HERBERTIA

1947

THE AMERICAN PLANT LIFE SOCIETY

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E. FREDERICK SMITH, Assistant Secretary-Treasurer,

The American Plant Life Society

Box 2398, Stanford, California

HERBERTIA

VOLUME 14

2ND DAYLILY EDITION

EDITED BY

HAMILTON P. TRAUB

HAROLD N. MOLDENKE

THE AMERICAN PLANT LIFE SOCIETY

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PREFACE

With the appearance of this issue of HERBERTIA, our publication schedule is up to date. Although conditions in the publications field have eased up somewhat, they hardly can be considered as back to normal for paper—particularly coated paper such as is required for Herbertia—is still a scarce item, and the price is three times that of pre-war years, and the quality is still sub-normal. We are grateful to our readers who retained a sense of proportion and were patient and realized that under the circumstances the delay in publication was unavoidable, and that the winning of the war was more important than the regular receipt of a publication on plants.

It is now seven years since the appearance of the FIRST DAYLILY EDITION of HERBERTIA in 1940. Since that date, the interest in daylilies has not lessened. It is logical therefore that Volume 14 (1947) should be the 2ND DAYLILY EDITION, and that it should be dedicated to an outstanding daylily breeder, the recipient of the 1947 HERBERT MEDAL, Mr. Ralph W. Wheeler, who has given us such fine daylily clones as *Ruby Supreme, Cellini*, etc. Mr. Wheeler favors us with a brief autobiography, and a valuable article on his plant breeding activities. We all congratulate Mr. Wheeler on his outstanding achievements.

Other articles on daylilies include reports from regional trial gardens by Prof. Watkins, Prof. Nelson and Mr. W. Quinn Buck; contributions on daylilies by Mrs. Gretchen Harshbarger, George Gilmer, Elizabeth Lawrence, Elmer A. Claar, Willie May Kell, Prof. Norton, Mr. Stuntz, J. Marion Shull, Mrs. Leonian, W. R. Ballard, Lewis A. Hurst, Dr. Cooley, Mr. Hayward, Mr. Culpepper, Mrs. MacArthur, and others.

In connection with the subject of daylilies, the reader should also re-read the daylily articles in the 1946 issue of HERBERTIA. These include two articles by Mr. Claar, an article on the Wheeler daylilies by Mr. Saxton, daylily culture by Mrs. Bright Taylor and Mr. George Gilmer. There are also the descriptions of many new daylilies under registration of clones.

The other amaryllids as usual are not neglected. Fred M. Danks writes on amaryllids in Australia, and Eric Hardy on amaryllids in the Holy Land; and W. F. Harrison on amaryllids in Mexico. Drs. Cox and MacMasters contribute an important article on starch in *Alstroemeria;* Dr. Uphof gives a review on *Pyrolirion;* "Ornatus" writes on double daffodils, with illustrations from photographs by Jan de Graaff; Stanley Johnson, Th. Hoog, Mr. Hayward and Dr. DuPuis contribute articles on hybrid *Amaryllis*; Mr. Hunt writes on *Alliums;* Mr. Hannibal on crinums; Dr. Cooley on *Sternbergia;* Mr. James on *Hymenocallis;* various amaryllids are discussed by Mr. Hayward, Mr. Vasku, and others.

Volume 15 (1948) will be the 2ND SOUTH AFRICAN EDITION. It will include a review of the subject since the appearance of the FIRST SOUTH AFRICAN EDITION in 1939. Amaryllids in other parts of the World will not be neglected and the usual articles on *Hemerocallis, Narcissus,*

Alstroemeria, hybrid *Amaryllis,* etc., from the U. S. A. will be included. All are requested to send in their articles for this issue by April 1948 so that we may obtain early publication.

HAMILTON P. TRAUB

Beltsville, Maryland,
September 20, 1947.

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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.

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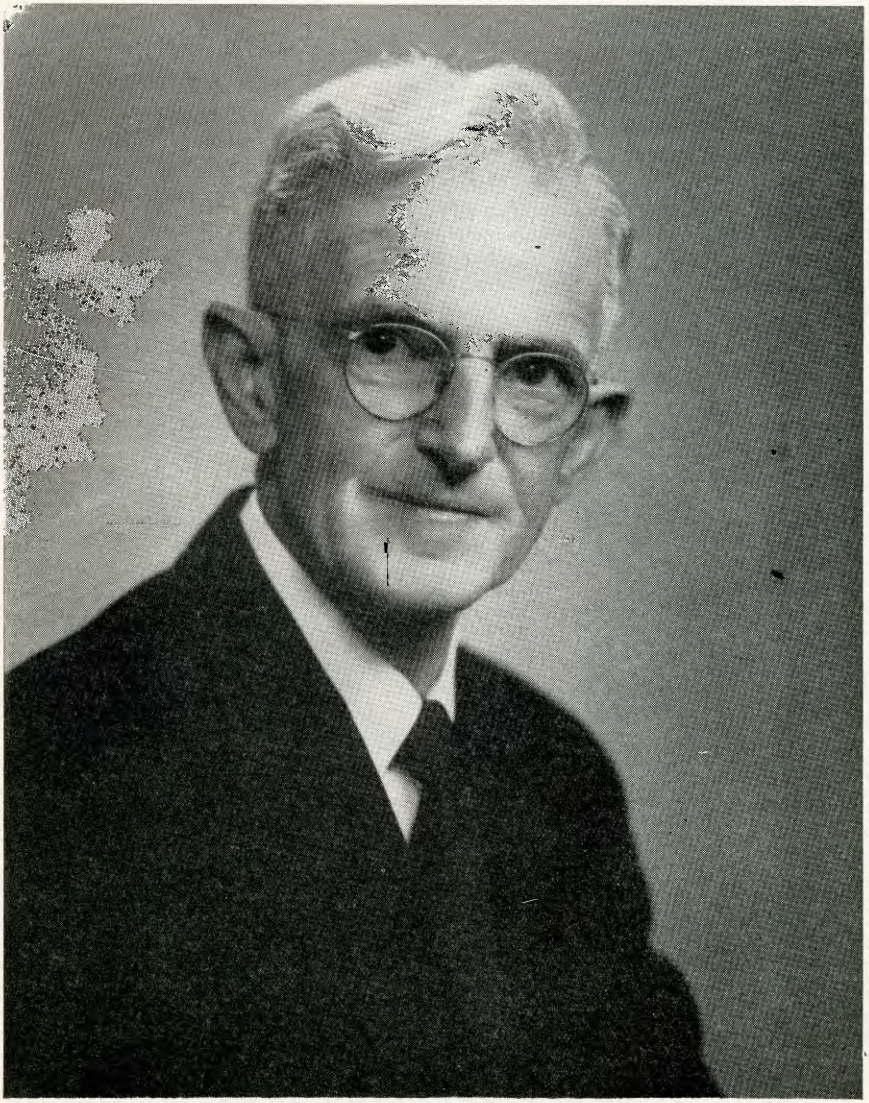
Dedicated to

