series that was exceptionally good on first bloom this year. Stromboli, with its orange-red cup tending to be flat, is distinct and meritorious. Alicante has been overlooked and should prove valuable for garden. Pirate King has been outclassed in color and dependability by its newer sisters.

ITEM No. 10. Large Cup, self white (2c)

Exhibition:

1. Ave*
2. Easter Moon*
3. Ludlow
4. Knowehead
5. Truth
6. Zero

Garden:

1. Zero
2. Ave
3. Ludlow
4. White Nile
5. Courage
6. Truth

Comment: Both Purity and Arctic Doric continue to perform well, the latter being especially valuable as it blooms early and is dead white on opening. Reports on Ardbane have been mixed. Knowehead is giving exceptional bloom after settling down. Elegant and graceful Early Mist has not received the recognition it deserves. At last, in Santa Lucia we have an able replacement for Ludlow, all of the stock of which is reported to have silver stripe,

a virus. Wedding Gift continues to perform well under varied conditions and locations, and should be an excellent choice for those areas difficult for whites.

ITEM No. 11. Large Cup, white, yellow perianth (2d)

Exhibition:

1. Bethany*
2. Daydream*
3. Binkie
4. Lemon Doric
5. Nazareth
6. Halolight

Garden:

1. Binkie*
2. Lemon Doric
3. Cocktail

Comment: Daydream, Halolight, Rushlight, and Limeade are exhibition material, but fall short of the reliably superb quality of Bethany, this season best-in-show, and a runner-up for best-in-show, at two of the largest shows in the country. Limeade should be noted as being borderline to measuring trumpet. Handcross just does not stand up in comparison with the Mitsch 2d's. Mitsch's new Jaunty is a departure in that it has a neat ruffled crown; it and Nazareth have perhaps the whitest crowns among the 2d's.

ITEM No. 12. Small Cup, colored, yellow perianth (3a)

Exhibition:

1. Ardour*
2. Chungking*
3. Jezebel
4. Therm
5. Ballysillan
6. Dinkie

Garden:

1. Market Merry*
2. Chungking
3. Apricot Distinction
4. Mangosteen
5. Therm
6. Dinkie

Comment: There is a dearth of both new and good material. Jezebel has the best color, but its perianth segments twist badly after opening. Doubtful is borderline in cup length, but it is good and has better sunproof quality than most. Perimeter has a red wire-rimmed cup and is perhaps the most dependable exhibition flower. How can Chungking score so highly for garden when its cup burns so badly? Of ideal form, Lemonade (classified 3a) and Aircastle (classified 3b) both open 3b and with age become infused with a dubious yellow color.

ITEM No. 13. Small Cup, color not predominant, white perianth (3b)

Exhibition:

1. Carnmoon*
2. Bithynia*
3. Coloratura
4. Merlin
5. Aircastle
6. Ballycastle

Garden:

1. Angeline*
2. Sylvia O'Neill
3. Lough Areema
4. Misty Moon
5. Dreamlight
6. Bithynia

Comment: In three years Carnmoon has risen from fifth to first place. Coloratura can be startling, this year in one garden the rim was almost red. Merlin is the finest red-rimmed 3b available. Green Hills has the greenest center yet seen in a flower of such size. It blooms relatively late, has a strong, tall stem.

ITEM No. 14. Small Cup, colored, white perianth (3b)

Exhibition:

1. Blarney*
2. Matapan*
3. Limerick*
4. Rockall
5. Snow Gem
6. Mahmoud

Garden:

1. Limerick*
2. Blarney*
3. Snow Gem
4. St. Louis
5. Kansas
6. Lady Kesteven

Comment: As Rockall is more widely grown, it is realized that almost every bloom is of blue-ribbon quality. Privateer is even larger than Rockall, but does not have its clean white or intensity of red. Toreador, yet another Rockall sister, is a borderline flower, but has a cup frilled with true cherry red. Among the more usually-formed 3b's Dragoman and Kingfisher are advocated. Accolade has fine color and the tallest, strongest stem yet seen in a flower of this type.

