

HERBERTIA



1946

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HERBERTIA

VOLUME 13

NARCISSUS EDITION

EDITED BY
HAMILTON P. TRAUB

THE AMERICAN PLANT LIFE SOCIETY

Box 2398, Stanford, California

1946

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THE AMERICAN PLANT LIFE SOCIETY

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PREFACE

This NARCISSUS EDITION of HERBERTIA is appropriately dedicated to Guy L. Wilson, the eminent British *Narcissus* breeder, who received the 1946 HERBERT MEDAL for his achievements in his specialty. In the field of plant improvement there has existed for a long time a "One World" concept, and we in America are always gratified by genuine achievement in any part of the World. Mr. Wilson has favored us with an interesting autobiographical note, and a valuable article on *Narcissus* breeding.

The cover design featuring trumpet *Narcissus* is the work of our talented friend, J. Marion Shull.

Our friends, Dr. Abilio Fernandes and Mrs. Fernandes, of the University of Coimbra, Portugal, again favor us with an outstanding contribution; this time on a subject particularly appropriate for the NARCISSUS EDITION—"On the Karyo-Systematics of the subgenus *Ajax* of the genus *Narcissus*." This provides basic information of great value to all *Narcissus* breeders. We are again greatly indebted to Dr. Thomas W. Whitaker of an excellent translation into English from the original French.

We are also greatly indebted to the NARCISSUS COMMITTEE, and particularly to its energetic and able Chairman, Mr. Arno H. Bowers, for arranging for the valuable contributions on *Narcissus*, including in addition to the above, other excellent articles: Harold Alston writes on the daffodil in Australia; Mr. Bowers on the parents of hybrid *Narcissus*; Messrs. Reinelt, Powell, Culpepper, Ballard and Cooley on *Narcissus* breeding; Charles J. Gould contributes an article on *Narcissus* diseases, and E. P. Breakey, on the insect and mite pests of *Narcissus*; Mr. Hayward, Dr. Cooley, Miss Kell and Prof. Watkins write on *Narcissus* culture.

In connection with the NARCISSUS EDITION, the reader should also consider the article in HERBERTIA 1947 on the breeding of double *Narcissus* by "Ornatus," an article that is beautifully illustrated from photographs furnished by Mr. Jan de Graaff.

Important articles on the other amaryllids are also included in this issue: Mr. Claar contributes two articles on *Hemerocallis*; Mr. Saxton writes on the Wheeler daylilies; Mrs. Bright Taylor, and Mr. George Gilmer write on daylily culture, and many new daylily clones are described under registration of new clones; Mr. O. Mohr writes an historical note on *Amaryllis* culture in Denmark, 1940—1945; Mr. Hayward contributes an article on *Amaryllis* culture in Florida; Dr. Uphof gives a review of the genus *Habranthus*; Mrs. MacArthur writes on *Habranthus brachyandrus*. There are also articles by Prof. Watkins on the culture of crinum; Miss Lawrence on *Hymenocallis*; Mr. Hunt on *Lapagerias* and *Agapanthus*, and Jo N. Evans on various amaryllids.

The next issue of HERBERTIA will be the 2ND DAYLILY EDITION. It will feature the daylilies, but will also contain the usual articles on the other amaryllids.

Beltsville, Maryland,
September 2, 1947.

Hamilton P. Traub.

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When taking photographs of amaryllids, an effort should be made to include the whole plant—*stem*, if any, *leaves, scape* and *flowers*. Separate views of the *bulb* and *roots* are also valuable in some cases. These remarks do not apply to cut-flowers.

CORRIGENDA

HERBERTIA, VOL. 12 (1945) 1947

Page 18, 3rd line from bottom, for "1946" read "1945."

Page 20, 7th line from bottom, for "her" read "him."

Page 25, 4th line from bottom, after "(Allium Tribe)" add ", and GILLIESIAE (Gilliesia Tribe)."

Page 33, 16th line from top, for "*Marocco Red*" read "*Morocco Red*."

Page 40, 2nd line from bottom, for "to cm." read "to 47 cm."

Page 41, last paragraph, 5th line, for "6-inch" read "8-inch."

Page 69, 3rd line from top, for "Kewennsis" read "Kewensis."

Page 69, 19th line from top, insert quotation mark before "The flowers" etc.

Page 83, species 29, first and 2nd lines, for "A. GATENAUM" read "*A. Gageanum*."

Page 112, 7th line of text, from top, for "stories" read "stores."

Page 123, 11th line from bottom, for "speedy" read "speed."

Page 151, 23rd line from top, for "itself" read "self."

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Dedicated to
GUY L. WILSON



Herbert Medalist—Guy L. Wilson

GUY L. WILSON

An autobiographical note

I was born in a pleasant home within a mile of where I still live in the green countryside of County Antrim, Northern Ireland. I was much the youngest of a considerable family, none of whom were particularly interested in horticulture, so I always say that the love of Daffodils must have come into the world with me from some better place, as I cannot remember a time from my earliest childhood when I did not love them ardently. An old family retainer now in the eighty-sixth year of her age can tell me how, when as a child, I was in her charge on Sundays while the rest of the family went to Church, she had only to turn me out on the lawn on spring days where I spent the whole forenoon turning up the heads of the Daffodils one by one to gaze at them. I still have most vivid recollection of my delight in day by day watching the developing buds and opening flowers of a little colony of the dear old double yellow Daffodil that grew in the grass on the lawn on the sunny side of a clump of laurels: then came a morning when I ran out to see the beloved flowers, and found to my horrified anguish that they had almost all disappeared; I rushed back to the house in quite inconsolable tears, to find that a maid had been given permission to pick a bunch to take home on her day out.

My Mother greatly loved flowers but grew them on a limited scale, as the cares of managing a household did not leave her much time for gardening. We had a large walled garden which was almost entirely devoted to the cultivation of vegetables and fruit, and our old gardener had little time to help with the flowers. My Mother was also handicapped by a quite unjustified idea that only the very hardiest and commonest things could hope to thrive in our rather bleak wet and late climate.

In those days little attention had been given to Daffodils in Northern Ireland and the very few that were known to me were those that grew around my old home. We had the old double *Telamonius Plenus* or *Van Sion* and the English Lent Lily and *Nanus*, which we called respectively common double, common single and the dwarf Daffodil, growing in the grass. In the garden borders there were a few tufts of *Obvallaris*, the Tenby Daffodil, and large clumps of Double *Incomparabilis Golden Rose* which I think had come to us from some cottage garden under the name Rose of Sharon! Anyhow we called it the Rosy Daffodil: we also had *Poeticus Recurvus* in the grass, and the lovely sweet scented double white Gardenia flowered *Poeticus* blooming profusely in the garden; but in those days these to me were "single and double Narcissus," something a little different from Daffodils, but very close to them in my affections: I used to say that my favourite flowers were Daffodils and Narcissus.

I have a clear recollection of one day in my very early childhood asking my Mother, "Are there any white Daffodils?" to which she replied, "Yes, I think there are, though I have never seen them, and if you take great care of it I will let you look at a book with pictures of some;" whereupon she showed me the 1888 issue of William Baylor Hartland's "Original Little Book of Daffodils." I still regard that lovely old Catalogue as one of my greatest treasures. I can vividly remember my childish delight and excitement at the idea that white Daffodils really existed, and at seeing pictures not only of them but of other hitherto undreamed of beauties with white petals and yellow trumpets, such as *Empress*, *Horsfieldi*, *Grandis*, etc., as well as such things as *Emperor* and *Sir Watkin*. Many an hour I subsequently spent studying that old Catalogue and I probably owe much to its inspiration; at all events I think it is ever since that time that I have had a special love for white Daffodils.

My Mother used to order just a few bulbs from Hartland year by year; how I used to watch for the arrival of those parcels, and how the very sight and handling of bulbs thrilled me. At a very early age, perhaps six or seven, I wrote to Hartland and asked him for a photograph of himself! He sent the photograph, which alas I have lost, with a most charming letter, and this was followed in autumn by a very nice little collection of Daffodils of some twelve or more varieties which he sent as a gift. From then onward of course all my pocket money was saved up to spend on bulbs, and various kind friends gave me bulbs from time to time, so that by the time I had to leave home to go to boarding school I had quite a thriving little collection. In the early months of the year I used to write home to my Mother, eagerly enquiring how this or that particular bulb was progressing; sometimes I sent her plans of the beds, marking the exact spot where special things were growing. It was fortunate that Easter holidays coincided with the Daffodil flowering season.

One of the most outstanding memories of my early youth was when on leaving school I went with my parents for a trip to Southern Ireland at Easter time, and we called at Cork to see Mr. Hartland and his Daffodils. Hartland was a great enthusiast and was the pioneer of Daffodil growing in Ireland. He was contemporary with Peter Barr, the founder of the well known firm of Barr & Sons in London; the Daffodil owes much to these two men. What I remember most clearly of that day's visit was a big stock of Bicolor *Horsfieldi* in magnificent condition, and a glorious display of *Hispanicus Maximus*, or as Hartland called it in those days, *Maximus Superbus Longivirens*; and how I surprised Hartland by picking out a plant of *M. J. Berkeley* from amongst this *Maximus*. That incident makes me think that *M. J. Berkeley* is probably a sport from *Hispanicus Maximus*, as Hartland told us that that particular lot of *Maximus* had recently been imported from Spain. On that day also I had my first sight of *King Alfred*, of which Mr. Hartland showed us twelve plants with much pride, remarking that they were worth £60. It was of course the finest trumpet

Daffodil I had seen up to that time. I remember feeling much gratified on coming home from this trip to find that my own Daffodils, though much later than Hartland's, grew with at least equal vigour and strength, so that our County Antrim climate could not have been so bad as my Mother seemed to think.

Of course I always wished to make bulb growing or Daffodil growing my profession and often said so, but my Father could not believe that it was possible to make a living from growing Daffodils, and always rather discouraged the project, while my sister and brothers were somewhat bored by what they considered my Daffodil madness, and the Daffodils were sometimes referred to as "the Yellow Peril." So when on leaving school I was offered a small post in my cousin's Woollen Factory which was near my home I was glad to accept it, as it enabled me to live at my old home, which I loved, and go on collecting and growing Daffodils.

During all this time I had not realised the possibilities of cross fertilising Daffodils and raising new varieties from seed; but I took one of the English gardening papers, then known as "The Garden," and occasionally saw in it what were to me most exciting accounts of the Rev. G. H. Engleheart's new seedlings which were appearing at the Royal Horticultural Society's spring Shows, and at the Midland Daffodil Society's Shows.

When I was twenty-one years of age I went to England to visit Mr. A. R. Goodwin, a keen amateur Daffodil lover who then lived at Kidderminster, and accompanied him to the Midland Daffodil Society's Show at Birmingham, helping him with his exhibits. In those days the Midland Show was the Mecca of Daffodil lovers. There I met Engleheart, P. D. Williams, Ernest Crossfield, Henry Backhouse, Mrs. R. O. Backhouse and others as well as some Dutch growers. The seedlings shown by these raisers were a revelation to me: it was a great occasion and an enormous stimulus to my enthusiasm. I began hybridising at once: that was forty years ago, and I have been at it ever since and hope to continue as long as I live, if conditions in this increasingly uncertain world permit. In due course I began to exhibit myself, and was delighted to find that my Irish grown flowers from the outset more than held their own against those grown in England. Presently there began a friendship between that great breeder, and great gentleman, the Brodie of Brodie, and myself, and for more than twenty years until the time of his death I visited him in Daffodil time every season: what I owe to his generous help and friendship is beyond calculation.

People seeing my flowers at Shows soon began to enquire for bulbs, which I was very glad to sell at first in a small way so that I could afford to buy the better novelties for breeding and exhibiting. Gradually demand increased so that I found it necessary to print a small Catalogue; and in time I realised that in order to give my Daffodils and the business of distributing the bulbs the attention they demanded I should have to give up my job at the Woollen Factory, and did so: and so for a good many years Daffodils have been my life work, as indeed they should

have been from the outset. I need hardly add that they have been an unending source of intense interest and delight, and have also been the means of my forming many delightful friendships and links with people far and near. As I have many correspondents in New Zealand, including one or two friends who had been to see me here, I determined to go out in 1929 for their Daffodil season. This was possible, as my business was then quite small, and of course their flowering season is in August, September and October, so that I could go for that time of year and not miss the flowering season here. That trip will be a most delightful memory as long as I live. Nothing could exceed the wonderful kindness and hospitality which I experienced throughout the whole country. The New Zealanders are very keen gardeners and they are much favoured in their climate and certainly grow fine Daffodils. The country is beautiful beyond description, and not the least enjoyable part of my trip was seeing as much as I could of it, and this was made easy for me by many kind hosts who took me around in their cars.

Turning to my work in Daffodil breeding, a good many of my flowers have by this time got scattered abroad in the world, and it gives me a lot of pleasure to hear that some of them are giving a good account of themselves overseas as well as at home. One of the first of my own raising was the B4 *Mystic*, which was introduced in 1923 and gained an Award of Merit later. *Principal*, a very good all purpose Yellow Trumpet which gained a First Class Certificate in 1937, was first sent out in 1931. *Garron*, a giant Yellow Trumpet of great vigour and fine quality came out in 1924 and subsequently gained an Award of Merit. I had the honour of introducing Engleheart's magnificent White Trumpet *Beersheba* in 1923. It gained a First Class Certificate in 1926. Fine White Trumpets of my own raising are *Cantatrice* (Plate 285), which was introduced in 1936 and awarded a First Class Certificate in 1939; and *Samite* (Plate 286), introduced in 1930 and awarded an F. C. C. in 1940. *Kanchenjunga* (Plate 287), introduced in 1934, gaining an Award of Merit in 1940: and the giant *Broughshane* (Plate 288) which I introduced in 1938 and which gained an Award of Merit in 1943. In the Incomparabilis Division my brilliant yellow and red *Indian Summer* was introduced about 1940 and gained an Award of Merit in 1946. In the Barrii Division the very fine yellow and red *Chungking* and the red and white *Bravura* (Plate 289) are recent introductions which are first class exhibition flowers. Amongst Large Crowned Leedsii *Carnlough*, introduced in 1934, has had remarkable success in Australia and New Zealand where it has won many championships at Shows, while *Slemish*, introduced in 1930, was the leading flower for some years, gaining an Award of Merit in 1935 and F. C. C. in 1939. *Truth*, another very good pure white 4A came out in 1936 and got its Award of Merit in 1940. Amongst Small Crowned 4B Leedsii are several of the best things I have raised, notably *Cushendall*, which was sent out in 1931 and gained an Award of Merit in 1935, and *Chinese White* (Plate 290), first show in 1937 as a seedling flower. It gained an Award of Merit in 1946 and is perhaps the finest 4B seen up to date.

NOTES ON DAFFODIL BREEDING

GUY L. WILSON, *Northern Ireland*

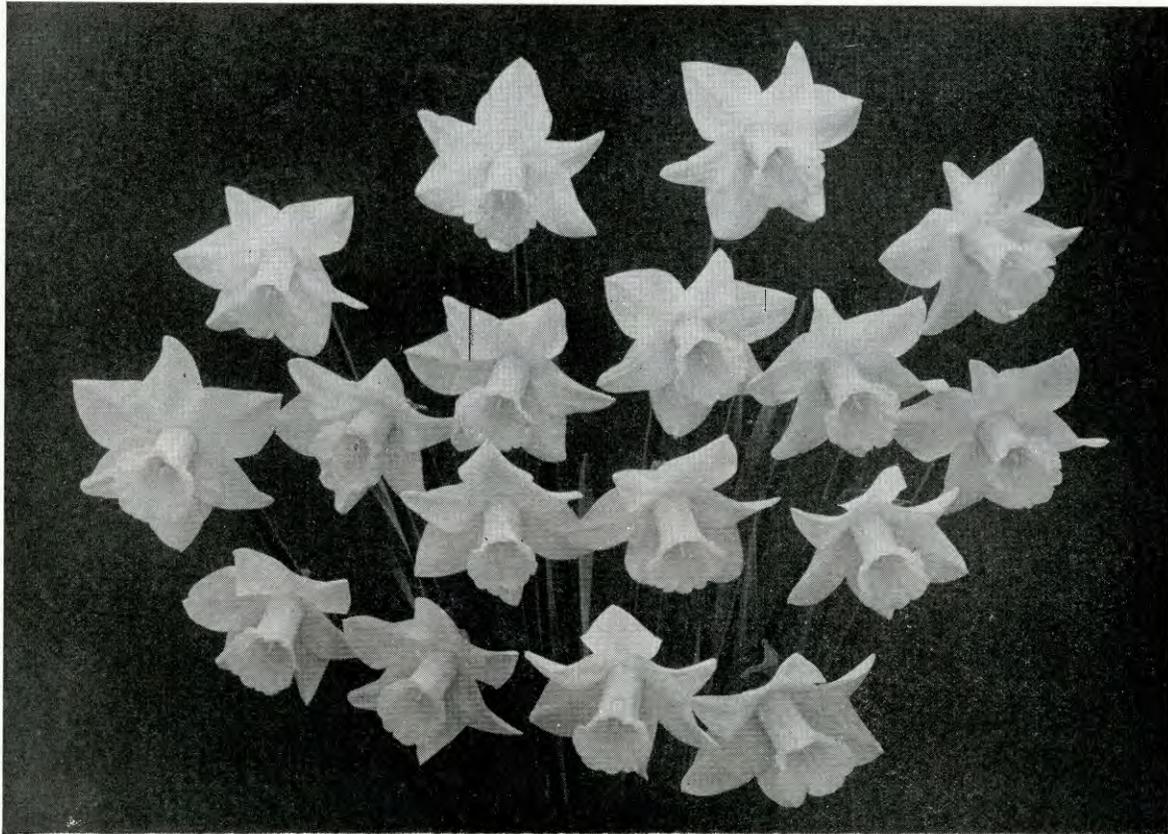
I do not propose to occupy much space in explaining the actual technique of cross fertilisation and seedling raising, as doubtless most readers are familiar with this. Moreover, Professor Sydney B. Mitchell has given some very helpful advice on the cross fertilisation of the flowers and sowing and raising of the seed in the concluding paragraph of his most interesting article on Daffodil breeding for Amateurs in the issue of *Plant Life* for April 1945.

I was much interested to note some slight variations in Professor Mitchell's methods from my own, no doubt partly due to our very different climates: e.g., here I find it best to sow seed immediately it is ripe, before we begin bulb lifting operations; as if kept for a length of time the percentage of germination may be lower or some of the seeds may lie dormant for a season before starting to grow. Also I find it better to sow in fairly deep boxes rather than in beds in the open, as if sown in the open the alternating wet and frosts of our winters would throw most of the seedlings out of the ground, whereas boxes can be given the protection of a cold frame for the first two winters, closing the lights only in frosty weather. At two years old we transplant the seedlings in June, without drying off, straight from the boxes to the beds in which they are to remain till they flower. As the dormant season of *Narcissus* bulbs is very short or nearly non-existent in our cool wet summers, this permits the little bulbs to start new root growth as soon as they feel inclined. I note that Professor Mitchell does his pollenising by using tweezers, with which I take it he picks up the anthers of the pollen parent and touches the stigma of the intended seed parent with it: I have heard of this method, but my own practice, and that of most British raisers, is to use small sable brushes such as are used by water colour artists, for transferring the pollen. It is of course very important to mark your fertilised flowers carefully, and label the resulting seed carefully and clearly by means of numbers when sowing so that a clear and accurate record of parentage can be kept. It is also wise to think out carefully at least some of the crosses you intend to make before the rush of the flowering season is upon you.

A quite bewildering number of new and fine Daffodils have been raised in the past thirty years, and they continue to be produced in increasing quantity. In spite of the world war an astonishing number have appeared since the British Royal Horticultural Society's Daffodil Conference in 1935. Of course the majority of these new things that appear at Shows never get into general garden cultivation; many because they lack stamina and all round good habit of growth (which includes the capacity to produce a sound firm healthy bulb) necessary to stand up to mass field cultivation and commercial handling. Many of course disappear because they are not sufficiently outstanding and distinct or striking.

In view of this ever increasing flood of new varieties, it is high time that breeders gave more concentrated attention to the production of varieties of really sound and reliable constitution combined with good habit and high quality flowers. Mr. Davis, the late Mr. Engleheart's life long foreman, visited our main London Daffodil Show last April, and is reported to have commented, and perhaps not without reason, that we are sacrificing quality to mere size. One of my U. S. A. correspondents said in a letter received a few weeks ago—"I am becoming annoyed by the great influx of what I call elephants without refinement." One does see some very large and gaudily coloured flowers which have only achieved coarseness. We must be very careful not to lose the beauty and dignity of form natural to the Daffodil. We shall lose all its peculiar charm if we try to make it look like something quite different from a Daffodil: we must make beautiful form, which implies perfect balance and proportion combined with good carriage and habit one of the essential objectives: with this we must also have good substance combined with high quality texture and clear clean colouring. We also want stems of adequate length and strong enough to stand up to weather out-of-doors without support, and if the stems carry the flowers above the foliage so much the better—this is a particularly desirable feature when bulbs are grown in pots for indoor decoration. Incidentally, the first objective of Dutch growers appears to be to obtain varieties that will force easily and early. Definite effort might also be directed towards obtaining sunproof colour in red cupped varieties, as many of these burn badly and get spoilt when exposed to strong sun. Non-fading red cups are attainable, as they come from time to time amongst seedlings and there are already a few varieties such as *Rustom Pasha* and *Flamenco* which are practically sunproof, while J. L. Richardson, I believe has some others amongst his newer red cups. Another desirable objective would be the production of varieties that form good clear firm bulbs. P. D. Williams used to pay a good deal of attention to bulbs, and considered *Fortune* as an example of a variety which makes a bulb of first class type. There are certainly wide differences in the bulbs of different varieties, some being soft or scaly and rough, therefore more likely to harbour such pests as bulb scale mites, etc. and become diseased. I think that *Maximus* blood in a breeding strain helps towards a firm type of bulb.

Daffodil breeding is now carried on by an increasing number of people both trade and amateur in many parts of the world. I know at least one keen amateur in Cape Colony, South Africa: New Zealand is full of ardent Daffodil lovers and raisers from end to end; there are also quite a number in South Australia where many good flowers are being raised; while Tasmania likewise has its quota of extremely enthusiastic breeders and exhibitors who are raising first class things, particularly noteworthy amongst them being Mr. C. E. Radcliff of Hobart, who I believe has made more progress than anyone else in the world in the production of pink crowned varieties. In U. S. A. the cult of the Daffodil is very definitely on the increase: I know of successful breeders in both



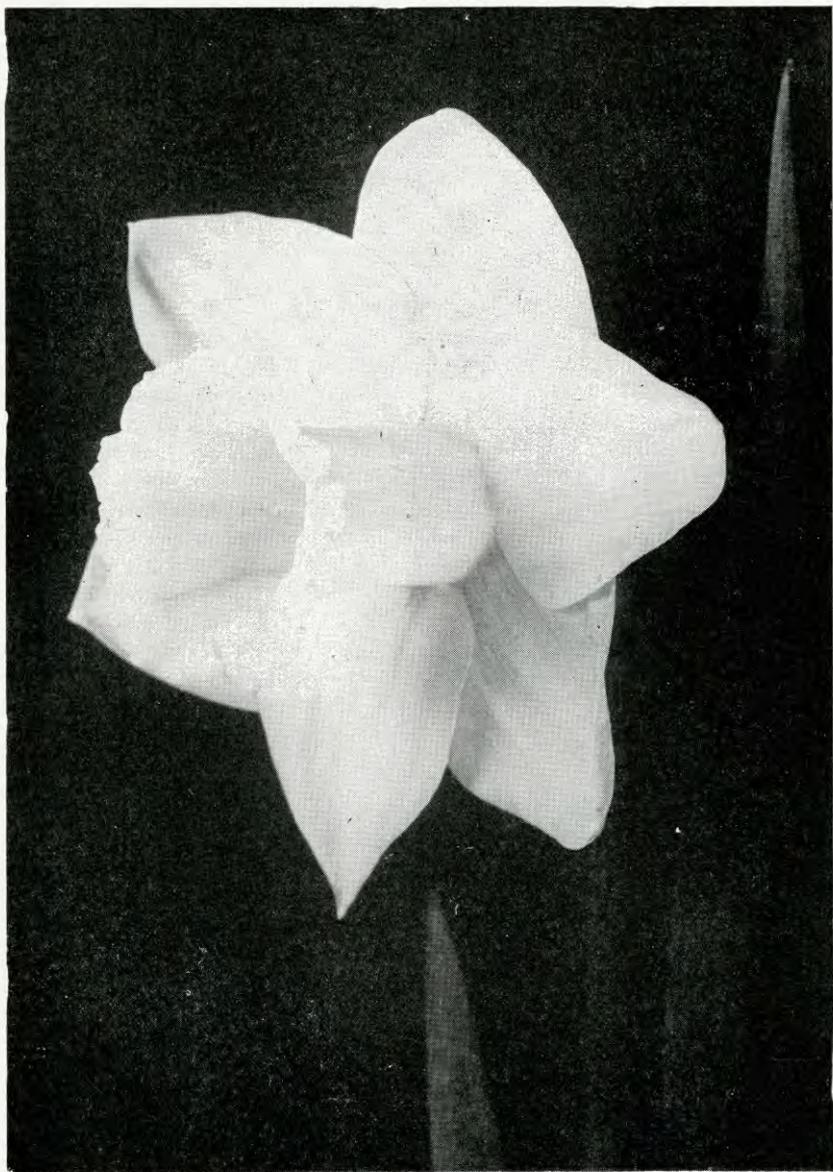
Hybrid *Narcissus*—*Cantatrice* (Esmiko X Beersheba)

A very smooth large white trumpet of beautiful form; the flower is very graceful, polished; the trumpet is slender, deserving both the Award of Merit and First Class Certificate given it by the R. H. S.
Plate 285

eastern and western States, particularly in Oregon which contains the great Oregon Bulb Farms at Sandy, and Mr. Grant E. Mitsch's farm at Canby—at both of which places the raising of seedlings is extensively carried on; whilst I regard that most brilliant plant breeder, Frank Reinelt of Capitola, California, as likely very soon to become the leading raiser of Daffodils in U. S. A. if indeed he has not already attained that position. If his progress with the Daffodil is as rapid and spectacular as are his glorious achievements in Delphiniums, Begonias and other subjects he may very soon leave us all behind. California has other keen raisers, and there are others still in B. C., Canada. All this is to be warmly commended as varieties raised in each different country are more likely to thrive and do well there than bulbs imported from distant and widely differing climates. It is found, for example, that bulbs sent from Britain to Australia and New Zealand usually take about five years before they settle down and give really good and representative flowers, whilst a few never do really well: it is equally difficult, if not more so to acclimatise bulbs here that have come from there. I understand that many of our British raised things seem difficult to settle in California, frequently lacking vigour and developing Virus there; Although they seem to grow magnificently in the cooler and moister climate of Oregon; but in all these places most if not all survive long enough to provide pollen and seed for producing a home raised race from which plenty can be selected which will thrive and flourish; and breeders will be well advised to work on those strains that they find best adapted to their own conditions of soil and climate.

Breeders of long experience in this country have of course discovered a few varieties that are outstandingly good parents. Time has also taught them to look out for the beneficial influence of certain now relatively remote ancestors in the pedigrees of their seedlings. For example, the good influence of that most beautiful of wild golden trumpets, *Narcissus hispanicus maximus* in transmitting clear colouring, fine durable texture and length and strength of stem; or of Incomparabilis *Princess Mary* in transmitting smoothness and symmetry of form and good habit and carriage with the short necked stems desired alike by market men and exhibitors, combined with a ready tendency to develop brilliant colour. The good influence of the best forms in *Poeticus* are also apparent to the practised eye, e.g., the fine quality and substance of *N. poeticus recurvus* or the neat and broad petalled circular form of *N. poeticus verus*; again the White Trumpet strain would seem to have a definitely refining influence upon quality and texture.

I should say that I have never been trained in the science of plant genetics, and I feel that those equipped with the knowledge and skill resulting from a thorough course of training in that science are likely to have a great advantage over the older generation of breeders, and may be able to achieve desired objectives more rapidly and with less waste of effort. A skilled geneticist may well be able to trace from the number and character of the Chromosomes of a given variety the probable original source of some particular character or characters that it



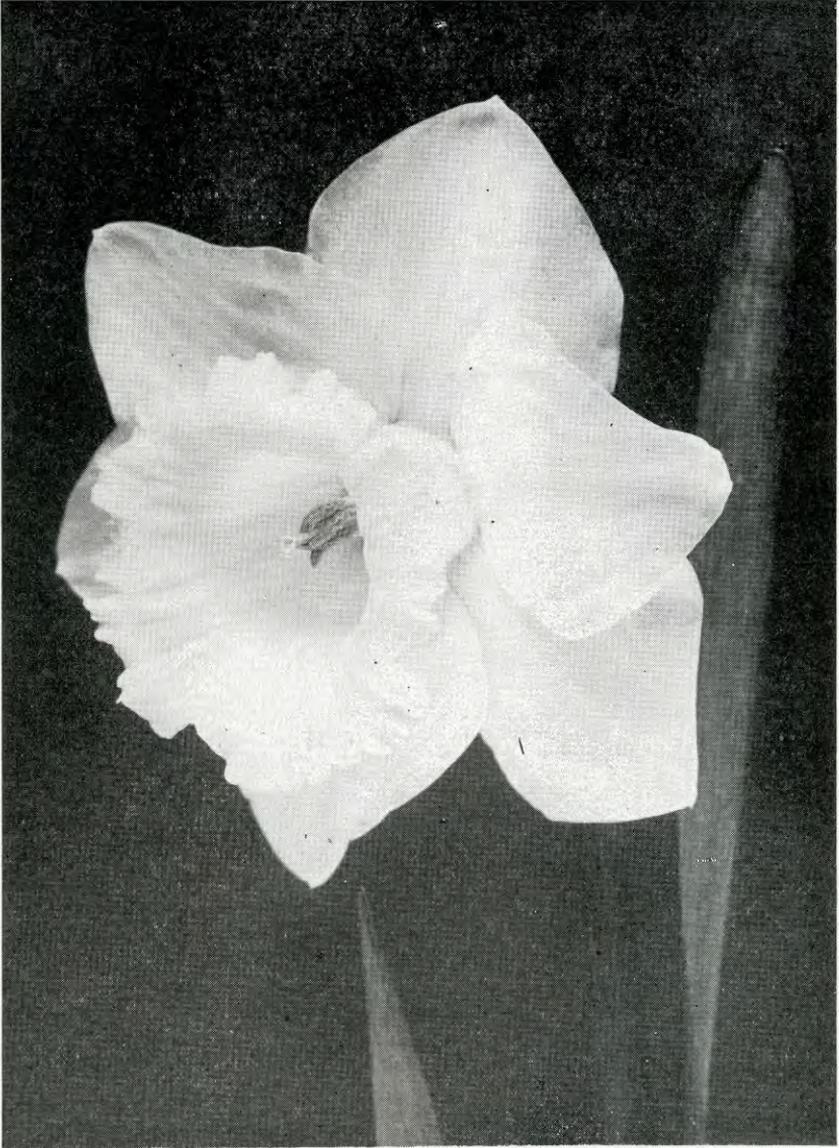
Hybrid Narcissus—**Samite**

Seedling of **Mrs. Krelage**; a beautiful ivory white trumpet of fine form and finish; First Class Certificate, R. H. S.

possesses and transmits to its progeny. I have recently had extensive correspondence with Dr. C. A. Walker of Nottingham, who is a plant geneticist; he has also been here at Daffodil flowering time, and I have been deeply interested in many of his deductions.

The old *Incomparabilis Princess Mary* which has been such an important factor in breeding was not a spectacular flower, and it had such a poor constitution that it has practically disappeared from cultivation, indeed I do not know of anyone in Great Britain who now has it. Its parentage is not known, but Dr. Walker thinks that *N. poeticus verus* probably figures in its pedigree, which may account for some of its virtues. Engleheart, probably being attracted by its orange tinted crown, mated it with the Poets and produced a number of small bright crowned Barriis which attracted a good deal of attention, as at that time red cups as we now know them were non-existent; but very few of these seedlings survived for any length of time as they had poor constitutions. Curiously enough, however, it was found that if *Princess Mary* was seeded to the pollen of the large trumpets, e.g. *King Alfred*, *Madame De Graaff*, etc. the resulting progeny was large and vigorous, of good habit, and often of good form and quality. Some things that came from crosses of that type were of much value in subsequent breeding, e.g. the yellow *Incomparabilis Golden Pedestal* which was raised by J. L. Richardson from *Princess Mary* x *King Alfred*.

A few of Engleheart's small crowned bright Barriis, which came from *Princess Mary* by *Poeticus* pollen, fortunately survived long enough to be of great value and importance to breeders. *Beacon* is the most notable of these: it is a little insignificant mean looking plant and flower, so nothing in the history of breeding has been more astonishing than the vigorous plants and large fine quality flowers which have come from first crosses between it and large vigorous things such as *Fortune*. P. D. Williams and A. M. Wilson discovered its possibilities and used it for some time before others were aware of them: it was also extensively used by the Brodie of Brodie. I am almost certain that *Beacon* came from a cross between *Princess Mary* and *Poeticus Recurvus*, as some of its seedlings, most notably P. D. Williams' beautiful *Folly* have much of *Recurvus* character. Dr. Walker confirmed this view on examining its chromosomes. The beneficial influence of *Beacon* on the quality and pose of many of its descendants is readily apparent. Another old flower used by P. D. Williams was *Firebrand*, a small Barrii with starry whitish perianth and small very vivid red cup. I had been told by the late F. Herbert Chapman that *Firebrand* came from *Princess Mary* x *N. poeticus poetarum*, and for years believed this to be its origin; but quite recently Mr. A. M. Wilson, who in early days had been in most intimate touch with P. D. Williams and Engleheart, told me that it came out of *Beacon*. Be that as it may, it is undoubtedly closely related to *Princess Mary*. The late J. C. Williams of Caerhays Castle, Cornwall, who was a cousin of P. D. Williams, and also at one time a noted breeder, succeeded in crossing *Firebrand* with *King Alfred*, and produced *Hospodar*, which was in turn largely used by P.



Hybrid Narcissus—Kanchenjunga (White Knight X Conqueror)

A very large white trumpet that has been valuable in breeding other large trumpets with wide full perianths; trumpet of this stately flower is serrated and widely flanged. Award of Merit, R. H. S.

D. Williams, giving him a wonderful series of brilliant red and yellow varieties, including such fine things as *Saltash*. It should be noted that in mating *Firebrand* with *King Alfred*, the good qualities deriving from the *Princess Mary* strain—via *Beacon* and *Firebrand*, and the *Maximus* strain—via *King Alfred*, were combined.

Brodie of Brodie raised a smallish neat Barrii which he named *Mozart*, from *Princess Mary* by one of his own seedlings. *Mozart's* almost flat crown is sharply rimmed with red which rather points to and confirms the suggestion that the sharply crimson rimmed *Poeticus verus* may be somewhere behind *Princess Mary*. From *Mozart* by pollen of *Gallipoli*, which was bred between *Bernardino* and *Will Scarlett*, Brodie raised *Seraglio* and *Therapia*; of these two *Seraglio* has proved a most valuable seed parent and many very fine flowers have been bred from it, such as *Market Merry*, *Dunkeld*, *Garland*, *Green Island*, etc., the *Princess Mary* influence behind it being apparently strongly dominant. It is still worthwhile mating it to the best of recent productions.

The neat little yellow perianthed Barrii *Gulliver* was one of P. D. Williams' earlier productions. I don't know how it was bred, but it has excellent form and texture and I should not be surprised if it came from *Beacon*, while Dr. Walker thinks it has much of *Poeticus verus* character. At all events the very fine *Incomparabilis Carbineer* was raised by A. M. Wilson from seed of *Gulliver*; and *Carbineer* has in turn proved itself a parent of great value both as pollen and seed parent: J. L. Richardson of Waterford, Eire, has raised a series of magnificent red and yellow *Incomparabilis* from *Carbineer* by pollen of *Porthilly*; vigorous plants of fine habit, high quality and magnificent brilliant colouring.

I have found the Barrii *Market Merry* a most useful flower in breeding brilliant yellow and red colouring. *Market Merry* was bred by Brodie of Brodie from *Seraglio* by pollen of a seedling he had raised from *Tamerlane* by *Fortune*. *Tamerlane* was bred from *Firebrand* by *King Alfred*, and was a sister seedling to *Hospodar*, already mentioned, but it never got into general cultivation, as it had much less colour in its cup than *Hospodar*. *Market Merry* is a very brightly coloured flower, and a little reflection will show that it inherits a lot of colour on both sides of its pedigree. I crossed it with the pollen of a smallish but very brilliant yellow and orange scarlet *Incomparabilis* of P. D. Williams' raising, and got a nice batch of seedlings of which the two best were *Indian Summer* and *Chungking*, both flowers of fine form with broad overlapping deep golden perianth and intensely vivid orange scarlet crown. *Indian Summer*, which is really a small cupped *Incomparabilis*, holds its colour better of the two, but has the fault of a long though stiff and wiry neck. Among my most recent seedlings are some resulting from crossing *Indian Summer* with Richardson's magnificent red and yellow *Bahram*—a short necked flower bred from *Penguite* by *Porthilly*, also *Carbineer*, besides one or two other short necked red and yellows of my own raising: some of the resulting seedlings promise to be very fine, as *Indian Summer's* long neck has been corrected, while they have beautiful quality and magnificent brilliance and intensity of

colour, in one or two cases I think even deeper than that of *Indian Summer*; but as the most of them have so far only flowered once it is rather soon to form a just opinion of their merits. From *Chungking* by pollen of a tall vigorous yellow and orange red *Incomparabilis* of fine substance and quality named *Klingo* I have in the past season flowered a couple of four year old seedlings which promise to be very fine, so it looks as though this strain is worth going on with.

A great many years ago Engleheart made a cross between *Poeticus Poetarum* and the Wild Trumpet *Abscissus* or *Muticus*, and produced *Will Scarlett*, which he said was the smallest of a family of enormous and coarse brethren. *Will Scarlett* made a great sensation on its appearance, as it was the first all red cup of any size; but it really is a shockingly bad flower, and on the whole I think it was unfortunate that it ever appeared, for it transmits many faults to successive generations of its descendants. Of its parents *Poeticus Poetarum*, though it has a very vivid wholly orange scarlet eye, has a terribly poor thin spidery perianth; while the rather curious Trumpet *Muticus* has also a poor and muddy coloured perianth, and a peculiar long narrow stove pipe trumpet. The temptation to use *Will Scarlett* to obtain striking red cups was too strong for some breeders, though I don't think that Engleheart himself ever used it, and neither P. D. Williams or J. C. Williams ever had it on their places. Mrs. R. O. Backhouse, however, must have used it freely, and she undoubtedly produced many striking and spectacular flowers of remarkable colouring, but in the case of yellow perianthed varieties the petal colour was always somewhat muddy and lacked the clearness, depth and brilliance of P. D. Williams' strains which had *Maximus* instead of *Muticus* behind them. Mrs. Backhouse's strain had undoubtedly great vigour, but they had a tendency to make rather large soft long necked bulbs which are not a good type for commercial handling. The bulk of her stocks eventually came into the hands of Dutch growers who propagated them and distributed them widely and a great many flowers undoubtedly have this strain behind them. Some of the worst faults of the *Will Scarlett* strain are roughness or unevenness of perianth, muddiness of petal colouring, and often disproportionately wide and gaudily coloured crowns which quite frequently have occasioned wart-like excrescences at their edges, or ugly and unwanted spots of pale yellow appearing in their orange ground colour, giving an unpleasant piebald effect, and making up coarse and vulgar looking flowers. By mating varieties of the *Will Scarlett* strain with others of the *Princess Mary* strain, more particularly of course if the progeny of such crosses are again bred to the better strain, it has often been possible to eliminate or at all events mask the faults of *Will Scarlett*.

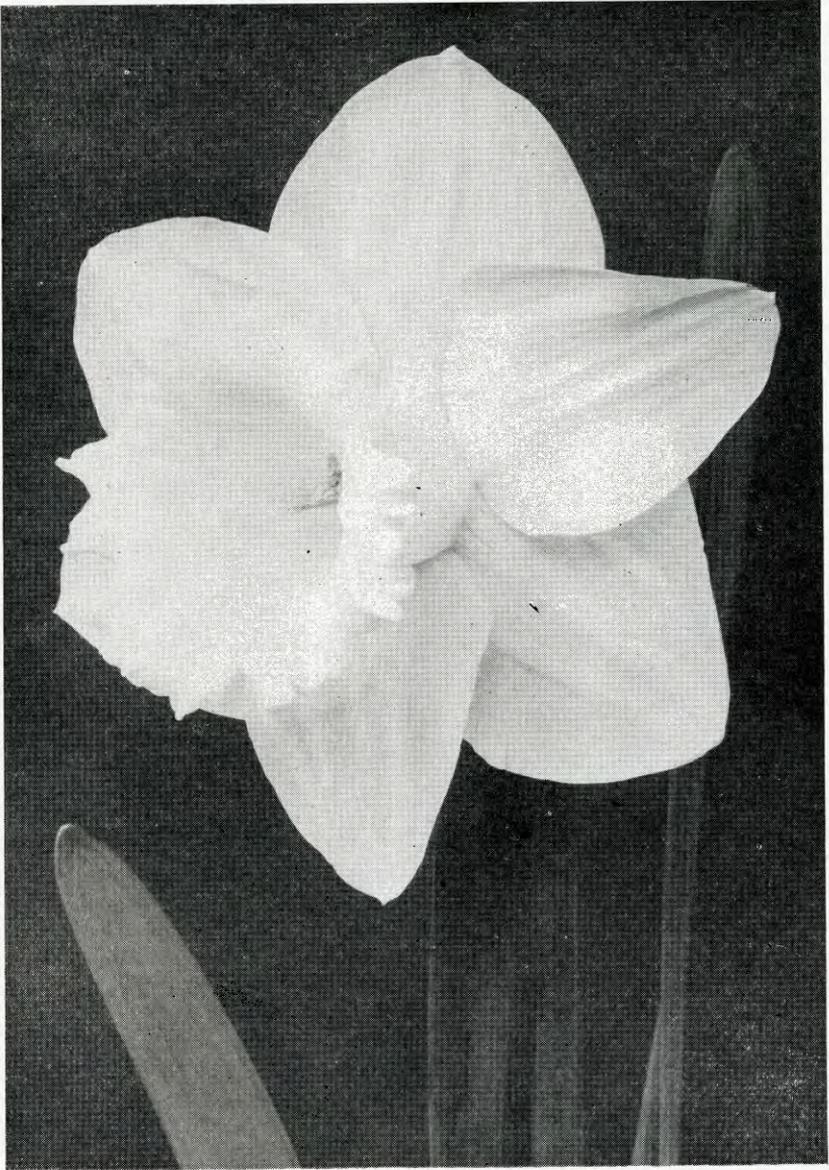
The late F. Herbert Chapman of Rye, Sussex, attempted to correct *Will Scarlett's* faults in a first cross by mating it with *N. Poeticus Verus*. From this cross he got *Crimson Braid*, a white petalled dark red rimmed Barrii, which he subsequently used in further breeding. *Crimson Braid* had considerable substance, but its perianth still reflexed very badly. Chapman used its pollen on *N. Poeticus Kestrel*, and got a series of

striking white perianthed Barrii-Poets with very rich coloured eyes; but even they lacked something in refinement. He also used *Crimson Braid* pollen on *Princess Mary* and got a very charming little Barrii which he named *Dinkie*, of excellent form and quality and of a most distinct and attractive soft clear rather greenish lemon colour, with a sharply defined narrow red rim to its small crown.

Probably the best known flower which came from the late Mrs. Backhouse's garden is *Incomparabilis Hades*, which has attained great popularity on account of the extraordinary depth and brilliance of colour of its almost cherry red cup. It has the fault of a rather floppy and muddy coloured perianth, though it is less coarse than many of the breed; it also has rather soft foliage and a long necked bulb, but its pollen has been of considerable value in breeding; e.g. J. L. Richardson got the splendid brilliant white and scarlet Barrii *Limerick*, which gained a First Class Certificate this year, by using *Hades* pollen on P. D. Williams' *Incomparabilis Folly*. Mrs. Backhouse must have bred some of her strain back to the best Poets, such as *Recurvus*,* as the best quality flowers which came from her garden were smaller crowned things of the Barrii and Barrii-Poet class; e.g. *Lidcot*, *Sunstar* and *Coronach*. *Sunstar* has been of much value in breeding, especially as a pollen parent, and tends to give flowers with very white perianths, whiter than its own. From its pollen used on *Beacon*, the Brodie of Brodie got *Pera* a most perfect small deep red and pure white Barrii, while by using it on *Folly*, Richardson got *Mahmoud*, one of the very best and most faultless deep red and pure white Barriis yet seen, and from the same cross I got *Bravura* (Plate 289), a really magnificent large pure white and red Barrii. *Coronach* is a flower of superb colour, real snowy "blue-white" perianth and small deep crimson eye: unfortunately it is a rather uncertain doer. Nevertheless Richardson has bred some very good things from its pollen, and Frank Reinelt tells me that he is using it extensively, so I expect soon to hear of some good results from him.

P. D. Williams had a late flowering small crowned 4B Leedsii which he called *Silver Coin*. I remember he used to tell me that it gave most beautiful seedlings. I did see just a few charming things from it when I used to go to see his flowers in March, but that was too early for most of the *Silver Coin* seedlings, and he said he had much better ones that flowered later. He gave me a few bulbs of *Silver Coin*: it is a small white flower, not much to look at, as it has the habit of seldom opening perfectly, and coming with green tips to its perianth; but it has much substance and a good stem and short neck: unfortunately it flowers very late, so that unless one tries to preserve pollen to use on it there is not

* Editorial Note.—According to Mr. W. O. Backhouse, who recently visited the United States, his mother, Mrs. R. O. Backhouse, never made any crosses with *N. Poeticus recurvus*. Her brilliant red cups originated in a cross between the Tenby Daffodil and *Poeticus Poetarum*. Five or six seedlings were obtained from this cross, of which three had red cups. Two were given the names, **Ladybird** and **Firelight**, both 2A, the latter being given an Award of Merit on March 16, 1903. Only one of these red cups was fertile, **Ladybird**, which Mrs. Backhouse used again and again. Hence, **Ladybird** was the real source of all her many red-cupped flowers.—Arno H. Bowers.



Hybrid Narcissus—Broughshane (Trostan X Kanchenjunga)

A very large white trumpet with extremely wide perianth segments which form a good background for the large trumpet; perianth is $5\frac{1}{2}$ inches across when well grown; Award of Merit, R. H. S.

Plate 288

much choice of things with which to cross it. I did cross it with *Silver Plane* and *Crimson Braid*, getting nine and seven seeds respectively: and with another flower which I had bred from a large Leedsii by pollen of *Crimson Braid*; this flower I called *Armoy*: it had a flat even perianth of thick texture and quite exceptional smoothness and a smallish neat yellow cup; like *Crimson Braid* it flowered very late, and I finally discarded it as it made such very poor soft bulbs. Turning again to the crosses between these three things and *Silver Coin*, I was astonished to get from the *Crimson Braid* pollen several most vigorous and very late 4B's with all strong short necked stems and flowers of quite exceptional substance; they had very good perianths, but the small crowns of some contained thick petaloid anthers or in some respect did not quite come up to requirements: none of them inherited any colour from *Crimson Braid*'s dark red rim. The best one of them, which was *No. 28/101* was an icy white green eyed 4B, rather like my lovely 4B *Cushendall*, but taller and more vigorous and free of increase, though not so perfect a flower. From *Silver Coin* x *Silver Plane* came several late flowering large 4B's of enormous substance with broad thick petals and short frilled crowns, strong stiff stems and very short necks; none, however, were considered good enough to name. It should perhaps be mentioned that the quantities of seed obtained from the few available flowers of *Silver Coin* were small. From *Silver Coin* x *Armoy* I got fifteen seeds: presumably most of these were really selfset, as only one came that was obviously the cross, but this was a beautiful flower with faultless white perianth of flawless texture, and great substance, and a neat little pale primrose or ivory crown, it is moreover a plant of good habit with perfect stem and neck: this won the medal as the best flower in the London Show in 1943, and was subsequently named *Tryst*. It may be interesting to state here that Dr. Walker feels pretty certain that *N. poeticus verus* is behind *Silver Coin*; I think that this is more than probable, and if it be so the above mentioned seedlings by pollen of *Crimson Braid* and *Armoy* must have a double dose of *N. poeticus verus* in their make up. I have this year flowered some really beautiful seedlings from *No. 28/101* by pollen of Richardson's magnificent *Green Island*—bred from Leedsii *Gracious* by *Seraglio*—of which some four have been selected for further trial: all of these have excellent smooth white perianths of splendid substance and very pale cool citron shallow crowns or eyes edged with bright orange, and in one case scarlet; so in these the *Crimson Braid* or *N. poeticus verus* rim of colour has returned modified and with charming effect on a very pale ground; which, assuming Dr. Walker's guess that *N. poeticus verus* is behind *Princess Mary*, the grandmother of *Seraglio*, is not surprising, because of course it is also behind *No. 28/101*.

A good number of years ago a flower of a lovely shallow crowned *Silver Coin* seedling was sent me from P. D. Williams' garden. I used its pollen on *Silver Plane*, *Nelly*, *Mitylene* and a *Silver Plane* x *Mitylene* seedling, and got quite a number of really good things. The best of them all was *Chinese White* (Plate 290), which came out of *Silver Plane*

and is still the finest 4B I have yet seen. From *Nelly* came *Foggy Dew* and *Carnalea*, both beautiful flowers: the influence of *Silver Coin* in the pedigree of these things is most pronounced and very beneficial.

From pollen of *Chinese White* (Plate 290) used on a white seedling bred from *Quartz* (*Morven* x *White Emperor*) by *Naxos* I got a very good 4A Leedsii of much substance, excellent form and proportion, a pure clear self white with a shade of cool green in the base of the crown. This plant, which is known as *No. 30/90*, has a very sturdy habit, with stiff stem and short neck and peculiar stiff dark green upright foliage: I have not yet named it, as the crown sometimes comes a little rough. I may mention here that I am pretty certain that *N. hispanicus maximus* is somewhere behind the breeding of Engleheart's white Leedsii *Naxos*: if that be so, the using of *Naxos* in this case blends the *Maximus* character with the *Silver Coin* strain. *Naxos*, it may be mentioned, though not one of the very whitest flowers, seems to have the faculty of giving the most beautiful icy whiteness to a proportion of its progeny—e.g. *Ludlow*, *Zero*, etc., *Maximus* influence would seem to be evident in the hardening of the texture of stem and foliage in *No. 30/90*. I have been using the pollen of *No. 30/90* and have among my most recent seedlings flowered for the first time in 1946 some very promising and beautiful flowers: e.g. from *No. 28/65*, a seedling from *Nelly* by a large 4A, which was a very nice white Leedsii but had a much too long neck and a rather weak stem, by pollen of *No. 30/90* I got some very good white 4A's, all of which were flowers of excellent proportion and remarkable substance, and strong stemmed, short necked sturdy plants. Descriptions of one or two of these from my field note-book read as follows:—*No. 35/106*. "Splendid pure white Leedsii of very good substance and pose."—*No. 35/107*. "Most perfect snow white Leedsii with smallish smooth bowl shaped crown: very nice proportion."—*No. 35/149*. "Pure white Leedsii; green in base of crown, very nice form and proportion, short neck."—and so on. *White Maiden*, a rather distinct Leedsii of somewhat drooping habit with broad perianth and a rather shallow saucer crown, mated to *No. 30/90* also gave nice things—e.g. *No. 35/144*, "Lovely smooth medium crowned snow white Leedsii"—*No. 35/166* "Very graceful beautifully proportioned large white Leedsii." Another cross which is interesting was made between a pure white 4B that I call *Stardust* x *No. 30/90*; *Stardust* is a sister flower to *Chinese White*, and as *No. 30/90* has *Chinese White* as its pollen parent the close relationship can be seen, and also that in mating these two, one gets a double dose of *Silver Coin* blood. I recollect that the seed from this cross, of which there was only a quite small quantity, looked particularly large and fine. The seedlings were vigorous from the outset, and those that have flowered are only 4 years old: they have very strong stems and stiff strong foliage, and they are all large beautiful very white shallow crowned flowers of splendid substance and quality. It would appear from these results that it would be well worth while using the pollen of *No. 30/90* on a wider range of flowers; and it is also easy to imagine further progress resulting from breeding from its progeny. Another

cross which this year gave some most charming and beautiful high quality seedlings at four year old was *Seraglio* by pollen of *Stardust*—thus blending the *Princess Mary* strain with the *Silver Coin* strain. These also were large flowers of the shallow crowned type of great substance and quality, the crowns varying from white to pale citron with charming pale buff or pale gold frills. I think we have struck a good line for combined quality and vigour in this *Silver Coin* strain.