Ralph Waldo Wheeler



Herbert Medalist—Ralph Waldo Wheeler

Plate 301

RALPH WALDO WHEELER

An Autobiography

Pitcher is a small town in the Valley of the Otselic in central New York State. I was born not in this metropolis but out on the farm, November 28, 1880. By the time I was taking maple sugar in my pablum it had been decided by my parents to move to the County Seat and so I was not to know the farm except as an idealized place for holidays and vacations, never as the exacting place for business life that a farm really is.

Among my activities as I grew up there was the usual gardening of those horse and buggy days, but under considerable protest on my part, each spring the planting of the pansy beds and violets, some study of botany with an herbarium which was required work in the State Normal School where I prepared for college; but there was no evident leaning towards either agriculture or horticulture. In fact, when I went to college it was to Amherst and not to one of the agricultural colleges.

After graduating from college in 1906 with the degree of Bachelor of Arts there were seven years of social and educational work, then twelve years in the wholesale millinery business, possibly somewhat of a step towards flowers. However, it was not until I came to Florida in 1925 that plants became a passion with me. My first years, in this land of flowers were fortunate in that my work required much traveling to all sections of the state. The tropical growth and strange, to me, plants at once captured my attention. It was natural therefore that I should assemble a collection of such natives and exotics as could be moved or propagated. In the meantime I had made the acquaintance of the late Henry Nehrling and the late Theodore L. Mead, two naturalists to whom all who come to Florida should be eternally grateful. Whatever further impetus towards horticulture was required, my association with these two grand men provided.

Already my attention had been directed to hybrid *Amaryllis* and so when the American Amaryllis Society (now American Plant Life Society) was formed in 1933, it seemed fitting to intensify my hybridizing efforts within this plant group. I had progressed to the point where my interest lay in the well open, full formed flower with short tube, short pedicel and flower face held in a plane above the verticle, now known as the Leopoldi type. As the basis of my further work I was fortunate in obtaining either bulbs or pollen of five distinct strains of Dutch and English hybrids, each with a long history of controlled greenhouse culture. At first the crosses were freely made, later with particular attention to color.

As was the common practice in Florida I was growing these bulbs in permanent plantings under half shade in a soil of an initial pH of 5½ which, by the addition of ground lime rock and oyster shell was brought up to just under pH 7 at time of planting . Some of the seedlings bloomed the second year, the balance in 30 months from the time the seed was planted. The resulting flowers were surprisingly fine, not so,

however, our natural out of doors growing conditions for these highly bred subjects of old world greenhouses. Some bulbs never bloomed the second time, others did bloom again but not with any degree of perfection, the bulbs losing their roots and becoming smaller and smaller each year. Even when lifted, cleaned, fumigated, cold treated, hormoned and replanted, vigorous new roots were not formed. Other Florida growers of the Dutch hybrids were having the same experience. Pot culture seemed to be indicated, but not being sufficiently equipped for this I reluctantly disposed of my collection of about 15,000 of these fine hybrids, retaining only those which had been given show awards, my named ones and those of which I had made Kodachrome slides. These I am attempting by means of pot culture in my greenhouse to bring back to health, a project I am not at all sure will succeed.

This just about brings us up to the main dish of the past twelve years, *Hemerocallis,* discussion of which, because of its length, it seems best to take up in a separate article.

NEW DAYLILIES FROM OLD

Ralph W. Wheeler, *Florida*

When, in the early days of the American Amaryllis Society, my neighbor, Wyndham Hayward, forced on me my first two daylilies he rubbed the lamp in just the right way to get a convert. Had anyone predicted that these two plants in part would found a race with the much sought for daylily characters he would not have been believed.

Only one of these plants made seeds from the first cross. From these seeds I grew fourteen seedlings, and as could well be expected the flowers were not too beautiful. However, one of them was quite different from any of the others, in that it had very wide segments for the small size of the flower. As little as I knew about *Hemerocallis* I did realize that this might be important, and since I wanted badly to see some virtue in these first daylily seedlings of mine I selected this one for further breeding, a choice more fortunate than could have been anticipated. This clone has turned out to be the best daylily parent I have tested in my experience with more than 200,000 seedlings. [Plate 302] Thus does the luck in plant breeding turn on a needle's point.