ITEM No. 15. Small Cup, self-white (3c)

Exhibition:

1. Chinese White*
2. Cushendall
3. Bryher
4. Frigid
5. Foggy Dew
6. Altyre

Garden:

1. Cushendall*
2. Foggy Dew
3. Bryher
4. Chinese White
5. Frigid
6. Silver Salver

Comment: The most exciting new 3c's are Verona, Tobernaveen and Benediction. Verona (Green Island \times Chinese White) grows as well as Green Island and generally combines the best features of both parents. The cup was slightly on the creamy side this first year. Tobernaveen opens purest white with green eye and appears to be even more refined than Chinese White. Benediction is very white, with a deep green eye, a smooth sparkling improvement of Bryher. Downhill is also showing promise. Kincorth and Engadine are evidently taking time to settle down to the American climate.

ITEM No. 16. Double Flowers (4)

Exhibition:

1. Double Event*
2. Swansdown*
3. White Lion
4. Camellia
5. Cheerfulness
6. Golden Ducat

Garden:

1. Cheerfulness*
2. Yellow Cheerfulness
3. Daphne
4. White Lion
5. Mary Copeland
6. Mrs. Wm. Copeland

Comment: The Richardson doubles (from Falaise) create a new high standard. Double Event is good every year, although some seasons it is more double than others. Acropolis is purest white with a touch of red. Tonga (Falaise \times Ceylon) is like a yellow and orange-red edition of Double Event. Candida is a new, fine white. All have good strong necks and stems and open more reliably than doubles in the past. Tahiti is more double than Tonga. Bridal Crown is a vigorous, reliable, handsomer Cheerfulness type, and White Marvel is an interesting sport of the triandrus hybrid Tresamble. Of especial interest is "Erlicheer" from the Antipodes, a fully double, clustered white tazetta sport. Plants, however, have shown a faint amount of some type of stripe. The most interesting pink double yet seen is a sport of Pink Glory which occurred in Bill Pannill's garden. It has a pink cup filled with pink petaloids, in form similar to Hollandia.

ITEM No. 17. Triandrus Hybrids, Large Cup (5a)

Exhibition:

1. Tresamble*
2. Lemon Drops*
3. Rippling Waters

Garden:

1. Thalia*
2. Tresamble*
3. Stoke

ITEM No. 17 (*cont.*)

4. Yellow Warbler
5. Stoke
6. Thalia

4. Moonshine
5. Yellow Warbler
6. Lemon Drops
Shot Silk

Comment: There are some good exhibition 5a's but there remains considerable room for improvement. All of the varieties that placed are familiar. King's Sutton is advocated for exhibition, and Eve Robertson's #104 (Brunswick × Thalia) has the smoothest, most crystalline texture yet seen. Honey Bells is valued for heavy substance and ability to set seed. Fairy Cup (Australian?) has been cited as a bicolor "tailored like Ave."

ITEM No. 18. Triandrus Hybrids, Small Cup (5b)

Exhibition:

1. Silver Chimes*
2. Dawn
3. Thoughtful
4. Sidhe
5. Rosedown
6. Oconee

Garden:

1. Silver Chimes*
2. Dawn
3. Thoughtful
4. Oconee

Comment: Many fanciers grow Silver Chimes as their only 5b, yet there are other deserving varieties. Thoughtful (yellow) and Ivory Gate (white) are both desirable. Tincton is a new, refined white from Blanchard, cited as "a coming daffodil." Sidhe has small flowers but its height places it here rather than with the miniatures. Does anyone know of available stock of Dawn that does not have stripe? Merry Bells is white with distinctive yellow saucer-shaped crown.

ITEM No. 19. Cyclamineus Hybrids, Large Cup (6a)

Exhibition:

1. Charity May*
2. Dove Wings*
3. Jenny*
4. Woodcock

Garden:

1. February Gold*
2. Peeping Tom*
3. Charity May
4. March Sunshine
5. Woodcock
6. Dove Wings

Comment: Chickadee is a promising new one with orangy cup. It was noted as "a bright addition to a mournful group." Woodcock is a fine flower but the perianth is rather flat, and the new Titania (one of first second-generation cyclamineus hybrids to be offered) is smooth with a relatively flat perianth and medium-length cup. Two interesting additions to this class were seen this spring at Charles Meehan's. One was a good red cup from Armada \times *N. cyclamineus*, and the other was from Jenny \times Coverack Perfection, a large flower with broad reflexed perianth, and a light yellow cup of moderate length with a rolled flange!

ITEM No. 20. Cyclamineus Hybrids, Small Cup (6b)

Exhibition:

1. Beryl
2. Roger
3. Quince

Garden:

1. Beryl

Comment: What a barren group this is! Roger is placed here because its crown definitely measures less than $\frac{2}{3}$ regardless of the classified list.