Earlier in this paper I said that the White Trumpet strain seems to have a refining influence. I think we can take it that the original parent of White Trumpet Daffodils is the lovely drooping little white *Narcissus alpestris*, which is probably better known as *N. Moschatus* of the Pyrenees. It is pretty obvious that other wild white Spanish Daffodils, e.g. *Colleen Bawn*, *Cernuus*, etc. are closely related to *Moschatus*, while the old Dutch raised *Albicans* is almost certainly one of its children or grand-children. The once famous white Daffodil *Madame De Graaff*, a most lovely refined thing in its day, was known to be bred between *Albicans* and the very vigorous growing Bicolor Trumpet *Empress*. *Madame De Graaff* was, of course, very extensively used in breeding, and many self fertilized seedlings must have been raised from it: amongst these such things as *White Knight* and *Mrs. Robert Sydenham* appeared. These were small flowers by today's standards, but they had very beautiful quality of texture and were much whiter than *Madame De Graaff*. Engleheart raised his very fine and now well known *Beersheba* from *White Knight*. The great Leedsii family arose in the first instance as a result of blending the blood of the White Trumpets with the Poeticus. In due course this original first generation Leedsii were again mated with *Madame De Graaff*, *Weardale Perfection* and other large trumpets, and gave rise to a beautiful race of large Leedsii which have, of course, been further developed, and have also been mated with very fine results with the *Princess Mary* and *Beacon* strain, and as has already been seen with the *Silver Coin* strain. Amongst the Leedsii many flowers of most beautiful quality can be found.

Pure bred large Yellow Trumpets as a family are with one or two exceptions rather inclined to coarseness; the most notable exception was *King Alfred*, a noble plant which owes its good qualities to its parent *N. Hispanicus Maximus*, whose influence predominates in *King Alfred*. The now well known and popular White Trumpet, *Mrs. E. H. Krelage*, was bred by the firm of Krelage in Holland, by *King Alfred* by pollen of *Madame De Graaff*. This flower was first shown at the London Royal Horticultural Society's Daffodil Show in 1912, when it created a sensation on account of its wonderful substance and beautiful waxy texture: it was in fact a blend of the best Maximus yellow trumpet strain with the further refining White Trumpet strain. I should think that even yet *Mrs. Krelage* is worth breeding from. It is the parent of my own First Class Certificate White Trumpet *Samite* (Plate 286), a very vigorous growing White Trumpet of superb quality; and I believe it to be the grand parent of another F. C. C. White Trumpet of mine,



Hybrid Narcissus—**Bravura (Folly X Sunstar)**

A large Barrii of great charm and grace, with a broad very white perianth and a well balanced orange scarlet flattish crown.

Plate 289

namely *Cantatrice* (Plate 285), which is still about the highwater mark for refinement and flawless beauty of texture. *Cantatrice* was bred between *Beersheba* and *Eskimo*, the latter a seedling of Brodie of Brodie's raising, which has *Mrs. Krelage* as one of its parents.

Brodie of Brodie raised a flower named *Nevis*, an almost White Trumpet which has proved of great value in breeding. On one occasion Engleheart sent him a small pinch of pollen of a white Daffodil which he said he thought had *N. triandrus* in its pedigree: Brodie's season in the north of Scotland was much later than Engleheart's, and when this pollen arrived, the only thing of any note that was in bloom in his garden was a large early yellow trumpet bred between *King Alfred* and a Dutch Bicolor Trumpet called *Glory of Noordwijk*. He put Engleheart's pollen on this and got *Nevis*, which was distinguished by remarkable thick smooth waxy texture. By using *Nevis* pollen on *Beersheba* he got the very fine large White Trumpet *Corinth*, a flower of great substance, and by using it on a seedling bred between the two Bicolor Trumpets *Weardale Perfection* and *Duke of Bedford*, he got that most noble and very large white or almost white trumpet *Askelon*, a flower that has magnificent breadth of petal, great size and most beautiful quality, which has in turn been of great value in breeding. It is the pollen parent of my *Kanchenjunga* (Plate 287), a remarkable giant flower with enormous breadth of petal, which in turn became the pollen parent of my giant white *Broughshane* (Plate 288). *Nevis* unfortunately makes rather a soft bulb; this fault is inherited to some extent by *Askelon* and *Kanchenjunga*, but is eliminated in *Broughshane*, whose other parent is *Trostan*, a very fine tall bicolor which I think came out of *King Alfred* by *Askelon* and therefore has a good deal of Maximus blood of which indeed *Askelon* itself has a trace, seeing that its grandparent, Brodie's Yellow Trumpet seedling, was a child of *King Alfred*.

The best modern Yellow Trumpets owe their quality to an admixture of White Trumpet blood in their ancestry. Take *Royalist* for example, a medium size Yellow Trumpet of faultless form and wonderful smooth texture. This was bred from *Cleopatra* by *Broadford*. *Broadford* came from *King Alfred* x *Lord Roberts*: *Lord Roberts* was a broad petalled Yellow Trumpet of very good form, which was bred from the Yellow Trumpet *Monarch* by *Madame De Graaff*. *Royalist* has proved to be a parent of great value, transmitting fine form, texture and quality to its progeny. By mating it with *Crocus* and *Trenoon* Richardson has raised a series of very high quality golden trumpets. Another interesting example is *Hebron*, bred by Brodie of Brodie from *White Emperor* by *King Alfred*. *White Emperor* is a very symmetrical White Trumpet of first rate smooth texture. *Hebron*, curiously enough, is if anything a deeper gold than *King Alfred*, and is a flower of smooth texture, though its petals incline to droop forward rather much; but it has given some excellent seedlings of high quality, notably *Cromarty*, bred by Brodie of Brodie from *Hebron* by *Alchemist*, a pure gold flower of faultless form, carriage and quality, which is in turn giving fine

seedlings: also such things as my own *Golden Hind* and *Virtue*, which came from *Hebron* by *Crocus*. This year a small batch of seedlings from *Golden Hind* by pollen of a seedling from self fertilized *Trenoon* show very high quality. In both of these strains, i.e. *Hebron—Crocus—Trenoon* and *Royalist—Crocus—Trenoon* we have a predominant *Maximus* via *King Alfred* yellow strain leavened by a trace of refining white trumpet quality.

Nothing has aroused more interest in comparatively recent years than the appearance amongst seedlings of the Leedsii and Leedsii-White Trumpet strain of occasional flowers with faintly pink tinted crowns. I guess one of the main origins of pink to have been the Bicolor Trumpet *Weardale Perfection*, which had a just discernible tint of soft warm creamy buffness in its pale yellow trumpet—which may trace back to the very slight buffness noticeable in some examples of the wild Yellow Trumpet *Abseissus* or *Muticus*, which I think is more than likely one of the first parents in the Weardale line. The old Leedsii *Minnie Hume* was mated with *Weardale Perfection*, and one of the resulting progeny was the Leedsii *Lord Kitchener*, which in turn gave several things with pink tinted crowns, the pink I suppose resulting from the blend of Weardale's warm cream with diluted *Poeticus* red. I think that pink may possibly arise from some other sources as well, but time and space forbid further speculations about them. What is now perhaps of more immediate interest is that once pink has appeared it seems possible to reproduce it in gradually increasing strength of colour and frequency by inter-crossing pink tinted things: one will of course get a lot of seedlings without any pink, but a proportion of pinks can reasonably be hoped for, at all events that is my own experience. Mr. C. E. Radcliff, of Hobart, Tasmania, to whose outstanding work in the development of pink crowned flowers I have already referred, tells me that he flowered a small batch of seedlings this year bred from two of his pink crowned things, and that every one of the seedlings had pink crowns. He also tells me that he is gradually getting stronger and purer tones of pink, and often combined with beautiful pure white perianths.

I have long had a special affection for the late flowering small crowned Leedsii or 4B class of which some of the first to be introduced were Brodie of Brodie's *Silver Salver* and *Samaria*, and my own *Mystic*. The latter was bred from pollen of a fine large circular *Poeticus* seedling of Engleheart's raising on one of the old type Leedsii. I crossed *Mystic* with pollen of *Poeticus Dactyl*, a very fine tall late Poet of splendid form, carriage and substance, raised by Engleheart, and got a whole series of charming and dainty things, such as *Grey Lady*, *Columbine*, *Misty Moon*, *New Moon*, *Dreamlight*, etc. I also used the pollen of *Dactyl* on a small flower of Engleheart's raising called *Emerald Eye*, which was a poorish doer and has I fear disappeared: it had very white perianth and small crown with a green eye: from this cross I got two of the best things I have raised, namely *Cushendall* and *Frigid*; both are late flowering small crowned 4B's of faultless form, quality and carriage. *Cushendall* has a perfect circular poeticus white perianth

and very shallow saucer crown edged with a cream coloured frill, while the centre is a lovely moss green; when I saw how good it was I repeated the cross and got *Frigid*, an even later and larger flower with broad but rather more pointed petals of the purest frosty white, and a small crown equally white with a touch of vivid emerald green in its eye; as it flowers as late as *Poeticus Recurvus* so it is never seen at Shows. These green eyes are very enchanting and are evidently capable of further development as at the London Show in 1945, Mrs. Vyner Ellis of Minsterworth Court, Gloucestershire brought me a flower to see which she had bred from my Poet *Cantabile* by pollen of *Cushendall*. *Cantabile*, though of course it has a rim of red to its eye, has more green than any poet I know; Mrs. Ellis' seedling was a thing of exquisite beauty, about the same size as *Cushendall* with a faultless *Poeticus* perianth of purest sparkling snow-white, while the eye was wholly vivid green except for a white fringe. At the same Show Mr. D. Blanchard of Blandford, Dorset, exhibited two remarkable flowers bred from my *New Moon* by *Sorello*, another small 4B of Brodie of Brodie's raising; the eyes of these flowers were entirely grass green without any rim of any other colour. One would like to see the jewel-like colouring of the exquisite eyes of these 4B's, not only the entirely green ones but those that are white, or faint greeny citron, or grey, green, or green centres, with rims of gold, orange, salmon, pink or cerise, carried into larger crowned flowers. I think this is not an impossible development, but it may not be easy of attainment as these charming 4B's are so late that almost all the larger things are over before they come out; moreover, unlike *Silver Coin* they seem unwilling to mate with the larger crowned things, but I dare say something further in this direction can be done with the help of the *Silver Coin* Strain.

I have hitherto omitted all mention of the most charming and delightful miniature Narcissi, such as *Minimus*, *Cyclamineus*, *Triandrus*, *Juncifolius*, *Jonquilla*, etc. as I have never done any work upon them myself, but Mr. Alec Gray of Treswithian Daffodil Farm, Camborne, Cornwall has made a specialty of them and is intercrossing them and has already produced many exquisite refined and dainty fairy-like little dwarf Daffodils suitable for rock gardens or alpine house culture; many of them have the additional charm of delicious perfume. I have no doubt they could be successfully bred in California, and probably also in Oregon and elsewhere in U. S. A. I would refer interested readers to a most informative and comprehensive paper by Mr. Gray on Miniature Daffodils in the issue of the R. H. S. Journal for June 1946 (Vol. LXXI part 6).

Early in this paper I suggested that breeders should work on those strains that they found best adapted to their particular conditions of soil and climate. I gather from Frank Reinelt's correspondence that he has already put this principle into practice, and has selected a comparatively limited number of varieties as the main foundation of his work. He has been making extensive use of the fine tall stemmed golden *St. Issey*, also *Tunis*, *Polindra* and *St. Egwin*, all of which were raised



Hybrid Narcissus—Chinese White (Silver Plane X Silver Coin)

An exquisitely beautiful large flat crowned Leedsii; clear pure white throughout, except a touch of green in center; delicately saucer-shaped crown is nice contrast to wide-petaled, almost circular perianth. Award of Merit, R. H. S.

by P. D. Williams, and of the tall early flowering Australian raised *Jean Hood*. I am particularly interested to know that he has developed a *Tunis* strain: I do not know how *Tunis* was bred, but feel pretty certain that *Maximus*, probably via *King Alfred*, enters into its pedigree. It is not really happy in my cold climate, but I have seen it in fine form in Cornwall and consider it an outstanding plant on account of its fine habit and the substance and durability of its flowers: Its stem is very tall, strong and short necked giving the large flowers a good pose. Its foliage is of the hard type which is resistant to fungoid troubles, and it makes a quite exceptionally hard bulb remarkably heavy for its size. From what Frank Reinelt tells me I think he has already some remarkably fine things amongst its descendants.

Some interesting lines of development remain largely unexplored. P. D. Williams left us a few most attractive and refined things resulting from crossings with *N. Jonquilla*, the small sweet Jonquil; such as *Lanarth*, *Hesla* and *Trevithian*: of these three *Trevithian* appears to be much the best doer, and is likely to become a very popular garden plant: it has the distinctive Jonquil character in its foliage, and habit of bearing one to three flowers on the stem; the clear yellow flower itself is charmingly smooth in quality and refined in form. Quite a lot more hybrids have recently appeared as a result of using the pollen of the small Jonquil on various things; some of these are beautifully neat and attractive in form, and some have quite bright orange red cups; but I have never yet heard of anyone achieving a secondary cross from these hybrids mated again with the large flowering types. I imagine such crosses would be difficult in our climate but should not be surprised if they were found to be quite possible in California. I should immensely like to see crosses between *Trevithian* and such things as *Havelock*, *Trenoon*, *Crocus*, *St. Issey* and some of the best quality red and yellow *Incomparabilis*. I imagine that if a strain of larger flowers could be developed with the blood of the small Jonquils in its pedigree, it would in all probability have distinctive character and much refinement of form, quality and colour. There is already a variety called *Golden Goblet* which I believe originated in Holland, which I think may be a secondary cross from some hybrid of *Narcissus Odorus Rugulosus*. It is an interesting plant, as it comes pretty near trumpet size and form, yet it retains a good deal of distinctive Jonquill character: it is a flower of almost trumpet form and intense self golden colour combined with great and most durable substance. I can imagine it doing much better in California than it does here, and that it might there be used with good effect in breeding. Another most desirable line might be developed from *Cyclamineus*. There have been quite a few small hybrids between *N. Cyclamineus* and Yellow Trumpet varieties that have most distinct and attractive form, excellent texture and fine golden colour: it should be quite possible to intercross them again with our best large garden flowers, such as *St. Issey* etc. and one can imagine a race of very high quality yellows resulting; moreover it might well be possible to get red into their trumpets, as I recollect long ago seeing in a friend's garden

a sport or seedling from *N. Cyclamineus* which was exactly similar to the parent in size and form but had an orange trumpet.

New and unexpected breaks such as the pink crowns will undoubtedly turn up from time to time, but even apart from such breaks with the great amount of material already to hand the possibilities are literally infinite, and the fascination of following them up and developing them is never ending and sufficient to provide Daffodil lovers with interest and delight for all time.

THE DAFFODIL IN AUSTRALIA—SOME RECENT DEVELOPMENTS

HAROLD ALSTON

Braemar, Diamond Creek, Victoria

The quest of the perfect Daffodil still goes on in Australia. Despite the exigencies of the war period and the shortage of efficient labour, daffodil growers throughout the Commonwealth have kept on steadily producing new varieties. They have also managed to keep together and in good health many of the older sorts. Although the standard of show flowers has reached such heights of perfection that it would seem impossible to find something superior each season amongst the many thousand seedlings; new beauties appear year after year to compete with their once unsurpassed parents on the show bench. Raisers each season make new crosses striving after the ideal flower though what this ideal is none can say. Even the most perfect daffodil may have something lacking which the raiser thinks could be improved upon in a future generation. New varieties are coming forward each season and it is expected that the first of the war-time seedlings will be making their appearance on the show benches this spring.

Naturally imports of new varieties from overseas have been limited owing to import restrictions so that growers have had to work with well-tried and acclimatised varieties raised prior to 1939. The demise of several noted raisers has thinned the ranks of experienced growers but in most cases they have left a legacy of first-rate flowers for those who follow to work with; and the fact that the gaps are being filled with young and enthusiastic daffodil lovers who will profit from the work of those who have gone, predicts a safe future for the daffodil in Australia. Some idea of the enthusiasm of these younger growers may be gained from the fact that one prominent amateur in Tasmania has this season set out 22,000 two year old seedlings all from flowers hand-pollinated with a definite objective in view. Others, however, limit their sowings to a thousand or so depending on the seed harvest and space limitations.

So successful have some growers been that when exhibiting they place reliance on seedlings of their own raising rather than named varieties from overseas. This does not mean that overseas productions are decried, far be it, as had it not been for the productions of British and Dutch bulb growers they would not have had the material with which

to work. The high prices asked for new novelties, however, act as a deterrent to the amateur who is already satiated with the multiplicity of extravagantly priced varieties, and who although eager to try his hand at the production of new varieties from seed, is not in a position to expend a large amount on bulbs which may or may not produce the desired results under Antipodean conditions, and which take from two to three years to become acclimatised and settle down. Despite this handicap amateurs throughout the Commonwealth and the Dominion of New Zealand are producing varieties that can hold their own and in some cases surpass those of overseas raisers. In fact several have already received high commendation in Great Britain. After a careful survey of the magnificent specimens to be seen on the show benches today, the acme of the plant breeder's skill and of cultural practice, it seems that raisers frequently overlook those characteristics of the garden plant which are not essential for exhibition purposes. The old idea that the perfect show flower would be out of place in a garden has gone by the board, and it has been the aim of Australian raisers of recent years to produce flowers of size and substance without the loss of form and balance with tall strong stems, short necks and above all strong constitution. The flowers should have long stems, the petals be strong in texture and substance, the neck of the flower should not be long and willowy, but short to withstand heavy rains and strong winds. Stiff upright foliage is the best. Refinement and quality, although exhibition points must be preferred to coarseness and size, and the balance between the corona and perianth must be maintained. These are points just as important in a garden flower as one for exhibition purposes.

Daffodil growing in Victoria got its send-off in August 1892 when the Royal Horticultural Society of Victoria held its first all bulb show in The Melbourne Athenaeum. This combined with the activities of the late Mr. Walter J. Smith of Riddell, Victoria and the publicity given to the flower by the celebrated actor Mr. George S. Titheridge stimulated public interest. In 1897 Mr. Alister Clark of "Glenara," Bulla, Victoria and Sir Heaton then Mr. Heaton Rhodes were members of a syndicate importing the latest productions of the great English raiser the Rev. Geo. H. Engleheart. Among their first introductions were *Albatross*, *Dante*, *Bennet Poe*, *Lucia* followed by *Flambeau*, *White Queen*, *Seneschal*, *Solfatarre*, *White Lady*, *Noble*, *Lady Mgt Boscawen* and *Great Warley*. In the meantime Mr. Titheridge had been amassing a collection of both species and garden hybrids and on his departure for England in 1898 sold his collection and the late Mr. Leonard Buckland of "Keyham," Camperdown and Mr. Alister Clark purchased the bulk of his bulbs. Rapid progress was made and on Mr. Titheridge's return ten years later, when he judged the flowers at the Melbourne show, he was astounded at the excellence of the seedlings on exhibition. Since then much water has flowed under the bridge and varieties which graced the show benches of those days would be today regarded as curiosities. Prominent growers at this period were the late Mr. Henry Boyce, the late Mr. James Lang of Harcourt and Mr. C. A. Nethercote of Hawthorn, the present treasurer of the Royal Horticultural Society of Victoria, and who although an octagenarian is still raising seedlings and



Hybrid pink-crowned *Narcissus*—(Left) **Kuranja**; raised by C. E. Radcliff, Hobart, Tasmania. (Right) **Pink a Dell**; raised by H. A. Brown, Mount Macedon, Victoria, Australia.

Plate 291

judging at shows. Mr. Boyce's memory is perpetuated in the Henry Boyce Memorial trophy awarded for the best twelve seedling daffodils not in commerce and raised by the exhibitor, which annually is keenly contested. For many years the late Mr. Buckland was successful and many of his productions figure in the ancestry of modern seedlings. His first notable success was with a white-perianthed incomparabilis which he called "*Pink Un*," a seedling from *Mary Magdeleine de Graaff* which sported with him showing a tinge of pink in the corona. From *Pink Un* several notable seedlings have been produced. Of late years the late Mr. D. V. West of Casterton was the most successful raiser of seedlings and on his death was followed by his son-in-law, the late Mr. Hubert Fell. He produced many fine trumpet daffodils and later some splendid incomparabilis in which *Bernardino* figured prominently in their pedigrees.

Mr. Nethercote and his friend the late Mr. Scott Morrison of Wandin, Victoria started growing daffodils in 1890 and Mr. Nethercote has been a consistent importer of new varieties ever since and has raised many seedlings, among them many beautiful flowers, but apart from distributing some to his friends has not disposed of any commercially. A severe critic, but good judge he like many others is still searching for his ideal flower. He and Mr. Alister Clark must be considered the doyens of the *Narcissus* world in the State. Mr. Clark's achievements are remarkable inasmuch as he has consistently worked with his own productions, using pollen of overseas varieties only on rare occasions. His development of and interest in the production of flowers of the Leedsii type with pink or pink edged coronas has resulted in the raising of many flowers of decorative beauty, and stimulated the interest of other growers in the development of pinks. Mr. C. E. Radcliff of Hobart, Tasmania already has to his credit several magnificent pinks of which the following varieties have all received awards: *Rosario*, *Kuranja* (Plate 291) and *Roslyn*. Mr. O. Ronalds of Tarago, Gippsland, Victoria has also been successful in raising pinks and last year his variety *Mrs. O. Ronalds* (Plate 292) when shown for the first time was accorded acclaim by all who saw it. It is a really fine flower borne on a tall strong stem with a pure white perianth with well overlapping segments and a pale rosy corona right to its base. Both Mr. Radcliff and Mr. Ronalds are producing flowers of outstanding merit which could successfully compete with the best of overseas productions. Dr. Jackson of Dover, Tasmania has also many fine flowers to his credit and although also an octagenerian is still sowing seed and keeping an accurate record of his crosses and the dimensions of the flowers he raises. Mr. Bisdee of Tasmania is also another enthusiastic seedling raiser as is Mr. Raphael of Hobart, and as the Tasmanian climatic conditions are particularly suitable many still finer flowers may be looked for in the future from that State. Mr. J. R. Byfield is also an enthusiastic grower and a noted judge in Tasmania while the late Mr. J. Hinsby was for many years guide and friend to young breeders.

Prominent hybridists in Victoria are: Mr. C. O. Fairbairn of "*Ganongill*," Skipton near Ballarat who has raised some fine seedlings



Hybrid pink-crowned *Narcissus*—(Left) **Mrs. O. Ronalds**; *incomparabilis*, raised by Mr. O. Ronalds, Tarago, Grippsland, Australia. (Right) **Hugh Dettman**; *Leedsii* raised by Mr. Alister Clark, Bulia, Victoria.

especially some from *Carbineer*; Mr. S. Mann of Ballarat a consistent exhibitor and the winner of many prizes; Mr. J. Davey also of Ballarat; Mr. A. S. Overton of Wandin; Mr. Hugh Dettman of Kyneton; Mr. L. K. Daly of Gisborne; Mr. Hancock of Ferntree Gulley; Mr. H. A. Brown of Mount Macedon who has on several occasions been successful in winning the Henry Boyce cup and many other prizes with his seedlings; Mr. Ernest Gibson of Essendon; Mr. O. Ronalds of Tarago; Mr. D. Gunner of Healesville; and Travers Morrison of Wandin. In New South Wales; Dr. Hugh Poate of Sydney and Mr. R. M. Twomey of Albany are also enthusiastic seedling raisers.

In Tasmania the leading growers are Messrs. C. E. Radcliff; S. J. Bisdee; J. R. Byfield; T. D. Raphael; Dr. W. Jackson; W. Jackson, Jr.; and Dr. Drake.

New Zealand growers and their work are not so well known to Australian growers but many fine flowers have been, and are being produced, by Mr. George Lewis of Christchurch, South Island; and Mr. J. T. Gray of Palmerston North; Mr. Alan Gibson of Marton; F. B. Burns of Timaru; and Dr. McKillop of Christchurch.

Regarding the flowers themselves, very few outstanding bi-color trumpets have appeared in recent years. Of these *Oliver* raised by Mr. O. Ronalds is a fine show flower with broad pure white perianth and nicely flanged light yellow trumpet. *Restford* raised by the late Mr. H. Fell is a really good large flower with broad over-lapping creamy white perianth and a shapely yellow trumpet. *Mondo* is also another of Mr. Fell's bi-colors of fine quality and smoothness and solid texture. Of white trumpets *Bridal Day* (Ronalds), *Allan Millikan* (Fell) and several seedlings from *Bersheeba* and *Slemish* have been prominent on the show benches. There is quite a number of good yellow trumpets of which *Ismaris* and *Leslie Fell* (Fell), *Bonnington* and *Robert Montgomery* (Radcliff), *Golden Coin* and *Cloth of Gold* (Ronalds) and *Clio* (Morrison) are all fine exhibition and garden sorts. There is such a plethora of *Incomparabilis* or short-cupped varieties that it is impossible to mention more than a few of the very best. *Jean Hood* (Plate 293) (D. V. West) is a variety of great merit with white overlapping perianth and beautiful open, red cup with strong stiff stems; *Ivo Fell* (Plate 293) a large round flower of good substance with creamy-white perianth and intense orange-red cup right to the base is an outstanding flower. *Daisy Jean* (Ronalds) is also a good white-perianthed *Incomparabilis* somewhat similar to *Jean Hood* while *Skylark* by the same raiser is a yellow with broad smooth segments and a large cup of deep orange. *Rubra* (H. A. Brown) is a distinct flower with white perianth and an apricot crown, with an edging of deeper shade.

In the *Leedsii* section the most remarkable progress has been the appearance of so many pink flowers, that is white petals with pink or pink-edged cups. Mr. Alister Clark has been successful in producing many of these flowers the best of which are *Hugh Dettman* (Plate 292), *Madge Buckland* and *Mabel Taylor*. The greatest advance, however, has been made by Mr. Radcliff of Hobart, Tasmania and his variety *Pink of Dawn* a bi-color trumpet with bluish pink trumpet has been



Hybrid Incorporabilis *Narcissus*—**Jean Hood**; raised by the late D. V. West, Casterton, Victoria, Australia; (Inset at lower left) **Ivo Fell**; raised by West & Fell, Casterton.

the grandparent of some outstanding flowers of which *Rosario*, *Kuranja* (Plate 293), *Roslyn* and *Roselip* have aroused admiration whenever shown. *Pink a Dell* (Plate 291) raised by Mr. H. A. Brown of Mount Macedon, Victoria is also a most decorative flower but on first opening the cup is yellow but quickly turns to pink. Last season Mr. Ronalds of Tarago, Gippsland showed for the first time his *Mrs. O. Ronalds* (Plate 292) a really fine show flower with broad overlapping perianth and cap of rosy pink right to the base and a slightly deeper edge. Borne on a strong stiff stem this promises to be an outstanding pink. Several good Barriis have made their appearance of which the best is probably *Metaphor* raised by Mr. Alister Clark, while Mr. S. Mann of Ballarat reports a fine flower the result of crossing *Flamenco* and *Rosclare*. Mr. H. A. Brown also has some fine tall flowers of this type but as yet most are under number. There are several nice *N. triandrus* hybrids but little or no work has been done, or is being done, with the Poeticus section which seems a great pity as these charming flowers prolong the season well into early summer. While the foregoing notes do not do sufficient justice to the work of Australian and Dominion growers they are sufficient to show that the cult of the Daffodil is firmly established and its prospects for the future extremely bright.

AMARYLLIS CULTURE IN DENMARK, 1940-1945

O. MOHR, *Denmark*

Before the war, as we are again saying, *Amaryllis* were gaining in favor in the minds of the Danish people, and accordingly, florists grew them in increasing numbers. *Amaryllis*, with their distinct, I should say spectacular, flowers are, however, grown profitably only when ample coal supplies are on hand, for the price of the flowers will be high during the winter months, and low in summer. This is a familiar situation in the United States too, I imagine, but the difference in price will be more certain here with dark and cold winter months and with lots of flowers grown outdoors during the summer and fall. We have no Florida or California to ship in flowers cheaply during our winters. Some bulbs are imported, mostly tulips, but very few cut flowers are imported.

Amaryllis, which are easily forced from Christmas until March, fit into this picture just like a glove. They produce their marvelous flowers during the time when prices are high and flowers are few. Without plenty of coal, the picture changes entirely. Our coal supply was cut right after the war broke out, as all contracts were canceled and the price started to climb as soon as new shipments came in. Coal was rationed on the basis of our 1939 consumption, which of course, was small compared to normal for deliveries had stopped on September 2nd (1940). The price of coal jumped from 8 to 40 dollars a ton (buying value) and still could not be found anywhere. With coal supplies cut to about to a third of normal, we had to change our production plan, as

we cut-flower growers all grow something besides *Amaryllis*. We turned to plants that could be grown under cooler conditions in order to stretch out our supplies of coal as much as possible. Some growers kept their *Amaryllis* bulbs, but forced them later, planted them closer together, and some discarded their *Amaryllis* bulbs. I thought that the war was going to last a good many years, and that coal would be very scarce during those years, and accordingly I kept about 15 per cent of my *Amaryllis* bulbs and let the rest go to pieces. The size of the bulbs was around 2 pounds apiece or better—bulbs that all would produce 2—3 spikes each. I regret that I did not carry them through the “cold years.” After the bulbs were thrown out, the houses were



Fig. 153. Hybrid *Amaryllis*; (Left) pink, 10 inch diameter; (Right) dark red, 10½ diameter; both raised by Mohr Bros., Glostrup, Denmark.

planted to tobacco, which was used to manufacture cigars, and later on they were used for tomatoes. This was quite a change from *Amaryllis*. As we grew roses, freesias, tomatoes and orchids, we had lots of trouble in getting through the very cold and dark winters. During these years, we experienced three very cold winters, the coldest on record in 100 years. So we had no desire to go back to *Amaryllis*. The bulbs that we saved were planted outdoors in April and dug in October, thus saving fuel, but of course, only a few flowers were produced. During the winters they were kept dry and were stored away. Of the few that did flower, one especially will be remembered for a very long time. It had a flower not seen before, the kind of a flower all growers dream about

but such as they seldom see. We kept it for three years and decided finally to propagate it by the cuttage method. But alas, all of the divisions were lost because the temperature was too low.

Our trouble was not a growers' trouble alone. During these years, the retailers were not able to heat their shops sufficiently and in consequence the temperature often fell in their windows as low as 32° F. or even below. When they tried to handle *Amaryllis*, they nearly always lost them while carrying them to their shops as their only means of transportation was bicycles and street cars. Bringing the flowers out to the customers in the same way was a sure way of destruction for we experienced the longest and most persistent frosts in our history for three consecutive years. All of this did not encourage the growers to spend what little coal they had been able to save of the winters on *Amaryllis*. It became a matter of life or death for most of our greenhouse plants.

As the years went by, we were able to get some Danish peat to stretch out our coal supplies. The price was shockingly high compared to the American price of 4-5 dollars a ton. On the basis of the B. T. U.'s in coal, we paid as much as 120 dollars a ton for the peat. Even with good prices for flowers this was too much.

With more coal expected in the future, not as yet seen however (1947), we plan to go gradually back to *Amaryllis* again. No doubt, in a few years the fine flowers will once again be seen in the retailers' show windows. The only trouble will be the retailers' inability to handle the flowers with care so as not to bruise the tepals. Although *Amaryllis* cut-flowers are outstanding when in prime condition, they look like a butterfly in the rain when badly knocked-about. We look ahead to the time when the retailers' will learn to buy the flowers before fully open, and thus be able to deliver them in fine shape to their customers.

We also regret that we have been compelled to use all of our seeds for new bulbs, and have not been able to offer any to the trade as we use none but seeds from our finest bulbs. Now again we will be able to dispose of some seeds and bulbs, but it will take another two to three years before we are back to normal again.

1. REGIONAL ACTIVITY AND EXHIBITIONS

VISITS TO GARDENS OF DAYLILY ENTHUSIASTS

ELMER A. CLAAR, *Chairman*
Daylily Committee

My visits in the year 1946 were much more limited than I should have desired.

I did not see any seedlings that were blooming for the first time in Dr. Stout's, Mrs. Nesmith's, and Mr. Plouf's gardens.

It was with a feeling of great personal loss that I heard of Mr. Leonian's untimely death. All who are interested in daylilies owe a great debt to this kindly gentleman. As a result, I did not go to Morgantown, W. Va., in 1946. I also missed Washington. Dr. Traub had been away on a war assignment and had to lay aside his hybridizing work for the time being. I should have liked to have seen Mr. Cooley's and Mr. Shull's hybrids but could not make it in 1946.

I went straight to the New York Botanical Gardens and found that Dr. Stout had moved his newer daylilies from the back of the observatory to the other side of the New York Botanical Gardens, which area is enclosed and under lock and key. Dr. Stout usually doesn't go to the Gardens on Saturday, and, unfortunately, I had to arrive in New York on Saturday. Dr. Stout had made special arrangements to be at the Gardens Saturday morning to see me but my train was so late that he thought I must have missed it and he left before I got there. This was most disappointing to me for the Doctor always has many new seedlings of interest. However, he very kindly left word with his associates to show me the new beds. There were a number of things of interest but most of the plantings were of his named varieties, many of which have been introduced and which I am growing at my home, and some, like *Charmaine*, have been described but are not yet available to the public. There was an alarming amount of destruction by thrips in this planting. I did not see any small seedlings there and later on Dr. Stout wrote that he was growing these at his home, together with his best seedlings. I missed these and so am unable to make a very satisfactory report on this visit.

I am growing Dr. Stout's 1946 introductions, *August Orange*, *Blanche Hooker*, *Caprice*, *Fantasia*, *Georgia* and *Rose Gem*, but as yet I have not seen them in bloom.

Among my favorites of Dr. Stout's daylilies are *Patricia* (a perfect flower form for me but not floriferous,) *Circe*, *Majestic* (a perfect flower color and form but not floriferous and not a good grower,) *Wolof*, *Linda*, *Festival*, *Taruga*, *Wau-Bun*, *Yeldrin*, *Bertrand H. Farr*, *Dominion*, *Cabellero*, and *Port*. *Red Bird* is a beautiful color but two out of three died for me and I have had similar reports as to lack of hardiness

from other growers. *Symphony* is all that I would ask of an intermediate.

From New York I went to Mr. and Mrs. Nesmith's garden at Lowell, Mass., and, as usual, Mrs. Nesmith had a considerable number of interesting things. I ordered and am growing all of her 1946 introductions except one, which was not available, and this year I also purchased *Kilarney Lass* and *Chief Cherokee*, introductions of previous years. The daylily that impressed me the most was Mrs. Nesmith's *Blood Root*, which is a brilliant red, described by some as an orange-red. *Tracery* was exceptionally fine, somewhat like *Twinkle Eye*, a flower which I named. No. 45-23 was a large pink, which I am growing as a guest seedling; 43-52 is a large fluted yellow flower, and 43-35 is another pink that impressed me; 46-113 is an almost black velvety red; *Daily Double*, a Geddes Douglas introduction, is a double yellow, the first double seedling that I have seen introduced. *Moonlight Cocktail*, another Douglas seedling introduced by Mrs. Nesmith, is a good yellow.

Among my favorite daylilies of Mrs. Nesmith's are *Royal Ruby*, *Honey Red Head*, *Black Falcon*, *Canari*, *Sweet Briar*, *Petra*, *Dawn Play*, *Pink Charm*, *Heather Rose*, *Su-Lin*, *Gay Troubador*, *Bold Courtier*, *Royalty*, and *Potentate*.

From Lowell, after a pleasant stay with Mr. and Mrs. Nesmith, I went over to Mr. Ernest Plouf's, at Lawrence, Mass. Mr. Plouf informed me that he had been away in the service for several years. Since I last visited his garden he has moved it out to the country. He has not had an opportunity to have any new seedlings. Several of his named varieties were very interesting. I was especially impressed with a pink that he has named *Pink Flamingo*. It looks like a self. *Algerian Sortie* is pinkish, large, and fuller than *Pink Flamingo*, but I did not like it so well. His reddish red, a very good one, was *Desert Sunset*. Mr. Plouf also had some late George Yeld introductions that he had secured from Mr. Yeld's daughter. One he named *Holildred Yeld*. This flower did not impress me. His *Vipart* is a large and odd shaped salmon color. *Creamore Ruby* continues to be one of the most brilliant reds.

One of the greatest thrills that a hybridizer can have is to go through the gardens of other hybridizers looking for something new. On one of our trips to Dr. Kraus' gardens at Wychwood, Lake Geneva, Wisconsin, last year, we went to his fields, located about two miles from Wychwood. The Doctor had used some oats straw in these fields to protect his seedlings during the winter. Unfortunately, all the seed had not been shaken out of the straw and his seedlings were having one terrific battle with the oats! Dr. Kraus has thousands of seedlings at Lake Geneva and at the University of Chicago, and among these are some beautiful velvety deep reds. The most outstanding of them in my opinion, and it also is the choice of Dr. Kraus, is No. 952, which, through the generosity of Dr. Kraus, I am growing. There are bigger reds but I know of no other so velvety. No. 2060 is a lovely cherry red; 1952 a crimson that Dr. Kraus liked better than any of the other reds (952 was

not out that day). I have crossed 952 with many other fine plants and hope to have seedlings from this plant in the near future.

Dr. Kraus' oldest named variety is *Joanna Hutchins*, which is a very much improved *Majestic*. The flower is very similar to that of *Majestic* but the plant is much better. It is floriferous and a good grower. A seedling that impressed me very much was an eyed pattern, No. 2284, a sister seedling, I believe, to No. 2050. Both resemble the favorite *Mikado*, but with better color, much better substance and a more contrasting eye. He also had a lovely raspberry colored seedling, No. 2084. On July 20, when I saw it, it was big and overlapping and very much worth while.

The seedling that impressed me as being the most desirable that I have seen in the last two years was a light pinkish lavender or orchid flower which I found in the field. It was a cross of Dr. Kraus' seedlings 595 x 471. He took the plant to the University of Chicago planting grounds and numbered it 1986. A considerable stir was created that day by a seedling, 471 x 424, which was variously described as a melon or straw color, and which also was removed to the University of Chicago gardens, and numbered 2001. As I had seen a seedling of somewhat similar color in Dr. Traub's garden at Beltsville a few years ago, I was not so impressed. Dr. Kraus also had an orange flower in this seedling bed which had a very fine color and which was further distinguished by the fact that it was a double. It was a cross of *Tawny* and *Regal Lady*. He also had in these same fields an interesting pink-rose seedling.

Dr. Kraus has been working on a series of miniature daylilies, with some very interesting results. They are comparable to the table iris. Among these are his seedling 2633, the flower of which is only 3" across, a gold colored daylily; 2322, a 2½" yellow; 2403, a dull rose or raspberry; 2096, a very bright red; 2740, a yellow, the scape of which is about 18" high, the flower star shaped and twisted, with an interesting pattern; and 2785, a very small dark red. I liked these very much for I have been working on this type of hybrid myself.

Dr. Kraus said that his favorite seedling is 852, a floriferous flower (it had 15 flowers the day I saw it). It has sulphur colored sepals, a wide dark eye, and a star shaped flower that is overlapping. I saw many others of his seedlings that I would rather have.

Chicago and vicinity are becoming a real daylily center. Among the individuals who are hybridizing are Mr. Orville Fay and Mr. Dave Hall of Wilmette, and Mr. Hubert Fischer of Hinsdale, President of the Men's Garden Club of the Chicago Region.

Dave Hall is very enthusiastic about his *Mission Bells*. It certainly is one of the most floriferous daylilies that are grown but I like *Mongol* better. Among his seedlings that I like best are his 46-13, a very luminous dark red, which I believe to be outstanding, and 46-17, a dark red which is distinguished by being very overlapping. No. 43-12 is a great favorite of Mr. Hall's. It is very similar in color to *Canari* and *Vespers*, but in each of these the color of the throat is the same as that of the sepals, whereas Mr. Hall's seedling has a green throat. It is

more overlapping and delightfully ruffled. The anther on Mr. Hall's seedling is white, whereas the anther on *Vespers* is black.

I secured this year from Mr. Robert Schreiner *Judge Orr* and Clint McDade's *Jean*.

From Midwest Gardens I secured *Orange Beauty* and No. 64-41, which Mr. Sass said he may name *Midwest Star*. The Sass yellow and orange daylilies are outstanding. *Hesperus*, *Nebraska*, Seedling 45-40, *Sunny West*, *Star of Gold*, *Revolute* and *Orange Lady* are all good.

From Mr. Russell I obtained:

<i>Meteor</i>	<i>Lillian Russell</i>	<i>Purple Waters</i>
<i>Monte</i>	<i>Trail Blazer</i>	<i>On Tour</i>
<i>Betty Slick</i>	<i>Guest Star</i>	<i>Francis Russell</i>
<i>Black Hills</i>	<i>Quote Me</i>	<i>Pat Fleming</i>
<i>Edith Russell</i>	<i>Purple Sage</i>	<i>Miss Houston</i>

Mr. Russell is an enthusiastic daylily hybridizer. I was in San Antonio, Texas, two years ago, on my way back from Mexico, and called him on the phone but it was too early for his blooming season so I did not go out to his garden. However, he has been at my home each year for the past several years and each time he has been loaded with enthusiasm and Kodachrome transparency pictures of his garden, introductions and seedlings. His pictures of over nine acres of daylilies are truly an impressive sight. So far as I know he is the only one who makes his living solely with daylilies.

I, personally, tremendously like Mr. Russell's *Painted Lady*. It has been so popular that he said it will not be available again for sale for a number of years. *Betty Slick* is a nice bicolor and *Trail Blazer* is outstanding among the darker types. His *Tejas* is a small but very brilliant red flower. I have seen nothing in the intermediate blooming varieties that equals his *Queen of Gonzales*. Russell's *Sylvia* is a bigger and better *Linda*. The eye is more contrasting and it has a better stem and flower. This is genuine praise because *Linda* is one of the daylilies that Mrs. Claar likes best. *Spit Fire* is brilliant. His *Miss Houston* is a superior pink. I cannot be enthusiastic about his *Annis Victoria Russell*. It is large but spidery, as I grow it. I like overlapping flowers.

Another enthusiast who certainly is going places is Mr. Ralph Wheeler of Winter Park, Florida. Some years ago he sent me a large number of hybrids, among them *Duncan*, *Easter Morn*, and *Bobolink*, an overlapping and brilliantly contrasting bicolor, which did not bloom for me last year. His *Ruby Supreme* takes time to produce a typical plant. It is a fine flower, very floriferous and worthy of the best of company. I cannot get any seedlings from it or by its pollen. I certainly made a great many crosses. Mr. Wheeler sent me a number of Kodachrome transparencies this winter and if one can rely on these pictures he apparently is at the head of the parade in anything I have seen in bicolors. He also apparently is developing some whitish tinged lilac flowers which are most noteworthy. Prof. Saxton is introducing Mr. Wheeler's plants and I predict a great demand for them.

Mrs. Claar and I are going to Jamaica this winter and when we come back if Mr. Wheeler's and Mr. Hayward's flowers are in bloom, we shall stop off at Winter Park to see them. I have not heard from Mr. Hayward for some time. His name of "*Salmon Rose*" is a perfect description of a lovely flower. His *Minnie* is a variable flower as I grow it—one time it is very superior and at other times it is not at all impressive. His *Emperor Jones*, *Araby* and *Irene* are tops.

Among Dr. Traub's flowers that I wish to emphasize as being among my favorites are *General MacArthur*, *Lidice*, *Mayor Starzynski*, *Indian Chief*, and *Dr. Stout*.

Dr. Norton's *Mongol* is my favorite yellow. It is a high flower, has a clean, clear color and is a fine plant. His *Garden Lady* is a fine bicolor.

I believe Dr. Shull's *Gorgio* and *Musette* are his best introductions.

I like Prof. Watkins' *Kanapaha* and *The Swan*.

Mr. Betscher's *Anna Betscher*, *Earliana* and *Gloriana* still are favorites.

Port Rose Garden's *Olive* and *Old Ivory* are worth while.

I have not seen any of Mr. Bechtold's seedlings. Gilbert H. Wild & Son are introducing them.

I have not seen any of Mr. Milliken's seedlings.

The Hills of Lafontaine, Kansas, are introducing their first seedling this year, *Redwood*, but I have not seen it.

Mrs. Dewey's *Enchantress* has not received the notice it deserves.

Mr. W. T. Wood's *Neon* is very good. It will be very popular when it becomes widely distributed.

Perry's *George Yeld*, *Sir Chandre*, *Mabel Hibberson* and *Flavia* are good in my garden.

Wyman's *Red Sox* is brilliant.

This summary of what I saw and liked necessarily must be limited to my own observations and tastes. My conclusion is that all of the hybridizers are getting excellent results.

I moved most of my flowers, including my seedlings, in the fall of 1945 to my new home at 617 Thornwood Lane, Northfield, Illinois. I have had over 10,000 daylily seedlings since I started hybridizing, ten years ago. I had about 4,000 last year, some of which will bloom this year. I have been thrilled with some of my seedlings. Among them is a flower that looks exactly like *Patricia* but it comes considerably earlier; however, it has the weakness of *Patricia* in that it is not floriferous. I have some fair pink, rose and red flowers but I shall not attempt to give any detailed descriptions of them until I see them in bloom some more.

THE AMARYLLID ROUND ROBINS

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In September, 1941, in the Club and Society page of the Flower Grower Magazine, Miss Marion P. Thomas told of a Round Robin Begonia Club, where all the "meetings" were conducted by correspondence. It was suggested that other round "robins" be formed on other subjects with the idea of bringing together, by letters, people of kindred tastes who liked to exchange information about their chosen topic. The idea caught on like wild fire and soon "robins" were formed on many subjects, with members from coast to coast.

The rules are very simple. Any reader of the magazine is eligible. Each subject has a "mother," with directors for each "robin," who lays out a route so the letters will take the shortest possible time from member to member. All letters are sent first class mail, and each member keeps the letters for a limited time of 4 or 5 days. When the letters are mailed to the next member, a card is also sent to the leader so that he may know just where the "robin" is at any time. It takes about two and a half to three months for the letters to make the rounds. A letter starts on its way with questions, problems to be settled, and other information; possibly seeds or photos inclosed. Each member adds to this, answering questions asked or seeking information for himself.

Some people feel that because they are beginners, they are not eligible for membership but such is not the case. All are in the "robins" to learn more about their pet hobby, and those who know the most help the ones who know the least. The beginners may have to start asking questions, but this merely gives the more experienced ones an opportunity to pass on what they have already learned.

The *Amaryllis* "Round Robins" were started in March of 1943 under the able directorship of Mrs. A. W. Knock of Minneapolis, Minn., and I was fortunate enough to join at this time also. Hybrid *Amaryllis* were our principal interest, but it was soon evident that many of the members grew other bulbs of the *Amaryllidaceae*.

Many of the members live in small communities and are often the only ones there interested in amaryllids, so the opportunity to "chat" with a kindred soul has been most welcome. I have found it very inspiring to compare my method of plant culture with that of other members, and I gathered much information on how to get certain bulbs to bloom, what to do for certain pests, best time to transplant, etc. The whole group has profited by the errors of others, as well as by their successes.

A good many of the members of the *Amaryllis* "Robins" are members of the American Plant Life Society. As some have never heard of it and its fine publication HERBERTIA when they join the *Amaryllis* "robins," the loan of a copy of HERBERTIA makes them so enthusiastic that they also join the Society.

Since *Amaryllis* is a very popular subject, our membership has grown until now we have twelve *Amaryllis* "Round Robins," each with ten members, and more forming all the time. Due to lack of time, Mrs. Knock had to resign as "mother" of them and the writer felt very honored when asked to take over as such. Since all of the directors of the *Amaryllis* "Round Robins" are also members of our No. 1 group, we keep in close touch with one another.

And of course, there has been a bit of friendly competition in the clubs to see who could get her seedlings to bloom first.

Most of the members, like myself, are people of modest means, and though ardent plant lovers, the cost of rare amaryllids is often beyond our limited funds. But seeds of our best flowers have been freely exchanged through the "robins" and there has also been a great deal of exchanging of offsets.

At first this may seem to be doing the commercial nurserymen out of their business, but such is not the case. In some instances, the member never would have been able to afford the price of some rare flower, but does have the patience to grow them from seed and eventually enjoy their great beauty. Other times, the descriptions of such items as *Lycoris*, *Hymenocallis*, *Haemanthus*, etc. have been so glowing and aroused so much interest, that members did not want to wait for seedlings, but sat down immediately and sent in an order to some commercial nurseryman.

Interest is at such a high pitch that members' plant collections have increased by leaps and bounds.

Also by comparing photos and descriptions, quality of the bloom of our plants is compared and judged. Many inferior hybrid *Amaryllis* are being discarded to be replaced by better types. Most of us do a little amateur hybridizing too, our best seed being shared with other members.

And sometimes seeds are sent around of plants that are not listed by any commercial grower. For example, Dr. Traub sent me a seedling of an *Agapanthus species*. When this bloomed for me, I sent seed around in the "robins" so eventually this fine plant will be bringing joy to many avid amaryllid fans across the country. Since species *Amaryllis* are my special pets, I've been able to send around seeds, or seedlings, of *Amaryllis vittata* too, and when other *Amaryllis* species bloom, hope to be able to distribute these as well and share my good fortune with others. In fact, like many of the other members, I seldom have two plants of anything, for as soon as they multiply, offsets are sent to friends. And many very fine things have likewise come my way, and I have profited thereby immensely.

The group of "robins" has done considerable to increase the general public's interest in amaryllids, for naturally, when a fine plant blooms, we call in our neighbors to view it, as well as display our choice plants in local flower shows. Soon the whole neighborhood gets interested in the various members of this fine family of bulbs. As an example, when I moved into my neighborhood three years ago, the only amaryllids anyone was acquainted with were *Narcissus*. Now, after hearing me

rave about my plants, and seeing some of them in bloom, one of my neighbors has some representative of all the amaryllids listed in the growers catalogs! And I know that this same thing has been duplicated in many sections of the country, wherever our enthusiastic "robin" members reside.

The group is always eager to learn, and books and magazine clippings are circulated. We have joined one of the botanical societies and share the publications, and are always on the lookout for anything that would further increase our knowledge of the *Amaryllidaceae*. We are also on the lookout for any rare amaryllids from foreign countries, in hopes of introducing them to the members; which eventually means to the whole U. S. for our members live in many different sections of the country. In fact, our clubs make a good "Trial Garden" themselves, with the various climatic conditions of Maine and Minnesota to Florida, Texas, California and all the way in between!

But one of the most enjoyable profits from the clubs is the many fine friendships formed. Although I have not met any of the members personally, the friendships made have brought me more enduring pleasure than my lovely flowers.