But luck alone is not sufficient; too much of it is bad. Also, the fact that we are not working for pure strains of seed but rather for superior clonal forms does not mean that Mendel's Law has no application here. True, some casual cross may produce an exceptional daylily, fine in every particular, but when working with large numbers of hybrids and with definite flower characters in mind it is essential to keep consistently going in the right direction. It is then that one needs to be sure that the laws of genetics are working for him rather than against him. Once this has become the established practice, any reasonable goal with daylily characters is possible. Patience, time and a fine knack in selection will bring closer and closer to perfection any particular plant character, flower form or color. When several of these improved

Wheeler Seedling daylilies at the Ihrig Garden, Orlando, Florida

Plate 302

characters are assembled in one plant a better daylily has been produced.

We are all striving for pretty much the same things in this *Hemerocallis* breeding, the more obvious being plant vigor, more flowers to a stem, wider segments, a more open flower, beauty of form, larger flower size, sun resistance, better colors, new colors. Of these, color is the one usually uppermost in the mind of the average daylily enthusiast. Let us, therefore, examine a daylily petal. It is like a piece of velvet in having a back or body and a nap or pile. In only the yellows and the

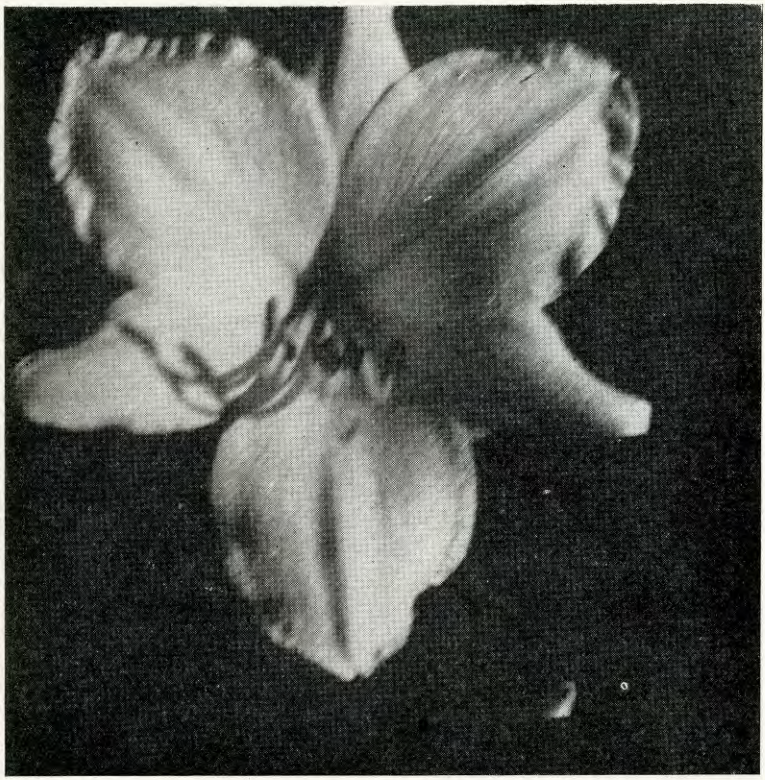


Fig. 173. Hybrid Daylily—*Cellini*

clear oranges are both the body and the pile of the same color. Now it should be evident that no clear colors are possible unless both body and pile are the same. In the early reds the body color was orange and the pile only was red. These reds become dull quickly in the sun. My first red to show the same color well through to the petal back provided one of my real thrills in *Hemerocallis* breeding, for I then realized that it was going to be only a matter of time before we should have not only clear reds, but clear rose, then perhaps real pink and certainly purple, for already I had produced flowers with definite blue tones in the red, an indication that purple was on the way. In my own breeding for color

I feel greatly indebted to the fact that previously I had become familiar with color dominance in orchid breeding. I assumed this would hold in the same way with Hemerocallis. My results seem to justify this rather hasty assumption.

Hemerocallis flower description always has bothered me. I do not get even a hazy idea of the flower from a written description, and I doubt if the descriptions of my flowers are of any more benefit to those who read them. Particularly is this true with respect to the flower coloring. Therefore, last year I took more than 300 Kodachromes of my better

Fig. 174. Hybrid Daylily—*Haile Selassie*

flowers and newer colors. This year I shall take at least 200 more. These are the 35mm. stills, taken at a uniform distance from the flower, thus furnishing an accurate gage of relative flower sizes. Also, through these Kodachromes better than in any other way, Hemerocallis enthusiasts in widely scattered sections have been given previews of the color breaks and new flower types as they come along, instead of being shut off from all that's new, as by a wall, until the finished product, sufficiently propagated, has been released years hence. My slides have been freely circulated among those interested for both private viewing and public showings. The comments which have come back, like visitors to my garden, are as a tonic to the rebuilding of my own enthusiasm.

The varieties which I have named have been described in HERBERTIA beginning with the year 1940. In addition to the named varieties there is that small group of hybrids of very great interest to me because of color or character breaks. Many of these are of no value in themselves but they most certainly will influence future hybrids. The Kodachromes showing these "advance styles" are a much prized part of my slide collection.

As is inevitable, many of my introduced varieties have been surpassed and should be supplanted, as they are sure to be, though I shall continue to grow these for the record. Others later will be dropped as better hybrids come along and become available, while some are sure to be grown as garden and special collection plants for very many years. In the accompanying descriptive list of those varieties which I consider current there has been no attempt at competitive or numerical ratings, only time and large numbers of individual gardeners in different sections being able to do this with any finality. I have, however, indicated certain qualities and characters which should furnish a basis for rating in accordance with individual likes and dislikes. Needless to say I consider that they all have their points or they would not still be included.

WHEELER DAYLILY CLONES CONSIDERED CURRENT AS OF 1947

Amherst (1944); flower large, purple-white, yellow throat, tepalsegs wide; scapes 42″ tall with up to 38 flowers; proliferations sometimes present. Chief distinction: color combination and form.