ITEM No. 21. Jonquilla Hybrids, Large Cup (7a)

Exhibition:

1. Sweetness*
2. Shah
3. Golden Incense
4. Golden Sceptre
5. Golden Goblet
6. White Wedgwood

Garden:

1. Sweetness
2. Golden Sceptre
3. Golden Incense
4. White Wedgwood
5. Shah
6. Golden Goblet

Comment: Shah is early for most shows, but such a good 7a that many judges do not consider it "typical." Yet if they smelled it, or noted its color and scalloped crown they would realize that it is in character. Some new additions would surely be welcome!

ITEM No. 22. Jonquilla Hybrids, Small Cup (7b)

Exhibition:

1. Trevithian*
2. Chérie*
3. Golden Perfection
4. Tittle-Tattle
5. Susan Pearson
6. Snow Bunting

Garden:

1. Trevithian*
2. Golden Perfection
3. Lanarth
4. Tittle-Tattle
5. Orange Queen
6. Chérie

Comment: There are some fine new 7b's. Among the red cups Suzy and Susan Pearson appear to be quite similar, yet several contend that Susan Pearson is the best red-cupped 7b introduced. Kinglet is also showing promise in the red-cup race. Nancegollan has clusters of small white flowers with ivory cups, and Snow Bunting eventually fades to white but seldom has more than one floret per stem. Sugarbush is one of the few that has a white perianth and orangy-yellow cup.

ITEM No. 23. Tazetta Hybrids (8)

Exhibition:

1. Geranium*
2. Matador
3. Orange Wonder
4. Martha Washington
5. Golden Dawn
6. Cragford

Garden:

1. Geranium*
2. Orange Wonder
3. Laurens Koster
4. Cragford
5. Scarlet Gem
6. Martha Washington

Comment: Smooth Matador with its large florets (yellow perianth and flat orange-red cup) shows that new additions to this class are appreciated. Matador is also a rarity in that it sets seed. Orange Wonder is more dependably smooth than Geranium and should be acquired by those who do not grow it. Fame and Golden Dawn are also welcome newcomers.

ITEM No. 24. Poeticus Hybrids (9)

Exhibition:

1. Cantabile*
2. Actaea*
3. Milan*
4. Sea-green
5. Smyrna
6. Shannach

Garden:

1. Actaea*
2. Cantabile*
3. Dactyl
4. Smyrna
5. Red Rim
6. Shannach

Comment: There have been no additions to this class in years. Those who do not grow Milan should, for it is reliable for exhibition blooms.

ITEM No. 25. Pink Cups of any Division

Exhibition:

1. Radiation*

Garden:

1. Mrs. R. O. Backhouse*

ITEM No. 25 (*cont.*)

- | | |
|-----------------------|-------------------|
| 2. Salmon Trout | 2. Mabel Taylor |
| 3. Rose of Tralee | 3. Pink Rim |
| 4. Mrs. Oscar Ronalds | 4. Interlude |
| 5. Rose Caprice | 5. Rose of Tralee |
| 6. Passionale | 6. Carita |

Comment: There is no other group that shows more variance from season to season, or even in different locations of the same garden. Among the introduced pinks the finest are probably Salmon Trout, Accent, Debutante, Flamingo, Caro Nome, and Passionale. Salmon Trout when in top form is still unbeatable. Accent opens pink, and stays pink, durable and healthy. Debutante has fine form and coloring, and increases fast, its main fault a tendency for its petals to catch in the frilled cup. Caro Nome is the only pink 3b of real merit. Flamingo has fine rosy pink coloring and a frilled edge to its trumpet-shaped cup. The color does not hold up as well as that of Accent. Passionale is subject to climate conditions as to color, but is near the top for form. Other interesting pinks include: Interlude—one that will prove to be superior for garden use; Carita—always pink and among the most striking for garden use; Roseworthy—small but reliable deep pink color every year; Chiffon and China Pink—both small but pure wild-rose pink; Leonaine—a late pink cup that tends toward orchid; Gay Mood (Q-36/4, a sister of Leonaine)—frilled pink cup and smooth perianth; Salome—very smooth, good color but some object to its yellow rim; Fintona—deep rose pink with nice perianth, especially valuable for early bloom; Infatuation—the green-eyed cup develops into a mixture of pink and white with a scalloped edge of purest pink.