THE MIDWEST HEMEROCALLIS SOCIETY

MRS. OLGA ROLF TIEMANN

In order to discuss Daylilies, a number of amateur gardeners who had discovered the true value of the new and improved forms of *Hemerocallis* joined together in "Round Robin" letter groups inspired by Helen Field Fischer's "Garden Club of the Air" program (KFNF, Shenandoah, Iowa) and Flower Grower "Round Robin" clubs.

To reach an even larger group, a society dedicated to *Hemerocallis* seemed desirable. This new society, the Midwest Hemerocallis Society, was organized by a group of enthusiastic daylily fans at a meeting sponsored by the Henry Field Seed Company at Shenandoah, Iowa, on July 13 and 14, 1946. Since then, many hybridizers, commercial growers and amateur gardeners have joined. The membership is over 400 now, representing all but 12 states. There are also members from Canada.

The society is a very enthusiastic group. Their first yearbook is on the press (January, 1947) and promises to be very worthwhile with pictures and articles on many phases of *Hemerocallis* culture by amateurs and experts. It will contain names and addresses of all members, list of literature in its lending library, sources of plants and other subjects of interest to *Hemerocallis* lovers.

Membership is still open. Send dues, three dollars, to the treasurer, Frederick Fischer, Box 5, Shenandoah, Iowa.

2. SPECIOLOGY

[EVOLUTION, DESCRIPTION, CLASSIFICATION AND
PHYLOGENY]

ON THE KARYO-SYSTEMATICS OF THE SUB-GENUS AJAX SPACH OF THE GENUS NARCISSUS L.

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[Translated from the French into English by Thomas W. Whitaker.]

INTRODUCTION

The history of the taxonomy of the group *Ajax* Spach of the genus *Narcissus* L. has been recorded in a very satisfactory fashion by Pugsley (1933). According to this author, we learn that the number of species attributed to this group varies a great deal, and that this variation has been due not only to the different numbers of forms known during a certain epoch, but also to differences of opinion among authors concerning the delimitation of specific groups. Thus Linné (1753), in the first edition of the "Species Plantarum," distinguished only one species. Later (1762), in the second edition of the same work, he distinguished two. Salisbury (1812) distinguished 10, Haworth (1831) 29, Herbert (1837) 9, Barr (1884) 8, Baker (1888) one, with 6 sub-species and one variety, and Jordan (1903) 13. Rugsley (1933) finally established two.

Cytological studies in this group have been made by de Mol (1922, 1928), Nagao (1929, 1930, 1933), Fernandes (1931, 1933, 1934), Collins (1933), Philip (1933, 1934) and Sikka (1940). However, in spite of these studies, we can state that we do not yet know the idiograms¹ of these species, since the morphology of the chromosomes has not been studied in detail. Accordingly, having procured material of a great many forms, we have resolved to establish their idiograms with the aim of illuminating the following two questions: (1) Can the data concerning the number and morphology of the somatic chromosomes be of aid in resolving the problem of the delimitation of species?; (2) What are the processes that have been active in the evolution of this group?

Apart from the forms corresponding to the wild species distinguished by Pugsley (1933), we are also presenting in this study, the results of our observations on the cytology of some forms obtained in cultivation, whose origin we have tried to clear up.

¹ [Translator's note. According to Sharp, (Introduction to Cytology) **idiogram** is defined as the diagrammatic representation of a karyotype: **Karyotype** is the chromosome complement characteristic of an individual or group of allied forms.]

MATERIALS AND TECHNIQUE

Some plants have been collected in Portugal in the wild state, others have been furnished by Botanical Gardens, and still others by Maison Barr & Sons², Reginald Kaye, Cayeux-LeClere & C.ie, Vilmorin-Andrieux & C.ie and Fernandes Coimbra, Valadares (Gaia).

The following list indicates the name of the forms³, as well as their origin :

<i>N. cyclamineus</i> DC.	bed, left bank of the Ferreira River, (fig. 154) near Pôrto.
<i>N. Johnstonii</i> Pugsley	Fernandes Coimbra.
<i>N. Johnstonii</i> Pugsley (<i>N. Queen of Spain</i>)	Barr & Sons.
<i>N. asturiensis</i> (Jord.) Pugsley	Serra da Estrêla.
<i>N. minor</i> L. (<i>nanus</i>)	Barr & Sons; Reginald Kaye.
<i>N. pumilus</i> Salisb. (<i>minor</i>)	Barr & Sons.
<i>N. nanus</i> Spach (<i>lobularis</i>)	Barr & Sons.
<i>N. hispanicus</i> Gouan (<i>maximus superbus</i>)....	Barr & Sons.
<i>N. obvallaris</i> Salisb. (<i>obvallaris</i>)	Barr & Sons.
<i>N. portensis</i> Pugsley? (<i>N. Pseudo-Narcissus</i> L. var. <i>concolor</i> in Coutinho, Flora of Portugal)	Origin uncertain; collected in the wild and cultivated in the Coimbra Botanical Garden.
<i>N. pseudo-narcissus</i> L. (Lent Lily)	Barr & Sons.
<i>N. pseudo-narcissus</i> L.?	Leca do Bailio.
<i>N. Gayi</i> (Hénon) Pugsley (<i>Princeps Maximus</i>)	Barr & Sons.
<i>N. moschatus</i> L. (<i>cernuus</i>)	Barr & Sons.
<i>N. tortuosus</i> Haworth (<i>N. longiflorus</i> Willd.)	Hortus Botanicus Petropolitano in Leningrad.
<i>N. pseudo-narcissus</i> L. var. <i>bicolor</i> (L.), in Coutinho, Flora of Portugal	Serra da Estrêla.
<i>N. pseudo-narcissus</i> L. (double flowered)....	Avelar.
<i>N. yellow double</i> Van Sion	Vilmorin-Andrieux & C.ie
<i>N. trumpet</i> Impératrice	Vilmorin-Andrieux & C.ie

² We are greatly indebted to Maison Barr & Sons, London, who have furnished us bulbs of the forms we have requested.

³ We are extremely thankful to M. H. W. Pugsley, who has communicated to us the equivalence between the names in the Catalogue of Maison Barr & Sons, and those species he has established in his monograph.

<i>N.</i> trumpet Emperor	Cayeux-LeClerc & C. ie
<i>N.</i> trumpet Major	Cayeux-LeClerc & C. ie
<i>N.</i> trumpet, King of the yellows	Vilmorin-Andrieux & C. ie
<i>N.</i> trumpet, M. me de Graff	Cayeux-LeClerc & C. ie
<i>N.</i> King Alfred	Fernandes Coimbra.



Fig. 154. *N. cyclamineus* DC. in its classic locality near Pôrto (bed, left bank of the Ferreira River). Dr. A. Rozeira photo.

Our observations have been carried out principally with root meristems. In only one case have we studied the first division of the nucleus in the pollen grains (*N. pseudo-narcissus* L. var. *concolor*), and meiosis has been studied in *N. hispanicus* (Maximus superbus) and *N. Johnstonii*. For obtaining preparations of root meristems, we have used Navashin's fluid, (Brunn's modification) and staining with gentian violet.

For the study of meiosis, in the pollen mother cells, we have utilized two types of preparations:

(a) Preparations obtained by fixation with La Cour 2BE and stained with gentian violet.

(b) Preparations obtained by fixation in acetic-alcohol (3 parts absolute alcohol: 1 part crystalizable acetic-acid) and stained in acetocarmine. These preparations have been made permanent by employing the technique described by La Cour (1937).

Mitosis in the pollen grains has been studied in non-permanent preparations, obtained by the maceration of anthers in a drop of acetocarmine.

OBSERVATIONS

By examination of the equatorial plates in the cells of the root meristems we have established the existence of 14 chromosomes in the following forms: *N. cyclamineus* DC., *N. asturiensis* (Jord.) Pugsley, *N. minor* L., *N. pumilus* Salisb., *N. nanus* Spach, *N. obvallaris* Salisb., *N. portensis* Pugsley? (*N. pseudo-narcissus* L. var. *concolor* in Coutinho, Flora of Portugal), *N. pseudo-narcissus* L., *N. Gayi* (Hénon) Pugsley,

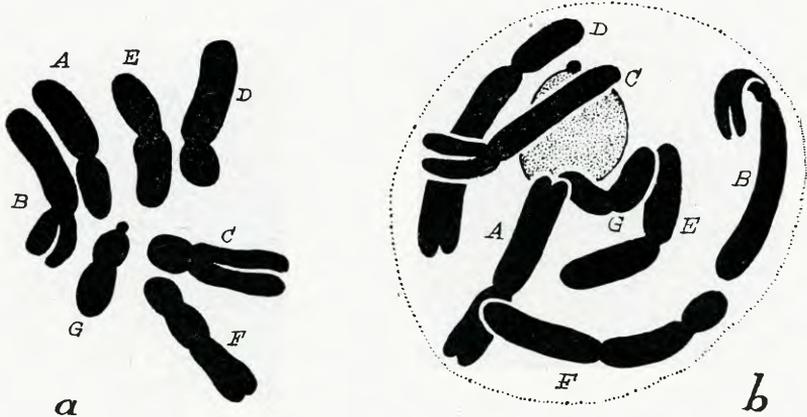


Fig. 155. *N. pseudo-narcissus* L. var. *concolor* (Coutinho, Flora of Portugal). *a*, Equatorial plate of the first division in the pollen grain; the chromosomes are marked by the letters A - G. *b*, Pro-phase of the same division; note chromosome G attached to the nucleolus by its satellite, X 2200.

N. moschatus L., *N. yellow double* Van Sion, *N. double flower* of Avelar, *N. trumpet major* and *N. trumpet*, King of the yellows.

An analysis of metaphase in the first division of the nucleus in the pollen mother cells has permitted us to identify the following 7 types of chromosomes (fig. 155a):

- A—heterobrachial chromosome li;
- B—heterobrachial chromosome Lm;
- C—Chromosome similar to the preceding type, but with the long arm slightly shorter;
- D—Chromosome Lp, resembles the two preceding types but with the short arm less than half the length of the longer one;
- E—Chromosome li similar to type A, but the two arms are shorter and the secondary constriction is located near the extremity of the long arm;
- F—Chromosome Lp similar to type D, but short arm not as long; a submedian constriction on the arm L has been observed in a majority of the figures;
- G—Satellited chromosome Pp'. This chromosome is the only nucleolar one, as indicated in prophase figures, in which this chromosome and its satellite is found attached to the nucleolus (fig. 155b).

In the diploid plates of all the forms mentioned above (Plate 294, fig. 156, 157, 158a and 159a), we have established the existence of 7 pairs of homologues, corresponding to the types described for the pollen grains. We have never found differences between elements of a pair which might indicate structural hybridity. So that, we can say that all these forms possess the same idiogram, expressed by the general formula :

$$2n = 14 = 4 : Lm + 4 : Lp + 4 : li + 2 : Pp'$$

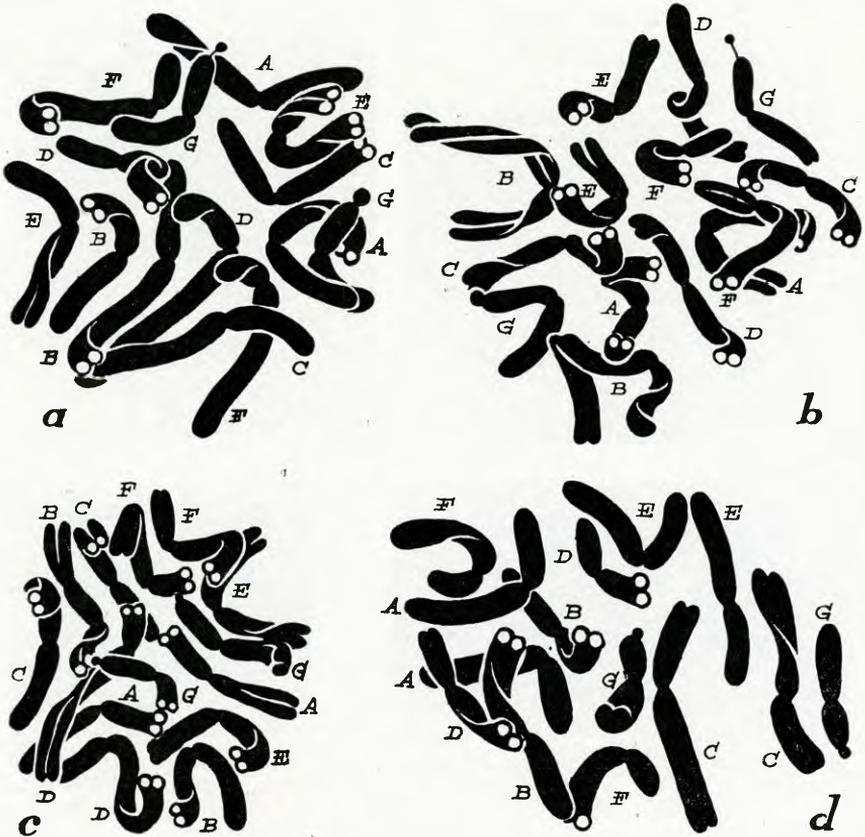


Fig. 156. Equatorial plates from the cells of the root meristem. *a, b*, *N. pseudonarcissus* L. (Lent Lily). *c*, *N. Gayi* (Hénon) Pugsley. *d*, *N. moschatius* L. The chromosome pairs are indicated by the letters A - G. X 3250.

In the root meristem of *N. minor*, we have found, apart from the normal diploid plates (fig. 158a), some plates having 28 chromosomes (fig. 158a). This is a question of mixoploidy, a well known phenomenon, and one which has already been described by Fernandes (1936) with another species of the genus (*N. reflexus* Brot.).



Fig. 157. Equatorial plates from the cells of the root meristem. *a*, *N. pseudo-narcissus* L. (Avelar). *b*, *N.* yellow double Van Sion. *c*, *N.* trumpet major. *d*, *N.* trumpet King of the yellows. The chromosome pairs are indicated by the letters A - G. X 3250.

Plate 294. (See opposite page for plate.) Equatorial plates from the cells of the root meristems. *a*, *N. cyclamineus* DC. *b*, *N. pumilus* Salisb. *c*, *N. nanus* Spach; note that the G chromosomes carry a "tandem satellite." *d*, *N. obvallaris* Salisb. *e*, *N. portensis* Pugsl.? (*N. pseudo-narcissus* L. var. *concolor*). *f*, *N. pseudo-narcissus* L. (Leca do Bailio). The chromosome pairs are indicated by the letters A - G. X 3250.

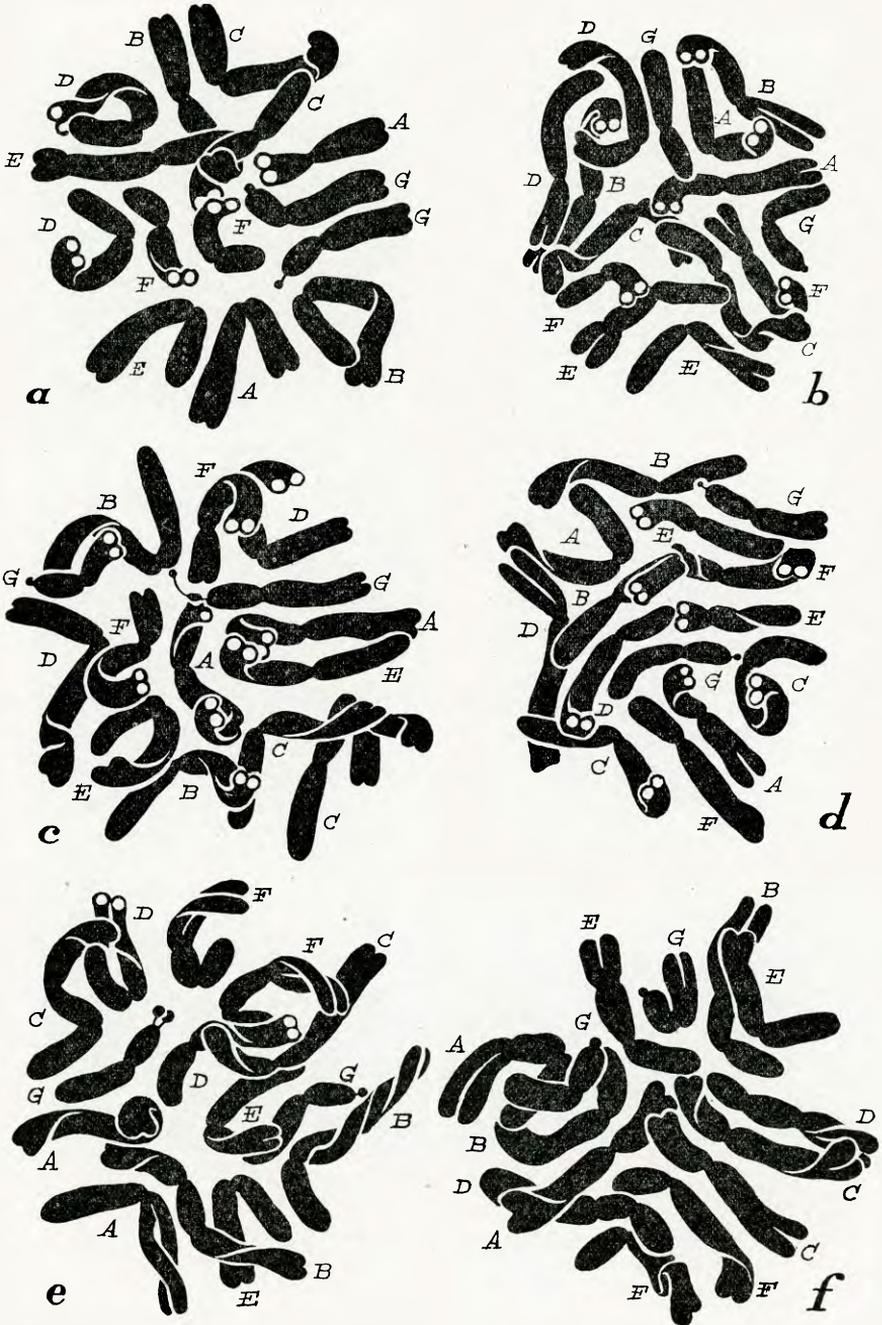


Plate 294 (see opposite page for details.)

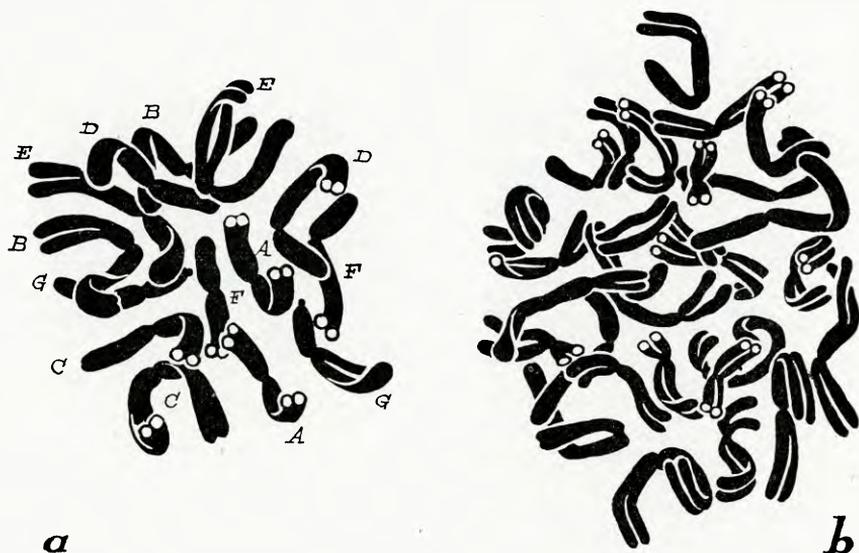


Fig. 158. *N. minor* L. *a*, Equatorial plate in the diploid cells of the root meristems. *b*, Tetraploid plate in another cell of the same root. X 3250.

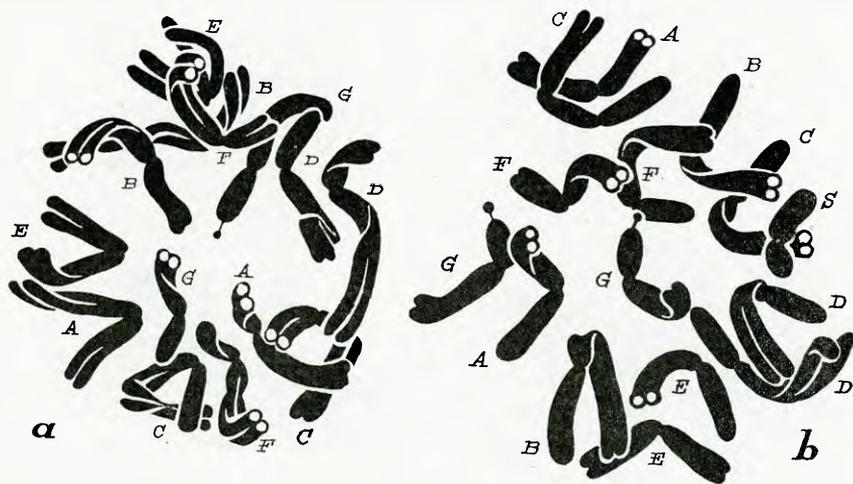


Fig. 159. *N. asturiensis* (Jord.) Pugsley. *a*, Equatorial plate with 14 chromosomes. *b*, Plate provided with a heterochromatic, supernumerary chromosome (S). X 3250.

In *N. asturiensis* we find some plants with 14 chromosomes (fig. 159a) and others with 15 (fig. 159b). The idiogram of the plants with 14 chromosomes is entirely similar to the previously mentioned forms. The plants with 15, present, aside from the normal complement, a

heterobrachial chromosome, simulating a Pp chromosome with shortened arms. The interphase nucleus shows a small chromocenter, disclosing that it is a question of a supernumerary, heterochromatic chromosome of the type of those that Fernandes (1939, 1943) described in *N. juncifolius* Lag. and *N. bulbocodium* L. Collins (1933) reports the existence

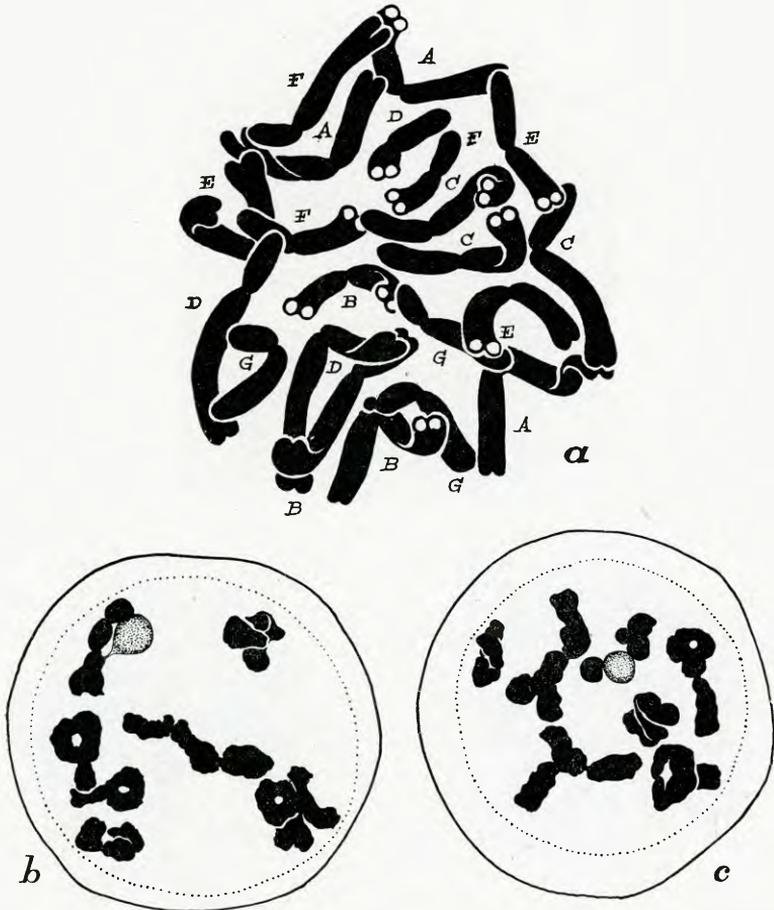


Fig. 160. *N. hispanicus* Gouan. *a*, Equatorial plate with 21 chromosomes in the root meristem cells. X 3250. *b*, Diakinesis showing 7 trivalents. *c*, The same showing 6 trivalents, a nucleolar bivalent and a univalent, also nucleolar. X 1050.

of 15 chromosomes in *N. minor* L. and *N. pumilus* Salisb., and Philp (1933, 1934) mentions the same number in *N. pallidiflorus* Pugsley. Our observations indicate that the normal chromosome complement of *N. minor* and *N. pumilus* is composed of 14 chromosomes. Accordingly, it is almost certain that *N. pallidiflorus* also has 14 chromosomes and that

the supernumerary elements found by Collins and Philp, are of the same nature as those we have found in *N. asturiensis*.

In *N. hispanicus*, we have found 21 somatic chromosomes, and the analysis of the plate reveals the existence of three chromosomes each, of the type distinguished in the haploid complement (fig. 160a). The chromosome complement is therefore expressed by the formula:

$$2n = 21 = 6 : Lm + 6 : Lp + 6 : li + 3 : Pp'$$

Diakinesis and metaphase of the heterotypic division almost always show 7 trivalents. The almost constant formation of this association (fig. 160b) indicates that the form studied is autotriploid.

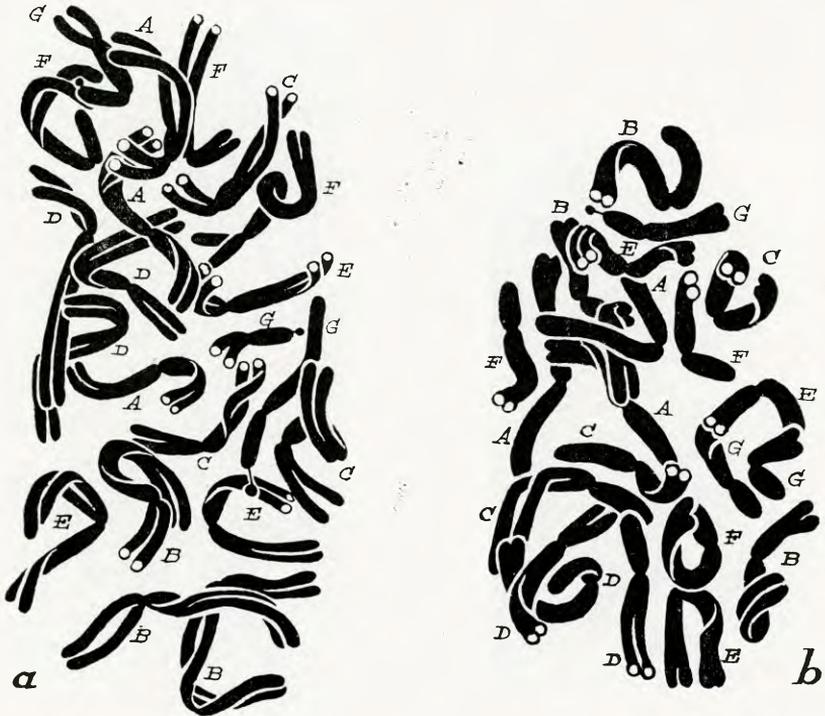


Fig. 161. Equatorial plate from the root meristem cells. *a*, *N. tortuosus* Haw. *b*, *N. trumpet Emperor*. Note the presence of three chromosomes each of the type A - G. X 3250.

Plate 295. (See opposite page for plate.) *N. hispanicus* Gouan. *a*, *b*, *c*, Anaphases of the heterotypic division showing some lagging. *d*, Telophase I showing laggards thrown out into the cytoplasm where they become micronuclei. *e*, Metaphase of the homotypic division showing 21 chromosomes; this cell produced 2 pollen grains with 21 chromosomes each. *f*, Telophase I, where such irregularity is not visible. X approx. 1400.

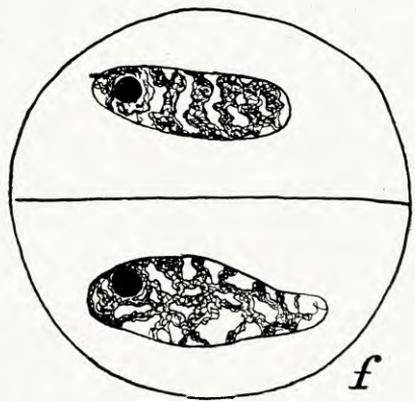
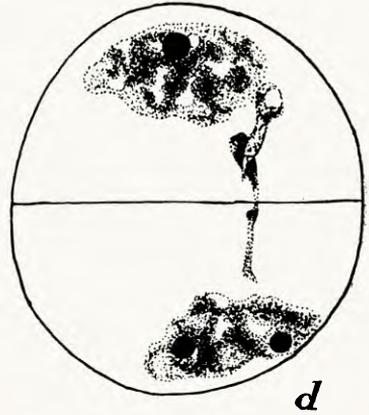
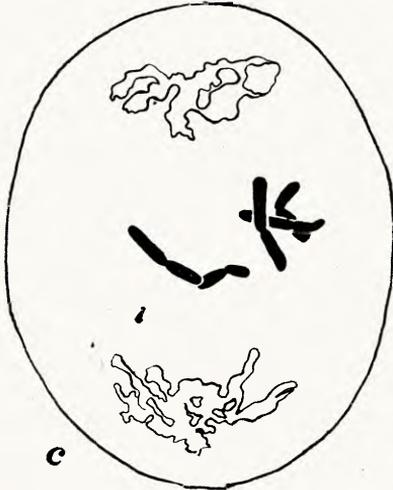
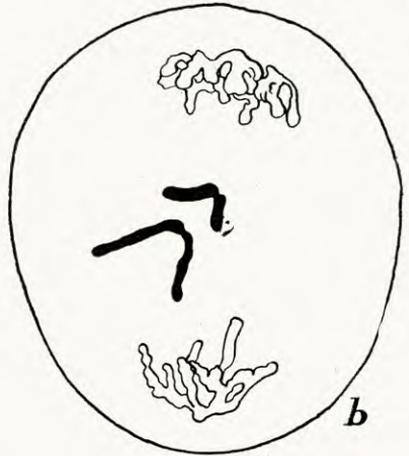
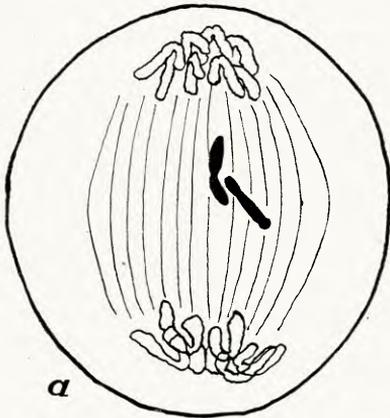


Plate 295 (see opposite page for details.)

Anaphase I (Plate 295a, b, c), telophase I (Plate 295d) and the second division indicate that the irregularities described are characteristic of autotriploid plants.

Philp (1933, 1934) also finds 21 chromosomes in the type species. However, in studying the variety *propinquus* (Herb.) Pugsley, he states

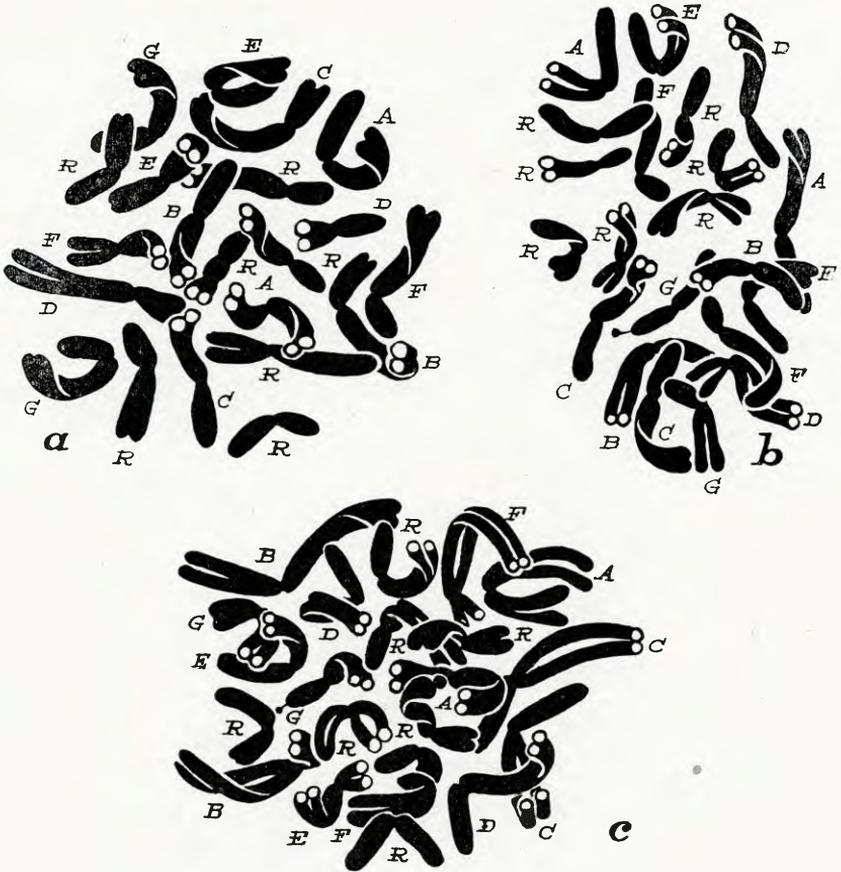


Fig. 162. *N. Johnstonii* Pugsley. *a, b*, Equatorial plate from the cells of a root meristem of a plant furnished by Fernandes Coimbra. *c*, The same, in another plant furnished by Maison Barr & Sons. In these figures the letters A - G indicate the chromosomes of a diploid complement of an *Ajax* and R the haploid complement of *N. reflexus* Brot. X 3250.

Plate 296. (See opposite page for plate.) *N. Johnstonii* Pugsley. *a*, Diakinesis showing 7 bivalents and 7 univalents. *b*, Metaphase I also showing 7 bivalents and 7 univalents. *c* and *d*, Metaphase I showing a trivalent in each cell. *e*, End of anaphase, showing two micronuclei and a bridge, accompanied by a small spherical fragment. *f*, Telophase I showing the same irregularities. X approx. 1400.

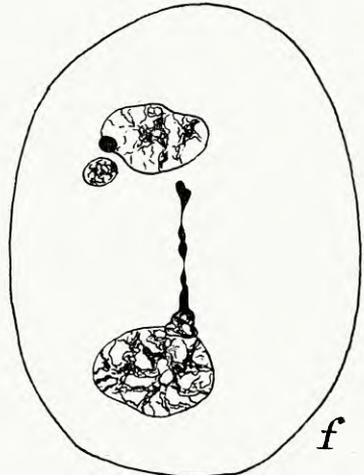
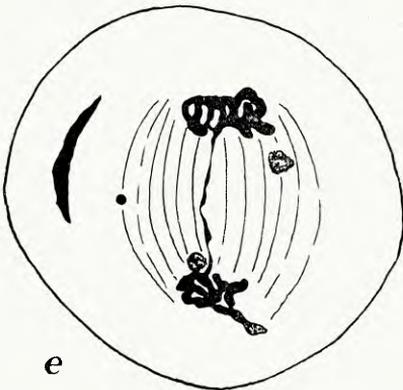
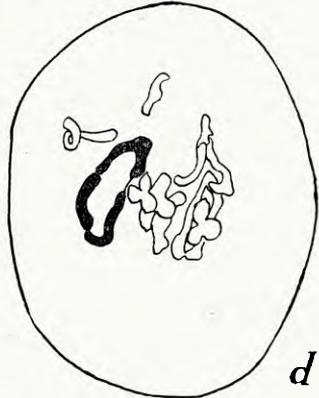
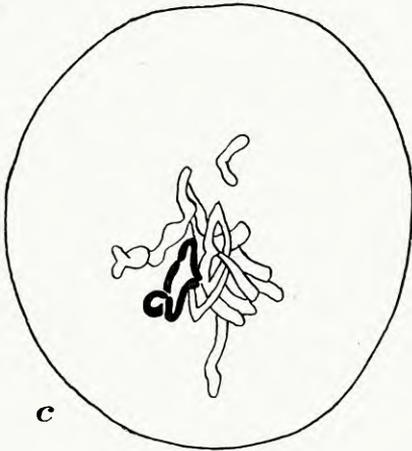
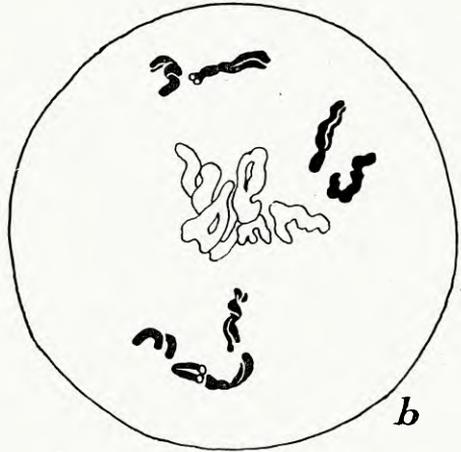
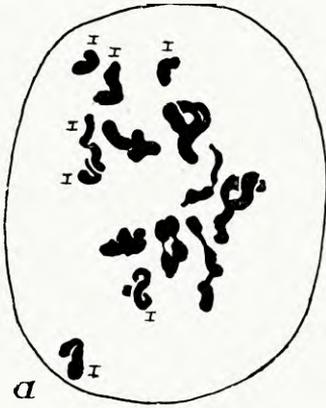


Plate 296 (see opposite page for details.)

that it is a diploid. There is thus in *N. hispanicus* intraspecific polyploidy, the variety being diploid and the type triploid.

Narcissus tortuosus and *N. trumpet Emperor* have also proven to be triploid. Figures 161a and 161b show that in this form the haploid complement is found repeated three times.

In *N. Johnstonii*, we find 21 chromosomes, either in the material furnished by Fernandes Coimbra (figs. 162a, 162b), or in that which was sent by Maison Barr & Sons (fig. 162c). Our observations confirm those of Philp (1933, 1934), concerning chromosome number.

From the fact that spiralization is greatly extended, the chromosomes at metaphase become so long, that to study their morphology is difficult. However, we have succeeded in obtaining some plates where the chromosomes are much shortened, which permitted us to establish the following chromosome formula:

$$2n = 21 = 4 : Lm + 7 : Lp + 4 : li + 1 : lm + 2 : PP + 3 : Pp$$

An analysis of this formula leads us to the conclusion that *N. Johnstonii* is not an autotriploid, since in its idiogram, we do not find the haploid complement represented three times. The presence of 4 chromosomes of the type Lm and 4 of the type li shows at once that this species possess the haploid complement of *Ajax* repeated two times. In making this withdrawal in the formula below, of the diploid complement, there remains a complement of 7 chromosomes expressed by the formula:

$$n = 3 : Lp + 1 : lm + 2 : PP + 1 : Pp$$

which corresponds exactly to that found in *N. reflexus* Brot., *N. triandrus* L. and *N. bulbocodium* L. The conclusion is reached therefore, that *N. Johnstonii* is a hybrid of a tetraploid form of *Ajax* and a diploid form, of either a *Ganymedes*, or a *Corbularia*.

A study of meiosis in the pollen mother cells confirms this point of view. Indeed, diakinesis (Plate 296a) show 7 bivalents, corresponding to the 14 elements of the *Ajax* complement, and 7 univalents, corresponding to the haploid complement of the other species. The same conformation has been observed in metaphase I, when the bivalents are disposed on an equatorial plane, while the univalents are found, most frequently, in an irregular fashion, on one part or the other of the equatorial plane (Plate 296b). Trivalents have been observed several times (Plate 296c, d).

Plate 297. (See opposite page for plate.) Equatorial plate in the cells of the root meristem. *a*, *N. trumpet Impératrice* ($2n = 22$); note the presence of four B chromosomes. *b*, *N. pseudo-narcissus* L. var. *bicolor* (L) ($2n = 28$). *c*, *N. King Alfred* ($2n = 28$). X 3250.

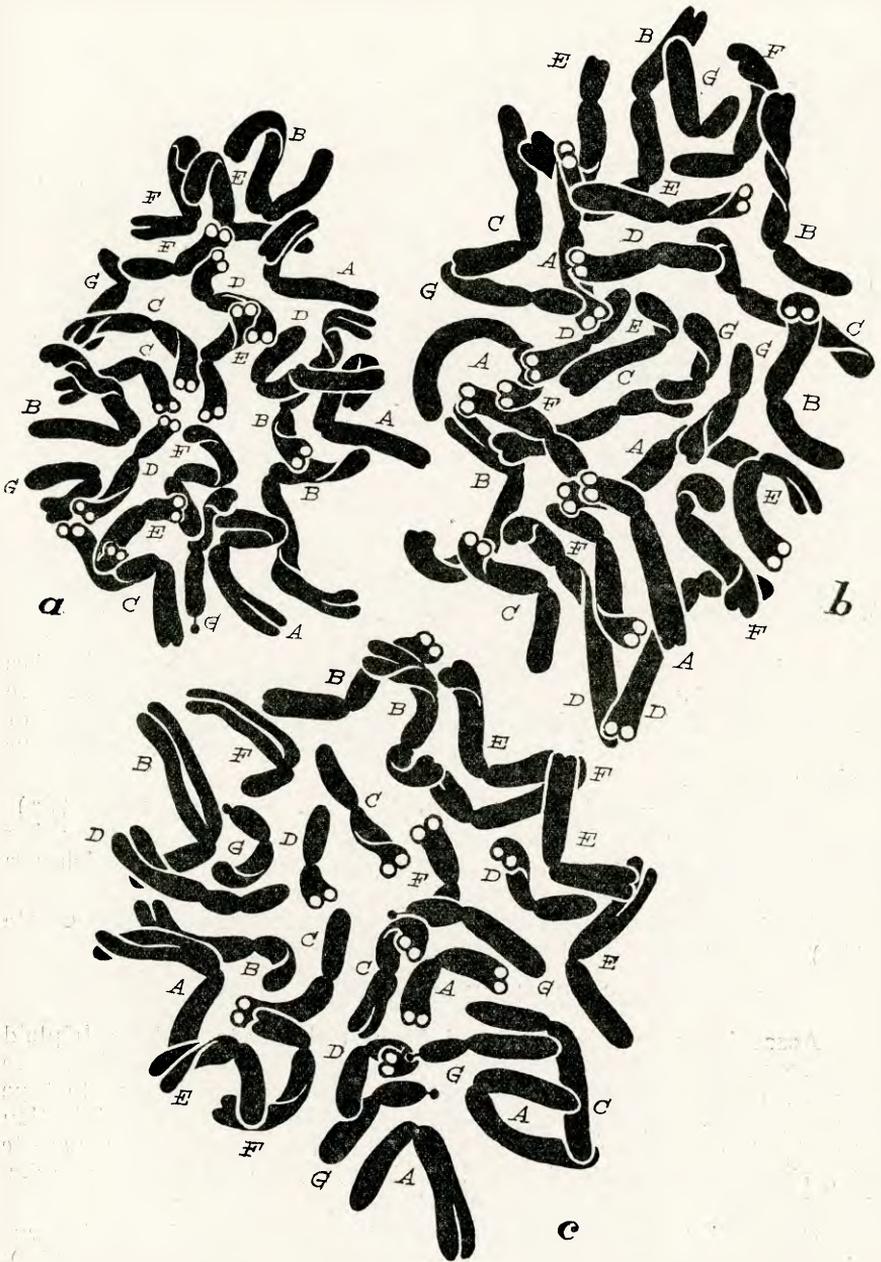


Plate 297 (see opposite page for details.)

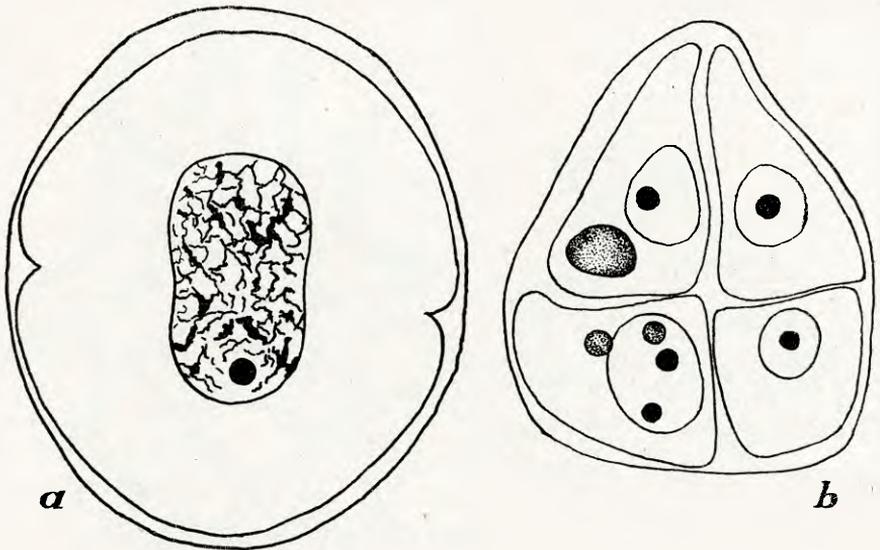


Fig. 163. *N. Johnstonii* Pugsley. a, Restitution nucleus formed at telophase I. b, Tetrad showing micronuclei in two of the 4 microspores. X approx. 1450.

As is to be expected meiosis is irregular (Plate 296e, f) and it takes place in a fashion entirely comparable with that which the authors have described for *N. jonquilloides* Willk., a species which is also a hybrid of a tetraploid form of *N. jonquilla* L. and a diploid form of *N. gaditanus* Boiss. and Reut.

Restitution nuclei sometimes have been observed (fig. 163a). These nuclei produce dyads of 21 chromosomes, and the resulting gametes are able, by fusion to give origin to hexaploids, which are probably stable and fertile.

In *N. trumpet* Impératrice, we have found 22 chromosomes (Plate 297a) whose morphology is expressed by the formula :

$$2n = 22 = 7 : Lm + 6 : Lp + 6 : li + 3 : Pp$$

Accordingly, this horticultural form is shown to be hypertriploid on account of having a chromosome of the type Lm. A more intensive analysis indicates that the supernumerary chromosome belongs to type B (see Plate 297a). This form has originated by means of hybridization of a diploid gamete, produced by a tetraploid form, with another gamete of 8 chromosomes (3 : Lm + 2 : Lp + 2 : li + 1 : Pp), formed by the non-disjunction of the bivalent Lm in a diploid form.

Other horticultural forms with 22 chromosomes are already known : Bicolor Victoria (de Mol, 1922; Philp, 1934), Buttonhole (de Mol, 1922), Empress (Nagao, 1929, 1933; Philp, 1934), Grandee (Nagao, 1929, 1933), Bicolor Horsfieldii (Philp, 1934) and Victoria (Sikka, 1940).

Meiosis has been studied by Nagao (1933) in Grandee and Empress and the results indicate that these forms are hypertriploids, like *N. trumpet* Impératrice.

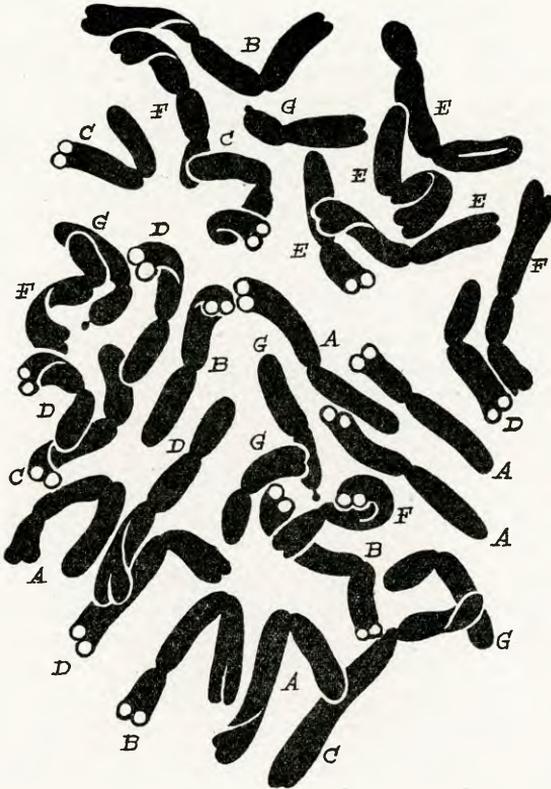


Fig. 164. *N. trumpet* M.me de Graff. Equatorial plate in the cells of the root meristems showing 31 chromosomes. X 3250.

Narcissus pseudo-narcissus L. var *bicolor* (L.) and the horticultural form, "King Alfred" show 28 chromosomes in the cells of the root meristem. The idiogram is represented by the formula:

$$2n=28=8:Lm+8:Lp+8:li+4:Pp'$$

These two forms present therefore chromosomes of the haploid complement A—G repeated 4 times. Consequently, it is a question of autotetraploidy.

Narcissus trumpet M.me de Graff shows 31 chromosomes in the cells

of the root meristems (fig. 164). The formula indicating the morphology of its chromosomes is the following:

$$2n = 8:Lm + 9:Lp + 9:li + 5:Pp$$

M.me de Graff is therefore a hypertetraploid, in the complement of which, one finds repeated five times, a chromosome of type Lp (D), another li (A) and another Pp (G). This horticultural form, from this fact, was produced by hybridization of a tetraploid gamete of the form (4:Lm+4:Lp+4:li+2:Pp', that is to say, 2A+2B+2C+2D+2E+2F+2G) with a gamete of 17 chromosomes (4:Lm+5:Lp+5:li+3:Pp') that is to say, 3A+2B+2C+3D+2E+2F+3G), produced by a pentaploid form. However, pentaploid forms have not been found up to the present in *Ajax*.

DISCUSSION

In the list given below, where the species are found arranged according to the classification of Pugsley (1933), we have assembled the number of chromosome counts which have been made up to the present in each of these species.

Section I

- | | |
|---------------------------------|--|
| 1. <i>N. cyclamineus</i> DC. | 14 de Mol (1922); Collins (1933); Fernandes (1933); Fernandes & Fernandes (<i>hic</i>).* |
| 2. <i>N. Johnstonii</i> Pugsley | 21 Philp (1933, 1934); Fernandes & Fernandes (<i>hic</i>). |

Section II

Series I Minores

- | | |
|--|--|
| 3. <i>N. asturiensis</i> (Jord.) Pugsley | 14 Fernandes (1931); Collins (1933); Fernandes & Fernandes (<i>hic</i>).
15 Fernandes & Fernandes (<i>hic</i>). |
| 4. <i>N. Lagoi</i> Merino | |
| 5. <i>N. minor</i> L. | 14 de Mol (1922); Fernandes & Fernandes (<i>hic</i>).
15 Collins (1933). |
| 6. <i>N. pumilus</i> Salisb. | 14 Fernandes & Fernandes (<i>hic</i>).
15 Collins (1933). |
| 7. <i>N. nanus</i> Spach | 14 de Mol (1922); Philp (1933, 1934); Fernandes & Fernandes (<i>hic</i>). |
| 8. <i>N. parviflorus</i> (Jord) Pugsley | |

* [Translator's note: "*hic*" is the Latin equivalent of "this." Thus reference is made to the work reported in the present paper.]