Angelus (1942) flower large, sulfur self, tepalsegs wide; scape 34″ tall with up to 17 flowers; recurrent bloomer. Chief distinction: form.

Asia (1946) flower very large, gold yellow, iridescent dusting; yellow throat; tepalsegs medium wide; scape 30″ tall with up to 30 flowers; proliferations sometimes present. Chief distinction: size and form.

Aurora (1946) flower medium size, rose to pink; yellow throat; tepalsegs medium; scape 36″ tall with up to 17 flowers; recurrent bloomer; proliferations sometimes present. Chief distinction: coloring.

Ballet Girl (1944), flower medium size, crimson to pink; yellow throat; tepalsegs medium size; scape 32″ tall with up to 44 flowers; recurrent bloomer. Chief distinction: coloring.

Billie Burke (1945) flower very large bicolor, purple maroon-yellow; yellow throat; tepalsegs wide; scape 36″ tall with up to 19 flowers. Chief distinction: coloring.

Blackhawk (1941), flower medium size, deep chocolate maroon; gold throat; tepalsegs very wide; scape 32″ tall with up to 18 flowers, recurrent bloomer. Chief distinction: color-form.

Bobolink (1943), flower of medium size, bicolor, purple-yellow; yellow throat; tepalsegs very wide; scape 45″ tall with up to 37 flowers; recurrent bloomer; proliferations sometimes present. Chief distinction: coloring.

Brackel (1942), flower very large, wine mahoghany in varying patterns; gold throat; tepalsegs wide; scape 32″ tall with up to 67 flowers; recurrent bloomer; proliferations sometimes present. Chief distinction: coloring, often with spotted tepalsegs.

Cellini (1945) (Fig. 173), flower large, sulfur self; tepalsegs very wide; scape 38″ tall with up to 27 flowers; recurrent bloomer. Chief distinction: beauty of flower form.

Cerise (1946), flower of medium size, cerise red, gold throat; tepalsegs wide; scape 36″ tall with up to 40 flowers. Chief distinction: coloring.

Fig. 175. Hybrid Daylily—*Ruby Supreme*

Cornell (1946), flower of medium size, bicolor crimson-yellow, yellow throat; tepalsegs medium in size; scape 34″ tall with up to 21 flowers. Chief distinction: coloring.

Demi-Tasse (1947), flower small, bicolor, magenta-orange, orange throat; tepalsegs narrow; scape 16″ tall with up to 34 flowers; recurrent bloomer; proliferations sometimes present. Chief distinction: dwarf character.

Duncan (1941), flower large, deep red, gold throat; tepalsegs of medium size; scape 36″ tall with up to 21 flowers; recurrent bloomer. Chief distinction: early blooming.

Easter Morn (1943), flower very large, deep yellow-dusted, yellow throat; tepalsegs very wide; scape 45″ tall with up to 33 flowers; recurrent bloomer; proliferations sometimes present. Chief distinction: floriferousness and tepalseg coloring.

Empress (1942), flowers large, deep purple-maroon, gold throat; tepalsegs wide; scape 40″ tall with up to 41 flowers. Chief distinction: coloring.

Ganymede (1943), flower large, bicolor, raspberry-yellow, yellow throat; tepalsegs very wide; scape 40″ tall with up to 42 flowers; recurrent bloomer. Chief distinction: coloring and form.

Haile Selassie (1945) (Fig. 174), flower very large, purple-orange, orange throat, tepalsegs wide; scape 42″ tall with up to 46 flowers. Chief distinction: coloring.

Halo (1941), flower very large, yellow-halo dusting, yellow throat; tepalsegs very wide; scape 54″ tall with up to 43 flowers; recurrent bloomer. Chief distinction: form.

Hazel Sawyer (1945), flower large, laurel pink, yellow throat; tepalsegs of medium size; scape 38″ tall with up to 45 flowers; recurrent bloomer. Chief distinction: coloring.

Indian Maid (1945), flower of medium size, very deep purple maroon, green throat; tepalsegs of medium size; scape 42″ tall with up to 36 flowers; proliferations sometimes present. Chief distinction: deep coloring; orange halo surrounding green throat.

Luridum (1941), flower large, bright red, greenish throat; tepalsegs of medium size; scape 50″ tall with up to 29 flowers; Chief distinction: coloring.

Madam Butterfly (1947), flower large, light orange with rust chocolate eye spots; orange throat; tepalsegs wide; scape 42″ tall with up to 21 flowers; recurrent bloomer. Chief distinction: eye spots, color and form.

Martha Washington (1943), flowers small, antique ashes of roses, canary throat; tepalsegs very wide; scape 38″ tall with up to 66 flowers. Chief distinction: coloring; flower form.

Ming Toy (To be described in 1948 HERBERTIA.)

Naranja (1946), flower large, deep orange self; tepalsegs wide; scape 36″ tall with up to 25 flowers; recurrent bloomer. Chief distinction: beauty of form.

Ohred (1941), flower medium-large, crimson, canary throat; tepalsegs medium in size; scape 40″ tall with up to 60 flowers; recurrent bloomer; proliferations sometimes present. Chief distinction: color; floriferousness.

Olympus (To be described in 1948 HERBERTIA.)

Paul Ihrig (1942), flower medium-large, champagne, green-gold throat; tepalsegs wide; scape 40″ with up to 21 flowers; recurrent bloomer. Chief distinction: pastel coloring.

Psyche (To be described in 1948 HERBERTIA.)

Robin Hood (1944), flower large, bicolor, carmine-yellow, green throat; tepalsegs of medium size; scape 36″ tall with up to 32 flowers; proliferations sometimes present. Chief distinction: vivid red with green throat.