ITEM No. 26. Naturalizing Varieties

- | | |
|-------------------------|-------------------------|
| 1c Beersheba | 2d Binkie |
| 2a Carbineer | 3b Mrs. Nette O'Melveny |
| 2a Carlton | 3b Queen of the North |
| 2a Fortune | 4 Cheerfulness |
| 2a Scarlet Elegance | 5a Thalia |
| 2b Brunswick | 6a February Gold |
| 2b Hera | 6b Beryl |
| 2b Mrs. R. O. Backhouse | 7b Trevithian |
| 2c White Nile | 9 Actaea |

Comment: We requested our reporters to list those varieties

that had proven of merit under woodland, grass, or other conditions for a minimum period of at least five years. Some of the oldest daffodils such as Emperor, Empress, *poeticus recurvus*, Barrii Conspicuous, *biflorus*, etc., were reported from several areas as still blooming profusely after forty to fifty years in the same location. For our list, however, we required a minimum of five votes from at least four of the major climate zones for a variety to place. It is generally recognized that the larger trumpet types, and many or most of the newest hybrids, are not as effective for naturalizing purposes as some of the graceful, early hybrids. Regrettably, some of the best of these are no longer commercially available.

A shortage of space has made it necessary to condense the comments, and to omit some of them. The essence of many of those omitted will be found in Mrs. Robertson's article.

Prompter responses to the symposium questionnaires would be of the greatest help in an earlier preparation of the symposium, and therefore of the Yearbook.

The 1962 American Miniature Daffodil Symposium

HELEN C. SCORGIE
Co-Chairman, Symposium Committee
Harvard, Massachusetts

WHAT is a miniature daffodil? That is a question that will never be answered to the satisfaction of all. My own definition is that it is a small replica of a large or standard daffodil. Others would define it differently. Some feel that they should have a "wild" look, although many species are as sedate in the garden as any cultivar. Others feel as they do about the standards, that the bigger a miniature is, the better.

The miniature definition is a wide-spread problem with all growers of small plants. Other specialized gardening groups are worrying the same bone of contention. One society has "standard miniatures" and "dwarf miniatures" and still is not satisfied. Among rock gardeners, where I am most at home, "alpine" has largely replaced "miniature" to describe plants of smallest proportions. Experts gather seed from mountain tops for their gardens and then, by sophisticated argument, prove that they are not "alpines"! So the miniature daffodil gardeners are in goodly company. At least, the miniature growers have not led their argument back to first meanings which would have handed the name over to the "red-noses"!

The fundamental difficulty is that no two plants are ever identical. Botanists, by arbitrary rules agreed upon, have come to a working agreement so that the opinions of all are respected. Where they differ, they know what the other means. Gardeners are beginning to follow their example at the upper levels, and in time, general rules will be agreed upon that will guide the particular group of gardeners in this problem.

For the individual gardener, interested only in his own plants, it makes little difference what he calls a "miniature." It is only when

he shows his daffodils that the decision cannot be his alone. Some group, a national society, a local society or the club sponsoring the show, must regulate in some way what is to be eligible as a "miniature."

There are two big issues to be settled in which there can be no satisfactory compromise. They must be solved in the end by accepting one or the other in each case of two choices. The decision will depend not upon logic but on majority vote.

The first is as to whether length of stem and/or width of the perianth are factors in the decision. Many dealers include among their lists of miniature daffodils some that would win at a show as standards or intermediates. This causes confusion to the novice who accepts as "miniature" anything found listed under that name. There is also the question as to whether a two-inch daffodil on a two-inch stem should be called a "miniature." Then, there is the problem of differing stem lengths on account of differences in climate or culture.

The second problem is the reluctance of miniature fans to include any daffodil that is unattractive. There is always a difference of opinion as to what is beautiful, although the gap could be greatly lessened if we spent more time studying our best daffodils with the scale of points in mind. We are too carried away by color and size. Beauty is much more than these. Aside from this, our concept of what is beautiful develops and changes.

The first 1d of which I have seen a record has passed into oblivion with only a meager description of it remaining. It was considered of no commercial value. The first daffodil recorded with a split cup (Division 11) got little interest when brought before the RHS Daffodil Committee, and not even the name of its parent was recorded.