Series II Lutei

9. *N. hispanicus* Gouan 21 de Mol (1922); Philp (1933, 1934); Fernandes & Fernandes (*hic*).
 var. *propinquus* (Herb.) Pugsley 14 Philp (1933).
 10. *N. longispathus* Pugsley 14 Philp (1933, 1934); Fernandes & Fernandes (*hic*).
 11. *N. obrvallis* Salisb. 14 Fernandes & Fernandes (*hic*).
 12. *N. pisanus* Pugsley
 13. *N. confusus* Pugsley
 14. *N. portensis* Pugsley? (*N. Pseudo-Narcissus* L. var. *concolor* in Coutinho, Flora of Portugal. 14 Fernandes & Fernandes (*hic*).
 15. *N. nevadensis* Pugsley

Series III Vulgares

16. *N. pseudo-narcissus* L. 14 Philp (1933, 1934); Fernandes & Fernandes (*hic*).
 17. *N. pallidiflorus* Pugsley 15 Philp (1933, 1934).
 18. *N. macrolobus* (Jord.) Pugsley

Series IV Nobiles

19. *N. Gayi* (Hénon) Pugsley 14 Philp (1933, 1934); Nagao (1929, 1933); Fernandes & Fernandes (*hic*).
 20. *N. nobilis* Schultes f.
 21. *N. leonensis* Pugsley

Series V Albiflori

22. *N. moschatus* L. 14 Philp (1933, 1934); Fernandes & Fernandes (*hic*).
 23. *N. alpestris* Pugsley 14 Collins (1933).
 24. *N. tortuosus* Haw. 21 Fernandes & Fernandes (*hic*).
 25. *N. albescens* Pugsley 14 Nagao (1929).
 26. *N. bicolor* L.? (*N. pseudo-narcissus* L. var. *bicolor* (L.) in Coutinho, Flora of Portugal. 28 Fernandes (1933); Fernandes & Fernandes (*hic*).
 27. *N. absissus* Schultes f. 14 de Mol (1922).

An analysis of this list shows that we do not possess data on the karyology of 9 of these species. However, by the fact that all of the series established by Pugsley (1933), possess representatives which have been studied, we can state that probably all of the species, with the ex-

ception of *N. Johnstonii*, have the same fundamental chromosome complement, represented by the formula:

$$b=7=2:Lm+2:Lp+2:li+1:Pp'$$

Apart from *N. Johnstonii*, *N. hispanicus*, *N. tortuosus* and probably *N. bicolor*, all the other species are diploids with 14 chromosomes. From the fact that their idiograms are similar, their karyology does not contribute any data which would permit us to separate these species. In considering even the most distinct forms, *N. cyclamineus* and *N. asturiensis*, we can state that their separation is not possible.

With respect to *N. hispanicus*, we have established in this species diploid forms (the var. *propinquus*) and autotriploids (the type). Here we have intraspecific polyploidy and triploidy which does not permit the effective separation of these forms as distinct species.

With respect to *N. tortuosus* and *N. bicolor*, we have studied only a few examples. We can assume that diploids also exist in these species. Accordingly, we can for the moment consider that triploidy and tetraploidy permit us to separate them.

In summary, we can say that the sub-genus *Ajax*, appears to be a homogenous group, where the Jordoñian species established by Pugsley (1933) belong to the same karyotype; there is some polyploidy; but we know that it is not sufficient to permit the separation of the species. The karyology is found to be in accord with the ideas of Baker (1888), who considered this group constituted a single, very polymorphic, Linnéan species.

With regard to *N. Johnstonii*, Henriques (1887) has been the first to suggest that this form could be a hybrid. Barr (1888) considered this plant originated by crossing of *N. pseudo-narcissus* and *N. triandrus albus* (*N. reflexus* Bröt.). Peter R. Barr (1929) showed that in harmony with the opinion of his father, the plants concerned either were found by someone in Spain, or were those received by A. W. Tait from Portugal (in the vicinity of Pôrto). In his catalogue of 1937, Barr also considered *N. Queen of Spain* as a hybrid of *N. pseudo-narcissus* and *N. triandrus albus*. Jacob and Calvert (1929) also considered *N. Johnstonii* as a hybrid of *Ajax* and a *triandrus*. Bowles (1934) is of the same opinion, and has substantiated it with the statement that "similar forms have been raised frequently in gardens by crossing *N. triandrus* with a yellow *Ajax*."

Baker (1888) did not attribute its origin to hybridization and considered it as a variety of *N. pseudo-narcissus*. Pugsley (1933) did not believe either in the hybridity of *N. Johnstonii*. In fact, he said, "If *N. Johnstonii* is a *triandrus* hybrid, it is remarkable that it uniformly possesses the equal stamens with linear, sub-basifixed anthers of an *Ajax*; and if a *bulbocodium* cross some curvature of the stamens and style would be expected. The lack of these peculiarities tends to show that no *triandrus* or *bulbocodium* element is present, as does also the relatively broad and flat foliage; and these features seem to outweigh the somewhat *triandrus*-like corona, and the narrow perianth-tube and

segments recalling *bulbocodium*. Moreover, at least in French gardens, the plant produces fully developed capsules and might perfect seeds under favorable conditions. Another fact that tells against hybridity is the plant's abundance. For nearly forty years it must have been collected annually for export in considerable quantity, for wild bulbs have been almost continuously on sale since the early nineties, in some years being offered by the thousand. It is difficult to believe that a *Narcissus* of hybrid could have multiplied to such an extent and remained so uniform. The "Queen of Spain" is therefore treated as an *Ajax*, and, in view of its very distinct features, has been raised to specific rank." (Pugsley, 1933, pg. 38-39).

As we have noted, the karyological data, suggested from all evidence, that *N. Johnstonii* is a hybrid of a tetraploid form of an *Ajax* and a diploid form of a *Ganymedes* or a *Bulbocodium* (these two groups possess similar complements, as Fernandes, 1935, 1936b, has shown). The data of external morphology—flowers more or less inclined, segments of the perianth reflexed, form of the corona, tube of the perianth "more narrowly funnel-shaped than in the other species of *Ajax*," (Pugsley, 1933), color of the flower, the exceptional existence of two flowers, etc.—show, at once, that the diploid parent is *N. reflexus* Brot. We are therefore in accord with the point of view of Henriques, Barr, P. R. Barr, Jacob, Calvert and Bowles.

However, the arguments of Pugsley, which speak against the idea of considering *N. Johnstonii* as a hybrid, are quite justified. How can we explain the facts mentioned by this author? In our opinion, the explanation is to be found in the fact that *N. Johnstonii* is not a hybrid of two diploid forms, but a hybrid of a tetraploid form of *Ajax* and a diploid one of *N. reflexus* Brot. Given this constitution, a greater predominance of the *Ajax* parent is to be expected. Thus it is explained how the leaves can be relatively large and flat, that the stamens are equal, with linear, sub-basifixed anthers.

The fact that *N. Johnstonii* can, especially in French gardens, produce capsules with fertile seed, is explained thus:—the diploid complement of the *Ajax* parent forms 7 bivalents, which disjoin regularly. The univalents of the *N. reflexus* are frequently eliminated in the cytoplasm and gametes with the *Ajax* complement can be formed. Fertilization of these gametes produces fertile seed. This seed evidently produces some *Ajax* and it should be interesting to study plants obtained by germination of this seed.

The extraordinary abundance of plants can be explained by assuming that *N. Johnstonii* possesses a great capacity to multiply vegetatively. The case of *N. jonquilloides*, which as we have shown, possess a constitution comparable to that of *N. Johnstonii*, is entirely worthy of being connected with this fact. *Narcissus jonquilloides* Willk. never develops, at least in our cultures, fertile seed. In spite of this, it multiplies vegetatively in a truly extraordinary fashion, since some pots which have been planted with bulbs were found completely filled in several years.

Among the plants collected by Johnston and A. W. Tait in the

vicinity of Pôrto, Henriques (1887) found one to which he gave the name *N. Taiti* and which he considered, in harmony with its external morphological characters, to be a hybrid of *N. pseudo-narcissus* and *N. reflexus* Brot. (*N. calathinus* L.). In mentioning this plant, Pugsley (1933) says that the exceptional solitary flower figured by Henriques resembles *N. Johnstonii*. However, he noted that the segments of the perianth are not reflexed and that the stamens are unequal. It would have been interesting to study this plant. Is it a question of a true *N. Johnstonii* or a hybrid between the diploid forms of *N. pseudo-narcissus* and *N. reflexus*? According to the characters of external morphology, which shows a greater predominance of the characters of *N. reflexus* than those of *N. Johnstonii*, the second hypothesis seems very probable. Unfortunately, in spite of our efforts we have not succeeded in procuring this plant.

According to the data of Tait (1886), *N. pseudo-narcissus* is present in the same locality in the vicinity of Pôrto, in two forms, one of which is more robust than the other. It is probable that the large, high form is tetraploid and the other diploid. Given these facts, that *N. reflexus* Brot. growing with these forms of *N. pseudo-narcissus* and that the two species are able to flower simultaneously, it seems probable that the two hybrids, *N. Taiti* and *N. Johnstonii*, have originated in the neighborhood of Pôrto, by crossing, respectively, the diploid and tetraploid forms of *N. pseudo-narcissus* with diploid forms of *N. reflexus*.

From the fact that a great majority of these species possess similar idiograms, constituted of 14 chromosomes, we can say that the evolution of *Ajax* in the wild state has taken place particularly by single gene mutations, or accompanied by structural alterations which do not effect the morphology of the chromosomes in such a fashion that they are evident by comparison of somatic plates. Polyploidy has also played its role, but its importance, from the point of view of the formation of new species, cannot yet be estimated. Tetraploidy and hybridization have been responsible for the differentiation of *N. Johnstonii*.

Very numerous forms of *Ajax* are obtained in culture. However, we only know the karyology of the forms mentioned in the following list:

<i>N. yellow double</i>	Van Sion	14	de Mol (1922, 1928); Fernandes & Fernandes (<i>hic</i>).
<i>N. trumpet major</i>		14	Philip (1934); Fernandes & Fernandes (<i>hic</i>).
<i>N. trumpet King of the Yellows</i>		14	Fernandes & Fernandes (<i>hic</i>).
<i>N. Henry Irving</i>		14	Philip (1934).
Victoria		14	Nagao (1929).
Victoria		22	Sikka (1940).
Golden Spur		21	de Mol (1922).
Golden Spur		30	Nagao (1929).
<i>N. trumpet Emperor</i>		21	Nagao (1933); Fernandes & Fernandes (<i>hic</i>).

Bicolor Victoria	22	de Mol (1922); Philp (1934).
Buttonhole	22	de Mol (1922).
Empress	22	Nagao (1929, 1933); Philp (1934).
Grandee	22	Nagao (1929, 1930, 1933).
<i>N. bicolor</i> Horsfieldii	22	Philp (1934).
<i>N. trumpet</i> Impératrice	22	Fernandes & Fernandes (<i>hic</i>).
King Alfred	28	de Mol (1922); Nagao (1929, 1933); Sikka (1940); Fernandes & Fernandes (<i>hic</i>).
Van Waveren's Giant	28	de Mol (1922).
Olympia	28	Nagao (1929, 1933).
<i>N. trumpet</i> M.me de Graff	31	Fernandes & Fernandes (<i>hic</i>).

An analysis of this list shows that 5 forms are diploids, 2 triploids, 7 hypertriploids with $2n=22$, 3 tetraploids and 2 hypertetraploids. This data reveals therefore that polyploidy alone, and polyploidy associated with polysomy have played an important role in the differentiation of horticultural forms.

Bowles (1934) states that the form Emperor has been produced by means of hybridization of *N. bicolor* and *N. pseudo-narcissus*. Assuming that the first species is a tetraploid and second a diploid, the chromosome number, $2n=21$, is in accord with this supposition.

From the fact that he did not succeed in identifying the existence of 4 similar haploid chromosome complements in the idiogram of King Arthur and also based on the morphology of the satellited chromosome Sikka, (1940) was led to the conclusion that his form is an allotetraploid. Our observations, on the contrary, show that the complement of King Alfred possesses exactly 4 chromosomes each of the 7 types A—G identified in the haploid complement, even as far as concerns the satellited chromosomes. King Alfred should therefore be considered as an auto-tetraploid, this is in accord with the observations of Nagao (1933), who showed a very frequent formation of tetravalents during the reduction divisions. The figures observed by Sikka (1940), have been produced by interesting translocations in the nucleogenio regions and, from this fact, they cannot be used to show the existence of diploid complements of two different species reunited in the idiogram of King Alfred.

Sikka (1940) expresses the supposition that King Alfred must have originated by fertilization of a non-reduced female gamete of the form Emperor with a haploid gamete of *N. hispanicus* var. *maximus* (*N. major*). This hypothesis is not in harmony with the facts, since *N. hispanicus* (*N. major*) is a triploid like Emperor. It is therefore, most probable that King Alfred has originated by fertilization of two non-reduced gametes produced by a diploid form of *N. hispanicus*, such as the variety *propinquus*.

SUMMARY AND CONCLUSIONS

1. With the exception of *N. Johnstonii*, all the species established by Pugsley (1933) in the sub-genus *Ajax* present the same fundamental chromosome complement, expressed by the formula $n=7=2:Lm+2:Lp+2:li+1:PP'$. Of 18 of these species, 14 are shown to be diploids, and one, *N. hispanicus*, is shown to be constituted of diploid and triploid forms. *N. tortuosus* is shown to be a triploid, and *N. bicolor* tetraploid. However, we have not established that these last two species do not have diploid forms.
2. The appearance in *N. asturiensis*, *N. minor*, *N. pumilus* and *N. pallidiflorus* of plants with 15 somatic chromosomes should be attributed in these species, to supernumerary, heterochromatic chromosomes of the type of those which have been found in *N. juncifolius* Lag. and *N. bulbocodium* L.
3. *Narcissus Johnstonii* possesses an idiogram represented by the formula:

$$2n=21=4:Lm+7:Lp+4:li+1:lm+2:PP+3:Pp$$

This formula corresponds exactly to the addition of a diploid complement of *Ajax* with a haploid complement of *N. reflexus* Brot.

<i>Ajax</i>	$2n=4:Lm+4:Lp+4:li+$	$2:Pp$
<i>N. reflexus</i>	$n=3:Lp+$	$1:lm+2:PP+1:Pp$
	<hr style="width: 100%; border: 0.5px solid black;"/>	
	$3n=4:Lm+7:Lp+4:li+1:lm+2:PP+3:Pp$	

4. By the fact that *N. Taiti* Henriq. presents some characters of *N. reflexus* in a more manifest degree than *N. Johnstonii*, we have suggested that this hybrid originated by means of crossing two diploid forms of *N. Pseudo-Narcissus* L. and *N. reflexus* Brot.
5. The karyological data, except perhaps for *N. tortuosus* and *N. bicolor*, does not furnish any elements which would permit us to separate the Jordonian species established by Pugsley (1933). The fact that all the species possess the same karyotype is in harmony with the ideas of Baker (1888), who considered the group to be a single, very polymorphic, linnean species. The most distinct species, *N. cyclamineus* and *N. asturiensis* cannot be distinguished from the others, from a karyological point of view.
6. The principal role in the evolution of the group in the wild state has been played by gene mutation, alone or accompanied by structural alterations not modifying in a visible fashion the chromosome complement. Polyploidy has also played a role, however its importance cannot yet be estimated, because of the fact that we have not been able to effectuate an intensive study of *N. tortuosus* and *N. bicolor*, and some species (9) yet remain to be investigated.
7. A list of the chromosome numbers of horticultural forms studied up to the present is given. This list indicates that the origin of some

forms can be attributed to gene mutation, but the principal role has been played by polyploidy alone, or polyploidy associated with polysomy.

8. The karyological data is found to be in accord with the question of considering the form Emperor ($2n=21$) as having originated by fertilization of *N. bicolor* ($2n=28$) with *N. pseudo-narcissus* ($2n=14$).
9. King Alfred should be considered an autotetraploid form and M.me de Graff could have been produced by fertilization of a tetraploid form with a pentaploid one.

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PARENTS OF HYBRID DAFFODILS

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For the past five years I have been trying to obtain parental names of various daffodil hybrids, sometimes with success but often not. Generally I was referred to the excellent list of crosses compiled by A. F. Calvert, F. C. S., published in the Royal Horticultural Society *Daffodil Yearbook*, 1936. On most newer daffodils, however, this gave little help.

Like many others who accumulate this information on later hybrids, I have kept it on odd cards, loose scraps of paper and in marginal notes of catalogs or notebooks, intending as they no doubt have to sometime assemble it into one orderly list. Pressure and a competent secretary finally accomplished this.

The following parentage list of approximately 700 daffodils represents merely Calvert's list plus almost half again as many additional hybrids, chiefly of English origin. Only a few are from America and the Antipodes.

3B Abschied	9	Poet X 3A Beacon
9 Adieu	9	Aeme X 9 Poet
2A Adventure	1A	Desperado X 2A Commander in Chief
5B Agnes Harvey	4B	Minnie Hume X 11 Triandrus albus
1C Agnes Montefiore	1A	Cleopatra X 7 Jonquil
3B Agrippa	3B	Dorothy Wemys X 9 Poetarum
3B Aida	2A	Princess Mary X 9 Poeticus
5B Alabaster	4B	Minnie Hume X 11 Triandrus calathinus
2A Aladdin's Lamp		Leedsii X 2A Fortune
3A Alcida	2B	Bernardino Seedling
2B Aled	4B	Minnie Hume X 1C Weardale Perfection
5A Alemena	1A	Lord Roberts X 11 Triandrus calathinus
3B Aleppo	2B	Bernardino X 3B Sunstar
3B Algiers	3B	Forfar self-fertilized
1B Alice Knights	1B	Madame de Graaff X 1B Cernuus
4B Alison	4B	Nelly X Seedling
4B Anthea	4B	Montanus X 9 Poeticus
2B Anzio	2B	Clava X 2B Hades
1C Apricot	1A	Abscissus X 1B Albicans
2A Arbalist	2A	Hospodar X Seedling
1B Ardelinis	1B	Mrs. E. H. Krelage X 1B Beersheba
5B Ariel	4B	Minnie Hume X 11 Triandrus calathinus
4B Arion	4A	Hera Seedling
2B Armyoy	4A	Hexagon X 3B Crimson Braid
1B Askelon		Seedling X 1B Nevis

4A Astrid	4A Mary Blewett X 1C Mrs. W. Moodie
1B Atalanta	1B Madame de Graaff X Seedling
1A Auralius	1A Renown X 1A Golden City
1B Avalanche	1B Madame de Graaff X Seedling
Avanley	1C Pink O'Dawn X 1B Beersheba
1B Avebury	Seedling X 1B Nevis
2A Aviemore	3A Beacon X 2A Fortune
2A Bahram	2A Penquite X 2A Porthilly
2B Ballyrashane	Seedling of Nissa
4A Banchory	1B Slemish X 4A Naxos
4A Bandon	1B Cameronian X 4A Slemish
3A Barbaric	1A M. J. Berkeley X 9 Socrates
2A Baronet	1A King Alfred X 2B Bernardino
4A Basilia	4A Maggie May X 1A King Alfred
3A Basra	3A Beacon X 2A Fortune
1A Bastion	1A Counsellor self-fertilized
3A Beacon	2A Princess Mary X 9 Recurvus Seedling
2B Beauty of Radnor	2B Bernardino X 3B Dragoon
1B Beersheba	1B White Knight X Seedling
2A Bellaghy	2A Trevisky X 2A Fairy King
1A Ben Alder	1A King Alfred X 1A Lord Roberts
1C Benedick	1B Loveliness X 1A King Alfred
2A Berdas	2A Sir Watkin X 9 Ornatus
2B Bernardi	1A Abscissus X 9 Pyrenean Poeticus
2B Bernardino	4B Duchess of Brabant X 2B Lulworth
6 Beryl	11 Cyclamineus X 9 Poeticus
2A Beryl Parr	1A Yellow Trumpet X 2A Fortune
3B Blinkbonny	3B Sunstar X 2B Hades
2B Blodwen	2B War Flame X 2B Pink 'Un
3B Bloodstone	2B Lulworth X 9 Horace
2A Bokhara	2A Tamerlane X 2A Fortune
2A Bombay	2A Diolite X 2A Marksman
1B Borealis	1B Corinth X 4A Naxos
1C Boreas	1B Loveliness X 1A King Alfred
7 Boskenna	2B Pilgrim X 7 Jonquil
4A Bradwardine	1B Nevis X 4A Tenedos
2A Braniel	2A Hospodar X 2A Fortune
3B Bravura	2B Folly X 3B Sunstar
2B Bread and Cheese	4A Alburnia X 1C Sincerity
2A Breila	2A Sir Watkin X 9 Ornatus
1C Bridal Robe	1C Sincerity X 1B Slemish
3B Bridegroom	3A Mozart X 2A Gallipoli
1A Broadford	1A King Alfred X 1A Lord Roberts
2B Bronwen	4B Minnie Hume X 1C Duke of Bedford
1B Broughshane	1C Trostan X 1B Kanchenjunga
4A Bryn Ellen	2A El Oro X 3A Twinkle
Bryn Orange	2B Estelle X 2A Fortune
1A Bulwark	1A Ben Alder X 1A Cleopatra
2B Buncrana	2A Carbineer X 2A Porthilly

2A Butter Bowl	2A	Leontes X 1A Seahorse
7 Buttercup	1A	Emperor X 7 Jonquilla
2A Calif	2A	Hospodar X Seedling
1B Callirhoe	1C	Duke of Bedford X 1B Madame de Graaff
8 Canberra	8	Adonia (Taz.) X 1A Yellow Trumpet
4B Candle Light	4A	Alburnia X 3B The Admiral
4A Candour	1B	Quartz X 4A Naxos
1B Cantatrice	1B	Eskimo X 1B Beersheba
1A Canute	1A	Emperor X 1A King Alfred
4A Capella	4B	Minnie Hume X 1B Madame de Graaff
4B Capri	4B	Mystic X 9 Poeticus
4A Caragh	4A	Mitylene X 2A Penquite
2A Carbineer	2A	Gulliver X Seedling
1C Carmel	1C	Findhorn X 1B Nevis
1C Carmenta	1B	Peter Barr X 4A Maggie May
4B Carnalea	4B	Nelly X Silver Coin Seedling
4A Carnmoney	4B	Nelly X 2B Folly
3B Carpatica	3B	Coronach X 3B Forfar
3A Carrigart	3A	Goyescas X 2A Penquite
9 Cassandra	9	Poeticus Ornatus X 9 Poetarum
1B Catania	1C	Morven X 1B Mrs. Ernst H. Krelage
2B Centurion	1B	Madame de Graaff self-fertilized
1A Cern	1A	Maximus X 1C Duke of Bedford
4B Chamois	4B	Mrs. Langtry X 9 Cassandra
4A Chastel	4A	Cicely X 1B Beersheba
2A Cheerio	3A	Seraglio X 2A Fortune
2B Cheers	9	Kestrel X 2A Fortune
7 Cherie	7	Jonquil X 4A Lord Kitchener
1B China Clay	1C	Morven Seedling X 1B Beersheba
4B Chinese White	4B	Silver Plane X Silver Coin Seedling
8 Chinita	9	Chaucer X 8 Jaune á Merveille
1C Chit Chat	1A	King Alfred X Seedling
9 Chloride	9	Distich X 9 Black Prince
2A Christian	2A	Pilgrimage X 3A St. Egwin
7 Chryse	1A	King Alfred X 7 Jonquilla
3A Chungking	3A	Market Merry X P. D. Williams Seedling
4A Cicely	2A	Fleetwing X 1B Mrs. Robert Sydenham
1A Clarion	1A	Monarch X 1A King Alfred
2B Clava	3A	Beacon X 2B Loch Fyne
4A Cleena	2A	Fortune Seedling
1A Cleopatra	1A	Monarch X Seedling
1A Clommel	1A	King of the North X 1A Sorley Boy
3B Clwyd	3A	Mozart X 2A Gallipoli
3A Coeur de Lion	2A	Princess Mary X 9 Poetarum
4B Columbine	9	Dactyl X 4B Mystic

2A Commander in Chief	2A Princess Mary X 1A King Alfred
2B Conbeg	2B Merryhill X 3B Sunstar
1C Consort	1C Trostan X Seedling
1B Coolin	1B Nevis X 1B Beersheba
2A Copper Bowl	3A Beacon X 2A Fortune
1B Corinth	1B Nevis X 1B Beersheba
4B Cornish Cross	3B The Sahib X 4B Mystic
2A Corregio	2B Will Scarlett X 2B Bernardino
2A Cotopaxi	2A Killigrew X 2A Penquite
4A Cotterton	1B Tain X 4A Evening
4A Courage	(1B Nevis selfed X 4A Naxos) X 1B Askelon
1C Coverack Beauty	1C Findhorn X 1B Nevis
4A Coverack Crest	2B Nissa X Seedling
2A Coverack Delight	1B White Emperor X 2A Yellow Incomp.
2A Coverack Gold	1A King Alfred X 4A Tenedos
2B Coverack Perfection	4A Mitylene X 2A Fortune
2A Coverack Sister	4A Mitylene X 2A Fortune
7 Coverack Sun	2A Pilgrimage X 7 Jonquilla
3B Cresset	2A Princess Mary X 9 Poetorum
3B Crete	3A Seraglio X 3B Sunstar
3B Crimson Braid	9 Poeticus verus of Linnaeus X 2B Will Scarlett
1A Cromarty	1A Hebron X 1A Alchemist
3B Crown Derby	4A White Sentinel X 3B Sunstar
2B Crusader	2A Princess Mary X 9 Poetorum
4A Culmore	4B Nelly X Seedling
4B Cushendall	4B Emerald Eye X 9 Daetyl
4B Cushlake	4B Fairy Circle Seedling
6 Cyclataz	11 Cyclamineus X 8 Soleil d'Or
1C Cygnet	1A Monarch X 1B Madame de Graaff
4A Czarina	2A Sir Watkin X 1C Weardale Perfection
9 Dante	9 Ornatus X 9 Poetorum
1A Darius	1C Grandee X 1A Emperor
4A Dava	2B Nissa X 1B White Emperor
1B Dawnglow	1C Rosary X 1C Pink O'Dawn
4A Denys Meyer	2B Bernardino X 1C Seedling
Derek Meyer	4B Walter Fitch X 1A Golden Emperor
2A Dervish	2A Fortune X 2A Cornish Fire
2A Derwin	2A Sir Watkin X 9 Ornatus
1A Desperado	1A King Alfred X 1A Harvest (Backhouse)
4A Devenagh	4A Niphotos X 1B Scapa
3B Dieppe	3B Coronach X 3B Forfar
3A Dinkie	2A Princess Mary X 3B Crimson Braid
5B Dione	4B Minnie Hume X 11 Triandrus calathinus
9 Discoed	9 Almira X 2B Will Scarlett

9	Ditty	.....9	Socrates X 9 Acme
4A	Diva	.....	Seedling X 4A Naxos
5A	Dorothy Kingsmill	.....1C	Grandee X 11 Triandrus
2A	Downas	.....3B	Sunstar X Seedling
4B	Dreamlight	.....9	Dactyl X 4B Mystic
1B	Dropmore	.....1A	Monarch X 1B Madame de Graaff
10	Dubloon	.....10	Telemonius plenus X 9 Ornatus
4B	Duchess of Brabant	.....4B	Minnie Hume X ?
1A	Duke of Kent	.....1B	Madame de Graaff X 1A Monarch
4A	Dulsie	.....1B	Everest X 1B White Emperor
2A	Dunkeld	.....3A	Seraglio X 2A Killigrew
4A	Dunlewey	.....4A	Mitylene X 1B Kantara
4A	Dunloe	.....4A	White Sentinel self-fertilized
4A	Dunseverick	.....4A	Still Waters X 4A Dava
1A	Durbar	.....1C	Glory of Noordwijk X 1A Cleopatra
4A	Earl Grey	.....1A	Emperor X 11 Triandrus Albus
4A	Early Morn	.....2B	Leslie Hulbert X 2A Fortune
9	Elegy	.....9	Horace X 9 Almira
4A	Elfrida Pearson	.....4B	Minnie Hume X 1B Madame de Graaff
2A	Ellangowan	.....2A	Killigrew X 3A Marquis
3B	Emerald	.....4B	Montanus X 9 Poeticus var.
4B	Endymion	.....4B	Minnie Hume X 9 Poetarum
1B	Epicure	.....1B	White Emperor self-fertilized
1B	Eskimo	.....	Leedsii X 1B Mrs. E. H. Krelage
4A	Ettrick	.....2B	Pilgrim X 1B Mrs. Robert Sydenham
1B	Everest	.....	Leedsii Seedling X 1B Mrs. Robert Sydenham
2B	Fair Edith	.....1A	Hon. Mrs. Jocelyn X 9 Poeticus
1B	Fairy Dream	.....1B	Nevis X 1B Beersheba
2A	Fairy King	.....2A	Gulliver seedling
7	Fairy Nymph	.....4A	Maggie May X 11 Jonquil
10	Falaise	.....10	Mary Copeland X Poeticus (?)
4A	Falcon	.....4B	Mrs. Langtry X 9 Poeticus
4A	Fanny Currey	.....4A	Lord Kitchener X 2B Bernardino
6	February Gold	.....11	Cyclamineus X 1A Golden Spur
2B	Fermoy	.....4A	Niphetos X Red & White Seedling
3B	Fidelia	.....4B	Montanus X 9 Poeticus
1C	Findhorn	.....1B	Madame de Graaff X 2B Lady Margaret Boscawen
2A	Fireflame	.....1A	Tenby Daffodil X 9 Poetarum
2A	Firelight	.....1A	Tenby Daffodil X 9 Poetarum
2B	Firewater	.....4B	Nelly X 3B Hades
2B	Flamenco	.....2A	Hospodar X 3B Sunstar
9	Flare	.....9	Bloodstain X Ecstasy
4B	Flora	.....3B	Flora Wilson X 2B Lulworth
1C	Florence Pearson	.....1A	Emperor X 1B Madame de Graaff
1A	Florists' Delight	.....1A	Monarch X 1A King Alfred
3B	Florizel	.....2B	Lulworth X 9 Horace
1B	Flushing	.....1B	White Trumpet Seedling X 1B Beersheba

1C Foresight	1C Bonython Seedling
3B Forfar	3A Beacon X (2A Fortune X 3B Sunstar)
1A Fortress	1A King of the North X 1A Sorley Boy
3B Fortunatus	9 Kestrel X 24 Fortune
2A Fortune's Beacon	3A Beacon X 2A Fortune
2A Fortune's Beauty	2B Bernardino X 2A Fortune
2A Fortune's Blaze	2A Fortune X 2A Gulliver
2A Fortune's Cheer	2A Fortune X 3B Robin Redbreast
2A Fortune's Circle	3A Seraglio X 2A Fortune
2A Fortune's Crown	2A Tamerlane X 2A Fortune
2A Fortune's Ensign	2A Fortune X 2B Galopin
2A Fortune's Flag	2A Knipp X 2A Fortune
2A Fortune's Flame	2A Killigrew X 2A Fortune
2A Fortune's Glow	3A Mozart X 2A Fortune
2A Fortune's Hope	3A Red Sea X 2A Fortune
2A Fortune's Pride	3A Beacon X 2A Fortune
2A Fortune's Smile	3A Mozart X 2A Fortune
1B Fountain	1B Eskimo X 4A Tenedos
3B Frailty	4B Montanus X 9 Poeticus
2A Franklin	2A Havelock X Seedling
4B Frigid	4B Emerald Eye X 9 Dactyl
1A Frontier	1A King of the North X 1C Content
2A Gaiety	1A Hon. Mrs. Jocelyn X 9 Poeticus
2B Gala	2B Folly X 2B Red Abbott
3B Galata	3A Mozart X 2A Gallipoli
2A Galliard	2A Calif X Seedling
2A Gallipoli	2B Bernardino X 2B Will Scarlett
2A Galway	Thought to be 2A Fortune X 2A Corcus
2A Garibaldi	2A Hospodar X Seedling
2A Garland	3A Seraglio X 2A Copper Bowl
2B General Sarrail	4A Maggie May X 1C Weardale Perfection
1B Georgina Clogstoun	1A Hamlet X 1B White Knight
2A Gibraltar	2A Carbineer Seedling
4B Gilt-edge	4B Moonbeam X 9 Allan-a-Dale
4A Girdle	4B Minnie Hume X 1C Weardale Perfection
2B Glad Eye	9 Poeticus verus X 2B Will Scarlett
4A Glenarm	(Leedsii X 1B Mrs. R. Sydenham) X 4A Tenedos
2B Glendwin	2B War Flame X 2B Pink 'Un
1C Glenravel	1B Mrs. E. H. Krelage Seedling
5B Gloaming	4B Minnie Hume X 11 Triandrus albus
1A Glory of Leiden	1A Abseissus X Trumpet
2B Golconda	1A Lord Roberts X 3B Fireball
1A Goldbeater	1A Maximus Self-fertilized
1A Goldeourt	2A Crocus X 1A Cromarty

1A King Alfred	1A	Emperor X 1A Maximus
3B King George V	9	Ornatus X 2A Gloria Mundi
9 King of Diamonds	9	Dactyl X 9 Ace of Diamonds
1A King of the North	1A	King Alfred X 1C Glory of Noord- wijk
1A Kingscourt	1A	Royalist X 2A Crocus
9 Knave of Diamonds	9	Dactyl X 9 Ace of Diamonds
1C Knight Errant	1A	Monarch X 1B Madame de Graaff
1A Knockboy	1A	King of the North X 1A Sorley Boy
4A Konia	3B	Albatross X 1B Mrs. Robert Syden- ham
2B Kopriva		Barrii X 2A Fortune
2A Krakatoa	2A	Garibaldi X 2A Fortune
2A Kwasind	1A	van Waveren's Giant X 2A Romance
4A Lady Betty		Seedling X 1B White Knight
2A Ladybird	1A	Tenby Daffodil X 9 Poetarum
1B Lady Kenyon	1B	Madame de Graaff X 1C Weardale Perfection
1C Lady Mine	2B	Great Warley X 1A van Waveren's Giant
1B Lady Warren	1C	Weardale Perfection X 1B Madame de Graaff
2B La Tosca	2B	Bernardino X 9 Poeticus
4B Laughing Water	4B	Minnie Hume X 2B Stella Superba
1A Leinster	1A	King of the North X 1A Sorley Boy
4B Lemon Frill	2B	Mabel Cowan X 2B Lulworth
1A Lemon Giant	1C	Florence Pearson X Giant Leedsii
1A Lemonora	1B	Corinth X 4A Naxos
2A Leontes	3A	Beacon X 1A Lord Roberts
1B Le Phare	1B	White Knight X 4A Tenedos
2B Leslie Hulbert	1B	Seedling X 2B Lucifer
1B Levant	4A	Tenedos X 1B White Knight
1C Le Voleur	1A	Cleopatra X 1B White Knight
4A Lido	4A	Imbros X 4A Tenedos
9 Lights Out	9	Dactyl X Engleheart Poet
4A Lily of Rotherside	4A	Lowdham Beauty X 3B Crimson Braid
3B Limerick	2B	Folly X 2B Hades
2B Linn	2B	John Evelyn X 2A Fortune
4A Lisbreen	4A	Mitylene X 4A Evening
1B Lizard	1B	Mrs. Krelage Seedling X 1B Beer- sheba
10 Llilnos	3A	Beacon X 10 Telamonius plenus
2B Loch Fyne	4B	Minnie Hume X 2B Lady Margaret Boscawen
3B Lone Star	4B	Montanus X 9 Poeticus
4A Lord Kitchener	4B	Minnie Hume X 1C Weardale Per- fection

1A Lord Roberts	1A Monarch X 1B Madame de Graaff
4A Louise L. Linton	4B Minnie Hume X 1B Madame de Graaff
1B Loveliness	1B Madame de Graaff X Seedling
4A Lowdham Beauty	4B Minnie Hume X 1B Madame de Graaff
2B Lucifer	1C Princepts X 9 Poetarum
5B Lucinda	3B Albatross X 11 Triandrus calathinus
Luther	Mary Blewitt X 4A Imbros
1B Madame de Graaff	1B Albicans X 1C Empress
1C Madame Plemp	1C Empress X Seedling
2A Magherally	Seedling of Fairy King
4A Magnolia	4A Felspar X 4A Empire
1C Maharajah	1C Victoria X 1C Weardale Perfection
3B Mahmoud	2B Folly X 3B Sunstar
1B Maiveroe	1B Quartz X 1B Beersheba
1B Manacles	1B Nevis Seedling X 4A Naxos
3B Mandalay	3B Harold Finn X 3B Ethelbert
1C Manna	1A Cleopatra X 1B White Knight
1A Maraval	1A King of the North X 1C Content
3A Market Merry	3A Seraglio X (2A Tamarlane X 2A Fortune)
2A Marksman	2A Hospodar seedling
4A Marmora	4B Minnie Hume X 1B Mrs. E. H. Krelage
2B Marshlight	1C Princeps X 9 Poetarum
4A Martello	Seedling X 1B Nevis
10 Mary Copeland	9 Poet X 10 Orange Phoenix
8 May Dew	8 biflorus X 9 poeticus
4A May Fisher	4B St. Olaf X 1B Mrs. E. H. Krelage
2B Mazeppa	2B Warlock X Seedling
1A Mellow	1A Cleopatra X Seedling
5B Melusina	3B Albatross X 11 Triandrus calathinus
9 Memory	9 Almira X 9 Horace
2A Mexico	3A Alight X 2A Rustom Pasha
1A Milanion	Seedling X 1A Royalist
4B Minnie Hume	1B Albicans X 9 Poeticus augustifolius
9 Minuet	9 Kingsley X 9 Socrates
3A Miramar	3A Beacon X 3B Sunstar
4A Miss E. M. Bowling	4B Anthea X 4A Lord Kitchener
3B Miss Willmott	9 Ornatus X 2A Gloria Mundi
4B Misty Moon	4B Mystic X ?
4A Mitylene	3A Beacon X Leedsii Seedling
1A M. J. Berkeley	1A Maximus X ?
4B Moina	4B Mystic X 2B Pink 'Un
4B Moonbeam	Mrs. Barton X 9 Recurvus
1B Moray	1B Nevis X 4A Tenedos
3B Morocco	9 Hildegarde X 3B Oiseau de Feu

1C Morven	1C	Victoria X 1B Madame de Graaff
4A Merville	4B	Nelly X 4A Banchorry
3A Mozart	2A	Princess Mary X Seedling
3B Mr. Jinks	2B	Bernardino X 3B Sunstar
1B Mrs. D. V. West	1C	Weardale Perfection X 1B Madame de Graaff
1B Mrs. Ernst H. Krelage	1A	King Alfred X 1B Madame de Graaff
1B Mrs. G. H. Barr	1B	Madame de Graaff X Seedling
1B Mrs. Lower	1A	Cleopatra X 1A Clarion
4B Mrs. Nette O'Melveny	4A	Hera Seedling
4A Mrs. R. O. Backhouse	4A	Lord Kitchener X Red Cup seedling
1B Mrs. Robert Sydenham	1B	Madame de Graaff X Seedling
10 Mrs. William Copeland	4A	Venus X pale double
3A Music	4B	Mrs. Langtry X White Trumpet
2A Mylor	2A	Pilgrimage X 1A Royalist
4B Mystic	4B	Miss Weisse X Poet
4A Namos	4A	Niphetos X 1B Kanchenjunga
2A Nancy Cumberlege	2B	Bernardino X 2A Fortune
2A Narvik	2A	Carbineer X 2A Porthilly
1B Neuralia	1B	Mrs. Robert Sydenham X 1C Conqueror
4A Nevin	4B	Minnie Hume X 1C Weardale Perfection
1B Nevis	1A	King of the North X White Ajax
2A Newlyn	4A	White Sentinel X 24 Gallipoli
1B Nilkanta	1B	Kenbane X 1B Kanchenjunga
2B Nissa	4A	Kingdom self-fertilized
4A Nocturne	4A	Marmcra X 4A Evening
4A Norah Pearson	4B	Minnie Hume X 1B Madame de Graaff
2B Novelty	2B	Lulworth X 9 Poeticus
2A Nutwith	2A	Hospodar X Seedling
3B Nysa	2B	Lulworth X 9 Horace
3B Olivia	2B	Lulworth X 9 Horace
6 Orange Glory	1A	Yellow Trumpet Seedling X Cyclamineus
3B Ortona	4A	Mitylene X 3B Coronach
2A Osiris		Princess Mary Seedling X 1A King Alfred
4A Oslo	4B	Nelly X 1B Beersheba
2B Palma	2A	Princess Mary X 2A Gallipoli
3B Pandora	2B	Lulworth X 9 Horace
2A Paramount		Seedling X 3B Crimson Braid
4A Parkmore	4A	Niphetos X 1B Scapa
4B Paulette	4A	Maggie May X 9 Recurvus
5B Pearl of Dew	3B	*Albatross X 11 Triandrus calathinus
1B Pearl of Kent	1A	Monarch X 1B Madame de Graaff
1C Peeress		Weardale Perfection Seedling X 1B Carmel

- 2A Peiping2A Carbineer X 2A Porthilly
 2A Pendeen Beacon Seedling X 2A Fortune
 3B Penhallick3B Harpagon X 3B Sunstar
 2B Penwith4A Tenedos X 2A Fortune
 4B Penzance1B Kantara X 4A Naxos
 3B Pera3A Beacon X 3B Sunstar
 1A Persia1A Sorley Boy X Seedling
 1B Peter Barr1A Monarch X 1B Madame de Graaff
 8 Peter Lower3B Yeoman of the Guard X 3B Mandalay
 2A Petrocleus1A King Alfred X 1C Weardale Perfection
 3B Petrinia2A Princess Mary X 9 Horace
 1B Petsamo3A Niphetos X 1B Kanchenjunga
 1C Phyllis Vansittart1B Madame de Graaff X 1C Weardale Perfection
 2A Pilgrimage2B Pilgrim X Broadford
 2A Pilgrim Father2B Pilgrim X 1A Ben Alder
 4A Pinkeen1 Okapi X 4A Tenedos
 4A Pinkie (Radcliff)2B Pinkeen X 1C Mrs. Moodie
 1C Pink O'Dawn4A Lord Kitchener (?) X 1C Mrs. Moodie
 2A Playboy Carbineer seedling
 8 Pleiades (Poetaz)3B Adonia X 9 Ornatus
 2B Pleione2B Lulworth X 9 Horace
 8 Poetaz (van der Schoot)....11 Tazetta X 9 Poeticus ornatus
 3B Polcoverack3A Mozart X 3B Sunstar
 4A Poldhu4A Imbros X 4A Tenedos
 5B Polydorus3B Albatross X Triandrus calathinus
 5A Polyxena1C Weardale Perfection X 11 Triandrus calathinus
 3A Primrose Dame1A Hon. Mrs. Jocelyn X Poeticus
 9 Prince of Poets9 Raeburn X 9 Dactyl
 5A Princess Ena1C Grandee X 11 Triandrus albus
 2A Princess Victoria2A Sir Watkin X 9 Ornatus
 1A Principal1A Cleopatra X 1A Sorley Boy
 2B Promptitude4A Gracious X Seedling
 3A Punchinello2A Hospodar X 3B Sunstar
 4A Puritan Maiden Giant Leedsii X 1C Florence Pearson
 1C Pyramus1C Weardale Perfection X 1B Madame de Graaff
 1B Quartz1C Morven X 1B White Emperor
 1C Queen of Beauty1A Lord Roberts X 1B Loveliness
 9 Queen of Diamonds9 Dactyl X 9 Ace of Diamonds
 5A Queen of Spain1A Santa Maria X 11 Angel's Tears
 1C Queen of Ulster1A Darius X 1C Weardale Perfection
 3B Quetta2B Bernardino X 3B Crimson Braid
 1A Racehorse1A King Alfred X 1A Monarch
 9 Recessional9 Socrates X 9 Lullaby

2A Red Cross	Seedling X 2B Will Scarlet
2A Red Dragon	1A Hon. Mrs. Jocelyn X 9 The Bride
2B Red Hackle	2B Folly X 2B Red Abbott
3B Redpole	3B Yeoman of the Guard X 9 Black Prince
2A Red Riband	3A Seraglio X 2A Fortune
3B Red Riding Hood	2B Lulworth X 9 Horace
3A Red Sea	3A Beacon X 2B Will Scarlett
2A Regent	9 Kestrel X 2A Fortune
2B Rewa	2B Bernardino X 2A Fortune
1C Richard Strauss	1C Grandee X 11 Triandrus albus
4A Riva	2B Bernardino X 1C Rosary
3B Robin	3A Beacon X 9 Dactyl
1A Rolled Gold	1A Goldbeater X 24 Penbeagle
Rosario	4A Pinkie X 1C Rosary
4A Roselands	4A Pinkie X Luther
4A Rose of Tralee	4A White Sentinel self-fertilized
Roslyn	1B Dawnglow X Rosario
2A Rouge	2A Killigrew X 2A Cornish Fire
1A Royalist	1A Cleopatra X 1A Broadford
3B Ruby	2B Lulworth X 9 Horace
1B St. Mary	1B Quartz X 4A Diva
3B St. Ninian	3B Nairn X 2A Killigrew
4B St. Senara	2A Princess Mary X recurvus
4B Samaria	3 Barrii Seedling X 4B Moonbeam
2A Samarkand	1A Ben Alder X 2A Fortune
1B Samite	1B Mrs. Ernst H. Krelage X 1B Beer-sheba
7 Sanda	1A King Alfred X 7 Rugulosus maximus
2B Santiam	2B John Evelyn X 2A Fortune
1B Scapa	1B Quartz X 4A Tenedos
2A Scarlet Pimpernel	1A Henry Irving X 9 Poeticus
4A Scarva	4A Mitylene X 2A Fortune
2B Scoutmaster	1A King Alfred X 4B Minnie Hume
2B Seabank	White Ajax Seedling X 3B Hades
4A Sea Urchin	4A White Nile X 4A Tenedos
3A Seraglio	3A Mozart X 2A Gallipoli
1A Seraphine	1C Weardale Perfection X 1B Cernuus
3 Serapis	2B Lulworth X 9 Horace
1A Severn	1B White Knight X 1A Royalist
2B Seville	Seedling X 2B Lulworth
9 Shanach	Dactyl Seedling
1B Sheeroe	1B Madame de Graaff X Seedling
4A Shining Waters	4A Marmora Seedling
5B Shirley	2B Lady Margaret Boscawen X 11 Triandrus calathinus
3B Shrove	2A Princess Mary X 9 Horace
5B Silver Chimes	8 Scilly White X 11 Triandrus albus

5B Silver Dew	4B	Minnie Hume X 11 Triandrus calathinus
4B Silver Moon	9	Poeticus X 9 Poeticus biflorus
4B Silver Salver	4B	Moonbeam X 9 Poeticus
4B Silver Spangle	2B	Lulworth X 9 Horace
5B Silver Swan	4B	Minnie Hume X 11 Triandrus calathinus
4A Silver Wedding	1C	Halfa X 1B Beersheba
2B Simla	2B	Bernardino X 2B Seville
1C Sincerity	1A	Lord Roberts X 1B White Knight
2B Sirius	1C	Princeps X Poetarum
1B Slemish	1C	Findhorn X 1B Beersheba
9 Smyrna	9	James Hogg X 9 Ace of Diamonds
4A Snow Crest	4B	Montanus X 9 Poeticus
1B Snow Crown	1B	White Emperor X 1B Beersheba
5B Snow Nymph	3B	Albatross X 11 Triandrus calathinus
9 Sodium	9	Aeme X Poeticus
4B Songster	1B	Mrs. Thomson X 9 Ornatus
1A Sparta	1B	White Emperor X 1B White Maximus
5 Spindrift	4B	White Lady X 11 Triandrus albus
1A Spread Eagle	1A	Hon. Mrs. Jocelyn X 9 Poeticus
4A Stability	2A	Princess Mary X 1C Vestal Virgin
2A Stella Tid Pratt		Seedling X 2B Will Scarlet
Stirling	3A	Beacon X (1A X 2A Pilgrimage)
2A Stout Lad		Faithful Seedling
4A Suda	1B	Nevis X 4A Lerd Kitchener
1A Sulphur Prince	1A	Ben Alder X 1B White Knight
1A Sultan	1A	Cleopatra X 1A Darius
2A Sun Chariot	2A	Porthilly X 2A Rustom Pasha
2A Sun Dance	1A	Magnificence X 2A Fortune
2A Sunkist	9	Dactyl X 4B Mystic
1C Sunshine	1A	Glory of Leiden X 2B Nelsoni aurantius
3B Susette	2B	Lulworth X 9 Horace
2B Suvla		Seedling from Minnie Hume X Incomp. X Leedsii Seedling
10 Swansdown	4A	Mitylene X 9 Poeticus Smyrna
2A Swashbuckler	1A	King Alfred X 4B Minnie Hume
4B Sweet Nell	4A	Maggie May X 9 Poeticus recurvus
4B Sylvia O'Neill	4B	Silver Plane X Silver Coin Seedling
1C Tain	1B	Beersheba X (? X Beersheba)
2A Tamerlane	3B	Firebrand X 1A King Alfred
2A Tamino	3A	Tredore X 2A Penquite
3B Tampico	2B	Warlock X 3B Forfar
9 Tannahill	9	Dactyl X 9 Ace of Diamonds
4A Tantalus	4B	Minnie Hume X 1C Weardale Perfection

1C Tapin	1A Cleopatra X 1B White Knight
2B Taranto	2B Great Warley X 1B Mrs. Ernst H. Krelage
2A Tashkend	1A Ben Alder X 2A Fortune
3B Teresa	2B Lulworth X 9 Horace
2B The Czar	2A Gaiety X 1A Lord Roberts
4A The Fawn	4B Minnie Hume X 1C Weardale Perfection
3B The Geisha	2B Lulworth X 9 Horace
3B Therapia	3A Mozart X 2A Gallipoli
4A Thira	4A Kingdom X 1B White Emperor
1A Thoroughbred	1A King of the North X 1A Sorley Boy
4A Tibet	4A Tunis X 1B Askelon
1A Tiernan	1B Madame de Graaff X 1A Monarch
2A Tinker	2A Damson X 2A Rustom Pasha
3B Tinkle Bell	8 Biflorus X 9 Poeticus
4B Tinsel	4B Silver Plane X Silver Coin Seedling
4A Tintagel	1B Nevis X 4A Tenedos
3B Titania	4A Maggie May X 9 Recurvus
3B Topsy	2B Lulworth X 9 Horace
2B Torso	9 Almira X 2B Will Scarlett
1B Trappist	1B Mrs. H. D. Betteridge X 1A King Alfred
Treasure Island	4A Hera X 3B Sunstar
1A Tresserve	1A Golden Spur X 1A Emperor
4A Trevoise	1B White Emperor X Seedling
5A Trimon	11 Bulbocodium monophyllum X 11 Triandrus albus
10 Triplex	4B Moonbeam X Poeticus
1C Trostan	1A King Alfred X 1B Askelon
4A Truth	4A Naxos X Seedling
4A Tryst	Silver Coin X 2B Armoy
2A Tuscan	2A Fleetwing X 2A Hospodar
Utopia	1A Pickwick X 9 Ornatus
1B Valetta	1C Morven X 4 Loch Lomond
5A Vanora	1B Lady Audrey X 11 Triandrus calathinus
1A van Waveren's Giant	1C Empress X Seedling
3A Varna	3A Beacon X 2A Fortune
2A Vedette	3A Beacon X Yellow Trumpet
4A Vega	4B Minnie Hume X 1B Madame de Graaff
5B Venetia	4B Minnie Hume X 11 Triandrus calathinus
1C Vestal Virgin	1B Madame de Graaff X 1C Weardale Perfection

5A Vintage	1A King Alfred X 11 Triandrus calathinus
3B Viola	2A Princess Mary X 9 Horace
9 Virgil	9 Poeticus ornatus X 9 Poetarum
2A Vladimir	2A Gaiety X 1A Lord Roberts
2B Vogue	4A Lowdham Beauty X 3B Crimson Braid
4A Volga	1B Cameronian X 4A Slemish
2B Warlock	9 Chaucer X Leedsii Seedling
1B Whirlwind	1B Beersheba X 1B Kanchenjunga
1B Whitebridge	1B Corinth X 4A Naxos
5A White Cloud	4B Minnie Hume X 11 Triandrus calathinus
1B White Emperor	1C J. B. M. Camm X 1B Madame de Graaff
1B White Glory	1C Vestal Virgin X 1B Nevis
4A Whitehouse	2B Nissa X 4A Tenedos
2A Whiteley Gem	2A Hospodar X 2A Fortune
4A White Maiden	4A Felspar X 1B White Knight
5 White Model	1A Defiance X 1B Madame de Graaff
4A White Nile	4B Laughing Water X 1B Mrs. Robert Sydenham
4B White Owl	8 Scilly White X 4B Minnie Hume
4A White Queen	4B Minnie Hume X 1B Madame de Graaff
5 White Rose (Backhouse) ..	4B Minnie Hume X 11 Triandrus calathinus
4A White Sentinel	3A Beacon X Leedsii Seedling
3B Wildfire	2A Princess Mary X 2A Gloria Mundi
4A Wild Rose	4A Mitylene X 4A Evening
1C William Baylor Hartland ..	1C Ione X 1C Horsfieldii
2B Will Scarlett	1A Muticus X 9 Poetarum
1A Winkfield's Dower	1A King Alfred X 1A Lord Roberts
2A Yellow Moon	2A Jubilant X 3A St. Egwin
Zania	4A White Sentinel X 2A Killigrew
Zelza	3A Varna X 2A Porthilly
3 Zera	2B Lulworth X 9 Horace
1B Zero	1B White Frost X 4A Naxos
Zipper	4A Mitylene X 3B Sunstar
Zulu	4A Mitylene X 3B Sunstar
Zuni	4A Hera X 3B Sunstar

REVIEW OF THE GENUS HABRANTHUS

J. C. TH. UPHOF

The genus *Habranthus* was established by William Herbert (Amaryllidaceae, 156-170. 1837.). He recognized 22 species, and a number of varieties, which up to the present, with some further additions and eliminations of other species, have been reduced to 11 species, including one recently described, *Habranthus juncifolius* Traub & Hayward (Herbertia 12 (1945): 40-41. 1947.).