Fig. 176. Hybrid Daylily—*Victoria*

Royal Lady (1943), flower very large, bicolor, purple-yellow, canary throat; tepalsegs narrow; scape 50″ tall with up to 45 flowers; recurrent bloomer. Chief distinction: form; coloring.

Ruby Supreme (1940) (Fig. 175), flower very large, ruby red, green-gold throat; tepalsegs wide; scape 42″ tall with up to 47 flowers; recurrent bloomer. Chief distinction: color; flower size; many flowers.

Scarlet Sunset (1946), flower medium; brightest scarlet, orange throat; tepalsegs medium; scape 30″ with up to 35 flowers. Chief distinction: brilliant color.

Tarrytown (1944), flower large, deep wine, yellow throat; tepalsegs medium; scape 48″ tall with up to 37 flowers. Chief distinction: color.

Vega (To be described in 1948 HERBERTIA.)

Victoria (1944) (Fig. 176), flower very large, old rose-violet sheen; canary throat; tepalsegs wide; scape 48″ tall with up to 48 flowers; recurrent bloomer. Chief distinction: beauty of form.

William Penn (1946), flower huge, purplish, red, chocolate, canary throat; tepalsegs wide; scape 36″ tall with up to 17 flowers; proliferations sometimes present. Chief distinction: color; size of wide open flower.

AUSTRALIAN AMARYLLID NOTES

FRED M. DANKS

33 Balwyn Road, Canterbury E. 7,
Victoria, Australia

Beyond the daffodils, dealt with in Herbertia 1946, there is little we have to give to a Country so rich in natural species and cultivated hybrids, but a review of conditions here might leave a clearer impression of what we can achieve, and a listing of what we have done could indicate the future possibilities.

We have the climate to suit everything from Tropical Queensland to the sub-temperate Tasmanian areas—hill country and dry hot lands—and the garden-enthusiasm to try anything new.

Hemerocallis, which is the major interest of this 1947 issue of Herbertia, can quickly be disposed of so far as it concerns us, for beyond those raised from seeds that have come, we have nothing but the older clones. Our greatest lack is in the standards by which to value those we have, and beyond gifts we can get none of the latest shades to try since the dollars we have to spend must be used for the more necessary items. There is the strictest prohibition against imports, but the "Gift" parcels come through.

I had seeds from Dr. Leonian many years ago, and have pollinated the best plant selections of these each year to gain a fine array. Some of these I like, but have no idea as to how the colors compare with the latest. Black and white illustrations indicate the form but the only colors we have seen are those in the full page of the Wayside Gardens catalog.

We can however suggest that in prospect of a relaxing of the financial "tie-up", it might be worth an experiment to see just how small a portion of a plant can be taken to allow for air transport, and just at what stage it is best to send. First of all, we need to know what the blooms really are. A demand cannot be built up until our keenest growers see what has been achieved, and I cannot see any great interest in them until they are better known.

Among the *Brunsvigia* hybrids, including *Brunsvigia rosea* (Lamarck) Hannibal (Syn.—*Callicore rosea* Link; *Amaryllis belladonna* Aiton, non Linn.), we have a little to give. W. P. Aylett, an iris en-

thusiast, has many seedlings of the Cape Belladonna, *Brunsvigia rosea,* and D. Chandler did considerable work with them some years ago. Old Alister Clarke, a great personality in the rose world, has many; and Both, of "Tunia", Service Adelaide St. Aust., is raising thousands of hybrid *Amaryllis* Linn., (Syn.—*Hippeastrum* Herb.). His long experience with gladioli is sufficient to guarantee success.

Nerines too are popular, and again Alister Clarke has shown the same discrimination in selection as he has with his pink cup daffodils. Dave Chandler has some late blooming ones and I have some hybrids between the dwarf, *Nerine humilis* and the larger ones.

All here would welcome contact with growers and most have something good to send in return even if only seeds of our newest hybrids among the native Leptospermums—something quite apart from the older species—or the quaint Kangaroo Paws of Western Australia.

I myself can share my own papavers—already internationally recognized; freezias, *sparaxis,* tritonias, tigridias, callas, polyanthus (primroses), etc., and some complicated intercrossings of the California *Iris.* These last show great promise of becoming really useful garden plants.

Seeds would be the easiest to send, although our only restriction beyond a quarantine inspection is the financial one on live plants.

The following addresses are those of worth while "contacts": W. P. Aylett, "Mango" Nurseries, Mangoplah via Wagga, New South Wales; and D. Chandler, Tecoma, Victoria.

AMARYLLID STUDIES IN THE HOLY LAND, 1945 & 1946

Eric Hardy, *England*

When the editor of Herbertia kindly asked me to contribute to the year book an article on any of the amaryllids I had come across in my plant-hunting journeys in Palestine and the Near East, I turned up my herbarium to specimens of *Pancratium, Vagaria, Narcissus* and other members of this group of beautiful flowers which recalled so many lovely scenes in a land where the sun and the flora are both generous to the field naturalist. I propose here to deal mainly with members of *Pancratium, Vagaria, Sternbergia* and *Narcissus* which enhance the Levantine flora.

Most of these are flowers of the spring or the autumn. In the late summer (July-August) of 1945 my friends and I made a fortnight's survey of the Anti-Lebanon area of the North Levant, and part of the Lebanon, and although we collected 285 species of plants and 11 subspecies, comprising 202 genera of 69 families, there were only *Allium* species to represent the Amaryllidaceae at that season of the year. Among these *Allium paniculatum L.* and *A. ampeloprasum,* and one or two other species were especially notable. In February 1946, I led an eight-day expedition to the south end of the Dead Sea, and the Wadi el Araba desert lying between there and the Red Sea, during which I collected 145 plant species of 44 families, of which 15 species were mono-

cotyledons, yet none of these was an amaryllid. Most of my specimens came from the central limetone hills of Palestine and the Mediterranean coastal plain.