ITEM No. 1. Division 1. Trumpets

1. Tanagra
2. Wee Bee
3. Little Beauty

Tanagra and Wee Bee were again so close that one vote would have changed their places. Little Beauty was well behind them. A considerable number of others received scattering votes.

Apparently, miniature trumpets do not have the appeal to growers and hybridizers that the standard ones do. This seems unfortunate to those of us to whom a trumpet instinctively typifies a daffodil.

This dearth of hybrids is not due to lack of worthy material, for *N. asturiensis* is highly variable. Mr. Gray speaks in his book of a superior form with a flat perianth. This has appeared occasionally among my collected bulbs, and it is quite distinct from the more common form. The standard trumpets offer a glorious color range. There is even the possibility of adding Division 1d to the miniatures.

ITEM No. 2. Division 2. Large Cups

1. Marionette
2. Goldsithney

Again, these two far outran the others. Mustard Seed should be more extensively grown. It increases slowly here and does not bloom as freely as Marionette and Goldsithney. But nothing could be more unimpeachably a miniature. Lady Bee has a stem within miniature limits. Its late blooming and pink cup make it desirable in the rock garden.

ITEM No. 3. Small Cup

1. Xit
2. Fairy Circle

Xit grows well in all regions. Some consider Fairy Circle too tall. The height of any daffodil may be controlled in part by the fertility of the soil and the amount of water the bulb receives during florescence. A very ancient little daffodil, Ruby, is mentioned by one reporter. I have never seen a mention of this in literature. It was raised by an amateur and must have been in the first Classified List. It would be interesting to know how it came to America. It must have been treasured to keep its name.

ITEM No. 4. Division 4. Doubles

1. Pencrebar
2. Kehelland

No one has a good word for these. Perhaps in time something better will appear. My most successful one is a little golden double found in an old Irish garden. The chances are that it was collected in Italy and is a natural hybrid.

ITEM No. 5. Division 5. Triandrus

1. April Tears
2. Hawera
3. Frosty Morn
4. Arctic Morn
5. Mary Plumstead

This group is one of the most popular with both growers and hybridizers. The list of those mentioned was long but Hawera and April Tears with the same number of votes far outnumbered the others. The division has two faults; they are commonly sterile and they are not reliably hardy. Hawera seems most hardy. The taller clones appear to be as hardy as any daffodil and perhaps in time more reliable miniatures will appear.

ITEM No. 6. Division 6. Cyclamineus

1. Snipe
2. Tête-a-Tête
3. Jumblic
4. Quince
5. Greenshank
6. Mite

The first four are the same as last year with a slight change in order. Beryl has disappeared from the list. Mite is temporarily withdrawn from commerce or it would probably be on more lists. One reporter says that it does well in grass. Here, it does best and is a most prolific bloomer where the soil fertility is kept low by planting it near a miniature shrub. Snipe is reputed by a number to be most successful at shows. One report is given of both Snipe and Little Witch setting seed by open pollination. Some find Jumblic unreliable. Jetage, as yet a novelty, receives general high recommendation.

ITEM No. 7. Division 7. Jonquils

1. Kidling
2. Sun Disc
3. Sun Dial
4. Pixie

Except for Kidling, there are no outstanding favorites in this section. Kidling should be a "first" for every beginner. It is absolutely hardy and will grow anywhere in full sunshine. Some planted

in my rows three years ago averaged nine bulbs from single ones. All were blooming size. Its late blooming helps to prolong the daffodil season and to tide over the rock garden between the spring and summer bloom.

This group is so attractive that the voting is apt to be scattered. Occasional lack of bloom is mentioned but not to the extent as in some other divisions. Orange Queen is mentioned as growing this year within miniature limits in height; even when it exceeds this, I like to grow it with the miniatures as a background on account of its gorgeous, unusually rich color. It enhances rather than detracts from the more delicate hues. It should be backed by a tiny conifer which will help keep it within the proper proportions.

ITEM No. 8. Division 8. Tazetta

1. Angie
2. Cyclataz
3. Halingy

These are unpopular except in the deep south. Most are not too hardy in the north; some like Shrew are definitely not so in the coldest areas although they are reported hardy in southern New England. There may be some other reason for its failing to come up in the spring, as a reporter from Virginia has tried it without success three times. It is seldom mentioned in the reports.