Baker (Jour. Bot. 7: 79-85, 1878) reduced the genus *Habranthus* to a subgroup (with 9 species) of the genus *Amaryllis* Linn. (under the synonym, *Hippeastrum* Herb.). However, Stapf (Curtis's Bot. Mag. t. 9126. 1926.), again restored the subgroup to generic rank. Sealy (Jour. Roy. Hort. Soc. 62: 195-209. 1937) verified the work of Stapf, and furnished an excellent diagnosis of the genus *Habranthus* Herb. Sealy's diagnosis is quoted below.

The practical gardener is as a rule not familiar with such developments, and the purpose of this brief review is to provide him with this information. There should no longer be any excuse for listing *Habranthus robustus*, for instance, under *Zephyranthes* in American trade catalogs. *Habranthus brachyandrus* however, is usually listed correctly.

Genus HABRANTHUS Herbert, emend. Sealy, 1937.

Spathe tubular and sheathing below, upwards free, unilateral and usually bifid but sometimes only partly split along the back and occasionally entire; peduncle normally one-flowered, sometimes two-flowered, very rarely up to four-flowered; bracts sometimes present, sometimes absent; flower oblique to declinate; perianth tube short; segments sub-similar or of four different sizes; stamens declinate; fasciculate, unequal, of four different lengths; stigma trifid, or capitate and trilobed.

The eleven species recognized in the present paper are native to temperate South America, e.g., Argentina, Uruguay and adjacent Paraguay and Brazil. One species is native to Texas.

1. HABRANTHUS TEXANUS Herb.

Habranthus Andersoni var. *texanus* Herb. Pl. 3596 Curtis's Bot. Mag. 1837. Herbert Amaryllidaceae. 168, 1837. *Atamasco texana* (Herb.) Greene; *Zephyranthes texana* (Herb.) Baker, Amayll. 33, 1888.

DESCRIPTION.—Bulb small subglobose, 1.5 to 2 cm. in diameter, neck 2.5 to 3 cm. long. Leaves 3 to 4, narrow linear, few, thick and firm, 5 to 10 cm. long. Scape slender, 10 to 20 cm. long, 1-flowered, terete. Spathe 2.3 cm. long. Perianth 2.5 cm. in length, yellow to copper colored, striped with purple on the outside; segment lobes cuneate, acute, 5 to 6 mm. wide. Capsule 1 cm. thick, 3-lobed.

NOTES.—Native to different parts of the state of Texas where this species is widespread, growing along gravelly hillsides, prairies, mesquite flats and sometimes on waste places, growing singly or in small patches. Bulbs are buried several cm. below the surface of the ground. It is called Copper Lily, Stagger Glass or Atamasco Lily.

This is probably only a variety of *Habranthus Andersoni* as indicated by the quotation from Curtis's Bot. Mag. t. 3596, under the following species.

2. *HABRANTHUS ANDERSONI* Herb. ex Lindl. Pl. 1345 Edward's Bot. Reg. 1830.

DESCRIPTION.—Bulb small, obovate, dark colored. Leaves narrow, linear. Scape one-flowered. Spathe bifid., light green below, upper part whitish; lower 2/3 tubular. Peduncle 2 dm. long. Perianth yellowish, darker striped, 3 to 3.5 cm. long; perianth tube 3 to 4 mm. in length and 2 mm. wide; lobes of the perianth 2 cm. wide; apex pointed with greenish tip. Filaments variable in length. Style longer than the stamens; stigma 3-lobed. The Botanical Register mentions var. *aurea*, var. *cuprea*, var. *obscura* and var. *brevilimba*.

NOTES.—This species with its golden or copper colored flowers was sent to Mr. Mackey by his collector Mr. Anderson with some other species derived from Montevideo, Uruguay, in spring 1929.

Along with the description of plate 3596 of Curtis's Bot. Mag. we find the statements: "Of this pretty *Habranthus*, four varieties are noticed by Mr. Herbert in the Bot. Reg., all apparently, from Montevideo. The plant must have an extended range. I possess specimens from Buenos Ayres gathered by Tweedie, from Araucania, S. Chile, by Mr. Reynolds; and Mr. Drummond sent the species from Texas (third collection, n.410 of dried specimens) which Mr. Herbert has pronounced to be the same differing slightly in the shape of the segments of the floral covering."

3. *HABRANTHUS BRACHYANDRUS* (Baker) Sealy, Journ. Roy. Hort. Soc. 62: 208. 1937.—*Hippeastrum brachyandrum* Baker Pl. 7344 Curtis's Bot. Magaz. 1894. Handb. Amaryllidaceae 42, 1888. Gard Chron. 2:154, 1890.

DESCRIPTION.—Bulb ovoid, tunicate, 2.5 cm. in diameter. Leaves 3 to 4 linear, pale green, glabrous, appearing before the flowers. Scape 30 cm. long, terminated into one flower. Pedicels erect, 5 cm. long. Spathe equally as long as the pedicels, one or two valved, tubular toward the base. Perianth funnel-shaped, about 7 cm. long; throat deep claret-red; segments pale pink, oblong-lanceolate, 2.5 cm. wide toward the middle; the upper half spreading when full flowering. Tube cylindric, short. Stamens reaching half the length of the lobes of the perianth. Anthers linear, versatile, large. Stamens and style of the same length. Stigma 3-lobed.

NOTES.—Baker states that the original herbarium plant which was described in 1888 was collected by Perodi along the banks of the River Parana, at the place where it leaves Paraguay to enter the territory of Argentina. Soon afterward bulbs were introduced from Buenos Aires by Mr. A. C. Bartholomew of Reading.

4. *HABRANTHUS VERSICOLOR* Herb. pl. 2485 Curtis's Bot. Mag. 1824.—Herbert. Amaryllidaceae 166, 1837.—Kunth Enum. plant. 5: 498, *Hippeastrum versicolor* Baker, Journ. Bot. 7: 82, 1878.

DESCRIPTION.—Bulb oblong, dark to almost black. Leaves 30 cm. long, 6 mm. wide, acute, three or more to each plant. Scape 10 to 12 cm. long before the appearance of the leaves, being reddish at first, becoming later on pale and greenish. Spathe red, 2 to 3 cm. long; peduncles 2.5 to 3 cm. long, pale green. Perianth 4 to 5 cm. long, red at first, later becoming white tinged with pink, especially toward the tip of the segments. Stamens 2 to 2.5 cm. long. Style 3 cm. in length; lobes of the stigma 6 mm. long, fimbriated.

NOTES.—This species is supposed to be native to Uruguay and Brazil, Herbert states that the bulb of the plant he described in Botanical Magazine was imported from Maldonado in South America. It flowered at Spofforth during January. He states that there is a four-fold diversity of the petals and in this diversity of the petals, he says, *Habranthus* agrees with *Hippeastrum* (= *Amaryllis*), however, the diversity of its filaments follow a different rule.

5. *HABRANTHUS ROBUSTUS* Herb. ex Sweet. Hort. Britt. ed. 2. 506, 1830. (Nomen).—Roemer. Syn. Monogr. 4: 100, 1847.—Lodd. Bot. Cab. t. 1761, 1831.—Kunth. Enum. Plant. 5: 498, 1850. pro parte.—Stapf. T. 9126 Curtis's Bot. Mag. 1926.—*Amaryllis robusta* Spach Hist. Veg. 12: 416, 1846.—*Hippeastrum tubispathum* Baker in Jour. Bot. 16: 416, 1878.—*Zephyranthes robusta* Baker in Handb. Amaryllidac. 35, 1888.—Pax. Engler Bot. Jarb. 9: 320, 1890.—Hicken. Chloris Platens. Argent. 70, 1910.—Hauman. An. Nac. Hist. Nat. Buenos Aires. 29: 277, 1917.—*Z. brachyandrum* W. Watson in Gard. Chron. 18: 132, 1895.

DESCRIPTION.—Bulbs globose, about 3 cm. thick; tunics dark-brown to almost black; collar to 4 cm. long, stoloniferous. Leaves succeeding the flowers, linear, obtuse, slightly channelled, 10 to 30 cm. long, 5 to 10 mm. wide, green, somewhat glaucous. Scape one-flowered, 10 to 15 cm. long, rather stout. Spathe tubular, about 4 cm. long, bifid along the upper third which is inserted 6 to 8 cm. from the top of the stalk. Perianth funnel-shaped, limb 6 cm. long, 8 to 10 cm. wide, light pink with white. Tip of the segments carmine, oblanceolate. Perianth outside toward the base greenish colored. Tube 2 to 4 mm. long, 5 mm. wide. Filaments declinate, two longest 4 cm., two shortest about 2 cm. long, the remaining intermediate. Anthers half-moon shaped, 4 to 5 cm. long. Style 5 cm. long, lobes of the stigma 3 mm. in length, recurved. Capsule 2 cm. thick, 3-lobed. Seeds 8 mm. long, 5 mm. thick, thin unevenly winged.

NOTES.—Native to Uruguay and adjacent parts of Argentina.

6. *HABRANTHUS SYLVATICUS* (Mart. ex Schultes) Herb. Amaryllidaceae 166, 1837.—*Hippeastrum sylvaticum* Baker Journ. Bot. 7:81. 1878.

DESCRIPTION.—Bulb globose, small. Leaves linear, narrow, longer than the scape, 30 cm. long, 2 to 3 mm. in width. Scape 10 to 12 cm. long, green. Spathe 3 cm. long, bifid for one third. Peduncles 2 to 2.5 cm. long. Perianth included, 5 to 6 cm. long; tube 2.5 to 3 cm. long, green with a thin faucial membrane. Limb funnel-shaped, purplish above, green below.

NOTES.—Has been reported by Herbert from Castingas, Bahia, Brazil, where it grows probably in the cooler regions of the mountains.

7. *HABRANTHUS GRACILIFOLIUS* Herb. T. 2464 Curtis's Bot. Mag. 1824.—Amaryllidaceae 165, 1837.—Kunth. Enum. Plant. 5: 497, 1850.—*Hippeastrum gracilifolium* Baker. Journ. Bot. 7:82, 1878.

DESCRIPTION.—Bulb oblong. Leaves linear, slender, nearly cylindrical, 30 to 45 cm. long; upper surface with a deep groove. Scape 16 to 20 cm. long, 1-flowered. Spathe green, bifid, tubular at the base. Perianth 2.5 to 3.5 cm. long; tube green; limb pale purple, expanding in the sunshine, closing at night. Stigma trifid. *H. gracilifolium* var. *Boothianus* Herb. Amaryllidaceae 165, 1837. T. 1967 Edwards Bot. Reg. 1837, is according to Herbert, a variety, while Booth considers this form as a distinct species. This variety flowered at Sir C. Lemon's garden about 1836 and is distinguishable from *H. gracilifolius* by "a rather longer peduncle, red on the germen peduncle and spathe, and the marked diversity of the filaments, but they are not exactly of two lengths in the specimen." (Herbert).

NOTES.—Native to Uruguay. Herbert reports that this little plant species was also imported from Maldonado in South America.

8. *HABRANTHUS CARDINALIS* (C. H. Wright) Sealy. Journ. Roy. Hort. Soc. 62: 208, 1937.—*Zephyranthes cardinalis* C. E. Wright. T. 8553 Curtis's Bot Mag. 1914; *Zephyranthes bifolia* (Aublet) Roemer, *Herbertia* 6(1939); 121-123, plate 149. 1940.

DESCRIPTION.—Leaves ligulate, acuminate, 12 to 14 cm. long, 6 to 8 mm. wide, somewhat keeled beneath and channelled above. Scape 10 to 11 cm. long, rose pink toward the base, the rest being green. Spathe rose pink, apex acute, its base being slightly flattened 12 to 16 mm. long. Perianth red, bent toward one side, bright red, funnel-shaped; tube 2.5 cm. long, greenish toward the base; segments somewhat spreading, oblong-ob lanceolate, thickened near the tip. Filaments reaching near or above the perianth-segments. Anthers oblong, violet. Ovary short, elliptic; stigma trifid.

NOTES.—Native to Santo Domingo.

Hume (*Herbertia* Vol. 6. 1939) places this species in *Zephyranthes* and he may be right in doing so. It is retained here tentatively. This is a border-line case that needs further attention.

9. *HABRANTHUS PEDUNCULATUS* Herb. Amaryllidaceae 161, 1837. *Habranthus bifidum* Herb. in Bot. Mag. t.2597. *Hippeastrum bifidum* Baker. Journ. Bot. 83, 1878, Handbook of the Amaryllidaceae 43, 1888.

DESCRIPTION.—Bulb globose, 1.5 cm. in diameter; scale dark brown; neck 5 to 7 cm. long. Leaves 2 to 3 linear, somewhat glaucous, 30 cm. long. They appear after flowering. Scape slightly compressed, 30 cm. long and 3 to 6-flowered. Spathe-valves 5 to 7 cm. long, lanceolate; pedicles 2 to 5 cm. in length, slender. Perianth bright red, erect or suberect, 4 to 5 cm. long; tube short, cornulate at the throat; segments oblanceolate-unguiculate, obtuse, 6 to 8 mm. in width. Stamens declinate, unequal, reaching about half the length of the limb. Anthers 3 mm. long. Style longer than the stamens. Stigma 3-lobed.

NOTES.—Native to the plains of Buenos Aires and Montevideo. This species was introduced in 1825 by Lord Carnarvon. It flowered during March. Baker states about this S. American species: "I cannot separate as species *Habranthus kermaduenus* Herb. (Bot. Mag. t.1638), *H.intermedius* Herb. (Bot. Mag. t.1148), *H.nobilis*, *nemoralis*, *spathaceus*, *angustus* (Bot. Mag. t.2639), *pulcher* and *pedunculatus* Herb."

10. *HABRANTHUS MENDOCENSIS* (Baker) Sealy. Jour. Roy. Hort. Soc. 62: 208. 1937. *Habranthus mendocinus* Philippi. Anal. Univ. Chile. 2:406, 1892. *Eustephia Macleanica* Baker. Ref. Bot. t.332 non Herb.

DESCRIPTION.—Bulb ovoid, 3 cm. in diam.; neck short; scales dark brown. Leaves linear, 30 cm. long, glaucous. Scape 15 to 30 cm. long, 2 to 6-flowered. Spathe valves lanceolate, 3 to 5 cm. long; pedicels 2.5 to 7 cm. in length. Perianth funnel-shaped, horizontal or ascending, 3 to 5 cm. long; yellow or red; tube short, greenish, crenulate at the throat; lobes oblong-lanceolate, pointed, 6 mm. wide. Stamens shorter than the perianth, declinate; anthers 3 mm. long. Style longer than the stamens; stigma 3-lobed. The var. *pallidus* Herb. Lodd. Bot. Cab. t.1760 possesses pale yellow flowers.

NOTES.—This species is native to the environs of Valparaiso, Chile. It was first illustrated by Louis Feuillée.

11. *HABRANTHUS JUNCIFOLIUS* Traub & Hayward, *Herbertia* 12 (1945): 40-41. 1947.

(The reader is referred to the original description in *Herbertia*.)

LINNAEUS CONFIRMS DR. HILL'S IDENTIFICATION OF *AMARYLLIS BELLADONNA* LINN.

J. C. TH. UPHOF

In 1940 (Critical Review of Sealy's "*Amaryllis* and *Hippeastrum*," *Herbertia* 6(1939): 163-166. 1940), I referred to Dr. Hill's, "Outlines of a System of Vegetable Generation, London, 1758," a work that was kindly lent to me by Dr. Hamilton P. Traub from his personal library. In this book Dr. Hill described experiments that were based on a plant that he definitely identified as *Amaryllis belladonna* Linn., by citing Linnaeus' phrase-name for that species, and page reference (p. 293.) to *Species Plantarum*, 1753. When I stated the case in 1940, I had overlooked a significant piece of evidence furnished by Carolus Linnaeus himself. In the second edition of *Species Plantarum*, 1763, an Appendix, pp. 1661-1682, consists of Addenda. It is important to note an item on page 1680:

Amaryllis Belladonna
Monographia System of Vegetable Generation. Lond.
1758. oct. t. 1-5.

Here Linnaeus definitely cites Dr. Hill's book, thus confirming the latter's identification of *Amaryllis belladonna* Linn., as the American

Belladonna. It is again obvious that this species cannot be at the same time also the South African, or Cape Belladonna which is now recognized as *Brunsvigia rosea* (Lamarek) Hannibal (syn.—*Callicore rosea* (Lamarek) Link).

One of Dr. Hill's illustrations (t. 1.), cited by Linnaeus, pictures a whole 2-flowered specimen of the American Belladonna. Linnaeus undoubtedly inspected this illustration and again there can be no question that he accepted this as representing the typical *Amaryllis belladonna* Linn. This also means that the phrase "*spatha multiflora*," as used in this connection, implicitly carries the meaning of "more than 1-flowered"; and the phrase "*corollis campanulatis aequalibus*" is used implicitly in the broad sense to include "lilium-like" flowers.

I am sorry that this reference was overlooked when the earlier articles were prepared, and it is published now so as to amplify the earlier presentations.

TERMINOLOGY FOR THE FLORAL ENVELOPE OF AMARYLLIDACEAE

HAMILTON P. TRAUB

In connection with the preparation of manuscripts on the *Amaryllidaceae*, it soon became apparent that the terminology in use, particularly in the case of the floral envelope, was inadequate. The types of the floral envelope in the *Amaryllidaceae* had not been definitely defined and were referred to either as a "perianth" or a "perigone," and the component parts were referred to as "perianth-segments," or "segments"; and "outer perianth-segments" and "inner perianth-segments." The same terms were used in totally different connections—where the parts of the envelope were free, or were united for part of their length below into a tube. It was therefore necessary to adopt an exact terminology.

It was evident that in the case of a large treatment of the *Amaryllidaceae* the constant repetition of such three-word-phrases to convey simple ideas would add materially to the cost, not to mention the ambiguous usage of the phrases. After some trials, therefore, the shortest possible terms were selected or coined, if none were available, to cover the needs. The terms and their meanings are classified in the key that follows:

KEY TO TERMINOLOGY OF THE FLORAL ENVELOPE IN AMARYLLIDACEAE

[The essential parts of the flower in general are the reproductive organs; (a) the ovule bearing organs (gynoecium), and (b) the pollen bearing organs (androecium), which may both be present in the same flower, or singly in separate flowers on the same or different plants; but (c) a floral envelope that covers the reproductive organs before the flower opens, may also be present or absent. In the *Amaryllidaceae*, the floral envelope is always present, and may be modified, as shown in the key below.]

1a. Flowers with floral envelopes :

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- [2a. Floral envelope consisting of distinct outer and inner partsI. PERIANTH
 3a. Outer, usually green, envelope1. calyx
 3b. Inner, usually colored other than green, envelope2. corolla
 (This subject is not considered here since it has no application to the *Amaryllidaceae*.)]

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- 2b. Floral envelope of similar parts (by evolution from type 2a), usually colored other than green (This is the kind of floral envelope encountered in the *Amaryllidaceae*)

II. PERIGONE

(The perigone in the *Amaryllidaceae* may be without or with appendages that may consist of fimbriae, scales, crown (corona), or cup, arising at the throat of the tepaltube. Such a modification of the perigone is termed a “*paraperigone*.” Similarly, the modifications of the gynoeceium and androeceium are referred to as “*paragynoeceium*” and “*parandroeceium*,” respectively.)

- 4a. Parts or leaves of the perigone free (not united at base, as in *Leucojum aestivum*)TYPE A perigone

The free portions of perigone, irrespective of origin

A-1. tepals

- 5a. Outer, or sepaline tepalsA-2. setepals

- 5b. Inner, or petaline tepalsA-3. petepals

- 4b. Parts or leaves of perigone united for part of their length below into a tube (as in *Sprekelia*) very short tube; and *Amaryllis solandriflora*, very long tube)

TYPE B perigone

- 6a. Tubular portion of perigoneB-1. tepaltube

- 6b. Free upper portions of perigone above tepaltube, irrespective of originB-2. telapsegs

- 6c. Free upper portions of perigone above tepaltube on basis of origin :

or sepaline

- 7a. outer/tepalsegsB-3. setepalsegs
 or petaline

- 7b. inner/tepalsegsB-4. petepalsegs

[1b. Flowers without floral envelopes :

(This subject is not considered here since it has no application to the *Amaryllidaceae*.)]

With reference to the use of the suffix “*seg*” (=segment), it should be noted that there are only a few obsolete usages of the word and no ambiguity can arise from that source. The word “*segment*” as applied to a portion of a tepal is the most apt one to use in this connection, but any combinations in which the whole word is used are too long, i.e., “*perigone-segment*” (14 letters), “*sepaline perigone-segment*” (23 letters), “*petaline perigone-segment*” (23 letters). By using the abbreviations “*se*” (=sepaline), “*pe*” (=petaline) as prefixes, and the suffix “*seg*” (=segment), these can be materially shortened,—“*tepalseg*” (8 letters), “*setepalseg*” (10 letters), and “*petelapseg*” (10 letters), respectively. At first these words may seem a little odd, but after a little acquaintance they do not seem out of place. The advantage is that they describe definite concepts concisely. It should also be indicated that the choice of substitutes based on the Greek words, “*petalon*” (=petal or leaf) and “*tmema*” (=segment) would indeed appear odd, and would not provide shorter words.

DEFINITION OF TERMS

[The terms preceded by an asterisk (*) are new.]

Perianth, the two floral envelopes, or calyx and corolla, when distinct and considered as a whole. Example: *Ranunculus bulbosus*.

Perigone, the two floral envelopes, or calyx and corolla, considered as a whole, when these have been so modified by evolution as to appear similar, but not necessarily exactly alike. Example: *Leucojum aestivum* (without tepaltube); *Amaryllis belladonna* Linn. (with tepaltube).

Tepal, a division of the perigone, sepaline or petaline in origin, when there is no tepaltube present.

**Setepal*, a tepal of sepaline origin.

**Petepal*, a tepal of petaline origin.

**Tepaltube*, a tube or cup made by the fusion of the lower portions of the tepals of the perigone.

**Tepalseg*, the free portion of a tepal when a tepaltube is present in the perigone.

**Setepalseg*, the free upper portion of a tepal of sepaline origin when a tepaltube is present in the perigone.

**Petepalseg*, the free upper portion of a tepal of petaline origin when a tepaltube is present in the perigone.

**Paraperigone*, a modification of the perigone other than that accounted for by the tepaltube and zygomorphy, such as appendages consisting of fimbriae, scales, crown (corona) or cup, arising at the throat of the tepaltube.

**Paragynoecium*, a modification of the gynoeceium with particular reference to the ovary and style.

**Parandroecium*, a modification of the stamens (androecium), particularly the filaments, such as teeth or a membrane between the filaments, forming in the latter case a staminal cup.

ZEPHYRANTHES LONGIFOLIA

HAMILTON P. TRAUB

Recently, Mr. O. F. Garrett, Horticulturist, Pecos, Texas, collected for Miss Willie May Kell bulbs of an amaryllid in the Davis Mountains, about 150 miles west of Odessa, Texas. Some of these bulbs were presented for the Society's trial collection, and proved to be *Zephyranthes longifolia* Hemsley.

According to Miss Kell, "Mr. Garrett at Odessa, Texas, collected these in the Davis Mountains about 150 miles west of Odessa. Mr. Hannibal immediately sent an air mail inquiry regarding them to Major Pam. . . . I wrote to Mr. Parks, the author of an article in 1937 *Herbertia*, and he was kind enough to answer me regarding these bulbs: 'The *Zephyranthes* from West Texas is probably *Z. longifolia*. I collected this species at Odessa and south and west to the Rio Grande and El Paso. It flowers after every little rain in low flat places. About the only difference one can see is that the leaves which come after the flowers have disappeared are 13—15 cm. long.' But mine do not quite answer to this description: the leaves are present in advance and along with the flower, they are 21—28 cm. long, by 3 mm. wide, and deeply grooved; the scape is 13.3 cm. tall; the flower is 2.9 cm. long, Dresden Yellow (RHS 64/2) inside, and (RHS 64/3) outside, and does not open wide, and only lasts one day."

Zephyranthes longifolia Hemsley is a relatively little known species for it requires an alkaline soil for good results, and soon declines when grown in the usual acid soil mixture. It can be maintained if liberal amounts of ground oyster shell are added to the soil mixture. This species has a very wide range including Texas, New Mexico, Arizona and Mexico, and it would not be extraordinary if it proved to be a polymorphic species with coexistent ecotypes or other contrasted forms, or even polytypic, with subspecies showing geographical replacement. But in spite of its wide range, however, the species is apparently quite uniform.

Zephyranthes longifolia was proposed by Hemsley (Diagn. Pl. Nov. 3:55.1880) on the basis of material in the Kew Herbarium from New Mexico and Mexico. Sereno Watson (Proc. Amer. Acad. Arts & Sci. 18: 161. 1883), under the synonym, *Z. aurea* S. Wats., gave the following description on the basis of material from Texas, New Mexico, Arizona and Mexico:

"Distinguished from *Z. texana* by the shorter and stouter peduncle (rarely over 2.5 cm. long), the yellow perianth of the same color outside or usually greenish, the capsule much larger (1.2 cm. long), and the larger seeds (6 mm. long)."

Baker (Amaryll. 33. 1888), recognized the species, and gave the following description:

"Bulb obovoid, 2—2.5 cm. diam.; neck 3.8—5 cm. long; leaves very narrow, contemporary with the flowers in summer, 15—23 cm. long; peduncle slender, 7.6—15 cm. long; spathe 2—2.5 cm. long, tubular in

the lower half; pedicel much shorter than the spathe; perianth 2—2.5 cm. long, bright yellow, coppery outside; tube short; segments unguiculate, 6 mm. broad; stamens much shorter than the limb; style trifid; capsule-valves orbicular, 6 mm. broad."

The following description is based on part of the living plants collected as bulbs by Mr. Garrett, and grown by Miss Kell in Northwest Texas and by the present writer in the greenhouse in Maryland:

"Leaves 3—7, usually 3 or 4, appearing with the flowers, 2.1—2.8 dm. (to 4.6 dm.) long, and 2—3 mm. wide, grooved on top; peduncle almost terete, up to 13.3 cm. at time of anthesis, but later elongating to 16 cm. tall, 3 mm. in diam at base, 2.5 mm. at top, reddish at base, green above; spathe 2 cm. long, fenestrated, united for $\frac{2}{5}$ its length below; pedicel finally 1.5 cm. long, 2 mm. in diam.; flower 2.9 cm. long, Dresden Yellow inside and outside, never opening widely, and lasting for only one day; tepaltube short; tepalsegs not unguiculate; capsule 1 cm. high, 2 cm. wide; locules of capsule orbicular, about 1 cm. in diam.; seeds numerous, 14 in each locule, black, D-shaped, 8 mm. long, 6 mm wide."

In spite of its wide range, *Zephyranthes longifolia* apparently does not show very great variation as indicated by the above descriptions. Only one *reported* variation is notable. Baker (1888) reports "segments unguiculate" (=tepalsegs claw-like at base). Baker apparently based his description on dried specimens and this may explain the difference. In the dried material the bases of the tepalsegs may have been shrunken to give the impression of being "claw-like." Only a further checking of material from a wider range can settle this point.

Although this is not a spectacular species, it might be used as the basis of a race of hybrid *Zephyranthes* that could be cultivated over the wide range of Texas, New Mexico, Arizona and Mexico. Many, however, will be satisfied to grow it as it has evolved in nature.

AMARYLLIS MORELIANA (LEMAIRE) TRAUB, COMB. NOV.

In 1841 Morel flowered in France a species of *Amaryllis* that had been collected by L. Linden in Brazil, with no definite local area indicated apparently. Lemaire (1845) described this species from a specimen furnished by Morel in whose honor he named it. This species was not accounted for by Baker (1878, 1888), and was omitted through an oversight from the revisions of the genus *Amaryllis* Linn., by Traub & Uphof (1938, 1940). A translation from the French is given under "Description" below.

Amaryllis Moreliana (Lemaire) Traub, **comb. nov.**

Syn.—*Hippeastrum* (*Amaryllis*) *Morelianum* Lemaire, in L'Hort. Universel, 4: 37-38, plate facing page 37, (labeled *Amaryllis* (*Hippeastrum*) *Morelliana*). 1845.

DESCRIPTION.—Bulb oblong, fairly large, green; leaves 6, elongated-elliptical, contracted, canaliculated and somewhat sheathing at the base, membranous at the margins, rather strongly striated, light green underneath, paler underneath where the mid-rib is strongly swollen and prominent, 4.5 dm. long, 4.5 cm. wide; peduncle subcylindrical, hollow, 5 dm. tall, umbel 2-flowered; spathe-valves 2, split to the base, light green, persistent, much longer than the pedicels which are rather short; ovary short, subtrigonous; flowers very large, star-shaped; tepaltube short, closed in at the throat by a paragerigone of an annular obconic greenish-white corona, which is formed by swollen scales; tepalsegs subequal, elliptic-oval, acuminate; setepalsegs with green points; all tepalsegs of a bright red ocher red, minutely veined with purple, from the center of the base of each tepalseg, up to half of the length, appears a pointed area of green, the six pointed areas forming a green star; style longer than the filaments, both colored violaceous-rose; anthers relatively large, versatile, colored a gay violet; stigma subtrifid.

RANGE.—Brazil (No local area indicated.)

NOTES.—The corona-like paragerigone closing in the throat places this species in the subgenus *Omphalissa* (Salisb.) Baker.

Although the descriptive article is entitled, "Hippéastre de Morel, *Hippeastrum (Amaryllis) Morelianum*," Lemaire, in the text, refers to the present species as a species of *Amaryllis* of the subgenus *Hippeastrum*. It is apparent that Herbert's nomenclature was not wholly acceptable to him. The plate, drawn by Aug. Dunénil, and colored by Maubert, is labeled *Amaryllis (Hippeastrum) Morelliana*. In the Index Kewensis, the name indicated in the title of the article, *Hippeastrum (Amaryllis) Morelianum*, is taken as the one accepted by Lemaire. This interpretation is accepted by the present writer. The name on the plate apparently was due to an error, for Lemaire could not accept both names at the same time. The new combination proposed by the present writer is therefore in order.

This is a very striking species and would be well worth cultivating. It is hoped that the Fosters will be able to re-introduce it when they make their next trip to Brazil.

—Hamilton P. Traub

GREETINGS TO DAYLILY ENTHUSIASTS

ELMER A. CLAAR, *Chairman*
Daylily Committee

After a succession of gorgeous spring flowers, followed by the incomparable flowering shrubs, daffodils, trilliums, tulips, the breath taking late May and early June irises, peonies, lilies and delphinium, do you feel morose? Is life an empty void with that gone, gone feeling? Do you philosophize as to the lack of permanence of the things that are so dear to all our hearts? Do you feel like the Chinese philosopher whose dragon is eternally chasing the flaming pearl as a symbol of man's striving after the unattainable?

No reason for this melancholy. A gardener's life need not be an empty void from late June, July and August until the fall favorites, the dahlias and the chrysanthemums, arrive.

Look up a daylily enthusiast. Visit his garden. Be careful! He has daylilyitis and it's contagious and infectious—and he believes he's having fun, all at the same time! Not only that, but he will wish it on you.

Note the diversity in the color range in daylilies—cream, yellow, orange, pink, red, purple, to almost black. Note the interesting combinations of these colors, the various forms and patterns, the giants and the dwarfs, the infinite variety.

If flower sentiment in other folks is just plain piffle to you, what you want is a flower with a future, with a growing public demand. Examine the facts. You will find the daylily is mounting in public favor faster than any other garden perennial. Acquire a few plants; watch them grow; show them to your friends and customers. Watch out! Penicillin and D. D. T. are no protection; nothing can help you. You've got daylilyitis!

I now assume you are mildly interested or you never would have read this far.

Have you observed that there is hardly an iris specialist or peony specialist who issues a catalog at the present time who does not also list daylilies? Many of the specialists in irises, peonies, and chrysanthemums also are devoting an increasing amount of time to hybridizing daylilies. This is natural inasmuch as no matter how much enthusiasm you have for the May and early June flowering perennials, they do not fill the void in your garden that daylilies fill in the latter part of June, July, and August.

Daylily enthusiasm has increased so much that a group of individuals in the Central States has organized the Midwest Hemerocallis Society. They already have had a daylily show, they have facilities to broadcast information about the daylily, and do so, and I understand their membership is growing by leaps and bounds. The best of luck to them. There is no question but that we can expect great things from this group. In addition, another group, led by Mr. Everett Lilly of Decatur, Illinois, has been expending a tremendous amount of work

with the object of organizing a national society devoted exclusively to daylilies. The more people that bear the torch, the sooner the merits of the daylily will be recognized. The best of luck to Mr. Lilly, his associates and supporters. I should like to see a daylily society in every state, county, and town in the United States.

The American Plant Life Society, the pioneer Society that has been popularizing daylilies, has at present trial garden collections of daylilies at:

The College of Agriculture, University of Florida, Gainesville, Fla., in charge of Prof. John V. Watkins.

The Department of Parks & Public Property, City of Des Moines, Iowa, in charge of Dr. Paul L. Sandahl.

The Department of Horticulture, Southwestern Louisiana Institute, Lafayette, La., in charge of Prof. Ira S. Nelson.

The Department of Agriculture, Cornell University, Ithaca, New York, in charge of Dr. Raymond C. Allen.

The Division of Horticulture, Texas Agricultural Experiment Station, College Station, Texas, in charge of Dr. S. H. Yarnell.

The Milwaukee City and County Parks, 714 Majestic Bldg., Milwaukee, Wis., in charge of Mr. Chas. E. Hammersley.

In addition, the Men's Garden Clubs of America have taken active steps to familiarize the public with the virtues of daylilies and have asked me to serve as CHIEF HEMEROCALLIARIAN for this organization. At present there are fifty-three garden clubs belonging to the Men's Garden Clubs of America and the president of each of these clubs is appointing a local chief hemerocalliarian, who is to acquire a collection of daylilies and emphasize the importance of this flower. Some of the letters from these local hemerocalliarians have been very enthusiastic and many of them have collections of considerable size.

The American Plant Life Society, the pioneer daylily organization, is making genuine progress in the compilation of a check-list through the enthusiasm of Dr. Norton, assisted by Mr. M. F. Stuntz.

In 1940, I attempted to classify the daylily hybrids according to the time of bloom and fundamental color. I also conducted a poll to determine the ten best daylilies in commerce over a period of three years, using a numerical rating system, with "A" as 95, "B" as 85, "C" as 75, and "D" discarded. I also attempted to conduct a poll to determine the first, second, and third best flowers in each blooming season and each color class for plants in commerce, over a period of three years. I sent these polls to all the individuals that I thought were interested in daylilies and who might be able to see a considerable number of plants. The results of these polls were published in HERBERTIA. It was a tremendous amount of work. I followed these experimental daylily polls in 1941 and 1942 along the same general lines.

Part of this was the system used by Mr. Kelso. After three years, I decided that the results of this plan merely pointed out the daylilies that were widely distributed. As a result, I next made a selection of the

daylilies that I liked the best in each blooming season and in each color class. I sent this list to the growers and hybridizers that I knew or that I had heard were growing a large number of plants or those who could see the latest introductions. The result was that very few of the most prominent daylily hybridizers replied to my inquiry. Part of this was due, I believe, to the fact that it takes a lot of time to compile a list like this, and also a hybridizer is reluctant to admit that his plant is not so good as someone else's introduction, after he has acquired a considerable stock of any one introduction. Therefore, not much was accomplished to change my mind about the plants that I had selected as best.

The list that I used in the 1944 *Herbertia* (pages 340-344) was cut down in an article in the April, 1945 issue of *Better Homes and Gardens*, in which I set out a list of daylilies in each blooming season and color class that I like best. In this article I attempted to divide these flowers into four groups, arranged largely according to the cost of the plants.

The first group was a recommendation to the individual who had never grown daylilies and who wanted a few for a small sum of money. Here is the list:

Early Bloomers—(before June 1 in Chicago suburbs)

Flava—lemon-yellow

Gold Dust—yellow, bronze back

Dr. Regel—orange

Intermediate—(between June 10 and 20)

Winsome—creamy yellow

Summer Bloomers—(approximately June 20 to August 1)

Hyperion or *Patricia*—light yellow

Golden Bell—yellow

Ophir—orange-yellow

Golden Dream—orange

Mikado—eyed variety

Cissy Guiseppe—red

Fulva—polychrome

Late Bloomers—(approximately August 1 on)

Multiflora Hybrids—various

The second group was based on the assumption that the individual was acquainted with daylilies, having acquired some of the old time, inexpensive types, and wished to add another dozen or so plants and keep the cost down to \$12 or \$15. The group includes:

Early—

Flavina or *Estmere*—yellow

Intermediate—

Queen of May—orange-yellow, large

Summer—

- Moonbeam*—cream-yellow, tall
Hesperus—tall, large medium-yellow, floriferous
Golden Bell—yellow
Mrs. A. H. Austin—orange
Golden West—large, showy
Linda, George Yeld, and Chengtu—Polychromes, beautifully patterned
Imperator—red-orange
Chisca—a bicolor and fascinating

Late—

- Dorothy McDade*—yellow, one of the finest of all.

The third group perhaps could have been omitted but it was a selection of the older introductions and plants with a relatively wide distribution in the newer colors of red, raspberry, pink, and purple. This group includes:

- Pastel pink—*Pink Charm*
 Raspberry—*Piquante*
 Rose—*Fulva Rosalind*
 Red—*Emperor Jones*
 Maroon—*Wolof*
 Ruby-red—*Royal Ruby*
 Purple—*Theron*

In the fourth group I selected my favorites among the Named day-lilies in each color class, irrespective of price. In the Better Homes and Gardens article, I restricted my choice to one or at most two plants so as to simplify the matter. This list was as follows:

Early—

- Yellow—*Earlianna* or *Elizabeth*
 Orange—*Judge Orr*

Intermediates—

- Creamy-yellow—*Winsome*
 Light yellow—*Little Cherub* (this is my seedling, so I'm prejudiced)
 Orange—*Queen of Gonzales*
 Red—*Wekiwa*
 Bicolor—
 Pastel—*Symphony*
 Strongly contrasting—*Zouave*
 Polychrome—*Domnion*
 Eyed variety—*Gay Coquette* (again my seedling)

Summer—

- Cream—*Vespers*
 Light yellow—either *Hesperus, Mission Bells* or *Mrs. B. F. Bonner*
 Yellow—*Anna Betcher*

Orange—*Majestic*
 Orange-yellow—*Golden West*
 Pink—*Sweetbriar*
 Raspberry—*Piquante*
 Purple—*Potentate*
 Rose—*Dawn Play*
 Red—*General MacArthur, Red Sox, or Tejas*
 Ruby Red—*Royal Ruby*
 Maroon—*Morocco Red* or *Wolof*
 Bicolor—
 Pastel—*Debutante*
 Contrasting—*Bold Courtier*
 Polychrome—*Painted Lady, Twinkle Eye* (mine), *Honey Red Head*,
 and *Dr. Stout* (all different and very good in my garden)
 Eyed variety—*Mikado*

Late—

August Prince

In checking over this list, there are only two substitutions I would like to make. In place of *Anna Betcher*, I would choose *Mongol* as a better flower, and in place of *Majestic*, I would select *Joanna Hutchins*.

As a result of these articles, I received numerous letters from individuals who wished to know where they could acquire these plants. I then got out a mimeographed sheet giving the names of the hybridizers who had made the crosses of the hybrids named. Most of the people wanted to know where they could buy these plants so in a second set of sheets I set out all of the commercial gardens (that I had listed at that time) where one might buy these daylilies.

I now believe I have a better approach to the matter, suggested by Mr. Ralph Wheeler. This year I shall ask each hybridizer to list the plants, if any, that he has originated, in each blooming season and color class, which he believes are better than or comparable to my choice of plants. I shall try this out in 1947.

The effort on my part to make such a selection perhaps is presumptuous and no doubt many would select other plants than those which I have chosen. Obviously, with the continued introduction of hundreds of plants a year, it is impossible for any one individual to see all the new introductions, and, in addition, if any two people did see them all, I know that there necessarily would be disagreement as to which was the best in a considerable number of plants. However, I have spent quite a bit of time at the various hybridizers' gardens in the southern, mid-western, and eastern parts of the United States, and have grown nearly five hundred named varieties of daylilies, so my selection is a starting point which does set a standard by which one can make comparisons. I only hope it will be helpful to those who are interested in acquiring daylilies. I also hope it will help to place a limitation on the number of new introductions. Unless a plant is better than one that has been selected in a given blooming season or color class, or in some other

important particular, there is no excuse for introducing it. In these groups, I obviously have not mentioned any unnamed seedlings and a considerable number of named flowers that I have not seen in bloom in established plants.

The daylily has proved to be one of the most stable of all perennials, in spite of the tremendous advances in some of the color classes. *Flava* has been in the United States for several hundred years and by any standard that you wish to use, the plant still is beautiful and worth growing. *Apricot* apparently was the first hybrid daylily of which there is a definite record. It was exhibited in London in 1892 as a seedling of George Yeld's. It still is worth growing. *Winsome* was mentioned in 1925 by George Yeld and is one of my favorites. I have seen nothing up to this time that would make me wish to discontinue growing any of these daylilies. This also is true of *Hyperion*, *Waubun*, *Ophir*, *J. S. Gaynor*, *Mikado* and many other daylilies that are old time favorites.

One of the pioneers among daylily hybridizers, Mr. Amos Perry, recently sent me a copy of a 209-page book which he calls his diary. It is a marvelous tribute to his scholarship, virility and enthusiasm as a plant specialist. It sets forth a Certificate of Appreciation by the Council of the Royal Horticultural Society to Mr. Amos Perry for his work as a HEMEROCALLIARIAN, dated July, 1943. This book also contains a reprint of a letter by the pioneer of all daylily hybridizers, that modest gentleman, Mr. George Yeld.

We all have much for which to be grateful to Mr. Perry. He sang the praises of daylilies when few had the inclination to listen.

In Volume 8 of *HERBERTIA*, which was a Daylily Edition, Mr. Perry says:

“*Hemerocallis fulva rosea*, a present from Dr. Stout, has worked wonders and transformed this genus—the second, third and fourth generations are wonderful—and I am of the opinion will be responsible for lifting this interesting genus from obscurity to one of the most popular of our summer-flowering border perennials.”

Pardon me, I have daylilyitis—I can't help it!

REGISTRATION OF NEW AMARYLLID CLONES

Descriptions of new clones of hybrid amaryllids for this section should reach the editor by September 1 if at all possible. Information sent after that date may be held over to the next issue if space is not available. This information is published to avoid duplication of names, and to provide a place for authentic recording of *brief* descriptions. Names should be as short as possible—*one word is sufficient*. It is suggested that in no case should more than two words be used.

At present there is a limit to the number of descriptions included from any one member. Not more than five brief descriptions of clones

under each generic heading will be published free of charge from any one member in any issue of HERBERTIA. Additional descriptions will be published in the advertising section at regular ad rates. The first five descriptions will appear in this section and the excess will be continued in the section entitled, "Buyers Guide."

HYBRID NARCISSUS CLONE

Introduced by J. S. Cooley, Berwyn, Maryland.

Canary Twins. An outstanding clone, 18 inches tall; umbel of two miniature trumpet type flowers, pedicels upright, ovary and flower only slightly inclined so that the twin flowers are in full view when one stands over them; flowers are for practical purposes a light Canary Yellow (RHS 2/1 to 2/2) self; tepal segments about 1 inch long, Canary Yellow (RHS 2/2,) trumpet slightly over 1 inch long, and about 1 inch across at the rim, Canary Yellow (RHS 2/1); moderately fragrant; flowers are of good substance and long lasting as cut flowers. Season; mid April to early May.

HYBRID AMARYLLIS CLONES

Introduced by Mr. Garnald D. Zeiner, Lost Spring, Kansas.

Crimson Comet; Reginae type A; 8 flowers; crimson with a yellow stripe down center of each tepalseg; flower 6½ inches in diameter.

Ruby; Leopoldii type A; 2 flowers; dark ruby; flower 6-5/8 inches in diameter.

Tippy; Reginae type B; 4 flowers; white with salmon stripes and tip on each tepalseg; flower 4-5/8 inches in diameter.

HYBRID DAYLILY (HEMEROCALLIS) CLONES

TRIAL GARDENS. Cooperative daylily trial gardens have been established at (1) *Cornell University, Dept. of Floriculture, Ithaca, N. Y.*; (2) *University of Florida, Dept. of Horticulture, Gainesville, Fla.*, (3) *Southwestern Louisiana Institute, Dept. of Horticulture, Lafayette, La.*; (4) *Whitnall Park Arboretum, Milwaukee City and County Park Board, Milwaukee, Wisc.*; (5) *Texas A. & M. College, Dept. of Horticulture, College Station, Texas*; and (6) *Des Moines Park Board, Des Moines, Iowa.* [Complete addresses are given under *Officers and Committees*, below.]

Introducers should send complete collections of hybrids to these cooperating agencies in order that the new daylily clones may be impartially evaluated.

Introduced by Ralph W. Wheeler, Winter Park, Florida.

Asia. As the name would imply this is a huge flower, opening flat with shallow throat, the segment tips being somewhat twisted. In color-

ing it is a glistening gold yellow with greenish tones. On the outside of the throat color, which extends well up the segments, there is a faint violet dusting. Sometimes the flowering stems produce proliferations. In Florida it does not bloom until late in June.

Aurora. This pale rose pink flower with slightly deeper coloring around the throat closely approaches a true pink self. The throat is yellow as also are narrow petal midribs, the cup of the throat being green. It is not a large flower nor is it a vigorously growing plant in Florida, however it is a recurrent bloomer here. The sepals are slightly recurved and the petals beautifully frilled. It has 30 inch stems.

Cerise. The strikingly beautiful coloring of this flower is produced by its rosy crimson pile on a ground of scarlet. In complete color harmony is the gold orange throat, the orange extending in lines through the sepal and petal centers. The fine form of the flower adds greatly to its beauty. It is compact with wide segments irregularly recurved and its petals are very frilled. Its stems are to three feet.

Cornell. A bicolor having petals of a fine, truly red color is something new in my experience. This flower is deep, rich crimson with light yellow sepals, throat and lines along the petal midribs. There is slight dusting on the sepals. The flower is medium large, wide segments tightly recurving from a compact throat, and has frilled petals. The stems are 32 to 36 inches. It makes divisions readily and is a recurrent bloomer in Florida.

Naranja. This is a clear, deep orange of clean color even deep in the throat. In happy contrast to my previous experience with large, deep orange daylilies, this flower opens perfectly and has great beauty of form. It has wide segments, the petals being $1\frac{7}{8}$ inches and the flower diameter 7 inches. The petals are frilled and are irregularly recurved while the sepals are regular. The stems are well branched and three feet tall. It blooms at mid season in Florida, four to six weeks later than *Aurantiaca Major*, and in only one year has it been a recurrent bloomer.

EDITORIAL NOTE.—The *Hemerocallis* clones, *Scarlet Sunset* and *William Penn*, introduced by Mr. Wheeler in 1946, will be described in 1947 HERBERTIA.

Introduced by Chas. E. F. Gersdroff, 1825 North Capitol St., Washington, D. C.

Day Dress. 38" ; 7", 12 hours, heavy substance, petals broad, ruffled edges, sepals medium broad smooth, even toned reddish orange, but not scarlet, opens mid-June (*Golden Dream* x *Calypso*).

Elizabeth Lapham. 40", $5\frac{3}{4}$ ", 24 hours, heavy substance, edges of petals ruffled, sepals fluted, all tips reflexed, full, self of glistening picric yellow to greenish yellow throat, opens early July (*Golden Dream* x *Calypso*).

Garden Bouquet. 40", 44 buds, heavy stalk, 4 $\frac{3}{4}$ ", 27 hours, heavy substance, broad dark green wavy edged foliage, pale lemon yellow to oil yellow throat, opens medium late June, (*Lemona* x *Calypso*).

Lady Elizabeth. 36", 5 $\frac{1}{2}$ ", 24 hours, heavy substance, (inform. intr. 1942); reflexed lily form, edges of petals crimped, self of lemon chrome, opens mid-June (*Lemona* x *Calypso*).

Lily Ruffles. 36", 5 $\frac{1}{2}$ " 18-23 hours, heavy substance, all segments heavily ruffled on edges, sepals orange to mars yellow (brownish orange), edged light cadmium, reverse deeper, edged amber brown, petals with raised mid-band, light cadmium with sheen of deep chrome, opens early July (*Fireglow* x *Vivid Sun*).

Introduced by Stanley E. Saxton, Faust, New York.

Zebra. A deep toned bicolor in tones of rust red and orange. The segments are regular and recurved, the petals being an ochre red tone with some rose infusion. The sepals are orange in sharp contrast. The plant is a very strong grower, increases rapidly and makes a colorful display even under adverse conditions. Scapes about 30" tall (*Cabellero* x *Goldeni*).

Introduced by E. J. Kraus, Univ. of Chicago, Chicago, Ill.

Flambeau. Height 36 inches. Leaves erect, recurved at tips, bright green, wide. Scape erect, 3 to 5 branched, 25 to 30 flowered, flowers borne just above foliage mass. Flower slightly pointed upward, tubular reflexed, six inches in diameter, segments overlapping, quick shedding. Petals 4.5 inches long, 1.25 inches wide, broadly oval, distal five-sixths bright grenadine red toned flame scarlet, veins very slightly darker, remainder orange. Sepals 4 inches long 1 inch wide, same color as petals. General effect in sun bright cherry red. Retains color and texture entire day. Odorless. Season July 1 to September 1, recurrent, free bloomer. Vigorous growth and propagation. Seedling of [(*Waubun* x *Rajah*) x (*Rajah* x *J. S. Gayner*)].

Vermilion Cliffs. Height 40 inches. Leaves erect, recurved at tips, wide, bright green. Scape stiff, erect, 2 to 4 branched, 20 to 25 flowered, flowers borne 6 to 8 inches above foliage mass. Flower faces directly outward or slightly upward, wide spreading, flat or slightly reflexed, shallow cupped, 7 inches in diameter; segments very broad and overlapping; quick shedding. Petals 4 to 5 inches long, 1.7 inches wide; very broadly ovate, distal half and lower margins clear bright vermilion, scarlet, toned grenadine red with clear orange throat. Sepals 4 inches long 1.5 inches wide, same colors as petals. General effect exceptionally brilliant vermilion scarlet, prominent orange throat. Stately and erect. Retains color and texture in bright sun. Odorless. Season first week in July to middle of August. Vigorous growth and propagation. Seedling (*Dauntless* x *fulva rosea*).