The polyanthus narcissus, *Narcissus Tazetta* L. is very abundant in the spring on the hills, on Mount Carmel, the forest at Bab el Wad beside the Jaffa to Jerusalem road, in the Galilee and Huleh areas, and elsewhere. This is undoubtedly the most likely origin of the Biblical "Rose of Sharon" despite the fact that gardeners cultivate under the latter name several plants which are not native to the Holy Land. The Hebrew word is *Chabatz elath* which, like the Septuagint and the Greek origins, denotes a bulbous plant and therefore rules out any true rose—anemone or ranunculus. The "Rose of Sharon" of Cantacles *ii*, 1, is translated "flower of the plain" in the Septuagint. The English Authorized and Revised versions of the Bible suggest the autumn crocus for Isaiah xxxv, 1, by which I presume they meant the common meadow-saffron (*Colchicum*). Others have suggested that Solomon imported and cultivated a true rose. My contention is supported by the late Prof. W. E. Post, of the American University of Beirut, in his Flora of Syria, Palestine and Sinai. I have seen the polyanthus narcissus so abundant on the Plain of Sharon that there is no doubt that it was equally abundant in Biblical times to impress the historians. Even today Arab boys gather armfuls of it in spring and stand by the roadside hawking them to passing motorists.

I found this narcissus in full flower as early as the first week of December 1945 in the shelter of the open pine forest at Bab el Wad ("The Gate to the Pass", or "Valley") following the arrival of the winter rains, and it lasts into the first month or two of the new year, till March. In the New Year it was an abundant flower of the countryside from Gaza up to the Lebanon hills. It bore three or four orange and white flowers on each stem and was strongly scented. One of the Targums or early Aramic paraphrases of the Old Testament explains the original Hebrew word by narcissus. I found it in fruit at the end of March. The flower stalk was about 6 inches high and the flower when fully opened not more than an inch in diameter. The only other *Narcissus* I collected was probably the late-flowering *Narcissus serotinus* L. (which grows in the dry hills of Hadera on the coast at Tripoli in Syria) from near Rehovoth, on the coastal plain, in October 1945. It had a larger, single flower and I had it identified tentatively at the Hebrew University herbarium in Jerusalem. Instead of a yellow corona dominating the center of the flower, there were prominent yellow anthers. The petals were white and six in number, and the leaves appeared after the single flower. It was most probably an escape from cultivation. *Narcissus Tazetta* L. in the Levant has three sub-species, namely *typicus* Boiss., the common form, *syriacus* (Boiss. et Baill.) Boiss., of North Palestine, and *cypri* (Haw) Boiss., of Aleppo, Syria.

Next we turn to those lovely ornaments of the western hothouse, but here delicate treasures of the hills and the sands, *Pancratium* and *Vagaria*. I made a special study of these with my colleague W. F. W. Harding, and we have already published jointly several of these ob-

servations (Jour. Roy. Hort. Soc., London, Vol. LXXI. pt. 3, March 1946). They belong to the drought-resisting bulbous flowers which come into bloom without any assistance of moisture as they flower before the great drought breaks. One species of *Pancratium* is quite common and another is not. The one species of *Vagaria* is also fairly common. The first one that we found was the so-called "Sea-Lily", *Pancratium maritimum* L. which we collected from sea-side dunes in pure sand at Gaza, near Jaffa, etc., in September and October. It also grew at Nathanya and was no doubt abundant all along the dunes before their development. It was also called the Sand-Lily and the Sea-Pancratium. Harding found it in full flower at Gaza facing the sea in the second week of September. On August 18, I found the plants south of Jaffa, at the Wadi Rubin estuary, in bud. Their leaves were a prominent feature in May. This Sea-Lily was usually in the pure sand but I have also found it in the sun-dried mud which joins the sand at the Wadi Rubin estuary. A flower of great beauty, it bore an umbel of 3 to 10 blooms at the top of the foot high scape, reminding one superficially of the mixture of a large white trumpet daffodil and a Madonna Lily. The resemblance is very close to the daffodil and the perfume is most pleasing. Long after the flower had faded, one single bloom would scent the whole of our room with honey sweetness. The flowers are pollinated by night-flying moths, probably the hawk moths (Sphingidae) which I saw commonly near them. When ripening, the base of the flower elongated considerably, and the carpels of the seed-head swelled with their 6 to 12 black satiny seeds.

On September 16, we found *Vagaria parviflora* Herb., which is called the "Small-Flowered Pancratium", upon a rocky limestone slope in thin soil on the open edge of the Government pine forest (*Pinus halepensis*) at Bab el Wad, beside the Jaffa-Jerusalem road beyond Latrun, at about 900 feet. Subsequently, it was found to be fairly widespread amongst the stony hills of this dry woodland. Poor rock crevices on dry hillsides are its favorite haunt at Mount Carmel and it grows likewise near Beirut and Sidon in the North. When we dug down to examine its bulbs we found them clinging hard to the face of the rock and thrusting their thick contractile roots tenaciously into the cracks. The bulb was the same size as a rather large daffodil bulb measuring 3 by 2 inches, but covered by thin outer scales of a most distinctive satiny, blackish-brown color which give it a characteristic appearance. They were growing in crevices of the rock 9 inches below the surface and they usually broke away at the root-plate at the base of the bulb when gathered. The flower scape was about as tall as that of *Pancratium maritimum*, that is a foot high, but more slender and bearing flowers of only about one-third the size. There was a disappointing lack of scent with this species, and I assume it is not pollinated by night moths. The flower heads when found in bud were like white lilium buds, with green stripes; they burst open immediately they were touched. In October the plants were in seed, with globular dark green swellings at the seed heads; in fruit they were not a little unlike the appearance of the fruiting heads of isises.