The poetaz section of the standard tazettas is popular to the extent that it has supplanted all pure tazettas in the symposium. It is robustly hardy, late flowering and fills the garden with gaiety and fragrance. Miniatures of equal stability would be welcome in this division. Unfortunately, neither species offers much help in producing elfin daffodils. In addition, the uncouth stem of the poetaz would be a more serious defect in a miniature.

ITEM No. 9. Division 10. Species and Wild Hybrids

1. *cyclamineus*
2. *triandrus albus*
3. *watieri*
4. *tenuior*
5. *rupicola*
6. *jonquilla*

This is the most unsatisfactory section with which the analyst has to deal in the list, and the end is of doubtful value. For that reason among others, it has been omitted in the last few years.

Almost invariably, the beginner starts with species and he is more content with the results if the "species" is one of which the botanist has never heard. The greatest difficulty is the use by reporters of fancy names and "semi-fancy" botanical ones which are often impossible to place with certainty. Others grow so few that no valid comparison can be made.

Two new species in commerce receive favorable reports. One reporter writes from the central region: "Two less common species that seem to be promising under my conditions are *fernandesii* and *calvicola*. The latter bloomed profusely but did not set seed. One bulb in 1958 was five in 1960. *Fernandesii*, two bulbs in 1959, still stays at two bulbs, but the leaves stay green through trying winter conditions and the stems, I think, had four florets each and seed was formed in about half the pods."

ITEM No. 10. Division 11. Miscellaneous

1. Nylon
2. Elfhorn
3. Tarleton
4. Jessamy

The results here are surprising and inexplicable. Elfhorn is reported from the south, the central region and the north as successful. Here, it is hardy in the open but never blooms. Oddly enough, this is also reported from the northwest! There is little in common between these two regions and I can think of no reason for this.

In spite of its being a mixture, Nylon is generally reported as doing better than the selected forms. This seems unreasonable and I suspect that in time the latter will be as satisfactory as Nylon. It is possible that as they would have been scarcer, the bulbs sold of the named clones were smaller and need time to grow. Their hardiness is evidenced by their good behavior in this cold spot.

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MRS. WALTER COLQUITT, *Registrar*
Shreveport, Louisiana

Registrants and Their Registrations

FOWLDS, MATTHEW, Rt. 3, Box 332, Canby, Oregon.

HARMONY BELLS.

MITSCH, GRANT E., Daffodil Haven, Canby, Oregon.

ABALONE, BUTTERSCOTCH, CALDRON, CHEMAWA,
FLAMING METEOR, GAY MOOD, GLEEFUL, GOSSAMER,
JEST, LIMEADE, LUSCIOUS, MELODY LANE, PROLOGUE,
SATELLITE, SILVER BELLS, SMILES, TRANQUIL MORN,
VIREO.

WILSON-TUGGLE, Mr. Harry I. Tuggle, Jr., introducer for Guy L.
Wilson, originator, Box 1108, Martinsville, Virginia.

ICEBERG.

1962 Registrations

ABALONE (Mitsch) #N96/3. 2b, 24", M. P. white, C. pale lemon
changing to buff margin, creamy below. Polindra × Green Island.
Daffodil Haven 1962.

BUTTERSCOTCH (Mitsch) #029/1. 2a, 21", EM. P. deep golden
yellow; C. deep golden yellow. Golden Torch × Galway.

CALDRON (Mitsch) #R100/1. 2a, 20", M. P. deep golden yellow;
C. fiery orange-red. (Market Merry × Carbineer) × Armada.

CHEMAWA (Mitsch) #P50/1. 2a, 21", EM. P. deep yellow; C.
pure orange with yellow frill. Narvik × California Gold. Daffodil
Haven 1962.

FLAMING METEOR (Mitsch) #R4/1. 2a, 21", E. P. clear deep
yellow; C. rich orange-red. Armanda × Ceylon.

GAY MOOD (Mitsch) #Q36/4. 2b, 16", LM. P. white; C. rosy
pink, uniform throughout. Green Island × ((White Sentinel ×
Mrs. R. O. Backhouse) × Wild Rose). Daffodil Haven 1962.