Pamela. Height 40 inches. Scape sturdy, erect, 3 to 5 branched, 20 to 30 flowered, rising 12 to 15 inches above foliage. Leaves wide,

glaucous green, upright, curving outward. Each flower 4 to 5 inches in diameter, short tube, wide-flaring flat cup facing directly outward. Petals 3.25 inches long, 1.25 inches wide, broadly oval, uniformly very pale buttercup yellow slightly darker at base. Sepals 3.25 inches long, 1 inch wide, slightly recurved, same color as petals, slightly darker at tips and basal margins. Slight, delicate odor. Thick waxy texture. Season July 5 to August 20. Seedling of *J. S. Gayner* x *Mrs. W. H. Wyman*.

Ute Chief. Height 40 inches. Scape erect, graceful, 3 to 4 branched 25 to 40 flowered. Leaves wide, dark green, upright, recurved at tip. Each flower long, tubular flaring, very slightly irregular, slightly pointed upward, quick shedding. Petals 4.25 inches long 1.25 inches wide long oval, distal three fourths nopal red indistinctly veined oxblood, with lighter midvein, deepening to oxblood toward top, scarcely discernible eye zone; throat deep orange. Sepal 4 inches long .75 inches wide tapering and slightly twisted towards tip, distal three fourths brazil red over cadmium, lighter at tip, inconspicuous oxblood eye zone. Remainder orange. Total effect rich brown red. Texture smooth, heavy. Odorless. Retains color in bright sun. Very free flowering. July 15 to September 1. Seedling of *Cressida* x *Rajah*.

Introduced by J. B. S. Norton, Hyattsville, Md.

Narcissa. Scape strong, 3 feet; flower funnel-form, full, 5 inch wide, chrome lemon with faint flush in throat, fragrant, day blooming; petals 1½ inches wide, sepals 1 inch. Blooming in July.

Bright Eye. Scape 2 feet; flower starlike, 3-4 inches wide, golden glow with narrow Eugenia red halo, slightly fragrant, day blooming, petals 1 inch wide, sepals ¾ inch. August blooming.

Phoenicia. Scape strong, 3 feet, flower open wide, the segments recurved, smooth, flower width 4-5 inches, day blooming; petals 1¼ inches wide, sepals ¾ inch; color cardinal. July and August blooming.

Decoration. Scape strong, 3 feet; flower full, wide spread, 4-5 inches wide; petals 1¼ inches wide, pepper red with wide light yellow center stripe; sepals over ½ inch wide, light yellow; day blooming in July and August.

Introduced by L. Ernest Plouf, Lawrence, Mass.

Mers-el-Kebir. 3 ft. July-Aug. Very full spatulate overlapping segments; small flower; fine waxy substance; good form; roundly and decidedly recurved; all segments crinkled on edges; soft peachy-orange slightly speckled; keeps well late. Outstanding as to substance, form and fullness.

Monotone. July. Large full 6 inch flower; smooth; tailored; well open; all segments even tone rich soft henna; deeper area; orange throat; good substance; round outline; outstanding in form, size and evenness of tone.

North Africa. July-Aug. The color of this variety is a reminder of the red North African soil; very full 6 inch flower; all segments

evenly toned deep henna; no midrib color; deep maroon zone on inner segments; orange throat; good substance, form and keeping quality; round outline; well recurved; medium throat expansion; outstanding for fullness and fineness in such a huge flower.

Oran. July. Bright heavily toned rich deep henna-red self; 5 inch well open flower; graceful and full; orange throat; no midrib color; heavy substance; chamois finish; round outline; good stem and branching; carries from a distance.

Sidi-bel-Abbes. 4 ft. July. All segments even tone deep rose-red; no zone; wide yellow throat; round outline; good form and substance. Named for the Algerian city, the home of the French Foreign Legion.

Introduced by Ralph M. Schroeder, Warrensburg, Ill.

Knighthood. (*Dominion* x Kraus' seedling). Velvety blackish crimson; throat orange with orange reverse on segments; segments wide; flowers 5½ to 6 inches across, up to 54 on a four foot stem, substance excellent; flowers lasting until after dark.

Introduced by H. M. Hill, Lafontaine, Kan.

Redwood. (*Dominion* x cross of *H. fulva* x *Persian Princess*). Scape strong, erect, many branched; flower red, fragment, 7 inches wide, throat yellow. Color better than parents, not so dark.

Introduced by J. C. Stevens, Greenville, N. Y.

Saladin. (*Rajah* x *Wolof*). Scape erect, slender, stiff, 4 feet high; flower full, recurved, day blooming, 4 inches wide, sun resistant, quick shedding, garnet brown, faint maroon eye.

Introduced by M. F. Stuntz, Williamsville, N. Y. [Originated by *G. L. Mac Alevy*.]

Roger Bacon. Scape erect, graceful, 3 feet; flower full, recurving, 5 inches wide, extended bloom, sun resistant, Ta-Ming yellow, garnet eye, July bloom.

Isaac Newton. Scape erect, heavy, many branched, 2 feet high; flower full, 5 inches wide, wide spread, extended bloom; petals tapestry red, sepals antique red, apricot midstripe in petals. July bloom.

Introduced by Four Winds Nursery. [Originated by *G. L. Mac Alevy, Snyder, N. Y.*]

Charles Darwin. Scape erect, graceful, much branched, 30 inches high; flower full, wide spread, day blooming, 3 inches wide, petals Burmese ruby, sepals same overlaid on Chinese yellow, sun resistant, July blooming.

Thomas Huxley. Scape erect, graceful, few branches, 3 feet high, flower starlike, wide spread, day blooming, 5 inches wide, Chinese yellow, July blooming.

Four Winds. Scape erect, slender, stiff, 30 inches high; flower starlike, wide spread, day blooming, sun resistant, bright red. July-August blooming.

Introduced by Mr. and Mrs. E. A. Taylor, Sharon, Mass.

Gilt Edge. (*Wolof* by red seedling). Scape erect, stiff, many branched, 4 feet high; flower starlike, wide spread, extended bloom, fragrant, 5½ inches wide, dark red, July and August bloom.

Introduced by Mrs. J. F. Emigholz, Cincinnati, Ohio.

Bold Warrior. Scape 40 inches. Broad overlapping petals, yellow overlaid Brazil red and garnet brown; sepals slightly flushed Brazil red; general effect, a rather bright Brazil red bicolor. July-August bloom.

Brick Rose. Scape 36 inches; flower 5½ inches wide; petals over one inch wide, vinaceous rufous, over antique red, with coppery overglaze and edge; throat deep chrome. May be described as a terra cotta with rose undertone. June-July bloom.

Flaming Glory. Scape 50 inches; flower 7½ inches across; petals 1½ inches wide, orange chrome, the crinkled edges touched rose; sepals lightly flushed orange rufous; a velvety flushing of English red over the flower deepening at the center; throat cadmium orange. A glowing dark scarlet with orange underglaze. July-August bloom.

Gold Coast. Scape 40 inches high; flower 7 inches across, petals 1½ inches wide, overlapping, deep orange gold. Widely branched with many buds. July-August bloom.

Luscious. Scape 44 inches; flowers nearly 7 inches wide, wide open, slightly recurving, petals 1½ inches wide, yellowish apricot with faint flushings and a banding of Etruscan red; throat lemon yellow, green at base. General color banded rosy light terra cotta of great charm.

Introduced by Robert Schreiner, St. Paul, Minn., [Miss Eleanor Hill, Tulsa, Okla., originator.]

Browneyed Susan. (*Chisca* x *J. A. Crawford* seedling). Early-midseason; pleasant golden yellow with markings of rich brown on each petal in the throat. Flowers again in the fall in the warmer parts of the country. 36 inches high.

Introduced by Alton R. Bowen, Pleasantville, N. J.

Aunt Jo. (*Red Bird* x *Miss Houston*). Scape 30 inches tall; petals pink with deeper eye zone; sepals pink; throat yellow. Fades but little in sun. Flower 4¼ inches wide.

Herman Kirscht. Scape 40 inches tall; flower 5 inches wide, petals wide, red, much recurved; sepals smaller, lighter, not recurved; throat yellow green.

Introduced by Hamilton P. Traub and J. S. Cooley.

Monterey; robust, flowers large, (color pattern 12 plus halo on tepalsegs); sepetalsegs Maize Yellow (RHS 607) slightly suffused reddish; petepalsegs near Mandarin Red (RHS 17) with narrow yellow strips in center, and edged Maize Yellow.

Corliss; robust; flower of good size and substance; color pattern semi two-toned distal (no. 3); ground color yellow, upper portions of tepalsegs Coral Pink (RHS 0619/2), iridescent in the sun, the petepalsegs deeper colored than the sepetalsegs; narrow orange stripe in center of petepalsegs; throat and lower portion of tepalsegs Indian Yellow (RHS 6/2). Moderately fragrant; early midseason.

Introduced by C. W. Culpepper, Arlington, Virginia.

Adventure (F-4 from Patricia x Stalwart); tepalsegs deep Chrome to Cadmium Yellow of Ridgway; flowers open widely, and tepalsegs are slightly reflexed, margins somewhat frilled; flower scapes 3 to 4 ft. tall; moderately still and well branched; midseason.

Big Glory (seedling of *Ophir* crossed with unnamed seedling); flower is Capucine Yellow to deep Chrome of Ridgway; semi-flaring, large, often having a spread of 7 to 8 inches; flower scapes sturdy and well branched; has same flowering season as *Ophir*, but is an improvement on that variety.

Albedo (complex ancestry, but having *Hyperion* admixture); flowering season is midseason late, the same as *Dorothy McDade*, but differs from it; tepalsegs are light yellow (close to Pinard Yellow of Ridgway), margins moderately frilled; flower spreading with a very short throat (tepaltube) in which there is almost no green; petepalsegs 1 to 1½ inches wide, and reflexed.

Acceptor (San Juan x Theron); sturdy and well branched; flower is Blackish Red-Purple of Ridgway; throat (tepaltube) light yellow; and light yellow line through center of tepalsegs; midseason, flowers opening over a very long period.

Introduced by Mrs. Bright Taylor, Ocala, Florida.

Rubaiyat, Height 36". Evergreen foliage. Flower 7", chimney red (Pl. 5 L 10). Petals 3⅞" x 1½"; sepals 3⅞" x ⅞". Throat star shaped, daffodil (Pl. 10 J 6).

Olive Baldwin, Height 36". Evergreen foliage. Flower round and regular with overlapping petals, 5" standing; basic color terra cotta (Pl. 4 D 12) with darker veining. Very wide petals—3½" x 1¾". Sepals lighter and narrower, recurved, 3½" x 1". Throat shading from sulphur yellow (Pl 10 J 1) to light chrome (Pl. 10 I 1), crinkled texture. Recurrent bloomer in Florida.

3. GENETICS AND BREEDING

COMMERCIAL BREEDING OF DAFFODILS

FRANK REINELT, *California*

Although I have grown Daffodils so far only as a hobby on a very modest scale, I would like to offer some experiences in breeding from the commercial point of view.

Commercial growers are necessarily specialized farmers who prefer to grow fewer varieties consistent in health and demand, as their object is primarily of a remunerative nature unlike that of an amateur who grows them purely for pleasure.

Great strides in development of a better flower have been made by breeders in the past, leaving us excellent material for continuation of their work. Literally thousands of varieties were introduced, only a few of which survived the test and reached popular commercial distribution. The reasons for this can be several. Many times sister seedlings of equal value were introduced under different names, one of which was very successful while the other soon disappeared. The man who controls the stock and launches them on their way has a great deal of influence. Large distributors naturally always push first the material they have most of, regardless of quality, and can popularize to some extent an inferior variety, but in the long run the sifting goes on and unless the new variety is better and possesses health and vigor beyond reproach the curtain goes down eventually.

Each year I notice some varieties disappearing from catalogs of specialists but more new ones showing up. Spectacular new advances are very rare—mostly they are slight improvements or variations of the old form, promising at best only a limited commercial run. The prices for novelties are usually high, being based on quality and scarcity, and the enterprising grower on the lookout for a good new variety is confronted with expensive trying out for himself which of the new varieties has the real goods. One cannot blame the majority for hanging on to the old standbys until competition forces them to do otherwise. A successful commercial variety must possess vigor and health which are the first and most important factors; heavy substance, good form, color and size are next in importance; the last perhaps are refinement and quality. The small garden amateur who is the chief ultimate consumer is not sufficiently educated to see much difference between so many varieties of identical color and form, as for instance yellow Trumpets. Many are more advanced and can afford to pay a higher price for better form, but there are only very few of those who can afford or will pay the high price of a recent novelty to enjoy its perfection. Since it takes a good twenty years from the time its maiden flower unfolded for a variety to be propagated on a sufficient scale to reach the general market, the graduation of price is necessary. During the

twenty years of the stock's passing from hand to hand many are left as casualties by the roadside.

As my education in Daffodils progressed I looked back upon times when I was enthused over a new variety, predicting its future only to change my mind in a season or two because of some factor overlooked in the first rush of enthusiasm. Experience is the only teacher, and one as he goes along becomes more and more critical before passing final judgment.

The most popular in demand and also most developed by breeders are the first five classes of Daffodils, namely Trumpets, *Incomparabilis*, *Barriis*, *Leedsii* and *Poets*. The English breeders who did most of the work maintained fairly strict rules as to form of the individual classes and strove mostly for perfection of form. This of course leads to the problem of great similarity, a complaint often voiced by growers. There is a decided necessity for more variation of form and color, however they should possess pleasing balance and maintain some resemblance to the Daffodil as a whole.

What constitutes good form is a matter of diversified opinion and depends on what one likes or dislikes. I have seen people go into ecstasy over a badly proportioned flower that I kept only for comparison as it had a huge cup with very poor perianth, while they passed up a lovely flower of smaller size near by. Great size has astonishing effects on the majority of people, breeders included; but unaccompanied by other qualities it has passing value only, as one soon gets tired of imperfection. Very large cups can be beautiful if they possess sufficient perianth for background.

Of present varieties in commerce a great many are beautiful and no doubt will enjoy a certain length of popularity before being superseded, but in the multitude there are only few flowers of first class breeding value from which the future progress will arise.

I have tested the majority of the best novelties in search for new and more promising parents. Some of these are very recent novelties, perhaps not sufficiently tried but nevertheless very outstanding.

California conditions of course are not perfect for growing Daffodils with the exception of the very early ones, but those that perform well in poorer conditions have more stamina and consequently are more promising as breeders.

When importing new stock from different localities some varieties do not perform normally often for several years until acclimatized, which is a bad factor from the commercial point of view, while others give normal flowers of their best under any conditions. Those of course are the real goods, having breeding value.

For practical purposes I group the large yellow *Incomparabilis* together with the Trumpets, as often very slight measurements in length of the trumpet assign their place in a group. The borderline flowers are better balanced usually than the full trumpets, and the majority of the best yellow flowers I choose for breeding are actually *Incomparabilis* although at first glance one would class them as Trumpets. Since they are the first to bloom of the larger forms, they herald spring and

to the majority of people they are the real Daffodils, which makes them the most important group of any.

After growing dozens of varieties for years I noticed that the class as a whole lacks sufficient substance and width of perianth to back most of the larger trumpets. Amongst the very early varieties none impressed me more than *St. Issey*, a borderline *Incomparabilis*, deep gold, of good form, fair substance and the tallest stem of any yellow of good quality. It is enormously vigorous and the fact that it is a week earlier than *King Alfred* makes it a strong contender for the first place so long occupied by this old favorite. I have chosen it as one of the best prospects for breeding yellows and the future will tell whether I was right.

Amongst the midseason varieties there are several possibilities. Both *Crocus* and *Trenoon* are of the deepest gold and heavy substance, the first rather short and inclined to stripe, the latter taller but not of as good a form. *Galway*, a newcomer I have had only for two seasons so far, impressed me most of any yellow. A borderline flower of very large proportions, fine form, tall stem and very thick substance, it is the most valuable addition I have yet for breeding yellows. It undoubtedly will make commerce as it is a magnificent garden plant. Another promising flower is *Golden Torch*. A flower with possible breeding value might be *Faithful*, a light yellow *Incomparabilis*, rather stiff looking but of enormous substance, a factor to be strongly considered.

Amongst the late varieties are the most refined show flowers, all rather short-stemmed and not too vigorous. *Cromarty*, in lighter yellow, and the deeper-colored *Kingscourt*, best of all the *Royalist* children, are perhaps the two finest of the group.

Of the short-cupped yellows the number one breeding prospect is unquestionably *St. Egwin*, as it combines great vigor, tall stem, large size, and beautiful form with the most refined quality of any yellow. Some excellent seedlings have come from it already, heralding a new giant race of *Incomparabilis* which will possess everything that it takes to make a good Daffodil.

Besides the above varieties I use a number of others for variation of form or other desirable characteristics they may have, but regard them as more or less of passing value only, although some of them may enjoy a certain commercial popularity for a time. Other breeders with different conditions certainly will form different opinions and select different varieties. How fortunate that we are not all doing the same thing as long as the goal remains the same, that of development of better varieties for the future.

White flowers are comparatively recent—little known by the general public but destined to be of great popularity once available in great quantities, and very valuable for florist work. *Beersheba*, the first white Trumpet of good quality, has now been superseded as a breeder; it also is a poor doer, and very short in California. *Tenedos* might still be worth using due to earliness and size, besides it has a tendency to breed pinks.

The most promising breeders are of course amongst the more recent and more advanced novelties. *Brunswick*, one of the earliest Leedsii, with good white perianth and cup edged with lemon ring, is a good prospect for breeding and a chance to succeed commercially, as it makes a beautiful and very lasting garden plant. *White House* may be worth using since it is tall, large and very smooth; if it had more substance it would be a first class variety. The best advance in early whites is perhaps *Zero*, a very large flower of fine form, good substance, and very white. A borderline Leedsii, with fine carriage, transmitting its whiteness to its progeny.

Of the midseason group I treasure *Polindra* a great deal because of its vigor, good form, stem and heavy substance. Performing perfectly season after season, it is an Incomp. with creamy white perianth and lemon cup, a very promising parent for strengthening the clearer whites, which are none too healthy. An intensely white flower of large size and good form is *Ludlow*, rather shorter of stem but certainly worth trying. *Broughshane*, the biggest of the White Trumpets, certainly impresses one with its size and enormous vigor and undoubtedly will have a great breeding value if reproduced in more refined editions.

Amongst the late whites *Cameronian* should have possibilities, being quite large, of fine quality and form. *Samite*, a little smaller, is the finest of the *Mme. Krelage* seedlings, possessing fine form, good substance and very beautiful texture. Since its pollenparent was *Beersheba* it is free from the blood both of *Askelon* and *Naxos*, from which two parents the majority of the finest whites were bred, transmitting a tendency to basal rot to their progeny. It may therefore be a good parent for offsetting this factor.

Mr. Wilson sent me a seedling bred by *Samite* pollen which is the finest and whitest Leedsii I have yet seen, with a beautiful perianth of substance as heavy as one could wish. Unfortunately the cup is sometimes imperfect, and it is not a good doer so will probably never be introduced, but it is an example of *Samite's* possibilities as pollenparent.

I have omitted a number of good white varieties which either had too many defects or were not sufficiently tried; my object was to mention those which are very white or others possessing vigor, stem, size, etc. which may contribute factors for producing whites with more resistance to basal rot.

Coming to colored flowers, which too are less known since the better examples are quite recent, we have a field which offers great versatility. The yellow *Incomparabilis* and *Barriis* with orange and red cups boast a very large number of varieties. *Fortune*, one of the earliest and largest, has undoubtedly a good commercial future since its constitution is quite faultless. As a breeding plant it has not given anything startling—itself it has only a fair quality, and the cup at best is only coppery orange. What we need is flowers with sharp contrast between the color of perianth and cup, both being of solid tone without fading a great deal. A few are here already and more are coming, but the field has great possibilities for the breeder. Of the *Fortune* seedlings the best I have

seen so far is *Hong Kong*. As large as *Fortune* itself, with shorter but better formed cup, quite orange red, it should have breeding possibility and a commercial future. With the advent of *Carbineer* came thick substance, and although itself it has not much color in its cup it gives excellent seedlings with very strong color and is still a good flower to work with. Mr. Richardson produced a series of brilliant seedlings from it, the best of which today is *Narvik*, not a very large flower but quite faultless in form, with tall stem and perianth of deep yellow with the reddest cup, bordering on crimson. The pollenparent was *Porthilly*, which has one of the reddest cups but rather weaker substance in the perianth. It was a happy combination as *Narvik* certainly inherited the best quality of both.

Other varieties which might have breeding value are *Diolite*, *Trevisky*, *Rustom Pasha*, *Market Merry*, *Royal Mail* and *Royal Ransom*.

The most difficult part of course will be to produce perianths of solid color, not of the transparent fading type of which we have so many now, with cups equally solid whether light orange or darkest red, and sunproof as much as possible. In cups too there is possibility for great variation of form and also frilling, which greatly enhances their value.

The colored flowers with white perianths including *Incomparabilis*, *Barriis*, *Leedsis* and *Poets* as a class offer perhaps the greatest possibility of color variation and new forms to be developed.

Pink cups, the newest advance in Daffodils, are still very rare and of inferior quality when compared with other classes. The first of its kind, *Mrs. R. O. Backhouse*, has been in commerce for quite a while but its breeding value is quite limited. To Australian breeders goes the prize for development of better pinks, of which *Pink o' Dawn* and *Dawn-glow* are the best so far introduced. The chief defects of the present pinks are insufficient substance and muddiness of the white color in the perianth.

Perhaps by combining the finest, whitest *Leedsis* of today with the *Poet* class one could produce a better base for future pinks. In most cases the pink is of coppery tone; to get real rosy pink one first has to eliminate all yellow, consequently only the whitest flowers, such as *Zero*, *Ludlow*, etc. should be used. From *Poets* or close relatives like the short-crowned *Leedsis* which have icywhite perianths there are bound to come colored *Leedsis* of good quality and exceptional whiteness, some of which should have the tendency to produce pink. It is a long-drawn-out process but the results should be worth it, and I can't think of any more beautiful combination than snowywhite perianth with clear rosy pink cup.

Another color combination amongst *Leedsis* are cups of cheesy buff tone. A good example of it is *Penvose*, with nice frilled trumpet-like cup. *Gertie Millar* produces this coloring some seasons. *Bread and Cheese* is perhaps the best flower of this class, having decided possibilities. Unfortunately the color is dependent on climatic conditions; in moist warm weather it is very good, in dry cold weather it is conspicuously absent. Some day varieties with strong buff trumpets retaining

the color are bound to appear, adding greatly to the variation of the Daffodil as a whole.

White flowers with orange or red cups are represented by a large number of varieties, many of very high quality with good commercial future, but only a small handful have top priority as breeding plants. The improvement most pending is the whiteness of the perianth and resistance to sunburn of the color in cups.

Since they are closer related to the Poets, the majority are late-flowering, with the exception of the Australian *Jean Hood*, which is very early. It is a good flower with fairly white perianth and nicely frilled orange red edged cup. Its breeding advantages are earliness combined with vigor and extremely long stem. Itself it may not make much of a commercial flower but its progeny certainly should. Of midseason flowers, *Hades*, with creamy perianth and cherry red cup, has proved a most valuable pollenparent for color and might still be worth using.

Amongst the late varieties are of course the best advances. *Coronach* and its child, *Matapan*, are the two varieties with the whitest perianths I have yet seen. The whiteness in both is even more intense than in most Poets, perhaps because of heavier substance giving it solidity and offering striking contrast to cherry red cups. *Limerick*, with nice white perianth and flat red corona, is perhaps the best of its type, with a good commercial future, since the color in the cup does not fade or burn.

Amongst the shortcrowned Leedsiiis there are several excellent flowers with high breeding value. My favorite is *Dreamlight*, much like a Poet, with white flat corona edged rosy red; since the yellow is eliminated from the base of the corona it should have a tendency to produce more delicate colored edges with an eventual goal of pinks and rosy red.

One of the most astonishing flowers ever produced, which in combination with Poets and colored flowers should have enormous value is *Green Island*. It has the most symmetrical and finest perianth yet produced, fairly white, of good substance, so wide that it forms an almost perfect circle. The large flat corona is ivory white with a lemon yellow edge. Quite stiff looking itself, nevertheless it offers great possibilities for developing an entirely new race of large flowers with large, flat colored coronas.

Conclusion: On the whole I have mentioned only a few varieties in each class, a decision I arrived at by eliminating point by point and considering every characteristic. The future advance no doubt will come from a very few parents, those that have what it takes to make a first class variety, and breeding the have-nots will give always only secondary quality slated for a very short run when introduced.

I dug my bulbs before I finished this article and after examining them carefully I had to eliminate a number of hopefuls as seedparents and confine them as pollenparents only, and then in a limited way. The White Trumpets and Leedsiiis have large soft scaly bulbs in most cases, subject to basal rot and other diseases. The mortality is high and the

tendency is apparent in their seedlings a great deal. Over half of them disappear during the four to five years after germination before they even bloom. The best smooth and hard bulbs are amongst the flowers with yellow perianths, especially of the earlier group. Breeding a hard smooth bulb should be a cardinal point for those who want to produce good commercial varieties. Personally I decided to use as seedparents only varieties which have the smooth and resistant bulb, and confine the doubtful to pollen only, as the progeny on the average inherits health more from the mother than the father.

The future certainly should bring us more vigorous, healthier and more beautiful varieties than we have now, as was the case in the past. The possibilities are unlimited; some day we shall have all those combinations of which we dream today. All it takes is imagination, lots of hard work, and long waiting—then when you get it, it will be already obsolete, because by that time you certainly will want something better, again created by your imagination.

PRODUCTION OF NEW NARCISSUS

EDWIN C. POWELL, *Maryland*

Although more than 7,500 *Narcissus* clones have been registered with the Royal Horticultural Society the production and introduction of new clones seems endless. Thousands of old clones have gone out of existence or are no longer obtainable and thousands of others have been superseded by better ones. Fortunately for amateur growers and the trade many of the newer kinds make their bow and soon pass on because they are not adaptable to either widespread popularity or cultivation. Some that succeed admirably in Europe have proved only commonplace on this side of the ocean.

A few American growers, both amateur and commercial, have taken up the breeding of *Narcissus* and have produced some outstanding clones. I was led into it nearly 25 years ago by a conversation with the late Dr. David Griffiths who, for many years, was in charge of the bulb investigations of the United States Department of Agriculture. I had then a collection of about 75 good popular clones, and he said to me: "Why don't you try breeding? What we need is good varieties produced in America and better adapted to American conditions." And so I began to cross the best clones that I had and each year added a few of the newer introductions that were promising as parents. Since 1925 I have made more than 5,500 crosses and produced more than 60,000 seedlings from which I have retained 70 for breeding, further testing, or introduction.

The aim of all breeders is, or should be, to produce clones that are superior to others in one or more important characters. If they are to become popular they must have strong constitutions, vigor, excellent substance, clear color, good form, and adaptability to grow well under

different conditions of soil and climate. Amateur growers especially are interested in new clones that will fill in the gaps in the flowering periods—later trumpets and earlier flowering Barriis and Poets.

The usual flowering season of *Narcissus* in most gardens covers a period of four to six weeks, but through a better selection of species and varieties it may be extended to eight or ten weeks. The first flowers



Fig. 164a. Hybrid *Narcissus*—*Katonah*; raised by Edwin C. Powell, Rockville, Maryland.

of *Chicopee* and *N. cyclamineus* opened in my garden on March 5 and 6, 1946, and the last ones, *N. recurvus* and *N. albus plenus odoratus*, faded on May 15. In 1947 the first two opened on March 25 and 26 and *Jonquilla Helena* was still in flower on May 27. A difference in the two seasons accounted for the difference in dates—1946 being unusually early and 1947 correspondingly late.



Hybrid *Narcissus*—two seedlings from the cross, *Tantalus* x *Jonquilla*. Photo by Edwin C. Powell.

One of the earliest most successful crosses was *Bernardino* X *Fortune*. From it I obtained 87 seeds and planted out 62 bulbs two years later. They produced a lot of fine yellow *Incomparabilis* with red or orange-red crowns from which I selected *Forber*, *Nansemond*, and *Pocahontas*. Some years ago I used the pollen of the species *Jonquilla*

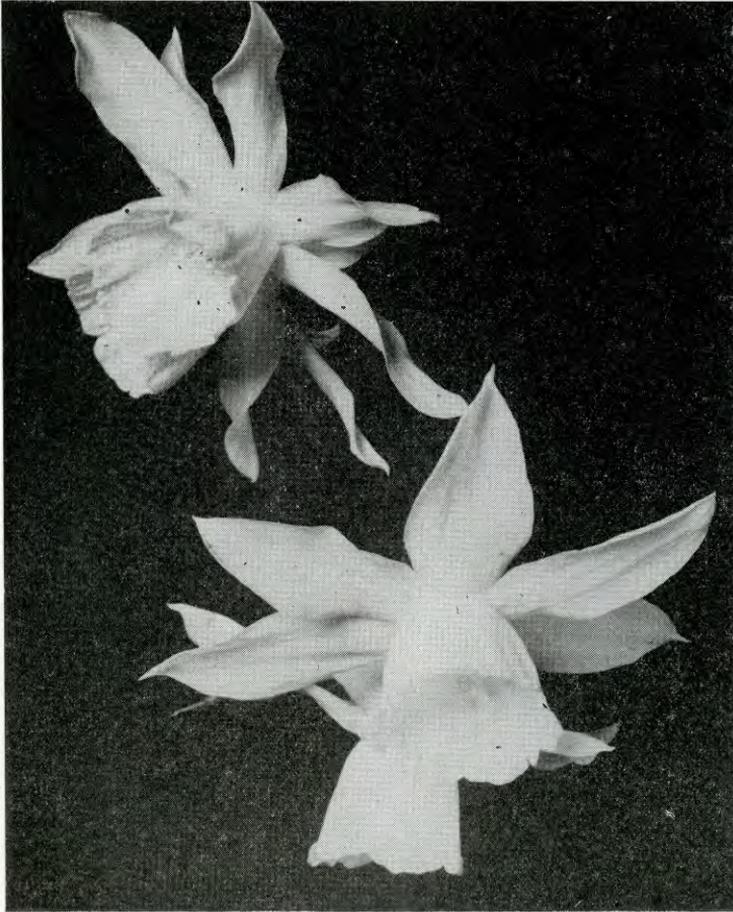


Fig. 165. Hybrid *Narcissus*—*Crystal Queen* X *Triandrus albus*; raised by Edwin C. Powell, Rockville, Maryland.

and *Triandrus albus* on quite a few clones (Fig. 165). The pollen of these is very potent. *Jonquilla* on yellow Trumpets or *Incomparabilis* generally produces yellow flowers of pleasing form and good substance, but on a white flower it may produce a white or cream-colored Jonquil hybrid. *Cheyenne* and *Kiowa* are two of this color, the former being particularly prolific.

Although *Triandrus albus* was used on several classes of flowers the best results were obtained from the Leedsiiis. Most of the seedlings were pure white and useful as garden flowers and for making arrangements because of their informal shape. However, I have two tall whites that appear promising, one good yellow, one with a primrose cup, and *Oconee* which has a flaring light yellow crown and produces two or three flowers on a stem.

Two outstanding clones are *Chicopee* and *Hiawassee*. The former is from *Obvallaris* X *Cyclamineus* and is the first variety to open, coming out either a day before or behind *Cyclamineus*. *Hiawassee* came from *Cassandra* X *Paper White*, grows 12 to 15 inches high and produces several small white flowers with pearl-colored cups on a stem.

Flowers that have a wide appeal and commercial possibilities have received the most attention. Other than *Hiawassèe* no attempt has been made to produce Poetaz clones, and there have been few seedlings in the Barrii class. There has been a goodly proportion of Trumpets, large-crowned Leedsiiis, some Poets, and a superabundance of Incomparabilis.

The production of seedling *Narcissus* has had its pitfalls and tragedies. About half of the crosses fail to set seed, and about half of the seeds fail to sprout, or the seedlings to reach flowering size. A tiny flower was produced by a *Cyclamineus* bulb the third year in a pot. A few flowers are thrown by fourth-year seedlings; about 50 percent bloom the fifth year and half of the others the sixth year. Bulbs that do not flower by the sixth year are now discarded as none had ever produced a worth while flower. The finest white Trumpet that I ever saw was noted one year in the seedling bed, duly marked, and then increased to four bulbs; all died before the next season. A tall and very large small-crowned Leedsii was increased to a dozen or more bulbs and then lost—a careless laborer when digging them placed the label in the lot behind it (which was discarded) instead of the lot ahead of it.

The technique of breeding is simple and easy to practice. Clones that are exceptionately good in one or more characters are selected as parents to be mated with equally good ones with the hope of intensifying some character, overcoming some weakness, or obtaining an earlier or later flowering variety—*Chicopee* as an example on the one hand and *Nakota* (the latest of the large-crowned Leedsiiis) on the other. The late Rev. G. H. Engleheart said: "The male is prepotent in determining both the form and color of the hybrid. In color this is most marked."

Early in the morning as the flowers open, in some clones before they open, the anthers are removed with the fingers or tweezers. Any that are wanted for their pollen to be used on later flowering varieties are placed on three-inch squares of leadfoil and when dry the foil is folded and placed in a coin envelope. As soon as the flower is deanthered, or shortly afterwards, the pistil is daubed with pollen, the bud sheath folded back, and a small stringed price tag, on which is written the number of the cross, is looped around the stem just below the ovary. The cross is recorded in the record book in which there are two extra

columns for the number of seeds gathered and of bulbs planted two years later. As the pollen is not wind-bourne and few insects visit the flowers there is little chance for stray pollen to fertilize the flower if it is promptly pollinated upon opening.

The seeds are gathered as they ripen and planted as soon as possible, those from each cross in a flowerpot in which is placed a metal tag with the cross number stamped upon it. The pots are plunged to their top in a frame where they remain until the bulbs complete two years growth. When the seeds begin to sprout in late winter the frame is covered with glass sash to prevent alternate freezing and thawing and the consequent heaving which would throw out the sprouting seed.

After the tops die down the second year the pots are lifted, the contents knocked out onto a wire screen, and the small bulbs and numbered tag picked out, counted, and placed in small containers (paper drinking cups) until planted out in rows in the garden. A hole is punched in the tag which is hung on a 12-inch No. 12 wire and set just ahead of the bulbs. Three or four years later when the first flowers appear the most promising are selected, duly lifted for testing, and to increase the stock for such purposes as may be considered desirable. From the hundreds of seedlings there will be many fine ones and few poor things if good parents are selected. It is a long wait between making the cross and appearance of the flowers, but if some crosses are made each year the time lag does not seem so important after the first crop of seedlings flower.

A FEW NARCISSUS CROSSES

C. W. CULPEPPER, *Virginia*

My interest in growing *Narcissus* from seeds was stimulated by the excellent results obtained by Mr. E. C. Powell in a locality not far from my own. The limited amount of time available for making the crosses and growing the plants to maturity made it necessary to adopt a very simple procedure. Consequently it was decided to limit the crosses to two varieties; *Fortune* and *Dick Welband*. It was thought that crosses of these two varieties might result in seedlings with large red-crowned flowers that would hold up better in this locality during periods of hot weather than existing varieties. As my stock of the two varieties would have to be limited it would be necessary to repeat the cross year after year for a number of years in order to get a sufficient number of seedlings to be reasonably sure that there was a good chance for the best combinations to appear.

To begin the experiment bulbs of each of the two varieties were secured and planted in large pots and kept in an unheated pit greenhouse during the most severe part of the winter. In spite of efforts to get them to flower at the same time *Dick Welband* flowered a few days after *Fortune* but *Fortune* still looked to be in good condition and the pollinations were made both ways. No seed set with either variety. With confidence that a better adjustment of the time of flowering could

be made another season the same procedure was followed the second year. Three flowers of *Fortune* and two of *Dick Welband* opened at nearly the same time the second year and the flowers of each variety were pollinated with the pollen of the other. Again no seed was produced. It was evident that nothing could be accomplished if seed could not be obtained. Without bothering to figure out the cause of the failure it was decided to change the procedure. The bulbs were planted outside in good garden soil. The unemasculated flowers as soon as open were pollinated with the pollen of the variety *Red Cross* and two to four days later the pollen of *Hades* was applied to the stigmas of the same flowers. This very unorthodox method, however, did result in a good set of seed with *Fortune* and a very few seed with *Dick Welband*. The same procedure was adhered to for the following five years. Several hundred seedlings of *Fortune* have now flowered. Only a very few seedlings of *Dick Welband* have been raised to maturity and they have been an uninteresting lot.

The *Fortune* seedlings varied rather widely in many characteristics such as time of flowering, height of stem, character of foliage, and size, form and color of the flowers. A large part of them were red crowned types, many of which might be considered superior to *Red Cross* and *Hades*. Many of them have had much more red in the crown than is the case with *Fortune*. Among the seedlings are individuals that are practically identical to such varieties as *Whitely Gem*, *Damson*, *Rustom Pshaw*, *Fortunes Bowl*, *Fortunes Crest*, *Fortunes Blaze* and *Red Abbott*. I do not consider any of the seedlings to have the all-round excellence and garden usefulness as *Fortune*. Whether any of the seedlings are better suited to the climate of this locality than the varieties already introduced will have to be decided in the future.

During these years the bulbs of these varieties have increased greatly so that I now have an abundance of flowers not only for crossing but for cutting as well. In the meantime I have disposed of sufficient bulbs to return the high price paid for the original bulbs.

The program has been much expanded during the last few years. Some of my own seedlings as well as other *Fortune* seedlings on the market have been used in crosses both ways with *Fortune*. Some crosses have also been made among the yellow trumpets. I would particularly like to secure a very late yellow trumpet superior to those that exist at present. *Lucinius*, *Statendam*, *Megaphone* and *Robert Sydenham* have been used. Some crosses with white varieties have also been made using *Ada Finch*, *Beersheba*, *Kantara* and *Brunswick*. I wait anxiously for these to come to flower.

Although there is a very long wait after crosses are made before results can be seen I think that crossing *Narcissus* will give one as much fun and excitement as can be had from crossing any other flower.

NARCISSUS BREEDING BY AN AMATEUR

W. R. BALLARD, *Maryland*

Two problems confronting the beginner in trying to develop new seedling *Narcissus*, is to determine (1) what crosses will produce seed, and (2) what crosses will result in worth while progeny.

In the first case there is too little authentic data in the literature to use as a guide, and what one does find is not always reliable for his conditions. Whether a particular variety will set seed often hinges on the source of the pollen. I have made repeated attempts to get seed from *Mrs. R. O. Backhouse*. This spring (1947) I tried again with pollen from *Hades*, *Mayflower*, *Central Park*, *Actaea*, *Gallipoli*, *Green Mantle*, *General Pershing*, and *Bulbocodium conspicuus*. The only success was secured in the last named cross—one pod was secured which ripened 3 seeds. Whether these will germinate remains to be seen.

On the other hand, *Lovenest* sets seed rather freely. In my crosses this year good results were had with pollen from *Hades*, *Beersheba*, and *Stresa*. In previous years I have used pollen from *Ada Finch* quite satisfactorily.

As a rule it is not too difficult to get seed to set on *Beersheba*. This spring I used successfully *Ada Finch*, *Lovenest*, *Gertie Millar*, and *Stresa*.

One can sometimes take advantage of abnormalities in seasons to make certain crosses made possible by overlapping of flowering periods which would not normally occur. Generally *Fortune* with me blooms so early that I do not have much of value from which to secure pollen, or suitable varieties upon which to use the pollen of *Fortune*. This spring I secured 5 pods and 30 seeds from *Fortune* x *Ada Finch* and 4 pods and 65 seeds from *Ada Finch* x *Fortune*.

It might be of interest, if I had room, to tabulate all the crosses made showing the varieties used, the number which set seed and the number of seed secured. However, of the 99 crosses made, 50 set seed, and the total number of seeds secured was 2358.

The amateur is often handicapped at first by having limited stocks of the better varieties and this precludes securing large quantities of seeds from particular crosses. Perhaps this is just as well until such time as he can begin to determine which combinations hold the greatest promise. I have been going on the theory that even the experts do not know all the best combinations, so I go merrily on effecting all sorts of combinations depending on the particular varieties which may be in bloom at the same time. If some of them turn out satisfactorily, I shall be content, for one can learn as well from the failures. It sometimes pays to be ignorant for, if he does not know that certain crosses cannot be made, he tries them any way and may have some unexpected successes.

It is obvious that one should start with the best varieties that he

can afford to buy. However, most of the varieties are more or less hybrid in make-up and may carry latent characters which might be expected to appear occasionally from unpromising material.

To the beginner four or five years seems a long time to wait for the first seedling to bloom, but after having possessed himself in patience through this period, the way is happier from then on because he can look forward to some new appearances each year.

The crucial time comes when he must evaluate the new arrivals—to do this satisfactorily he needs to know something of the high standards reached by other breeders. It is only by comparison with the best that exist that the merits of the new seedlings can be ascertained. One cannot hope to buy all the latest introductions or even to visit plantings where they are blooming. One is fortunate if one can have those who are familiar with the advances made by other breeders to look over the new seedlings and to indicate what looks promising. With experience one can learn to form one's own judgments. As with other types of flowers, one will find plenty of good seedlings, but not many that are good enough to name and introduce to the trade. However, there is immense satisfaction, as far as his own garden is concerned, to have some seedling "just as good" even though not better than the best.

If all goes well I shall have my first seedling of the present series in bloom in the spring of 1948. (I did have some years ago a nice lot of seedlings from a cross of *Van Waveren Giant* x *King Alfred*). It will take several seasons, presumably, to get a good line on the combinations having the most promise and by that time one's own seedlings will no doubt enter prominently in the future crosses to be made.

One advantage which *Narcissus* breeding holds for the amateur is that he can raise a large number of seedlings on a relatively small plot of ground. It is not at all difficult to handle the seedlings. With small lots of seed, I use tin cans with the tops and bottoms removed. These are placed in a cold frame and filled with a mixture of sandy soil and leaf mold. The seeds are planted usually in October and covered about an inch deep. Germination is generally good early the next spring. Seedlings are allowed to stay in the cans through two growing seasons, then are transferred to well prepared beds where they are to bloom.

In preparing these beds I like to dig off the first four or five inches of soil and throw this to one side. Leaf mold and a good complete fertilizer is dug into the bottom of the beds, the surface levelled off and the 2-year bulbs put in place about four inches apart. The top soil is then put back to cover them.

Plant breeding is a fascinating pursuit for the appearance of the new seedling in bloom gives an added zest to the art of gardening. There is ample room for many more amateurs to take up this interesting hobby. They may never have the thrill of seeing some fine morning a seedling of theirs so outstanding that it will take its place along with the very best, but they can have a lot of fun just the same—and the *Narcissus* is a good place to start.

EXPERIENCES IN BREEDING NARCISSUS

J. S. COOLEY, *Maryland*

Some years ago I became interested in breeding *Narcissus*. In any breeding program one soon develops certain objectives, and then bends all energies towards getting plants that he likes and that have certain characters which he hopes to recombine in the seedling plants grown from these parents. When one starts to cross these clones having desirable characters one soon learns that many of them will not set seed. Much of the present writer's time and effort in the beginning was wasted trying to use as seed parents clones that do not set seeds. For example he tried to use *Dick Wellband*, *Francisca Drake*, *Firetail* etc., as seed parents, but with failure to get results. In this location there is much better seed setting in some years than in others. Rather than keep trying to get slightly compatible clones to cross it seems preferable to use for seed parents those that will likely set seed even if they do not have all the desired characters. In many cases one will therefore, have to rely largely on the male parent as the carrier of the important character most desired. When one gets some of this progeny to bloom one can then start back crossing and selfing. The experienced breeder perhaps knows what parents are useful for his needs. The beginner may want a list of clones that will usually set seed. The writer has successfully used the following as seed parents: *Love Nest*, *Pilgrimage*, *Alcida*, *Lucinius*, *Horace*, *Sonata*, *Whitely Gem*, *Beersheba*, *Kantara*, *Tunis*, *Damson*, *Daisy Schaeffer*, *Dawson City*, *Alasnam*, *Henry Fielding*, *Obvallaris*, *minor*, *King of the North*, *Fortune*, *White Emperor*, *Gertie Millar*, *Golden Harvest*, *Triandrus Albus*, *Mitlylene*, *Havelock*, and *Stressa*. These clones probably have been used many times in breeding work and the immediate progeny likely will not be different from what we already have. One can however start with such plants having some desirable quality for the objective in view and use the progeny for further crossing and thus build towards the ultimate goal.

A little seed was obtained the first year of my breeding works. There were however many failures. Along with the problem of learning how to obtain seed set was the problem of learning how to grow seedlings with little or no special equipment.

There are many pitfalls in the growing of *Narcissus* seedlings. The early attempts at growing seedlings were sometimes successful but often they were complete failures. The seed was sowed outside and this is probably a part of the explanation for the failures. Several different methods of growing seedlings have been tried during the years I have been interested in breeding *Narcissus*. The seed was sown (1) in a bed outside as soon as harvested; (2) in flats as soon as harvested; (3) outside in flats in November; (4) in a bed in November; (5) in flats as soon as harvested and placed in a cold frame in Nov.; (6) and in flats in a cold frame in Nov. The method that has been most universally successful with our soil and climate has been to sow the seed as soon as

harvested in rich soil in a wood flat 6 inches deep having a hardware cloth bottom. The flat is left outside under a tree till fall when it is placed in a cold frame, care being exercised to keep the seeds moist during the winter months. The seedlings usually begin to emerge in February. By this method of sowing the seed a very high percentage of germination is usually obtained. About May 1 when the cold frame



Fig. 166. Hybrid *Narcissus*—*Canary Twins*; raised by J. S. Cooley, Berwyn, Maryland.

gets too warm the flats are moved out of doors and are plunged in the soil level with the top of the ground. After the tops of the bulbs die down at the expiration of the 2nd or 3rd. summer the bulbs which are often no larger than peas are sieved out and planted in fertile soil in a bed. The bulbs are set 2 to 3 inches apart in rows that are spaced 6 to 8 inches. As soon as they are planted cow peas are sowed over the bed to serve as a cover crop. The bulbs are left here undisturbed until they bloom. In the meantime cow peas are sowed over the bed each year when the tops of the bulbs are about ready to die down. The

rank growth of cow peas serves several useful purposes, namely, it keeps the soil cool, prevents the growth of weeds such as crabgrass, chick weed and other noxious weeds; it also provides humus and helps to increase the soil fertility and also keeps the soil loose and mellow so that cultivation is scarcely necessary.

Most of the bulbs have bloomed after growing in the bed for 2 to 3 years. The total time required from seed to blooming is 4 to 6 years. By this time the plants that are good enough to warrant further observation are removed and kept for further breeding, and the rest are destroyed. In later years the good ones from this lot are put aside for still further observation.

Although there is a long wait of 4 to 6 years before one can see the results of any one's breeding work this should not deter one from engaging in such a project. If one will persist in the work and make some crosses each year and start some new seedlings, one will then have a new batch of seedlings each year to bloom for the first time after the 4th year. Then one perhaps does not realize that the plants that bloomed this year were the result of crosses made 4 or 5 years ago. No matter how low the probability is of getting an outstandingly good flower one is always expecting it to appear—if not this year surely it will the next year. There are usually a number of seedlings that are good—in fact as good as some named clones, but they are not good enough nor are they sufficiently better than the existing named clones to justify introducing them. Of outstanding seedlings selected up to the present time, the following may be mentioned.

Canary Twins (Fig. 166). An outstanding clone. 18 inches tall; umbel of two miniature trumpet type flowers, pedicels upright, ovary and flower only slightly inclined so that the twin flowers are in full view when one stands over them; flowers are for practical purposes a light Canary Yellow (RHS 2/1 to 2/2) self; perianth segments about 1 inch long, Canary Yellow (RHS 2/2), trumpet slightly over 1 inch long, and about 1 inch across at the rim, Canary Yellow (RHS 2/1); moderately

[Continued on page 185.]

4. AMARYLLID CULTURE

[REGIONAL ADAPTATION, SOILS, FERTILIZATION,
IRRIGATION, USE IN LANDSCAPE, DISEASE
AND INSECT CONTROL, ETC.]

NARCISSUS DISEASES

CHARLES J. GOULD *

The narcissi or daffodils grown in commercial fields and amateur gardens in the United States rank among the world's best. Like other flowering plants, however, daffodils are subject to certain diseases which are usually caused by fungi (molds), viruses, or nematodes (eelworms).

Eight diseases occur more or less frequently throughout the United States on daffodils. One of these is caused by a nematode, two (Mosaic and Decline) by viruses, and five (Basal Rot, White Mold, Scorch, Fire and Smoulder) by fungi. The two most commonly found to be serious are probably Basal Rot and Nematode. These eight diseases may often be distinguished by the appearance of affected leaves as follows:

Key to Leaf Diseases

1. Leaves yellowed and stunted, bulb affected with a soft, chocolate-brown rot. (Plate 299)*Basal Rot*
2. Leaves brown and "crumpled" or sickle-shaped as they emerge from the ground, dead areas sometimes covered with a velvety-gray mass of spores. (Plate 300)*Smoulder*
3. Leaves with definite dead tips or spots.
 - A. Spots reddish-brown, most frequent near ground level, appearing after flowering and sometimes causing leaves to collapse. (Fig. 167(1)*Fire*
 - B. Leaf tips dead and brown, sometimes covered with a white mildew-like layer. (Fig. 167(2)*White Mold*
 - C. Leaf tips dead early in season, yellow, red or brown in color and bearing numerous small dark "pimples" (pycnidia); reddish-brown scab-like spots often present below tips. (Fig. 168(A)*Scorch*
4. Leaves mottled in color.
 - A. Yellow-green mottles or streaks scattered on leaves. (Fig. 168(B)*Mosaic*
 - B. Yellow, purple or white narrow streaks, sometimes dead, tan tips. (Fig. 169)*Decline*

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5. Leaves distorted and exhibiting yellow-green pimples (spikkles). (Fig. 170) *Nematode*

In the following pages these diseases are briefly described. Their control is summarized at the end of the article.

BASAL ROT

(Caused by *Fusarium oxysporum* f. *narcissi* (C. & M.) Syn. & Hans.)
[See Plate 299.]

Symptoms

The bulb is partially or entirely decayed with a soft chocolate-brown or reddish-brown rot; shoots arising from diseased bulbs are sometimes stunted, turn yellow and die prematurely.

SMOULDER

(Caused by *Botrytis narcissicola* Kleb.) [See Plate 300.]

Symptoms

Tips of young leaves are crumpled, yellowed or browned and dead; older leaves may be affected with a wet, pinkish-brown rot on one side which makes them sickle-shaped; gray masses of spores are often present on diseased areas.

FIRE

(Caused by *Sclerotinia polyblastis* Greg.) [See Fig. 167(1).]

Symptoms

Flowers exhibit small, watery spots; on leaves the spots are a bright yellow, chocolate or reddish-brown in color.

WHITE MOLD

(Caused by *Ramularia vallisumbrosae* Cav. [See Fig. 167(2).])