The third species, *Pancratium Sickenbergeri*, grew in the more desert regions around the Dead Sea and was characterized by its leaves which curled up into a distinct spiral at the tip. It flowered in October in the desert near Sebbeh.

Interesting structural features set apart *Pancratium maritimum* and *Vagaria pariviflora*. The main differences between these species lie in the coronas, the former having larger flowers, 4 or 5 inches in length, and a corona resembling that of the trumpet daffodil except that it is bordered by 12 large triangular teeth. From the angle of each alternate indentation and opposite to the midrib of the perigonium (which consists of 3 petals and 3 sepals of similar appearance) a stamen arises. The non-free portions of the filaments of the stamens can be discerned as thickened veins in the corona which ultimately merge with the central veins of the perigonium segments, the remainder of the corona at the same level merging with the tube of the perigonium. Apart from the smaller size of the flower in *Vargaria parviflora* which is only about a third the size of that in *P. maritimum*, every alternate indentation of the corona is carried down almost to the junction of the perigonium with the corona so that the corona is almost completely split into six portions each of which has the non-free portion of the filaments of a stamen serving as its midrib. Thus we see stamens arising from the perigonium, the filaments of which have for half their length a winged blade on each.

This would seem to be a transition stage between the structure of *Pancratium maritimum* and a corona-less flower with simple, straightforward stamens. On this basis we might consider the corona as an elaboration of the stamens. Baillon, however, in his work on coronas in general, regards them as disc-like developments of the floral axis comparable with the nectar-secreting discs which are frequent in flowers.

The seeds of *Pancratium maritimum* and *Vagaria parviflora* resemble glossy black beech seeds with their three sides, and it was interesting that when our Jewish guide at one of the hill settlements one day offered us a gift of seeds of the "Rose of Sharon", he eventually produced these seeds. This flower of course is not given that name.

Finally, the lovely showy sternbergias, which seem to have suffered most at the hands of the collectors, are today much rarer in Palestine than when most of the older books on its flora were written. The yellow, funnel-flowered *Sternbergia lutea* was rare near Jerusalem excepting at one spot near the neighboring Jewish village of Beit Hakerem where it flowered in the early autumn, but at that time it is very abundant in great masses over the Transjordan countryside south of Amman. The place where I found it most abundant in Palestine was on the hillside overlooking the railway gorge at Dier es Sheikh in the hills some miles below Jersualem. That was in February when its leaves had come up in abundance, a sign of what must have been a very striking show of flowers in the previous autumn. Writing in the 17th Bulletin of our wartime Jerusalem Naturalists' Club, my friend F. H. Norris noted collecting *Sternbergia ? Fischeriana* bulbs in the limestone just below the summit at 5,500 ft. on Mount Cassius, on the Syrian-Turkish border,

in May 1945. There, judging by the number of seed-heads, it was not very free-flowering in the wild state. It was rather more stunted at this height than lower down. The bulbs proved quite hardy in southern England where one flowered. He also found *Vagaria parviflora* in seed near the falls at Baniyas, in the upper Jordan Valley on December 1st (Bull. 27, J. N. S.). *Sternbergia pulchella* is supposed to grow in the Lower Lebanon; *S. Clusiana,* the dwarf one, is also widespread outside the Jordan Valley.

The other amaryllid is *Ixiolirion montana,* growing locally in spring, between Gaza and the Lebanons. Erect blue-violet flowers mark its growth in the hills and fields, with its narrow, glaucous leaves.

[Editorial note.—Photo prints of *Pancratium maritimum* and *Vagaria parviflora* by Capt. W. F. W. Harding of the British Army, and also his brief notes about these two species, were received too late for inclusion in this issue of Herbertia, and will be reproduced in the 1948 issue.—*H. P. T.*]

GROWING AMARYLLIDS IN MEXICO

W. F. Harrison, *Mexico*

Since Mexico is a mountainous country and extends from north of the Tropic of Cancer to well down in the direction of the Equator, and on the east from the hot tropical Gulf of Mexico to the warm Pacific Ocean on the west, one finds every degree of climate, hot, cold, wet and dry—the tropical fever ridden coast of Yucatan and Vera Cruz to the high Sierra Madre around the Mexican Central Plateau, where it freezes and snow falls, as it does in the Northern United States, reaching from the dry desert states of Sonora and Coahuila to the heavy rainfall on the Isthmus of Tehuantepec. The native vegetation varies with the climatic conditions. In the dry parts or where it is dry for several months in the year, a large percentage of the plants are bulbous or rhizomatous. These include many amaryllids. In the mild temperate mountain valleys of Vera Cruz, where it never freezes and never gets really hot, one finds many species of *Hymenocallis* or Spider Lilies, and other tuberous or bulbous plants growing in cans, pots, or any container that will hold a little soil, or planted directly in the open ground, crowded between other plants and trees. Every home has its plants—some have been handed down from one generation to another, others brought from distant places. In the moist warm mountain valleys they have found a congenial home—some have names, many have not; some are used in medicine, others for their beautiful flowers. The women especially are fond of flowers. Hunting around in these old towns, one may find many plant treasures.

The hybrid *Amaryllis* seem to be practically unknown to the natives, and what few are here have been brought in by foreigners in the last few years. When I was forced by poor health and malaria to move from the valley close to El Inante and the National Highway to a higher altitude, I decided to try raising hybrid *Amaryllis* along with other flowers and

fruits for I have always had a soft spot in my heart for these huge and beautiful flowers. The moist temperate mountain climate, at an elevation of about 3500 feet, seemed to be adapted to their culture. It seldom frosts, except in rare years, when it does even freeze the sugarcane in the valley below. The heavy rainfall is from May to October, but there is usually some rain in every month of the year.