- GLEEFUL (Mitsch) #N3/1. 2d, 16", LM. P. clear sulphur lemon; C. same turning to near pure white. Binkie × Content.
- GOSSAMER (Mitsch) #P77/1. 3b, 21", M. P. white; C. pale yellow with $\frac{1}{8}$ " pink margin. Rubra × Foggy Dew. Daffodil Haven 1962.
- HARMONY BELLS (Fowlds) 5a, 14", M. P. clear yellow; C. clear yellow. Usually 3 flowers on a stem. Whiteley Gem × *triandrus albus*.
- ICEBERG (Wilson-Tuggle) #39-31. 1c, 20", LM. Flower opens pale 1b, quickly changes to 1c. Broughshane × Cotterton.
- JEST (Mitsch) 2a, 20", M. P. light yellow; C. medium yellow. John Evelyn × Fortune.
- LIMEADE (Mitsch) #P5/4. 2d, 18", EM. P. clear sulphur lemon; C. same fading to near white inside. Binkie × (King of the North × Content). Daffodil Haven 1961.
- LUSCIOUS (Mitsch) #R70/2. 2b, 17", LM. P. clean white; C. deep clear pink. Rose of Tralee × Mabel Taylor.
- MELODY LANE (Mitsch) #Q52/3. 2b, 18", M. P. white; C. lilac pink. Loch Maree × Radiation. Daffodil Haven 1962.
- PROLOGUE (Mitsch) #N36/1. 1b, 17", VE. P. white; C. clear yellow. Long lasting quality. Foresight × Trousseau. Daffodil Haven 1962.
- SATELLITE (Mitsch) #N104/2. 6a, 12", E. P. clear yellow; C. deep orange. Rouge × *N. cyclamineus*.
- SILVER BELLS (Mitsch) 5a, 14", M. P. white; C. white. (Daisy Schaffer × Polindra) × *triandrus albus*.
- SMILES (Mitsch) #N50/3. 2b, 15", LM. P. white; C. pale lemon, becoming nearly white with overlapping frills of coral salmon. Green Island × Glenshane.
- TRANQUIL MORN (Mitsch) 3c, 18", LM. P. white; C. white. Green Island × White.
- VIREO (Mitsch) #P85/1. 7b, 10", L. P. soft clear yellow; C. same with green eye. Seraglio × *N. juncifolius* (?). Daffodil Haven 1961.

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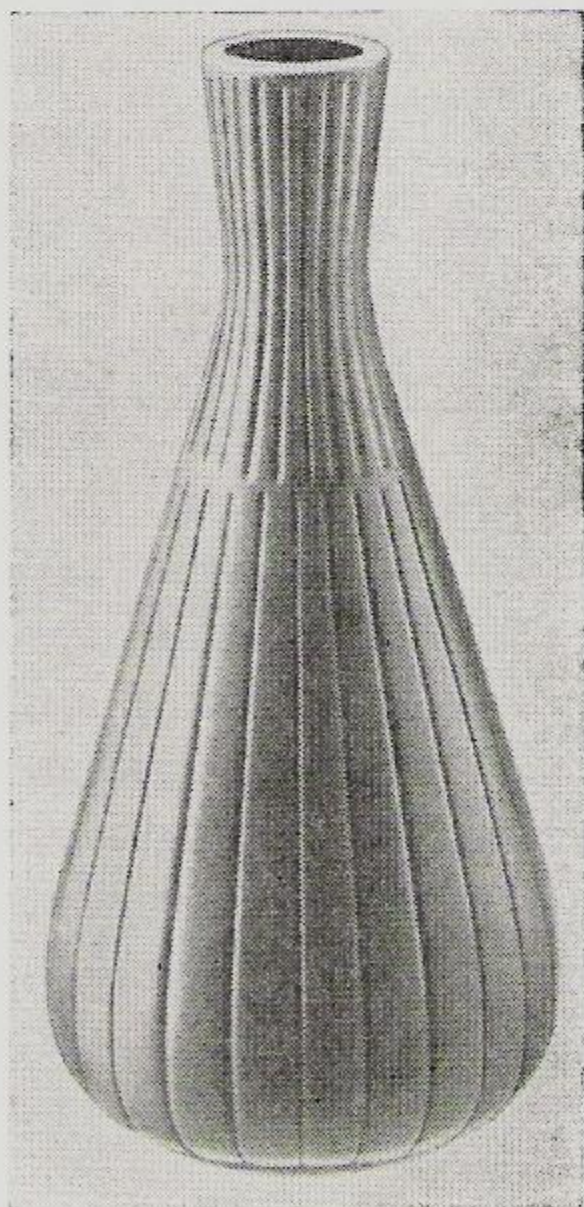
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