Symptoms

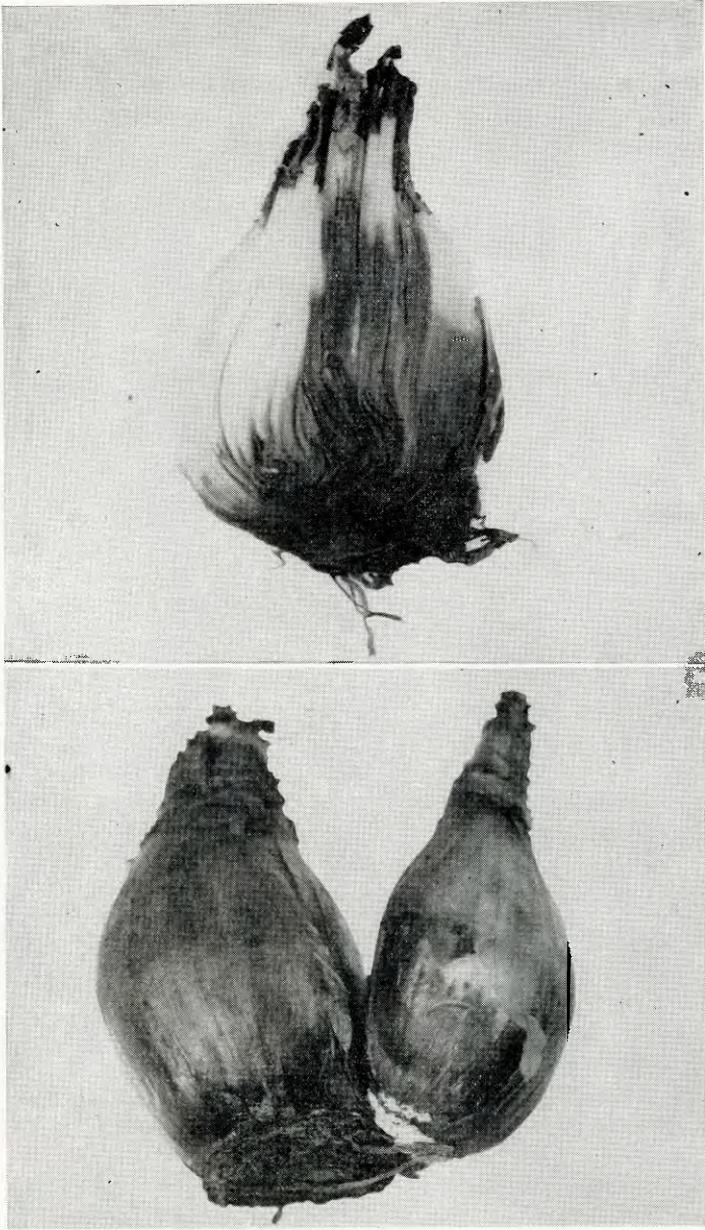
Tips of leaves exhibit sunken grey spots or streaks which become covered with white powdery masses of spores during moist weather. This disease is usually most serious in mass plantings which are left undug for several years.

SCORCH

(Caused by *Stagonospora curtisii* (Berk.) Saac.) [See Fig. 168(A).]

Symptoms

Tips of leaves are dead, yellow, red or brown in color and somewhat wrinkled as they emerge from the soil; reddish-brown, elongated, raised "scabs" sometimes develop below infected tips. This disease is also



Basal Rot of *Narcissus*

most serious in mass plantings which are left undug for several years. The same fungus will attack *Amaryllis*, *Crinum*, *Sprekelia*, *Sternbergia* and *Galanthus*.

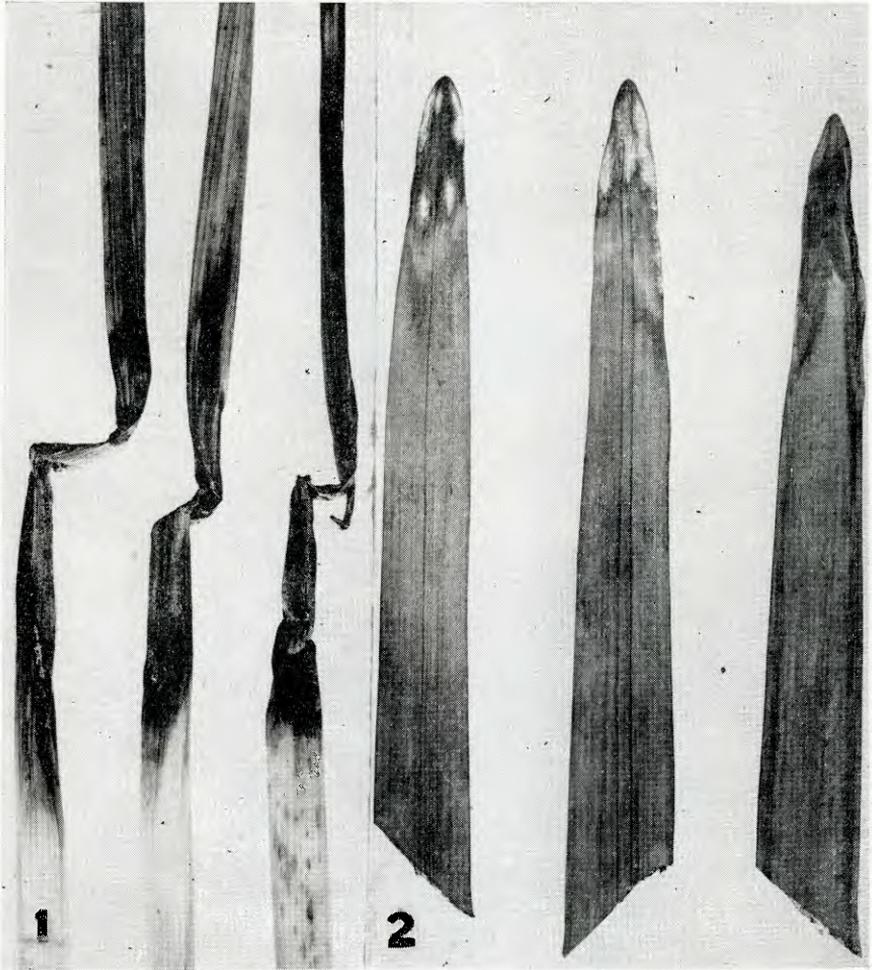


Fig. 167. Symptoms of *Narcissus* diseases— 1, Fire; 2, White Mold.
Photos by Frank P. McWhorter, Oregon State College.



Plate 300

Smoulder of **Narcissus**



Fig. 168. Symptoms of *Narcissus* diseases— A, Scorch, (Photo) by Frank P. McWhorter, Oregon State College; B-1, healthy *Narcissus* leaf; B-2 and B-3, leaves showing *Narcissus* Mosaic symptoms.

MOSAIC

(Caused by a virus) [See Fig. 168(B).]

Symptoms

Plants are stunted; leaves exhibit light green, grayish-green, yellow or brown stripes or mottles and may be twisted and slightly roughened; flowers exhibit small white streaks or blotches. This disease is most evident before flowering time.

DECLINE

(Also called White Streak. Caused by a virus) [See Fig. 169(2).]



Fig. 169. Symptoms of *Narcissus* diseases— 1, Purple Streak; 2, White Streak; and 3, Papertip.

Symptoms

Leaves exhibit narrow dark green or purple streaks, which often turn white, yellowish-white or gray as the leaves mature; the tip of the leaf frequently turns yellow and dies. This disease is most evident after the time of flowering.

BULB OR STEM NEMATODE

(Caused by *Ditylenchus dipsaci* (Kuhn) Filip.) [See Fig. 170.]

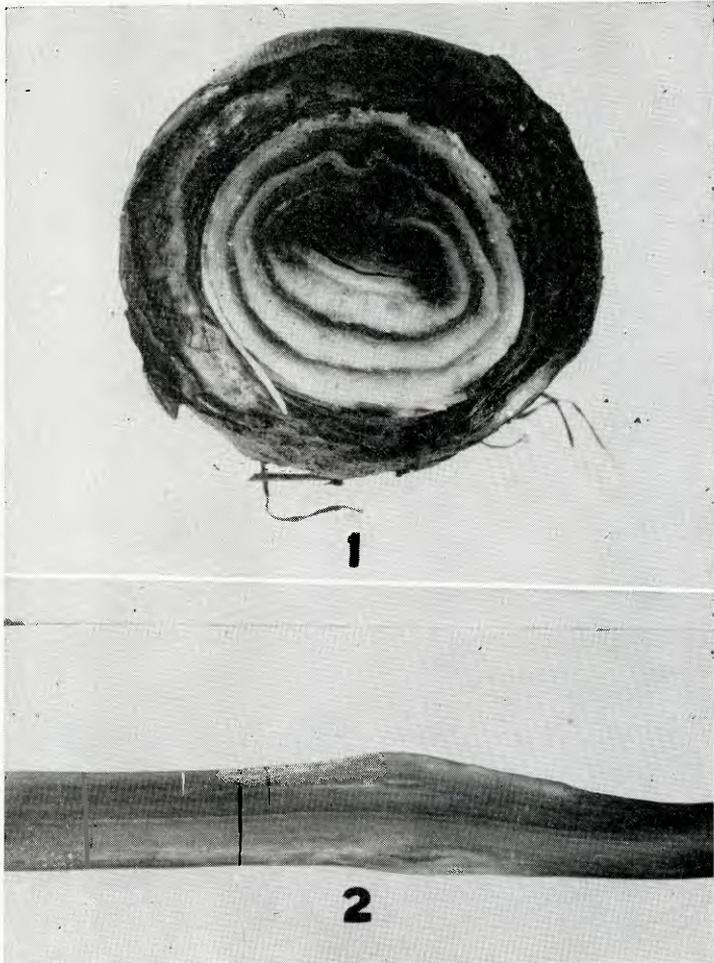


Fig. 170. *Narcissus* nematode disease symptoms— 1, in bulb; 2, in leaf. Photos by W. D. Courtney, Associate Nematologist.

Symptoms

Leaves may be twisted, distorted and exhibit (1) corrugated leaf thickenings near bases of leaves; (2) marginal discolorations; and (3)

pale yellow or yellowish-brown pimples (spikkles). Infected bulbs may be completely rotted, or show one or more rings of brown, disorganized scales lying between white healthy ones. The early stage of the disease starts with yellowish spots in the neck region, whereas basal rot, with which it might be confused, usually begins at the base. This disease is worse in warm climates than in cool ones, such as the Pacific Northwest.

CONTROL MEASURES

Control measures for the various diseases may be summarized as follows:

Leaf Spots

(Smoulder, Scorch, Fire and White Mold)

1. Dig bulbs every year; clean and replant in a new location.
2. If leaf spots are commonly troublesome, disinfect bulbs according to directions given for basal rot control.
3. Avoid planting in locations with poor air and soil drainage; practice wide spacing of plants and clean cultivation.
4. Remove and burn infected leaves; destroy all foliage when mature.
5. If, despite the above precautions, leaf spots continue to be serious, spray plants at two week intervals with 4-4-50 Bordeaux (for small amounts use 4 ounces of monohydrated copper sulfate, 6 ounces of hydrated lime and 3 gallons of water). Add Penetrol (1/2 oz.) or DuPont Spreader-Sticker (1/6 oz.) to every 3 gallons of spray solution, to enable it to wet the waxy narcissus leaves. Follow the manufacturer's directions on preparation. Commercial growers often spray their narcissi once after flowering, as a matter of insurance, even when diseases do not appear to be present.

Basal Rot

1. Do not plant any bulbs that exhibit even a trace of rot.
2. Store bulbs under cool, well-ventilated conditions.
3. Dip bulbs (for planting outdoors) for two minutes in a Ceresan solution 10 days after digging. "2% Ceresan" (1 lb. in 8 gals. of water, or 2 oz. in 1 gal.) is recommended in the Pacific Northwest, and New Improved Ceresan (1 lb. in 40 gals. of water, or 1/3 oz. in 1 gal.) in warmer areas. Dry bulbs rapidly, or plant immediately after treatment.
4. Plant in cool, well drained soil. Avoid soils and fertilizers high in nitrogen.
5. Plant in a new location every year.
6. Dig and destroy in the spring all plants exhibiting yellowed leaf tips.

Mosaic and Decline

1. Try to buy daffodils that are Mosaic- and Decline-free. Patronize reputable dealers.
2. Remove and burn all plants that develop symptoms. Look for Mosaic before flowering and for Decline after flowering.
3. Protect seedlings (from aphids, which carry the viruses) with fine-mesh cheesecloth cages.

Nematode

The bulb or stem nematode is controlled in the Pacific Northwest by rotation and by treating bulbs (several tons at a time) every two or three years in a hot water bath (110°-111° F.) for four hours. Formaldehyde solution is added to this bath in the proportion of 1 pint to every 25 gallons of water.

Naturally this procedure would not be practical for the average amateur, so the following measures should be tried:

1. Try to buy daffodils that are nematode-free. Patronize reputable dealers.
2. Remove and burn all plants that develop nematode symptoms.

Most of the control measures listed herein are intended for the amateur. Commercial control measures are discussed in detail in a Bulletin No. 480, "Narcissus Diseases in Washington," published by the State College of Washington (Pullman, Wash.) in Nov., 1946.

I am indebted to many persons for their assistance in preparing this article, and especially to Dr. F. P. McWhorter (Plant Pathologist of the Oregon Agricultural Experiment Station and Agent of the U.S. D.A.) and Mr. W. D. Courtney (Associate Nematologist of the Division of Nematology, Bureau of Plant Industry, U.S.D.A.). Dr. McWhorter furnished photographs for Figure 167(2), taken from the Oregon Station Bulletin #304, 1932; and also for Figures 167(1) and 168(A); Mr. Courtney furnished photographs for Figure 170.

INSECT AND MITE PESTS OF NARCISSUS

E. P. BREAKEY *

The statement that the *Narcissus* has fewer insect and mite pests than many of our well-known ornamentals would seem to be in keeping with the facts. This does not mean, however, that these pests of *Narcissus* are any the less important considering the damage they do. Perhaps it means that those of us who are concerned with controlling the insect and mite pests of *Narcissus* can concentrate our attention more fully on a smaller number of subjects. It might be of interest to note that these pests of *Narcissus* are limited to a few species of flies and two species of mites. However, one of these flies, the *Narcissus* bulb fly, probably does more damage than all the others put together.

THE NARCISSUS BULB FLY

The adult of the *Narcissus* bulb fly resembles a small bumblebee somewhat in appearance. It is a shiny yellow-and-black fly whose body is covered with rather long and coarse hairs. The adults are active fliers and prefer sunny locations. Flight among the plants is somewhat zigzagged and usually about eight to ten inches above the ground. Their flight is also characterized by a peculiar high pitched hum when they are most active during warm sunny weather. They apparently dislike the wind for they usually are found in sheltered spots. The adult flies feed on pollen and nectar and will leave the host plants in search of this food.

The *Narcissus* bulb fly is thought to have been a native of southern Europe. It appeared in the bulb producing areas of northern Europe early in the nineteenth century. The insect was reported as present in the United States as early as 1879 and in Canada as early as 1903. This fly is now definitely established in the major narcissus producing areas of the United States.

Damage to the *Narcissus* results from the feeding of the maggots or larvae in the bulbs. Infested growing bulbs produce fewer leaves than normal. That is, if the bulb is not too seriously damaged, it may produce a few leaves. These are usually rather small and grassy in appearance. Infestation in bulbs to be planted may be detected by examining the bases. Cleaning away the soil and old roots with a knife will aid in this examination. A brown colored sunken portion of the root ring which surrounds the base indicates the presence of a maggot. This deep brown discoloration often extends upwards on the side of the bulb above the point of attack. If the bulbs fail to grow, it is probably because the maggots have injured them severely enough to have killed them. Such bulbs are soft, discolored and often in an advanced state of decay. An examination of such bulbs will disclose a large whitish or yellowish-white maggot inside the bulb feeding on the plant tissue.

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The *Narcissus* bulb fly is known to attack *Narcissus*, hyacinths, *Amaryllis*, *Galtonia* and several others. In addition, the writer has also reared the *Narcissus* bulb fly from infested bulbs of the following species: *Cooperia pedunculata*, *Hymenocallis amancaes*, *Chlidanthus fragans*, *Sprekelia formosissima* and *Paneratium maritimum*.

Adult flies begin to appear in late April and are present into June. The peak of adult activity is in mid May. The eggs are laid singly on the bulb leaves at approximately ground level and occasionally in the soil close to the host plants. The newly hatched maggot moves downward between the soil and the surface of the bulb to the base of the bulb where it enters and starts feeding. The larvae are well developed with the approach of winter and remain in an inactive condition in the bulb throughout the winter months. The normal life cycle is completed in one year.

The mature larva has a length of five-eighths to three-fourths of an inch. On reaching maturity the larva leaves the bulb in the spring and moves upward through the soil to the surface where it pupates. The pupa is the transitional stage in which the insect changes from the larva to the adult fly. The skin of the mature larva hardens to form the covering or puparium within which the transformation occurs.

CONTROL

The only satisfactory method for controlling the narcissus bulb fly is to lift the bulbs as soon as they are mature, clean them, and fumigate them, after which they should be returned to the soil promptly. Unfortunately, no sprays have yet been devised that will give reliable protection. Both cyanide and methyl bromide are used in the fumigation of narcissus bulbs. Successful fumigation requires adequate equipment. This means first of all that the grower must have access to a fumigating chamber that has been constructed for the purpose. Most commercial growers have this equipment and use it in a routine procedure. The problem confronting the gardener or the estate owner is quite different. The present methods of control do not lend themselves to the protection of narcissus that have been naturalized in a woodland glade. No really satisfactory field treatment for bulb flies has been developed. Poison bait sprays have been recommended in England, but these appear to be ineffective under conditions in the United States. It is hoped that some of the newer insecticides may prove effective once we learn how to use them.

FUMIGATION

Fumigation with hydrocyanic acid gas is effective in killing the bulb fly larvae within the bulb. The hydrocyanic gas can be generated from either sodium cyanide or calcium cyanide. Calcium cyanide is the most convenient form to use and should be used at the rate of 16 ounces to each 100 cubic feet of fumigator space. The bulbs should be left in the fumigator for four hours at a temperature of 70 degrees F. The fumigating chamber should be gas tight. It should be provided with a heater

and automatic temperature controls and should be equipped with a fan for circulating the gases during fumigation. CAUTION! *Sodium cyanide and calcium cyanide and the hydrocyanic acid gas evolved from them are deadly poison.* Adequate precaution should be observed in using the gas and the materials from which it is generated. Only experienced and dependable persons should attempt to use these materials. The fumigation chamber should be cleared of all residual gas after fumigation before anyone is allowed to enter it. It is not advisable to handle fumigated bulbs until at least 24 hours after they have been removed from the fumigation chamber.

A reaction of the calcium cyanide with atmospheric moisture evolves the gas. This reaction is rather slow and the chemical must be spread out thinly to permit the air to reach all of it. It is advisable to apply the material by spreading it on paper on shallow pans or trays which are placed on the floor of the fumigation chamber. At the end of the fumigation excess material may be rolled up with the paper and disposed of.

Methyl bromide can also be used for fumigation. It should be used at the rate of three pounds to 1000 cubic feet of fumigating space. The bulbs should be given an exposure of four hours at 70 degrees F. Methyl bromide will also kill *Tarsonemus* mites if they happen to be present, something that cyanide will not do.

HOT-WATER-FORMALIN TREATMENT

Bulb fly larvae in *Narcissus* bulbs can also be killed by immersing the bulbs in water that has been heated to a temperature of 110 to 111 degrees F. for a period of four hours. Commercial formaldehyde solution should be added to the water at the rate of one pint to 25 gallons. This is done to prevent the spread of fungus diseases in the treating bath. The tank should be insulated against the rapid loss of heat and the bath should be circulated through the bulbs during the operation. Some means should be provided for automatically adding heat to the bath as it is lost through radiation or otherwise dissipated.

THE LESSER BULB FLY

Narcissus bulbs are occasionally found in a more or less rotted condition, the decayed tissue containing numbers of maggots. These are the larvae of one of the lesser bulb flies and almost without exception are found in numbers, whereas the larvae of the *Narcissus* bulb fly, with the same regularity, occur alone or singly. There are three species of these flies occurring in *Narcissus* bulbs and all belong to the genus *Eumerus*. *Eumerus tuberculatus* Rond. is the most common of the three species. *Eumerus strigatus* Fallen is occasionally found and *Eumerus narcissi* Smith is present in limited numbers, apparently in certain localities only. These three species are very similar in appearance and habits, so all three can be discussed as a group.

Opinions differ as to the importance of these three species as insect enemies of the *Narcissus*. There are those who claim the larvae are not able to attack normal sound *Narcissus* bulbs, that they are able to enter

only bulbs in which decay or rot has already affected the tissue. It is known that the larvae of the lesser bulb flies can not develop in the absence of certain decay organisms. No doubt many bulbs in which decay or injury may have been only incipient could have been saved if larvae of the lesser bulb flies had been prevented from attacking them. Moreover, the writer has examined many bulbs that have been injured by the larvae of these species which bore unmistakable evidence that the injury was due primarily to the activities of the maggots.

The adult flies are quite different in appearance from those of the narcissus bulb fly. They appear black at a distance but closer examination reveals the color to be a dark blue with profuse iridescence. The body bears three pairs of grayish white marks on the upper side of the abdomen. Both ends of the fly are bluntly rounded giving the body a plump appearance. The adults are somewhat variable in size ranging in length from one-fourth to one-third of an inch.

The lesser bulb flies are known to attack *Narcissus*, hyacinths, *Amaryllis*, onions, *Iris*, shallot and several other plants. The writer has also reared them from larvae infesting bulbs of *Lilium specosium*.

Adults from overwintering larvae appear in April or May. Soon after emergence the females begin to deposit their eggs in clusters of three to ten or more in the soil close to or on the leaves at the neck of the bulb. Soon after hatching the larvae work downward to the bulb which they enter and in which they develop. As soon as mature they move to the soil surface where they pupate and the adults emerge late in June or in July. In the commercial bulb producing sections the bulbs are being harvested at this time and the bulbs in storage are exposed to the egg laying activities of the females of this second generation. Most of the larvae of this second generation pass the winter as immature larvae. A few develop into adults in August or early in September. A few of these may lay eggs from which larvae will develop that will also overwinter. Adults from both of these groups appear about the same time in the spring, thus there are two complete generations and a partial third annually, though they overlap to considerable extent.

CONTROL

Control measures that have been found to be effective against the narcissus bulb fly are also effective against the lesser bulb flies. In addition the grower might keep in mind the advisability of protecting his bulbs against unnecessary bruises or injuries and of protecting planting stock while in storage.

BULB MITES

Any stock of *Narcissus* bulbs may contain bulb mites. These pests are usually associated with decayed tissue in some form and there is some difference of opinion as to whether or not the mites are primarily responsible for the decayed tissue. In many instances the evidence available points to the mites as being primarily responsible for the decayed

tissue. Plants grown from bulbs infested with these mites turn yellow and present a sickly appearance. The leaves are stunted and the plants will generally fail to produce flowers, or will produce only misshapen ones. Bulbs injured by mechanical means, rough handling, heating or weakened by disease are subject to attack by mites, and it is in such bulbs that the mites are usually found.

THE BULB MITE

The bulb mite, *Rhizoglyphus hyacinthi* Bdz. is the most widely distributed species and is the one most commonly encountered by the bulb grower. This mite will attack nearly all classes of bulbs including *Narcissus*, hyacinths, *Amaryllis*, lily, *Crocus*, and *Gladiolus*. The adult mites are almost as large as the head of a common pin. Their bodies are rounded, glistening white and sometimes there are dark spots on the back. The eight legs are reddish brown and the beak or mouthparts region has a similar brown color. The immature stages resemble the adults in appearance but are smaller and the first stage has only six legs.

The life of the adult mite varies in length from one to two months. Each female may deposit from fifty to one hundred eggs. The eggs are quite large and can be seen with the aid of a low-powered lens. Newly hatched nymphs resemble the more common insects in that they have six legs, all other stages having eight legs. Under certain conditions, probably unfavorable to the species, a heavily chitinized, non-feeding but very active stage known as the *hypopus*, may develop from the six-legged nymph. This stage may last from one to two weeks. *Hypopi* readily attach themselves to insects or other creatures and may in this way be distributed to new and more favorable environments. The mites apparently prefer rather healthy bulbs and are known to migrate through the soil from bulbs in an advanced state of decay to the more attractive ones.

CONTROL

Methyl bromide fumigation will kill the bulb mite. It is doubtful if it will kill all the eggs and it may be that the *hypopi* will be able to stand the methyl bromide fumigation. It has been demonstrated however that the methyl bromide fumigation is very much worthwhile, particularly where the grower is not equipped to use the hot-water formalin treatment. The standard control for the bulb mite is the hot-water-formalin treatment. If this treatment is used for the control of mites in lily bulbs, the time should be reduced to one hour. Iris bulbs will tolerate three hours, provided the bulbs are treated at the right stage of maturity. Inexperienced growers contemplating using this treatment should consult their local authorities. The bulb mite is known to spread rapidly among bulbs in storage. Precautions against this spread should be a part of the routine procedure of every grower.

THE BULB SCALE MITE

Recently a very small mite has been found infesting *Narcissus* bulbs, and because of its habit of working between the bulb scales, it has been called the bulb scale mite. The species is *Tarsonemus laticeps* Halbert. Numerous articles in the literature refer to this mite as *Tarsonemus approximatus narcissi* Ewing. These mites are very small, so small in fact that they are not discernible without the aid of a microscope or a strong hand lens. When present in considerable numbers on the bulb tissue, they have the appearance of fine grains of light colored sand. This mite, like the bulb mite, spreads rather slowly in the field, but also like the bulb mite it spreads rapidly among bulbs in storage. Plants from infested bulbs are discolored and there are scarlike yellowish-brown longitudinal streaks on the leaves and the flower stems.

CONTROL

The same methods that are effective in controlling the bulb mites will also control the bulb scale mites. Growers should take precautions against the spread of these mites in storage and whenever possible, should avoid replanting on infested land.

MAINTAINING SOIL FERTILITY FOR NARCISSUS

J. S. COOLEY, *Maryland*

Most varieties of *Narcissus* give more and larger flowers and in general are much more satisfactory when grown in a humus enriched soil than when grown in a hard poor soil. Obtaining a fertile soil for the initial planting is not easy and the maintenance of such a condition is even more difficult, since the *Narcissus* plot must be given clean cultivation for part of the year. The writer has developed a procedure whereby the soil fertility of a *Narcissus* plot can be maintained or even enhanced during the 3 or 4 years in which the plants remain in the same plot.

The important aspect of the method is to keep the ground covered with a cover crop, preferably a legume when the *Narcissus* plants are not actively growing. The *Narcissus* bulbs are dug and reset every 3 or 4 years. Digging may be done in this location the latter part of June. The bulbs are reset as soon as dug and a cover crop of cow peas planted immediately. This is early enough for the cow peas to make splendid growth by frost time. The next spring after a crop of cow peas has been grown, the soil is free of weeds and very mellow and loose. Practically no cultivation is then necessary and the soil is so mellow that it is a joy to work it. A heavy yield of fine flowers is assured after the cow pea treatment. If more gardeners realized the value of humus in gardening there would be less burning of trash and more use of compost.

The cover crop should be supplemented with mineral fertilizer. Extreme caution, however, must be exercised in its application so as to prevent injury. This is especially true when it is applied at the time when the bulbs are planted. The procedure that has given good results with me is to work well into the soil acid phosphate at the rate of about 500 pounds to the acre (about 1.2 pounds to a bed 5 feet wide and 20 feet long) at planting time. As the tops emerge in early spring a mixed fertilizer as 5-8-5 is applied. This may be followed by one or more moderate applications of the 5-8-5 mixture according to the needs. The skillful use of mineral fertilizer is an important aspect of growing *Narcissus*. It is better however to proceed very cautiously and to under-feed rather than to overfeed. The relative importance of the three usual fertilizer elements N-P-K needs special study for one's particular soil requirements, some soils being low in one element and others in another.

If the *Narcissus* planting is in the flower garden, some flowering plant will need to be used for a cover crop. The common flowering *Portulaca* forms an attractive ground cover which shades the soil and checks erosion. Since *Portulaca* is not a robust grower and not a legume, the fertility of the soil should be kept up by adding compost and commercial fertilizer. In regions where *Crotalaria spectabilis* thrives it may be sowed as the *Narcissus* tops die and it will make a great display of yellow flowers the latter part of the season.

Where *Narcissus* are grown for cut flowers or for breeding purposes, a satisfactory way is to utilize a plot in the vegetable garden where a cover crop for soil improving purposes may be grown the latter part of the summer after the *Narcissus* tops die. In this case the most satisfactory cover crop the writer has used is cow peas (*Vigna sinensis*). Cow peas have several distinct advantages. They make a heavy vine growth from June till frost time. The dead cow pea vines are useful as a winter protection after the leaves are killed by frost. The vines readily rot, so that they do not seriously interfere with cultivation. A thick stand of cow peas prevents the germination of chick weed (*Stellaria media*) seed in late summer. This plant which is so prevalent in rich garden soil may be a very useful winter cover crop where the ground is turned in the spring, but may be quite a nuisance in a *Narcissus* planting where it interferes with the development of the bulbs in the early spring. Also considerable labor is required to clean a bulb bed of a mat of chick weed. Any procedure therefore that facilitates the control of chick weed in the *Narcissus* plot is a boon to the gardener.

NARCISSUS FOR THE SUBTROPICS

WYNDHAM HAYWARD, *Florida*

One of the neglected fields in the creation of new *Narcissus* varieties is the development of new varieties for the subtropics, the lower limits of the temperate zone, and the beginnings of warm climate latitudes.

This is to be noticed particularly in Florida, where the large-flowered daffodil types are not suitable except in the upmost tier of counties along the Georgia and Alabama lines. Over peninsular Florida, a winter resort section which would welcome a generous variety of *Narcissus* types for winter and spring gardens—there are only a few, mostly the *Narcissus tazetta* or Polyanthus varieties.

These Polyanthus *Narcissus* are grown commercially all along the coast from North Carolina around to Texas and in Southern California. They are found in home gardens, where with good culture and care they survive year after year as a splendid bedding and cut flower contribution to the subtropical winter scene.

A few of the Poetaz types of *Narcissus*, which are listed as hybrids between the Polyanthus and Poeticus *Narcissus*, are reasonably well at home in Peninsular Florida. Certain of the jonquils and jonquil hybrids are likewise suited, especially *N. odorus*, the Campernelle jonquil. Just why these jonquils are at home to an extraordinary degree in the sub-tropics is uncertain, as they are reputed hardy and also well adapted to gardens in the Northern states where severe freezing is experienced.

Several types of jonquils and jonquil hybrids are found in old gardens in the lower South, including delicious little Campernelle single types, more delicate and charming than the common Campernelle jonquils offered by bulb dealers in the North. These have been growing for decades in these old gardens, and have greatly multiplied. They survive year after year without being dug, requiring only to be weeded and fertilized sparingly every year, and divided when too crowded. There are Jonquil hybrids, apparently with Poetaz or Polyanthus *Narcissus*, which also have survived from year to year in the sub-tropical gardens from old time. The Campernelle blossoms are all the same pleasing gold color, and the shape of the miniature daffodil-like flower with its corona, are characteristics. The jonquil-polyanthus hybrids, have the jonquil foliage, mostly, and flowers more like the Polyanthus types.

Names of these old varieties have long been lost. They are variously called, Princess Ann's daffodils, Queen Anne's Jonquils, etc. Anne seems to be a popular name in flower memory.

Of the Polyanthus *Narcissus*, only a few varieties are grown commercially in the United States, mainly *Paper White*, and a few so-called varieties of same, as *Paper White Grandiflora*, *Paper White Supreme*, etc., *Chinese Sacred Lily*, white with an orange cup, and the familiar *Grand Soleil d'Or*, (great sun of gold) perhaps the most attractive of the varieties commonly grown, and highest priced. The bulbs of *Grand Soleil d'Or* are slower growing and more delicately constituted.

Another interesting Polyanthus *Narcissus* is *Grand Monarque*, a fine, vigorous and free-flowering type, which many fanciers prefer to all the rest. However, it is later in blooming period than the other three, although reasonably easy to grow and produces large bulbs (up to 22 cm.).

Polyanthus *Narcissus* apparently are not too particular about their soil requirements. They do well in fairly acid (5 pH) to above-neutral soils, possibly liking circum-neutral soils best, although the writer has grown handsome bulbs of *Grand Monarque* in acid soils suitable for Irish potato crops, (pH of 4.5 to 5.5) year after year with good results. The recommended range of pH reading for optimum growth of good bulbs and cut flowers is still to be determined, as far as this writer is aware.

The *Paper White* bloom is pure or ivory white, that of the *Grand Soleil d'Or* is a lovely gold, with slightly deeper orange cup, and *Grand Monarque* has a large lemon cup with creamy white perianth. There are two other varieties sometimes found in America, *The Pearl*, with small, pale lemon cup and creamy perianth, blooming early. It is a vigorous type, usually found as a rogue in *Paper White* plantings, and is thrown out by the hundreds by growers, who claim that its flowers do not hold up as well as the *Paper White* in the cut flower trade. It is slightly more vigorous than the *Paper White*.

During the 20's and early 30's, *Paper White Narcissus* were grown by the hundreds of acres in Florida, Mississippi, Texas and other states of the lower South and along the lower Atlantic coast. The price of *Paper White* bulbs sometimes went as low as \$8.00 or \$10.00 per 1000 for the small sizes (10 cm. up). The large sizes, as 16cm. up, sold as cheaply as \$25 per 1,000. *Grand Soleil d'Or* bulbs were never cheap, bringing \$40.00 to \$60.00 and more in blooming sizes, 12 cm. up to 17 cm.

Since World War II increased the costs of production, and labor difficulties and other conditions curtailed the plantings of Polyanthus *Narcissus*, especially *Paper White* bulbs, these have risen in price tremendously in recent years, bringing as much in past seasons as the *Grand Soleil d'Or* before the war, or nearly so.

There are no large commercial plantings of the jonquil types in the South, so far as known. They are grown for garden ornament, and cut flowers.

The Polyanthus *Narcissus* are grown for garden display also, but mostly for cut flowers. The flowers are shipped by the ton to Northern markets in season, which is midwinter. *Paper White* is in flower in the field at Christmas time, the *Chinese Sacred Lily* follows shortly after and the *Grand Soleil d'Or* comes into its full glory in January and early February. *Grand Monarque* is at its best in February. These dates are approximate in middle Florida, for bulbs planted early in the fall, at least by the end of September.

What Sub-tropical gardens need is the attention of breeders of *Narcissus* to produce more kinds of *N. tazetta* hybrids, the introduction of more types of the *N. tazetta* from warm climates where it is native,

and more attention to jonquil-polyanthus hybrids. The introduction of new types of *N. tazetta* appears to be a most promising field for plant investigation. The species is a varied one, found native widely from the Pillars of Hercules to China and Japan. In all this range there must be hundreds of variations and strains of *Narcissus tazetta* which would bear study in the gardens of the Lower South, either for use in hybridizing or as garden material unchanged.

Paper White is an old variety, the *Grand Soleil d'Or* goes back to the late 18th century, and the *Chinese Sacred Lily* may not be a hybrid at all. *Paper White* seeds rarely in Florida, but *The Pearl* seeds occasionally. *Paper White* under special culture has been known to seed, so hybrids should be possible. Hybridization is a delicate operation, requiring a skilled plantsman for success. The seeds are little black shot-like things, the size of radish seeds or slightly larger, and are slow in germination and growing. Several years would be required to make a blooming size bulb.

The best Polyanthus blooms as observed by the writer in Florida, were grown on bulbs lifted in summer, stored in a warm dry place in the shade until late September, and then planted back in well manured, fertile, moist soil, where the drainage is at least good to fair. Commercial bulbs are "round" bulbs, a condition which lasts only one season. A round bulb planted back in the soil splits and makes a mother bulb the next season, with one or more offsets or "slabs". These offsets are separated from the mother bulb and grown on two or three years to produce blooming size bulbs for commerce. The best blooming size bulbs are 12 cm. size and up, 14 to 16 cm. being optimum for ordinary garden and forcing purposes. Millions of *Paper White* and thousands of the *Grand Soleil d'Or* bulbs are sold annually in late summer and fall by seedsmen, department stores, florists, etc., in the North and South for forcing in the home in pebbles and water, to which this type of *Narcissus* is better adapted than others. Northern florists and wholesale growers force thousands of these bulbs for midwinter cut flowers, as they can be brought into bloom in a cool greenhouse with little heat or trouble, and provide a sweet-smelling, bright cut flower with good stems and excellent lasting qualities in the midwinter season of December and January. By successive plantings, they may be had in bloom later. The greenhouse grown flowers are usually far superior to the field run stock shipped north from the Southern outdoor plantings, but have to bring a high price to meet costs, as the Northern grower has to discard his bulbs after forcing.

Growing the bulbs on an acreage scale in the lower South is not something to undertake on overnight impulse. It is a slow, tedious, painstaking process, involving a large investment of time, labor and money, besides the difficulty of developing markets for the finished product. The bulb production must be efficient and economical to pay production costs and a profit.

It is possible that in the Riviera section of France, and the gardens of Southern Spain, or even in the Scilly Isles southeast of England, there are varieties of *Polyanthus Narcissus* which should be introduced to the United States promptly for trial. John Weathers lists the following varieties of *Polyanthus Narcissus* in his "The Bulb Book", (1911):

"Flowers white, with a yellow or orange corona—*Bazelman Major*, *Couronne Blanche*, *Gloriosa*, *Grand Monarque*, *Grand Primo*, *Her Majesty*, *Laura*, *Maestro*, *Mont Cenis*, *Queen of the Netherlands*, *Scilly White*, *Staaten General*, and *White Perfection*.

"Flowers all white,—*Early Snowflake*, *Paper White*, *White Pearl*.

"Flowers all yellow—*Apollo*, *Aureus*, *Bertolini*, *Bathurst*, *Charles Dickens*, *Cupularis*, *Jaune Supreme*, *Lord Canning*, *Soleil d'Or*, etc."

To American *Narcissus* enthusiasts, who have only *Grand Soleil d'Or* in their gardens of all the above listed "all yellow" *Polyanthus* varieties, Weathers' roster of names leaves a strong impression that some plant introduction is very much in order from the *Narcissus* gardens of Southern Europe. The writer makes a sincere appeal to all *Narcissus* lovers knowing of the existence of other varieties of *Polyanthus Narcissus* than are commonly grown in the United States to communicate the news to him at Winter Park, Florida, whether in American gardens or anywhere else in all the broad range of this interesting species.

NARCISSUS CULTURE IN NORTHWEST TEXAS

WILLIE MAY KELL, *Texas*

The *Narcissus* clones now in the trade as a rule do not grow as well here as in other parts of the country. Extremes of heat and drought from early May to late Fall are not conducive to the best growth of north temperature zone bulbs. In the Fall of 1947, there was a temperature of 70 to 74 degrees daily into December. If a location of high shade with no cultivation during the intense heat of summer is possible, many varieties will live and thrive. Where the exposure is to the full force of the Texas sun in the long extreme summer heat, many varieties go down so deep they can not bloom and often split up into small immature bulbs. Perhaps if they were dug, cured, and stored in a cool cellar as required to maintain strong, full tulip bulbs, they might be better grown.

Many of the newer, larger varieties decline. *Diotima* and *Ben Hur*, after three years were smaller flowered than seven year old *King Alfred*. *King Alfred* is climate proof. It is commonly grown around here. But the usual varieties seen in most gardens are the ones handed down from old gardens. Unfortunately most of these old ones are not passed on with any kind of name other than some local "nickname".

February through March is the usual flowering period. However there are some which commence in December and others carry through into April. *Narcissus Tazetta* var. *Paper White*, often buds in December and is frosted in the bud. There is a fragrant yellow jonquil which blooms in December and seems to escape being frozen ordinarily. The

doubles are early but the flowers are practically always blasted by frost at night so they do not mature, although from the next zone south of us they do mature. From Central Texas on South they flower well. *Narcissus odoratus*, *Campernelle plenus*, *Twink*, *Mary Copeland* all blast from frost. There is an old one quite common in old gardens with the ridiculous name of "Scrambled Eggs" which is a good flower when it does not blast. There are three sizes of "Honey Jonquils" which never fail, even the severe freeze of this winter did not seem to hurt the flowers. The tiniest one is the first to bloom, starting in late January or the very first of February. It combines so well with the earliest of tiny spring flowering bulbs, especially the lovely fragrant Roman hyacinths, white, blue, and pink or even the purple Southern Belle. The middle size is second to flower, starting before the tiny one is quite through. The largest of the three, though it is a miniature, is the latest. They are so close together that one has to compare the flowers to see the difference in the sizes. "Early Daffodil" is another old variety which is desirable. It commenced to bloom the 4th of February this year, and should be even earlier in less severe winters. It has a white perianth with a pale yellow cup, a charming early flower to cut. *Narcissus Tazetta* var. *Orientalis*, always called "Chinese Sacred Lilies" flowers later than the "Paper Whites", and so usually blooms well. The bulb is quite large and increases so rapidly that, together with the knee-high leaf growth, requires plenty of growing room. Starting with 8 bulbs, in four years there were 15 clumps.

Diotima and *Ben Hur* are early in the big trumpet class, although *King Alfred* accompanies them. The middle to the third week in February is their usual flowering time.

In 1940, *Actaea*, *La Vestale*, *Glory of Lisse* and *Diana Kasner* were planted. Only *Diana Kasner* survived and flowered each year, and has increased enough to separate. However, this location was carefully fixed for a lily bed according to the instruction of the Lily Committee. It proved to be disastrous not only for lilies but most other bulbs and plants for this semi-arid region during the heat and drought of Texas summers here, especially during the war when no man power was available for flower gardens.

An old *Narcissus* called "Orange Queen" (but not true to name) is an early variety which does well. However, the most choice of the old ones is "Swan's Neck". This a charming flower in a class to itself. It is a strong grower, frost resistant, and cuts well.

In 1941, *Thalia*, *Whitewell*, *Laurens Koster*, *Mrs. Krelage*, and *Solfatare* were planted. *Thalia* flowered each year and has now increased sufficiently that it needs separating. Only a few *Whitewell*, planted in the same location, are now living. Only one *Laurens Koster* has survived, and no *Solfatare*. *Mrs. Krelage* has lived but has not increased and has not always flowered. Two different plantings were made of *Solfatare* and *Mrs. Krelage* and the pattern was repeated with *Mrs. Krelage* living and *Solfatare* dying out completely.

Beersheba, *Fortune*, *Dick Welband*, *Golden Harvest*, *Tunis*, *Daisy Shaffer*, *Van Waveren's Giant*, *Moonshine*, *Johanna*, *Roxane*, *W. P. Mil-*

ner are now being tried. *Triandus Albus* was planted but the severe freeze of this winter blasted the buds, perhaps in a milder winter, this variety may fare better. *Mrs. Backhouse* is a beautiful and choice variety which never fails to bloom, although it is very slow to increase. *Love-nest* is second to *Mrs. Backhouse* in the "pink" class.

There are other old ones but it is difficult to try to describe them with not even a "nickname" to designate them.

There is a distinct need for breeding work with *Narcissus* for this climatic region, and similar areas. Perhaps some enterprising gardeners will take it up as an interesting hobby. There is adequate material to start the experiments.

GARDEN CULTURE OF NARCISSUS IN FLORIDA

JOHN V. WATKINS

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Few bulbs are more at home in Florida gardens than are the polyanthus narcissi. This group, characterized by many small-crowned flowers and broad leaves is quite variable and its botanical status is confused. Suffice it to say that most of the narcissi bearing many small flowers that we grow here are classed as *Narcissus tazetta*, the Polyanthus *Narcissus*. Exceptionally free from the insects and diseases that frequently spell disaster for many bulbs, these old-time favorites are highly commended.

The variable colors range from the immaculate *Paper White* through various combinations of cream and yellow to deep orange. There are types with single cups and others in which the stamens become petaloid and give a double effect.

Holiday blossoms are produced by early *Paper White*; *Chinese Sacred Lily* comes late in December or in January and this first month of the year usually finds *Grand Monarch*, *The Pearl* and other late polyanthus in flower. From Lake City westward the Campernelle Jonquil, originally found wild in France and Spain is a popular spring-flowering bulb. *King Alfred*, the spectacular large-trumpeted daffodil and even rarer types grow well west of Madison, and though peninsular gardeners may force these temperate species one season, they seldom carry over well in the light sands and warmer winters of central and southern Florida. Poet and pheasant's eye *Narcissus* are usually not successful excepting in the western part of the state.

Narcissus bulbs should be planted between the middle of September and the end of October. For best flowering, select large, round solid, baseball-like bulbs and set them about four inches deep and at intervals four to five times their diameters. Thus they will be in the zone of constant moisture and if you plan to leave them for naturalizing, they will be much better off at this considerable depth and distance. For best results the narcissus planting should be in full sun, as the blooms

will be few, the leaves attenuated when shade-grown. Well drained but fertile beds are needed. All narcissi form blossom buds during the late spring growth, the primordial inflorescences being carried over in storage. For this reason aftercare is most important.

The bulbs should be fed adequately after flowering and then lifted when the leaves turn brown. Store in the garage and discard the foliage and old roots when they separate from the bulbs easily. Leave all the brown protective coat and dust with sulphur to discourage mealy bugs. As with all bulbs be certain that rodents cannot gain admittance to the storage containers.

During September and October tiny roots begin to grow on bulbs in storage, indicating that the rest period has been completed and, given a congenial environment, the roots will elongate rapidly and the tops will begin their annual growth cycle. All types of narcissus that you have had in storage must be cleaned and divided in preparation for planting. Break off the slabs or side bulbs and save the round mother bulbs for setting in the most prominent garden spots, as these will make a notable show in December and January. The slabs can be planted separately in rows in the vegetable or cutting garden where they should assume flowering size in one year.

The preparation of the beds for most kinds of bulbs might be outlined as follows. Choose a spot that is in full sun in which the same kinds of bulbs have not been growing formerly. If the soil is very light, apply about two or three inches of rotted cow manure and turn this under to a depth of some eight or ten inches. If you plan to set your bulbs in drifts as a part of the landscape planting, you will want to make individual planting holes so that the plants will not stand in straight rows. For *Narcissus*, Snow Flakes and hybrid *Amaryllis*, the holes may be a full five inches deep. In the bottom you can drop a small handful of your favorite plant food. This fertilizer should be stirred well and covered with a little earth so that the bulbs do not stand directly upon the salts. Set the bulbs right side up, fill with the regular garden soil and water if you like. No damage will be done if you simply leave the soil unirrigated, but most gardeners feel that they can encourage the plants to establish themselves and grow off to best advantage if they water immediately after planting.

These popular bulbs grow best under a mulch; so after you have finished planting, apply a blanket of leaves some three inches thick over the plot. Walking between the plants will compact the soil, so it is suggested that bulbs be planted in beds or drifts that are narrow enough to be worked from the sides. The mulch should eliminate cultivation, of course, but it will be necessary to pull weeds by hand while they are young and tender.

DAYLILIES IN CENTRAL FLORIDA

MRS. BRIGHT TAYLOR, *Florida*

From early March until Summer is over my daylily "test plot", as I call it, is the most exciting place in my garden—an open, sunny space about sixty feet long and fifty feet wide, bisected by a path and bordered by trees. On one side of the path are all the named varieties I have collected for the last fifteen years and on the other side my own hybrids, the eldest just turned six.

They are planted in rows without regard to their display value and cultivated as one would cabbage. This past year I have used compost exclusively, made the organic way, and I think I notice a definite improvement in size and vigor as a result.



Fig. 171. Hybrid daylily—*Prima Donna*; raised by Mrs. Bright Taylor.

The evergreen types are our best ones, not only because of their decorative foliage in the winter time—important as that is, but also because they thrive in Central Florida, having enough genes in their heredity of *H. aurantiaca* and *H. aurantiaca major*. The habit of recurrent blooming, either a development of our mild climate or a natural characteristic of those types that grow best in it, extends our season and makes us seek less ardently the late bloomers so much coveted by gardeners in the North and Middle West. Almost as soon as the last bud has opened, a brand new bunch of scapes appear—often at three or four distinct times, giving us almost as fine a display in the Fall as in the Spring.

Some one, in speaking of daylilies, has said that they are in color, indescribable, in performance, unpredictable and in the garden, indispensable. I subscribe completely to those sentiments, for no color chart carries the myriad tones and overtones found in some of them. A cloudy

day or a sunny one, a move from one side of the garden to the other, a dry season instead of a wet, will curl or uncurl petals, lengthen sepals, dull or brighten colors and upset all previous opinions of practically any variety you think you know. For that reason I do not like to make a list of favorites; they vary so from season to season. I will, however, list and discuss briefly some that have been outstanding *this year*.

To begin with, our season was ten days late, due to the fact that we had all our cold weather in February. After our first cold day the evergreen foliage that had been so lush and green looked as if a pail of boiling water had been poured over it. The deciduous ones went completely below ground and did not reappear until spring. That definite rest period may account for the fact that some of the unpredictables were better than usual. *George Yeld* bloomed the first time in three years. *Bicolor*, *Dominion*, *Festival* and *Saturn*, all have behaved passably, though, as a rule they cannot be counted upon. These varieties require a rest period in which to build up strength to bloom. They do not get it if our winter is mild and, therefore, dwindle in size and vigor rather than increase. June 17: a bloom on *Afterglow*, the first since 1942.

Among the March blooms that caught my eye none was better than Betscher's *Glorianna* and *Beacon*, a pair I have had but a few years. *Glorianna*, in particular, is a large, showy flower in the deep yellow or light orange class, with a wide shallow throat. It has already bloomed three times.

Perry's *Queen Mary* is a tall, medium sized orange yellow, very nice for the back of the border and a variety that repeats.

Meade's *Chrome Orange* is what its name implies—a good color, a medium tall plant, and an early recurrent bloomer.

Aureole is still one to be cherished. It seemed to like its compost diet very much, for the blooms were larger and finer than I have ever seen them.

Gold Dust, my favorite of the semi-dwarfs, always begins blooming at ground level, as if in so much of a hurry to bloom it cannot wait to grow. In the fall it will have nice scapes with many small, fragrant flowers opening in the afternoon and holding over through the next day—so two sets of flowers are often in evidence.

Winsome failed me this year. I divided it too vigorously—forgetting that the fine-foliage plants dislike to be left as single ramets as *H. aurantiaca major* and other robust fans do. (If you have a problem child—one that never blooms, perhaps you might try leaving it undisturbed for a spell.)

There are three early reds, though Stout's *Zouave* is really a bicolor and quite brown after a season here. Of them Wheeler's *Duncan* is the largest and the best color, since Traub's Victory Montevideo has such an undertone of orange the red color is much diluted. Stout's *Vulcan* and *Baronet* come in early April, both vigorous growers, the former much better in the shade. In this group, too, is Watkins' *Welaka*, mandarin orange on the color chart, something quite indescribably lovely in the garden, but with stems rather lax and too weak for the large

blossoms; worth staking, at that. *Sir Michael Foster*, a large yellow trumpet, still good after forty years, also goes to the back of the border, since it grows quite tall. *J. A. Crawford*, a large, soft yellow; *Sachem*, Stout's deep, glowing red, that stands the sun all day but is rather "leggy", so one should plant a medium grower in front; Hayward's *Marcel*—very large, with stems too weak; *The Yearling*, an evergreen *Bijou*, with clusters of small flowers; *Circe*, a small round, pale yellow; *Soudan*, a fine seed parent, mother of many hybrids; *Dauntless*, still unsurpassed in form and substance; Nesmith's *Persian Princess*, a wonderful dark red that likes our climate very much; *George Kelso*, Dr. Traub's fine bicolor—all these are April bloomers.

By May my garden is like a convention hall—jam packed with so many candidates you want to see and know, it's hard to get around. Wheeler's *Paul Ihrig* was good this year and set seed from every cross I tried to make. The pastel petals seemed more pink, so I used it very often; I liked the form and forgave its lack of branching. Mrs. Finlayson's *Grandiflora* opened this month too—a pale yellow of large size, with frilly petals. It is still blooming and never fails to attract attention, no matter what other favorites our garden visitors have. *Easter Morn* has a nice form and a suggestion of the pink color the kodachrome gets to such a great degree. Traub's *Fred Howard*, grown to a fair sized clump, glows with soft pink tones across the garden, set off by its greenish throat. *Carnival* is still good, brownish red with such a wide, yellow throat it is distinctly different. *Golden West*, one of Sass' best numbers, is a tall plant with many star shaped flowers in a soft yellow. *Linda*, *B. H. Farr*, both pastels verging on pink; *Majestic*, a fine, large orange; *Amaryllis*, vase-shaped, golden yellow, well worth preserving because of its substance; Watkins' *Kanapaha*, a true red without the orange tone; *Mayor Starzynski*, so neat and compact and softly glowing, a good garden type, for the scapes are sturdy and hold well the numerous blooms each day; *Taruga*, a large, lemon yellow, with twisted petals; the *Duchess of Windsor*, lasting far into the night; *Patricia*, crisp and cool and firm, even after full sun all day; *Caballero*, the showiest of bicolors; *Princess*, very pale; *Jubilee*, pale yellow with a dark band at the throat; *Mrs. Austin*, intriguing still, a deep gold cup, quite regular and medium sized; *Wolof*, a brown red that goes well with Wheeler's *Brackel* and *Sabrina* for those that like the shades; *General MacArthur*, brilliant and conspicuous; *Dr. Stout*, large enough and fine enough for its distinguished name; *Port*, a mound of small red blossoms that would be fine in the front of the border; *Ruby Supreme*, too widely known to need my mention here; *Halo*, my favorite of the Wheeler hybrids; *Ohred*, a small edition of "Ruby"—and redder, I think; they come with a rush—so you can see that May is a gala month indeed.

It is now mid-June, with the end still not in sight. Most of Nesmith's fine varieties are still to bloom. *Black Falcon*, *Honey Redhead*, *Dawn Play*, *Autumn Red*—none have opened yet, though last year by this time they were almost finished. The Nesmith varieties that I grow bloom late, on the whole, whether because they are not yet acclimated or because it is their nature, I do not know. 'Swan', Watkins' huge orange,

has responded well to compost and water and is startlingly beautiful. It is not a lily to grow carelessly for it requires good care. Sass' *Moonbeam*, almost white, paler than his *Revolute* or *White Lady*, is a night bloomer and of such fragile substance it must be grown in the shade. Stout's *Rose Gem* is an even, clear old rose with a nice green throat and will bear watching. *Blanche Hooker*, in the same group, shows promise; already it has bloomed three times. *Fantasia* I must confess I do not fancy—like Wheeler's *Victoria*, it is perhaps a triumph for the hybridist, but lacks real garden value, in my eyes.

Among my own hybrids are many interesting colors and forms. The pinks have been my special aim toward which I have made some progress. I am describing a few at this time—with some trepidation, I'll admit, for though they do well in my garden, one never knows how they'll appear in another setting. They may not be able to take the northern winters; they may fade in the Midwest sun, or their colors appear dull in coastal fog. The two described in 1945 *Herbertia*, *Cluny Brown* and *Prima Donna* (Fig. 171), still seem quite promising. *Cluny Brown* bloomed April 22nd for the first time and after a two weeks holiday has started again. The color is smooth and even, the substance firm. *Prima Donna* was in bloom from the sixth of May until a few days ago. Though loaded with seed pods, there are several proliferations and to-day I notice several new scapes are coming up to bloom. They may be, as so many daylilies are, only regional performers; it is the comparative few that do well on a national scale, and only a rare one—like *Europa*—that is universal. Time, alone, gives the verdict.

THE WHEELER DAYLILIES

STANLEY E. SAXTON, *New York*

In mid-May of this year (1947) I journeyed by plane from the still chilly spring gardens of northern New York to Orlando, Florida which was as warm as a hot northern summer day.

I was greeted at the airport by Mr. Ralph Wheeler with whom I was to stay. Gardens were alive with color everywhere; whole fields pink with naturalized phlox, while petunias, roses and all the northern summer flowers were growing luxuriantly. Added to these were azaleas, camellias, gloriosas and many amaryllids, all helping to make bold splashes of color in the gardens.

Mr. Wheeler is an orchid enthusiast and has a greenhouse at his home devoted entirely to these. He also raises *Gloriosa rothschildiana* by the thousands! But my interest was primarily in hemerocallis so early the first morning we started out for his seedling daylily plantings.

The larger portion of Wheeler's daylily seedlings are planted in the Ihrig gardens in Winter Park. Here are several acres of seedlings, plus many beds of selected named varieties. We estimated that there were about 100,000 plants in the seedling portion of the planting. A large share of these were in flower and I have never seen such a stunning show as this large field of daylilies made. I would walk down a path

between the thickly planted beds and see a particularly full petaled rich rose or pink flower over which I would exclaim. Mr. Wheeler would smile and say "Let's look at this one over here", and sure enough there would be a larger or more floriferous plant with flowers of an even purer tone, or better form. To study, classify and evaluate such an extensive planting is in itself a major project.



Fig. 172. Hybrid Daylily—*Martha Washington*.
Photo by S. E. Saxton.

And yet certain of the plants showed such decided improvement in size, color or form that it was immediately apparent that to surpass them would be a very difficult task. Out of this mass planting have come some of Mr. Wheeler's recently named varieties and I am going to take a moment to describe a few of these.

It is hard to pick a favorite but, of all the flowers seen, the one that stands out in my picture memory is *Martha Washington* (Fig. 172). Upon seeing this I at once exclaimed, "A real old rose", and sure enough when we compared it with the color card in the field it was the exact shade of old rose. This flower is medium in size but three or four open flowers to a stem is not unusual. I photographed a stem with four open flowers which had 66 buds! A single stem is almost a bouquet. Picture a bed with fifty plants in bloom. I rate this tops in its color class and doubt if it can be improved.

Nearby was a good sized bed of *Haile Selassie* which made a brilliant show. The flower stems are tall, well branched and the flowers very large. The color is a deep maroon purple, lighted by a bright orange-yellow throat and almost white midbands in the petals. This midband is broader in the sepals, giving a striped effect to the flower. Another very dark flower, but more on the mahogany-garnet tone is *Brandywine*. This is a very rich velvety color. The darkest flower that I saw was one Mr. Wheeler may name *Blackbird*. It is almost black. The petals could be wider but this will come in time.

Like many daylily enthusiasts, I have felt that improvement in the yellow class would be difficult, but Mr. Wheeler has three or four flowers which far surpass others in this class. Probably the best is *Cellini* with very wide, almost circular, overlapping petals like a dutch *Amaryllis* in a delicious light buttercup yellow. A shade lighter, and barely brushed flesh pink is one with long, reflexed, crimped and ruffled petals, drooping a bit lazily. This is very large and a wonderful improvement in its class. Lightest of all is *Juno*, its pollen almost white and, in color, the palest sulphur yellow; a finely formed flower but not a fast grower.

I must mention another flower in the yellow tones which made a lovely picture in a massed bed. This was *Easter Morn*. It is a full flower of deep buff yellow flushed mauve pink and very charming. I saw it in full sun where it held up remarkably well, but I have flowered it myself in partial shade with increase in the pinkish-cinnamon overlay, and recommend such a planting.

Brackel is a winner in its class. It has the faculty of changing its color tone from day to day, ranging from mahogany brown to rosy garnet, and with a deeper eye zone. A large flower, it has a peculiar brocaded effect like broad stitching on the petals, more pronounced on some days than on others. Its variability is one of its charms.

Mr. Wheeler is very fond of *Bobolink*, and while I do not share his enthusiasm, I must admit that this flower had about the best purple tones in its coloring of any of the named flowers I saw. I did not see *Amherst* in bloom, much to my regret, but my kodachromes show it to have more blue in the color than any other daylily.

Most of the named reds were not in bloom during my visit, but I can vouch for *Ruby Supreme* as a leader in the deep ruby class from my own flowering of it. *Ohred* is a somewhat lighter and clearer red but not as large or bold a flower as *Ruby Supreme*. I am looking forward to *Scarlet Sunset* which shows the brightest scarlet tone of any of my kodachromes.

Let us turn our attention for a bit to the Mead Botanical gardens in Orlando. Here there is a large loan collection of Mr. Wheeler's most recent seedlings, some coming into flower for the first time. Very few of these are named but some of the most promising new developments can be seen here.

A bright red bicolor, named *Cornell*, was most effective. The sepals are shaded with the same color as the petals, so perhaps we should call it a bitone. In any case it is the purest red I have seen in this type of flower. *M1-1-12* is a very large, wide petaled, apricot flower which has a tropical luxuriance in its carriage. There were many fine seedlings here but two especially appealed to me: *M6-1-26* was a reverse bicolor, petals light apricot and sepals rosy pink, a large full faced flower, and the second was a light flesh pink flower which I thought the finest I had seen in this color.

Of course, at any given time, all of the fine varieties cannot be in bloom, and I particularly regretted not being able to see *Naranja*, *Cerise*, *Billie Burke*, *Cameo*, *Royal Lady*, *Victoria* and *Tarrytown*, as I had not flowered these in my own garden. *Paul Ihrig*, *Halo*, *Empress*, *Angelus*, *Tom Thumb* and *Sabrina* have all bloomed for me and I rate each highly in its class. I did see the semi-dwarf varieties *Ming Toy* and *Dryad* which have fine color and should fit into the rock garden picture.

To discuss the dozens of fine varieties still under number which I viewed with Mr. Wheeler would take a small volume, and I think it best to close by saying that many fine new flowers are on the way to add to the beauty of our gardens.

DAYLILY TRIALS IN VIRGINIA

GEORGE GILMER, *Virginia*

I have been a daylily enthusiast for upwards of ten years. I am now growing over 150 varieties. These plants vary slightly from year to year. Some require almost full sun, to do well; others are better in half shade. Divisions of the same plant in different parts of my garden will vary some as to height, size and a little as to season of bloom. This article must, therefore, be taken as the opinion of one man as to performance in one location.

I am only mentioning those which have performed exceptionally well for me.

DR. HAMILTON P. TRAUB'S DAYLILIES

I have grown since 1944 twenty-five daylilies introduced by Dr. Traub. These daylilies are usually as good in the hot sun of 6:00 P. M., as at 9:00 A. M., on the brightest day: *Carnival*, *Dr. Stout*, *Duchess of Windsor*, *Elaine*, *Emberglow*, *Fred Howard*, *Fire Red*, *Helen Wheeler*, *Lidice*, *Mayor Starzyński*, *Reba Cooper*, *San Juan*, *Victory*, *Montevideo* and *Wekiwa*.

The Traub introductions bloom early midseason and midseason. I wish some were very early or late. The foliage is above average and

excellent on *Mayor Starzynski*, *Emberglow*, *Queen Wilhemina*, *Fred Howard*, *Peony Red* and *Wekiwa*.

One root of *Mayor Starzynski* planted in the spring of 1944 was divided into twelve nice plants in July, 1946, averaging as large as the original. This is my record increase. *Reba Cooper*, *Emberglow*, *Victory Taierhchwang* increase rapidly. *Wekiwa*, *La Tulipe*, *Helen Wheeler* and *George Kelso* increase well.

Helen Wheeler is a wonderful pink that holds shape and color as no other pink in my garden. *Emberglow* and *Fred Howard* are top-notch pinks. *Fire Red* is one of the brightest and best reds. *Mayor Starzynski* is a very free flowering plant with perfectly formed small red blooms leaning towards orange. *Wekiwa* is one of the finest reds that grow. *Lidice* is a fine orange, blooming early and over a long season. *Duchess of Windsor* is a lovely daylily, perfectly shaped. *Dr. Stout* is a beautiful orange with a touch of red. *Queen Wilhemina* is a fine orange with a reddish eye. There are some others such as *John Blazer*, *Golden Glow*, *Berwyn*, *General MacArthur* which are said to be as good if not better than those in my collection. The plant of *Indian Chief* is too small to rate at the present time.

DR. A. B. STOUT'S DAYLILIES

Dr. Stout has introduced many fine varieties. All are offered on introduction at \$3.00 each so there is little chance anyone will not get his money's worth. I grow forty-eight Stout varieties not including ten purchased when first offered in 1946. I generally order whatever he introduces. The following are my favorites:

Princess is a fine large lemon yellow. *Patricia* is one of the finest yellows. *Taruga* is light yellow with long twisted petals. *Wau-Bun* is early yellow with long twisted petals. *Rajah* is large vigorous reddish. *Red Bird* is one of the brightest red. *Vulcan* and *Wolof* are both good maroon varieties but so similar that many people will not want both.

B. H. Farr is beautiful peach and cream, but fades, in the sun. *Aladdin* is early eye pattern of yellow and bronze. *Mikado* is most popular eye pattern, but not as vigorous as many. *August Pioneer* is orange and valuable because late. *Chentu* is late coppery orange red with distinctive foliage. *Hankow* is late yellow with scarlet. *Cabellero* is the best bicolor, pink and yellow.

MRS. THOMAS NESMITH'S DAYLILIES

Mrs. Nesmith has introduced many varieties, including some very good ones. Most are introduced around \$10.00 and many remain in that class for years. For this reason I have not been able to buy them by the dozen as I have no plants for sale but raise them as a hobby. I have seventeen of hers and can recommend the following: *Sweetbriar* is a good pink; *Tara* is a good deep pink, free flowering; *Matador* is a good fiery red, different from most reds, and *Royalty* is a good red.

H. M. RUSSELL'S DAYLILIES

I have 48 Russell varieties, 12 were planted in 1946, and some of the others are too small to rate. Four are among the best grown today: *Annie Victoria*, orange; *Mrs. B. F. Bonner*, like *Hyperion* but decidedly better; *Queen of Gonzales*, deep yellow; and *War Path*, a red which is not excelled by any.

Russell introduces some at fancy prices which I do not have and are perhaps among his best, and some at lower prices, which I have bought freely. I expect to add about six more of his to my Roll of Honor.

H. P. SASS' DAYLILIES

I have grown three Sass varieties. I recommend *Dorothy McDade* as a fine late yellow, not excelled by any blooming at that time.

OLD VARIETIES

Gold Dust blooms very early and does well in considerable shade; *Apricot* is a good yellow, and *Ophir* is the handsomest yellow among the old introductions.

HABRANTHUS BRACHYANDRUS

MRS. W. E. MACARTHUR, *Florida*

These interesting bulbs, members of the *Amaryllis* Family, came into my garden as stowaways in 1937, where they came from, or how they settled in my garden will probably always be a mystery.

Mrs. W. D. Diddell identified them for me and in *Herbertia* 1938 Mr. Walter S. Flory, of Texas Agricultural Experiment Station, A & M College of Texas [now at the Blandy Experimental Farm, University of Virginia, Boyce, Va.] had a fine paper entitled *Cytotaxonomic Notes on the Genus Habranthus* which greatly increased my meager knowledge on the history and characteristics of these bulbs. *HERBERTIA* has been a veritable storehouse of information on the *Amaryllidaceae*.

Habranthus Brachyandrus bulbs were purchased from Oakhurst Gardens for comparison with my colony and they are identically the same, like most bulbs they require a year or so to become established before blooming regularly each season which is June through August in Florida, the scapes coming up over night bearing one bell of lavender pink, having a maroon spot in the throat, they are prolific bloomers sending up several scapes from each bulb, they set seeds easily.

In crossing them with *Habranthus robustus*, the only difference noted in the three bulbs raised is a longer perianth of a deeper blend of pink and taller scape, no markings in the throat. Have tried crossing *Habranthus robustus* with *Zephyranthes grandiflora (carinata)* with no results. *Habranthus robustus* is a lovely bulb to own, easy to grow and satisfactory to work with in garden design or artistic arrangements.

One of the most beautiful of this family is *Habranthus cardinalis* (C. H. Wright) Sealy which I imported from Nassau some years ago,

enjoyed them only a short time when they disappeared altogether, perhaps my soil did not contain the correct amount of lime. It may be that the moles and field mice helped to destroy them. As soon as convenient am going to import more of these beautiful bulbs and try again to make them like Florida. This time I will give them liberal amounts of oyster-shell in the soil.

These allied members of the lovely *Amaryllidaceae* help in a large degree to satisfy the longing of Florida gardeners for the hybrid liliums that our Northern friends enjoy and grow so luxuriantly.

GARDEN CULTURE OF CRINUMS IN FLORIDA

JOHN V. WATKINS,

Assistant Professor, Horticulture, University of Florida

Rivalling all bulbs, surpassing most in their adaptability to Florida, the crinums are widely appreciated by all classes. On the terraces of the Palm Beach estates where they are grown for their huge tropical leaves, in the clean-swept front yards of saw mill shanties where they are liked for their milk and wine, lilium-like blossoms, in the hobby collections of suburban commuters, these giant semi-tropical *Amaryllis* are ever with us.

Among the largest of the true bulbs the huge storage organs will weigh several pounds and they will seek a depth of a foot and a half or more under the earth. Crinums grow rapidly, forming huge clumps from the offsets that are produced in large numbers. Remaining year after year, succeeding in broken shade or full sun requiring no attention save an annual spring feeding, these mammoth Amaryllids are highly commended.

Genetically, the genus is in great confusion, hybridization having proceeded for generations without benefit of vital statistics. Planting stock from different nurseries illustrates this point as bulbs bearing the same names will have different flowers and conversely, the same varieties from different sources will bear flowers unlike each other.

This all adds up to the fact that it is difficult to compile an authoritative list of the best varieties. Probably the best procedure is to purchase bulbs that you like when you see them in bloom.

The modern, strikingly different *Ellen Bosanquet* with the deep rose flowers, the pastel pink *Cecil Houdyschel* will not be confused. The tulip-shaped Christopher Lily and the immaculate *Powellii Alba* are easy to identify by form, but the many garden-variety crinums are irrevocably mixed.

Because of their huge coarse leafless scapes, the inflorescences will seldom serve as cut flowers just as they are, but the individual flowers, when severed at their point of attachment are useful in small containers. In this way too, no buds are sacrificed, as the younger ones can open on the plant to be used later in the house.

POST-WAR AMARYLLIS GROWING CONDITIONS IN FLORIDA

WYNDHAM HAYWARD, *Florida*

Acreage production of the hybrid *Amaryllis*, as a popular florists' and seed store bulb, to be sold mainly in the North in the larger cities as pot plants or in the dry state, has shown an increase in Florida, in the last 10 years, until at the present time there are an estimated 200 acres devoted to this highly specialized horticultural crop in the state.

The State Plant Board is now providing an inspection service for hybrid *Amaryllis* grown in the open field. This service calls for several visits of a State Nursery Inspector to the growing fields, and examination of the bulbs under cultivation for evidence of diseased conditions or the presence of insect pests. A certification is then provided for the grower, similar to that provided for crops of Easter Lily bulbs and Narcissi in Florida.

More than half of the *Amaryllis* acreage in the country is in Orange County, and it is estimated that 3,000,000 *Amaryllis* bulbs are harvested in the Orlando area alone annually. There are other plantings in other parts of the state, as around Ft. Myers and Tampa. In the Orlando area, (Orlando is the county seat of Orange County, important citrus area) numbers of former growers are no longer engaged in growing *Amaryllis*, and the interest of fanciers declined during World War II, when circumstances took many of the growers, amateur and professional, away from their farms, or war-time occupations and labor shortages made it impossible to take care of their bulb plantings.

Because of the War, the National Amaryllis Shows which were sponsored annually by the Society, alternately in Florida and California, have been suspended, and it appears at this writing (1947) that it will be several years before the *Amaryllis* fans can resume these exhibits. A number of the leading exhibitors in the pre-war shows, from 1934 on, are no longer growing *Amaryllis*, or have moved away or have been forced by other interests to let their plantings decline until they no longer produce any quantities of exhibition quality flowers.

Exhibition quality flowers are not something that just happen. They are the result of long-planned preparations, and careful management of a large bulb planting. Most of the growers now engaged in producing *Amaryllis* in Florida are marketing their bulbs on a quantity wholesale basis, merely as bulbs, with no specifications offered as to the quality of the flowers which the bulbs will produce. If they will bloom that is all the seed store or department store counter trade demands, and that is where most of the bulbs are sold. The greater part of the field run bulbs would not be of exhibition quality, or suitable for display in competition at an important flower show.

The price received by growers has reached figures several times that of pre-war years, when 2½-inch diameter bulbs were known to have been purchased by jobbers, field run, at 4 cents each. The wholesale price

of 2½-inch bulbs, the standard blooming size offered in the trade, has risen to 16 to 25 cents or more, at least twice the average pre-war level. Expenses of cultivation, fertilizing and labor of planting, etc., are much higher than before the war. Common field labor in the Orlando area, which received \$2.00 to \$2.50 a day in 1940, is now receiving much higher wages, in some cases \$1.00 to \$1.25 an hour for totally unskilled workers. In the country sections women and less able-bodied men can be obtained for lesser cost, 50 to 75 cents an hour.

A few of the growers are making an earnest effort to improve the quality of their bulbs as to the flowers, by careful selection of parent stock in the growing of new seedlings, and the importation of high priced greenhouse exhibition stock from abroad, principally Holland. The Holland growers seem to have come through the war with their choice *Amaryllis* in better shape than the American growers, as they deluged the American trade with imported Dutch hybrid *Amaryllis* in 1946-47, and have large stocks to ship to America in 1947-48 according to advance catalogues.

The exhibition types of hybrid *Amaryllis* or the bulbs producing this type of the flowers, are usually more delicate in constitution than the common field run of Mead strain hybrids in Florida. Hence plantings of choice stock "go back" or retrograde in the ground or in pots outdoors unless given careful and continuous attention. Irregularities of weeding or fertilizing sends these bulbs into a decline, so that even after former conditions of good culture are restored, it takes several seasons before a planting will be in good condition again. In the meantime one's best bulbs may be lost, as pure whites, pinks, or solid reds of wide, broad-petaled types. These are mostly recent introductions from abroad or from greenhouses in the north,—recent in the number of generations of the bulbs produced under outdoors conditions in Florida.

The writer's commercial planting has suffered this same decline during the war years when he was engaged in editorial work on an Orlando (Fla.,) newspaper, when labor and time were not available for continued attention to his *Amaryllis* planting. Out of some 50,000 bulbs of all ages which produced 10,000 blooms in 1941-42, there were less than a dozen bulbs which bloomed in the spring of 1946, after five years without weeding or fertilizing. In the next few years the writer hopes to be able to restore this planting to pre-war standards, as most of the bulbs are still alive, although reduced in size to half-inch or one-inch diameter by the long period of neglect.

A number of leading growers have imported breeding stock of choice hybrid *Amaryllis* since the war, from such Holland specialists as C. G. Van Tubergen, Ltd., Ludwig & Co., Warmenhoven & Zonen, and Leo Van Grieken & Zns. These imported bulbs arrive in weakened condition, with few exceptions, so that the blooms the first season are inferior or worthless as a criterion to judge the quality of the bulb at its best. In fact in many cases it would be better if the bulb would not be allowed to bloom until the second season, in order to conserve its strength.

This inherent weakness of the Dutch *Amaryllis* bulbs under outdoor Florida conditions is due of course to the fact that the Dutch grow and select the bulbs under greenhouse conditions with more or less the care that other fine plants receive, while in Florida, the average grower plants his bulbs in the ground so that they virtually shift for themselves, and only the fittest under the condition survive.

A few Florida growers pot up their imported stock and use it for exhibition purposes, and breeding, crossing the better types of the more vigorous Florida outdoor strains with the Dutch bulbs, and vice versa. This will produce in a few decades a fine new race of hybrid *Amaryllis* in the case of conscientious growers, which will inherit vigor from the Florida strains and quality of bloom and size, color, etc., from the Dutch bulbs. It will not happen with the first few generations, however, as both strains have been isolated too long. Whether the Florida growers will ever be able to produce a vigorous strain of the pure whites, remains to be seen. In some cases, the Dutch pure white *Amaryllis* will not bloom for several seasons in Florida after the initial flowering. Doubtless cutting off the bloom stalks to prevent flowers until the bulbs are firmly re-established in pots or beds would help this difficulty.

Among large *Amaryllis* growers and dealers in Florida are B. M. Sangster and John Masek. Sangster recently reported he had more than a million bulbs in cultivation on 40 acres, and he indicated that the trade demand for the bulbs was still good. His bulbs are field grown, on Orlando types of the Norfolk fine sandy loams, common over Central Florida. Some of them are interplanted in young citrus groves, to give a few crops of the bulbs while the trees come into production.

One *Amaryllis* grower, A. A. Dobbs, of Orlando, is reported to have grossed \$4,400 annually on 1½ acres of the bulbs, but the average is nearer \$1,500 according to Sangster. One man can care for four acres with proper equipment, he related in a recent interview to the press.

The *Amaryllis* fields are planted from seedlings or offsets, and most of the growers try to grow a few seedlings every year to keep up the variety of their stocks. Every seedling hybrid *Amaryllis* bulb is a different colored and shaped flower under Florida conditions, although they may run to general types. The danger of growing the bulbs from offsets is that fast-multiplying inferior flower types may be increased to an extent that they will crowd out the slower-growing bulbs producing better-type blooms.

Seed are raised by transferring pollen from the anthers of one flower to the pistil of another, using the better types of flowers for parents. Vigor, size of bulb, broad, open petals, clean coloring, light throat, and thrifty root systems are among the desirable factors to be considered in selecting bulbs for field planting seed stock. A field of bulbs producing good quality flowers, even if not exhibition stock, but thrifty, quick-maturing and producing a reasonable amount of offsets to be planted back after the annual digging, is highly desirable from the commercial point of view.

Neglect of this quality angle, and consequent growing of *Amaryllis* bulbs like so many potatoes will prove disadvantageous in the long run.

when additional growers take up the business and competition becomes keen for the sale of the bulbs. The present seller's market cannot be expected to continue for many more years.

IMPROVED LAPAGERIAS AND AGAPANTHUS AT KEW

WILLIAM LANIER HUNT, *North Carolina*

Improved Lapagerias.

On the first day of August, 1945, the writer had the pleasure of studying in the Temperate House at Kew and the good fortune to find Mr. C. P. Raffill, Assist. Curator, in charge of this part of Kew Gardens in his office. We spent several hours together in a rather intense review of amaryllids at Kew since my last visit there in 1927.

Mr. Raffill has for some years been improving that vine of vines the Chilean *Lapageria*, and his seedlings are something to make one gape. He has developed flowers up to four inches in length and with a rather more pronounced silver spotting than in the type with which most of us who have ever seen this magnificent vine are familiar. The color of the seedlings, too, seems a more intense pink.

Lapageria is, of course, not exactly what one likes to call a vine but rather a graceful twiner. Its broad, evergreen foliage is almost beautiful enough to justify its cultivation, and the flowers then, place it at the top of the list of semi-evergreen, flowering twiners.

In an article, "A Report to Home Gardeners", written for the magazine *Home Gardening* in April, 1946, this writer mentioned the fact that one could find, here and there, in old, heatless green-houses over the South, a fine specimen of *Lapageria* and that it should be grown in the patios of New Orleans. The May number of *Home Gardening* carries a response from Mrs. Walter B. Price in which she says that the vine is grown successfully there.

Agapanthus.

During my study at Kew last summer, one of the amaryllid groups under close observation was, very naturally, the collection of *Agapanthus* species and the seedlings which Mr. C. P. Raffill, Asst. Curator in charge of the Temperate House, is growing from his crosses. His white "Somerset East" is one of the showiest of all *Agapanthus* varieties. The huge heads of flowers are of that dramatic character that make the variety one that will be permanent for a long time, certainly. To this writer's eye, it is a white, improved *A. orientalis*, though my notes do not indicate the parentage.

Huge tubs of crowded plants of various agapanthus are set outside in summer. Showiest of all, of course, were the above-mentioned white variety and the tremendous *A. orientalis*. We examined the curiously leggy *A. caulescens*, and, of course, *A. pendulus*, with drooping,

intensely dark blue flowers. The latter can be seen in the *Botanical Magazine*.

In reference to the flower beds in front of the water-lily house, my notes have the following, scribbled enthusiastically in the usual English shower:

“Bed of *A. umbellatus* edged with *Zephyranthes candida* would be gorgeous with complete ground-cover of the *Zephyranthes*—blue above white. In the bed are, also (in front of the 6-inch taller *A. umbellatus*) *A. umbellatus* var. *Mooreanus*, but they have just finished flowering.

Suggest bed of the two mixed, i. e., spread over the whole bed—also some of the white ones of each. Seed heads and stems should be removed for tidiness as soon as the *Mooreanus* had finished flowering. For a touch of yellow, some early and some late kniphofias would be good. One of the white crinums could be used for more weight in white.”

HYMENOCALLIS IN NORTH CAROLINA

ELIZABETH LAWRENCE, *North Carolina*

I have written before about the native white Spider Lilies (American Lilies), but I want to write again, for they are increasingly beautiful in my garden, and increasingly baffling. In North Carolina we have two that are native, a spring blooming one from the coast and a fall blooming one from the mountains. The spring blooming one I take to be *Hymenocallis mexicana* of the check list in *Herbertia* vol. 11, which Dr. Small calls *H. crassifolia*. Two years ago my brother brought me several bulbs in bloom from near Wilmington, N. C. where they grow in quantity in marshy places along the Cape Fear River. Last year there was no bloom, but this year they bloomed late in May. It seemed to me that they were the most beautiful of all, although there were not so many flowers to an umbel, as in the Louisiana species. They open at twilight, one to four flowers on twenty-four inch stalks. The leaves are as long as the stalks, and very narrow, to about an inch and a quarter across. The flowers are nine inches across, with a flat cup that is two and a half inches across, and a tube two and a quarter inches long. The segments are a quarter of an inch across. Apparently North Carolina is the northern limit for this species.

Our summer blooming species is *H. occidentalis* said to be native only as far east as Tennessee and Kentucky, but found just over the line in the North Carolina mountains. Last August I saw great drifts of this in bloom in Mr. Knight's garden in Biltmore, N. C. He said that he had collected it himself in North Carolina. In my garden it has been the only one that would bloom in shade.

In the Gulf states there are also spring and summer blooming species. The best known is *H. galvestonensis*, which has a bad name in cultivation. It bloomed for me a couple of years, but for the last two years the bud has blighted before it opened. I have two Spider Lilies similar to this. One came from Vicksburg, Mississippi, and one Mrs. Dorman got from Baton Rouge, Louisiana. These bloom regularly. They are not so large as our native (North Carolina) one. Still another

which Mrs. Dorman sent me, bloomed this May for the first time. It is the smallest of all, with four flowers on a seven inch scape, and this year it was the first to bloom, opening on the ninth of May. The plaited cup is an inch deep, and coarsely and characteristically toothed. The leaves are pale green like those of the *H. galvestonensis* type, but a little narrower (less than an inch across) and a little longer (to sixteen inches).

Another spring blooming species came from St. Martinville, Louisiana. It was listed as *H. occidentalis*. This is a very large one, with very broad foliage (two and a half inches across) like that of the tropical species, and of a bright dark green. The flowers are large, from nine to eleven on stout scapes over two feet tall. As many as six may be out at once, making it very showy, and especially lovely with *Iris gigantea caerulea*. The distinctly hexagonal cup is two inches and a quarter across, and the tube to three and a half inches long. This and the Wilmington Spider Lily are two of the handsomest amaryllids in the garden. They both like a heavy damp soil rich in humus, and must be planted in the open to bloom.

There is also a summer blooming Spider Lily in the Gulf states. This is similar to our *H. occidentalis*. It is not as reliable as to bloom as the spring species, but it is a very large and handsome one, with beautiful broad shining foliage. It has bloomed for me late in July, and early in August, but it seems difficult to establish. Mrs. Dorman sent me a number of bulbs over a period of several years, and I have tried them in all sorts of situations. One that seems to be established is in soil that is rich and damp, but well drained. It had two stout scapes last August with nine flowers to the umbel. The flowers were eight inches across, and the tubes over four inches long.

In the Alabama and Mississippi market bulletins you will find the farm women advertising the native white Spider Lilies for sale. This is the place to find these and other treasures.

AMARYLLIDS IN THE SOUTH

JO N. EVANS,

Haphazard Plantation, Ferriday, Louisiana

My earliest recollections—and I am a grandmother now—are of the Sunday afternoons and holidays that I tramped the woods and country roads with my Father in search of native flowers. This with my Mother's love of the old fashioned garden flowers is the background of my life time of searching for old, unusual native and naturalized plants.

Living for a number of years close to Natchez, Mississippi, has given me wonderful hunting grounds. In the early 1800's the people of Natchez built beautiful gardens. These gardens were generally laid out by landscape artists brought from Italy, France, and other foreign countries. These landscape artists brought much of their material with them. There are a number of records of old gardens still in existence, one such record tells of twenty-two miles of garden walks, bordered

with thousands of narcissi, another record tells of the terraces being planted with *Amaryllis*. I quote from an old book published in 1835,—“The broad walks were as usual in Southern gardens bordered by the varnished *Lauria Mundi*, occasionally relieved by the Cape Jasmine, slender althea and dark green arbor vitae. The splendidly attired *Amaryllis*, the purple magnolia, the Arabian and night-blooming jessamine, the verbinum or lemon scented geranium, with the mystic aloe that hoary monarch of the garden, which blooms but once in a century, the broad leaved yarra or coco and the sweet scented shrub and oleander with countless other shrubs and flowers, breathing forth the sweetest



Fig. 172a. Amaryllids at Haphazard Plantation—(Left) *Crinum scabrum*; (Right) *Amaryllis solandriiflora* hybrids naturalized.

fragrance gratified the senses and pleased the eye wherever it was turned.” (Joseph Holt Ingraham—*The Southwest*. New York. 1835.)

My first real interest in crinums came when I was searching for violets along a stream and came upon a clump of white crinums in bloom. I knew these were an escape, probably a small bulb cleaned out of some old yard and washed down stream by a hard rain, there in a deposit of sediment it had grown into a large clump. I later identified

this one as *Crinum bulbispermum album*. It is the first one to bloom with me. I grow it along the edge of a small lake and it always blooms with the Louisiana native iris. They make a pleasing combination.

I began to watch for these old lilies and have had many thrills finding different ones. I am not a botanist and can not identify all of the crinums that I have collected. I have one that blooms quite tall on stiff stems and holds its head very high, it is light pink with a shading to rose in the center of the petal, it is very hardy and blooms several times during the summer. The bulb looks like a large *Amaryllis* bulb.

Dr. Traub, editor of HERBERTIA, identified *C. scabrum* for me. (Fig. 172a). Every Southern garden should grow this crinum, with its beautiful cup shaped white blossoms banded through the center of each petal with dark red. It holds its head straight up. Miss Elizabeth Lawrence of Raleigh, N. C. has this to say about this crinum, "I agree with you *C. scabrum* is one of the best, but it is not hardy with me." This crinum is hardy in this part of Louisiana and every winter we have some weather that goes as low as 16 degrees. It blooms several times during the summer.

I have *Crinum giganteum* and each winter the top is frozen so badly that it never recovers enough to bloom for me. I have seen clumps of this crinum in bloom around New Iberia, Louisiana, and they are a spectacular flower to behold. Mrs. J. Willis Slaughter of Houston, Texas, who has grown and collected crinums for many years says "*C. giganteum* is the loveliest of them all, with its tulip-like white clusters that bloom from summer until frost in Houston, and meanwhile with its unique foliage is as decorative as an aspidistra when not in bloom." Houston is much warmer than my garden at Haphazard.

Another tender crinum that has not been identified grows around Lafayette and Abbeyville, Louisiana. This is about the warmest section of this state. This crinum has enormous bulbs, very long bright green leaves, and sends up a tall stem that has many dark red flowers with very narrow recurving petals. The bulb will not even stay with me during a real cold winter.

I have one good clear pink crinum that came to me from Lafayette and was originally obtained from an old garden in New Orleans. It seems to do its best blooming in October, as a cut flower it is as beautiful as *Brunsvigia rosea* (syn.—*Amaryllis belladonna* Ait.)

Of course I have *C. Powellii Alba*. I think this is one of the best of the pure whites and it never seems to be hurt by the winter weather.

Every old garden in this part of the country has the crinum that blooms in the summer and on through the fall. It was pictured on a well known catalogue cover as *C. fimbriatulum*. The petals are wide with a band of red and the flower opens up star shaped.

Around Baton Rouge there is an old crinum that is a nice light pink, when it blooms it points its petal straight to the sky. Mrs. Sarah Kelley, who is interested in crinums, has this to say "I think this crinum is a hybrid as it does not set seed to any pollen or when selfed". It is a quite unusual crinum.

Around most of the cabins on the plantation the old Milk and Wine Lily, *C. Sanderianum*, grows in large clumps. In this part of Louisiana where the Mississippi has occasionally broken the levees and covered the country, crinums have been one of the few plants to come through the water unharmed.

There is a very large white crinum in this part of the country that is very impressive. I have seen old clumps of this with as many as ten stalks in bloom at one time, standing at least four feet high, with ten to twelve blooms on each stalk. This is a very hardy crinum, I know of one winter that the temperature dropped to five degrees and it was not hurt. The bulbs are very large and seem to like shallow planting.

I bought *C. Kirkii* out in California, from a dealer, it is the same as one grown in our old gardens. Our native *C. americanum* takes well to cultivation and makes a nice garden plant.

I have bought all of the named varieties of crinums, or possibly I should say all of the named hybrids. In my opinion they are all worth while, *H. S. Elwes* is a beautiful light pink; *Cecil Houdyshel*, *J. C. Harvey* and *Virginia Lee* are all blooming in Haphazard garden. *Peachblow*, with its large rosy buds that open up into flowers with just a blush of peach-pink is a beautiful crinum. However, with me its stems are too weak to hold its heavy blossoms and unless staked it topples over. This may be a fault of too much fertilizer. *Ellen Bosanquet*, with its wine red blooms will always be one of my favorites. I grow it side by side with *C. scabrum* and often use it in arrangements together.

I find that the only difficulty I have with crinums is planting them too deeply. I give them lots of fertilizer and water.

If we could trace the history of these old bulbs there would be much romance revealed. No doubt they were brought to America for the fine old gardens of the South and from these gardens worked their way from hand to hand through the country. They are worth while for through several generations they have taken our floods and our long summers and are still sending forth their fragrant blossoms to every one who would enjoy them.

Along with my interest in crinums I became interested in *Amaryllis*. The old hybrid St. Joseph *Amaryllis* grows everywhere and in any kind of soil. Along with St. Joseph's *Amaryllis* we occasionally find a beautiful white *Amaryllis*. This one has a red stripe through the center of the petals and was identified for me by Mr. Cecil Houdyshel as *Amaryllis solandriflorum* hybrid (Fig. 172a). This *Amaryllis* should be grown a great deal more. It is perfect with a background of tall self blue bearded iris.

I am a little confused over the different types of *Amaryllis belladonna* Linn., non Ait. that I have found. There is no doubt that some types of this salmon pink amaryllis are much hardier than others. I have had them freeze in my garden at Haphazard, but two hundred miles farther north they were not hurt in the same cold weather. Some bloom on 24" stems while others are about 12" tall.

I have never seen *Agapanthus* bloom outdoors further north in the state than Baton Rouge. I keep hearing stories of old plantings of "Blue Lily of the Nile" but each time when I have investigated they have proven to be camassias.

I grow many of the big hybrid *Amaryllis* but have to be sure they are mulched when a real cold wave is headed my way.

I do not think I have covered the amaryllis as yet, but that is the joy of collecting there is always something just ahead, something to find, something to grow and something to learn about, and most important of all more beauty to enjoy.

[DAYLILIES—Continued from page 116.]

Camelot, Height 42". Evergreen foliage. Flower large, 6" standing; in color near saffron yellow (Pl. 10 J 8) with throat lemon yellow (Pl. 10 K 3) shading to golden yellow (Pl. 10 L 7). Petals ruffled, $4\frac{1}{2}$ " x $1\frac{3}{4}$ "; sepals $4\frac{3}{8}$ " x $1\frac{1}{2}$ ". Showy garden type.

Sun Queen, Height 30". Evergreen foliage. Deep chrome self-wide, frilly petals; narrow, twisting sepals. 6" flower. Petals 4" x $1\frac{3}{4}$ "; sepals 4" x 1". Hint of green in throat. Early bloomer and recurrent.

Sunset Glow, Height 34". Evergreen foliage. Large round well shaped flower of good substance, $5\frac{1}{2}$ " standing. Petals $4\frac{1}{2}$ " x $1\frac{1}{4}$ ". In color samurai (Pl. 4 H 11), darkened and ruffled at edges with midzone capuline buff (Pl. 9 E 5). Sepals $4\frac{1}{2}$ " x $\frac{7}{8}$ ", near pheasant (Pl. 4 C 11). Throat golden yellow (Pl. 10 C 7).

NOTE: Color references are to Paul and Maerz' "A Dictionary of Color."

5. THE AMERICAN PLANT LIFE SOCIETY

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 Mr. Donald B. Milliken, *California*
 Prof. J. B. S. Norton, *Maryland*

[Members of the Hemerocallis Jury are *ex officio* members of the Daylily Committee.]

REGISTRATION OF DAYLILY NAMES—Prof. J. B. S. Norton, *Registrar, 4922 40th Place, Hyattsville, Maryland*; and Mr. M. Frederick Stuntz, *Collaborator, 6505 Main Street, Williamsville, 21, N. Y.*

[Correspondence about priority of Daylily names should be sent directly to Prof. Norton, *but a self-addressed, stamped envelope should be enclosed if a reply is expected.*]

DAYLILY JURY (For evaluating Daylilies)—Prof. L. H. MacDaniels, *Chairman, Cornell University, Ithaca, N. Y.*

Those in charge of Official Cooperating Trial Gardens are *ex-officio* members of the Daylily Jury.

[Reports from official trial gardens, indicated below, should be made directly to Prof. MacDaniels, by Aug. 1 in each year in order to be included in annual summary for HERBERTIA.]

OFFICIAL COOPERATIVE DAYLILY TRIAL GARDENS

- | | |
|---|--|
| Prof. John V. Watkins, in charge of Daylily Trial Garden, College of Agriculture, University of Florida, Gainesville, Fla. | Dr. L. H. MacDaniels, in charge of Daylily Trial Garden, Dept. of Agriculture, Cornell University, Ithaca, N. Y. |
| Dr. Paul L. Sandahl, Supt., in charge of Daylily Trial Garden, Dept. of Parks & Public Property, City of Des Moines, Iowa. | Mr. H. T. Blackhurst, in charge of Daylily Trial Garden, Dept. of Horticulture, Texas Agric. Expt. Sta., College Station, Texas. |
| Prof. Ira S. Nelson, in charge of Daylily Trial Garden, Dept. of Horticulture, Southwestern Louisiana Institute, Lafayette, La. | Mr. John E. Voight, RFD One, Box 76, Hales Corners, Wisc., in charge of Daylily Trial Garden, at The Botanical Gardens, Whitnall Park. |
| Mr. W. Quinn Buck, in charge of Daylily Trial Garden, Division of Ornamental Horticulture, University of California at Los Angeles. | |

Note.—Introducers of new daylily clones should send plants directly to the Trial Gardens for testing. As soon as practical each trial garden will publish, in HERBERTIA, lists of the 10, 25, 50 and 100 best daylilies, on the basis of the clones tested, for the climatic region in which it is located.

AMARYLLIS SECTION

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- | | |
|--|--|
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Mr. William T. Stearn, *England*

Miss Elizabeth Lawrence, *North Carolina*

(d) DATA CARD FOR HEMEROCALLIS

When describing daylily clones, all breeders and growers are requested to use the Official Data Card for Hemerocallis, devised by the eminent artist and horticulturist, J. Marion Shull, and fully described in *HERBERTIA*, Vol. 7, 1940. These cards should not only be used in describing new clones but also for the description of all older clones grown in the various climatic regions.

These cards are available at present in the 3 inch by 5 inch size at the nominal price of \$1.25 per hundred, to pay for printing, handling and postage. Make checks payable to the AMERICAN PLANT LIFE SOCIETY, and send orders to—

*Mr. E. Frederick Smith, Asst. Sec'y.-Treas.,
The American Plant Life Society,
Box 2398, Stanford, Calif.*

(e) SCORE CARDS FOR HYBRID AMARYLLIS AND HEMEROCALLIS

(a) *Hybrid Amaryllis*. For classification of flower types and score card for Hybrid Amaryllis see *HERBERTIA*, Volume 5, pages 141 to 145, 1938.

(b) *Hemerocallis Score Card*. For the official score card for Hemerocallis see *HERBERTIA*, Volume 7, page 126, 1940.

II. PUBLICATIONS OF THE AMERICAN PLANT LIFE SOCIETY

(a) PLANT LIFE, THE PERIODICAL DEVOTED TO PLANT LIFE IN GENERAL.

Vol. 1, (No. 1.) SYMPOSIUM ON NARCISSUS BREEDING by various authorities. (*Nos. 2 & 3.*) FIRST BROMELIACEAE EDITION. Profusely illustrated symposium on the bromels by Dr. Lyman B. Smith, Mulford B. and Racine Foster, David Barry, Jr., Ladislaus Cutak, and W. Hayward. 105 pages.

Vol. 2, (Nos. 1-3.) VERBENACEAE EDITION. Illustrated treatment of the Verbena Family by the Moldenkes, the outstanding authorities on this plant family. pages.

(b) HERBERTIA, THE YEAR BOOK DEVOTED TO THE AMARYLLIDS (AMARYLLIS FAMILY).

A complete file of HERBERTIA, the year book of Amaryllis Section of the American Plant Life Society, is indispensable to all who are interested in Amaryllids. A limited number of copies of the following are still available:—

Volume 1 (1934). DEDICATED TO HENRY NEHRLING. Containing the biography of Henry Nehrling, and many valuable articles on amaryllids; with a portrait of Henry Nehrling and 16 other illustrations; a total of 101 pages.

Volume 2 (1935). DEDICATED TO THEODORE L. MEAD. Containing the autobiography of Theodore L. Mead, and many excellent articles on varieties, breeding, propagation, and culture of amaryllids; with portraits of Theodore L. Mead and David Griffith and 18 other illustrations; a total of 151 pages.

Volume 3 (1936). DEDICATED TO ARTHINGTON WORSLEY. Containing the autobiography of Arlington Worsley, and important articles on description, genetics and breeding, physiology of reproduction, and amaryllid culture; with 3 portraits of Arlington Worsley, one color plate and 30 other illustrations; a total of 151 pages.

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Volume 11 (1944). FIRST ALLIEAE EDITION. Dedicated to Dr. Henry A. Jones, the eminent American authority on the onion. This is

one of the most outstanding issues up to the present for its record making contributions on the systematics of *Allium* by British authorities, and on onion breeding, propagation, and culture by American authorities. It contains Mr. Airy Shaw's translation of Vvedensky's *Alliums* of the Soviet Union; Stearn's essay on the onion in the Old World and other articles; and articles on onion breeding, propagation and culture by Dr. Jones and his colleagues. There are also important contributions on ornamental *Alliums* for North America, and *Allieae* of North America. There are excellent articles on hybrid *Amaryllis*, Daylilies and various other amaryllids. Forty-three illustrations—25 plates and 18 text figures—and a total of 369 pages.

Volume 12 (1945). FIRST EDUCATIONAL EDITION. Dedicated to Supt. R. C. Huey, a pioneer in the use of amaryllids as an educational tool. This volume contains a brief autobiography by Supt. Huey, and an article by him on the use of amaryllids in teaching plant science; the announcement by Mulford B. Foster of the reintroduction of the sweet-scented *Alstroemeria caryophyllaea*, and an article by Harry L. Stinson on the true *Alstroemeria Ligta*. This issue also contains an article on the origin of *Tapeinanthus humilis* by A. & R. Fernandes; important articles on *Narcissus* breeding; *Leucocoryne* and related genera; articles on various other amaryllids, including valuable contributions on *Hemerocallis* description and appreciation, breeding, culture, and packing daylily plants for shipping. Twenty-four illustrations—15 plates and 10 text figures—a total of 180 pages.

Volume 13 (1946). FIRST NARCISSUS EDITION. Dedicated to Guy L. Wilson, the noted *Narcissus* breeder. This volume contains an autobiography of Mr. Wilson and an article on *Narcissus* breeding in Australia by Mr. Alston; articles by American *Narcissus* breeders, including Frank Reinelt, E. P. Powell, J. S. Cooley, C. W. Culpepper and W. R. Ballard; an article on the karyology of the subgenus *Ajax* of the genus *Narcissus* by the Fernandes's; a list of parents of hybrid *Narcissus* by Arno H. Bowers; *Narcissus* diseases by C. J. Gould; *Narcissus* insects and mites by E. P. Breakey; *Narcissus* culture by various authors. There are also articles on *Hemerocallis*, hybrid *Amaryllis*, *Habranthus*, *Crimms*, *Lapagerias*, *Agapanthus*, *Hymenocallis*, etc. Thirty-nine illustrations—186 pages.

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[COOLEY, NARCISSUS—Continued from page 134.]

fragrant; flowers are of good substance relatively long lasting as cut flowers. Season; mid-April to Early May.

Emily. Leedsii type, 15 inches high; flower held horizontally, and are of delicate beauty; tepals white, cup light yellow in upper 1/3, changing to white gradually below. Named for Emily Dickinson. Early April.

Chieftain. Trumpet type, 21 inches high; self yellow, flowers held upright at an angle of nearly 90 degrees. Notable for tall scape and clear self color. Early April.

Janice. Trumpet type, 18 inches tall; yellow self; very slightly lighter yellow than Chieftain; flower held upright at an angle of nearly 90 degrees. Notable for vigor as a garden plant. Early April.

Spring. Barrii type; 15 inches tall; flower held horizontally; tepals white, cup yellow with reddish-orange rim. Early April.

The writer is particularly interested in the first one, *Canary Twins*, for it appears to have considerable merit. The flowers are somewhat like Pearly Queen but they are less pendant and the color is clear Canary yellow throughout. *Triandrus Albus* may be one of its parents in the group of seedlings from which it was selected.

The other four are also quite interesting and require further testing.

IN MEMORIAM — ERNEST BRAUNTON, 1867-1945

We regret to report the death of Ernest Braunton, long a highly esteemed member of the American Plant Life Society. He was born in London, England, August 21, 1867, the son of William and Emma (Haslett) Braunton, and moved to Rockford, Iowa, with his family in 1871 where he became an American citizen by naturalization as a minor. He moved to southern California in 1887 and was prominently identified with civic improvement throughout his long life. In his long and useful career he held many important positions.

He was supt. of landscaping at Singleton Court, one of the first elaborate estates in Los Angeles, in 1899, the grounds now occupied by the Los Angeles Orthopedic Hospital; supt. of the Leslie C. Brand estate, Glendale, 1902; planner of the Bryant Botanical Garden at Santa Ana; designer of the Lily Ponds at Huntington Library Gardens; and designer of the grounds for over 100 homes in southern California.

He was Professor of Landscape Gardening, University of Southern California, 1914-19; lecturer at the Farmers' Institute (University of California Extension) for several years in the early 1900's; and judge at many County Fairs, and Flower Shows throughout southern California, including all of the Pasadena Flower Shows from the first to the one shortly before his death in 1945.

He was Associate Editor, California Cultivator, 1901-1932; Editor, Garden Dept., Los Angeles Times, 1903-1926; Editor of "Garden Doctor Department," Los Angeles Times, 1942-45; contributor of articles to the Pacific Rural Press, Westways, and several eastern magazines; contributor of articles on southern California horticulture, to Bailey's Cyclopedia of Horticulture; and author of "Garden Beautiful in California."

He was a member of the Los Angeles Board of Forestry, 1911-1912; and member of the Los Angeles City Park Commission, 1916-1918.

Mr. Braunton died at the age of 77 years in Los Angeles, Calif., March 22, 1945, several days after he was judge at the Southern California Flower Show at Pasadena. He is survived by his widow, Mrs. Addie (M. Kirkpatrick) Braunton; two sons, Bertram A., of Glendale, Calif., and Stanley E., of Los Angeles, and three daughters, Mrs. Helen M. Rickabaugh, of Lakeport, Calif., and Mrs. Marion C. Millikan and Mrs. Ernestine E. Petersen, both of Los Angeles.

—Hamilton P. Traub