I found several species of *Zephyranthes*, or Fairy Lilies, growing in humus amongst the rocks, and under the shade of the big oaks and sweet gums. The soil is very fertile because the forest is heavy and the ground is carpeted with a thick mulch of leaves and humus. However, there are only patches that can be cultivated for the rocks and boulders are so liberally scattered between rocky hills and canyons.

Here, hybrid *Amaryllis* planted in the open ground begin to bloom from the middle of February, depending on how cold the winter was. Some do not lose their leaves unless frozen, others go dormant naturally in December. The first seeds are usually ripe by the end of April. I do not allow plants to produce seeds unless I wish to plant them for it is a strain on the vitality of the bulb. As soon as the pod splits open, the seeds are planted in moist soil—half loamy sand and half decayed humus. The flats are placed so that the seeds get heat but not the open sun. By the middle of September, or before the weather gets too cold, the seedlings are transplanted to other flats or pots so that they will make abundant roots before cold weather sets in. Here they are left all winter until they are transplanted to the open ground about the first of March —in ground that was heavily fertilized with barnyard manure in the previous year. The plants are hoed or cultivated to keep the weeds down. The young plants are planted about one inch deep, or plenty of loose soil is placed over the bulb to keep it from drying out in the hot spring sun. A light dressing of bone meal, and plenty of moisture are provided for these bulbs seem to enjoy a cool, damp soil. After the plants are well established, and before the rains set in during May, they are given a good mulch of leaves and manure. This serves to keep the soil from washing, and provides additional nutrients when the soluble compounds are carried down to the roots by the rain water.

In our usual dry spell in August, the mulch is lightly hoed in, but care is taken not to injure the roots that are close to the surface. In the case of a big bulb the roots may extend for two feet in all directions. A new mulch is then given that will remain on the ground until it is hoed in during January or February. I have had plants that produced eight flowers to the stalk, and two 34-inch stalks to the bulb. These are however not the most delicate colors.

At various intervals the bulbs are given a dressing of bone meal, and the soil around them is lightly hoed, until May when they are given another mulch of humus and manure which is left until August. The mulch is then hoed in and another mulch put on because sometimes in August and September, we have hurricanes, when the bottom falls out and it really rains. I try therefore to protect my soil for it is easier to keep it from washing than to make new fertile soil. Even a few grass clumps and weeds are better than nothing for they can easily be hoed up after the rains are over.

By the spring of the second year, some of the strongest will put up a flower stalk. Out of seventy seedlings of a pure red *Amaryllis* pollinated from a rose pink, I had one bloom in twenty-three months, four good, big flowers on a twenty inch stalk, of nearly the same color as the seed parent. Red was therefore dominant over pink. Four others bloomed by two years, but only one was outstanding. Since they are planted fifteen inches apart and the rows are two feet between rows, they will be left in place until the fall after they have all bloomed. Then they will be sorted according to quality marked on the labels, and the offsets from superior bulbs will be planted separately.

The hybrid *Amaryllis* is one of the most beautiful and at the same time one of the most easily cultivated and fool proof bulbs. If one gives them only reasonably good care, one will be richly rewarded. Usually they are quite free from diseases and insects. In this locality, in some years, a white and black ringed hairy caterpillar will get on them and devour many leaves unless removed. They are however easily killed by knocking off into a pail containing some oil on water. In the spring, when the buds grow up, the climbing green cut-worm will sometimes eat into the tender buds. But with a little vigilance these are easily controlled. A few plants have died from internal dry-rot—the leaves turn reddish-brown and dry up; on examination of the bulb, it will be noted that the heart has dried up although there is no sign of decay, and the roots remain in good condition. Fortunately the disease does not seem to be contagious for plants close by are not affected. Young plants should have some protection from the midday sun for the tips of the leaves will burn in the full sun. With full sun, on delicate plants, all leaves dry up and will not be replaced until the cool weather comes again.

IN MEMORIAM—LEON HATCHIG LEONIAN, 1888-1945.

[Plate 303]

The flower fanciers, who knew of his work in the development of the day lily, regret the passing of Dr. L. H. Leonian at his home in Morgantown, West Virginia on June 7, 1945. He was especially noted for the improvement he made in color quality of *Hemerocallis* of the fulvous types.

Dr. Leonian was born in Van, Armenia, February 27, 1888, and received his secondary education there. He emigrated to the United States in 1910, where he worked for a few years in New York and Detroit. He graduated from the University of Kentucky with the B. S. degree in 1916 and from the University of Michigan with the degree of M. S. in 1917. Following a year as Assistant Research Horticulturist at

[LEONIAN—Continued on page 32.]

Leon Hatchig Leonian, 1888-1945

Plate 303

1. REGIONAL ACTIVITY AND EXHIBITIONS

REPORT ON DAYLILIES, 1947

ELMER A. CLAAR, *Chairman,*
Hemerocallis Committee,
American Plant Life Society

Dr. Leonian and Mr. Betscher have passed away; Mr. Traub has been away and has not as yet resumed hybridizing; Mr. Plouf had been away to the war and had no new seedlings last year; and Mrs. Nesmith had to curtail her activities due to wartime pressure. Therefore, I did not make my annual trip East this year, partly because of these facts and partly because of the stress of business and lack of time.

However, I had, before the season opened, about 500 named varieties of daylilies and added about 75 new ones this year, and I have had access to the University of Chicago plantings of over 1000 named varieties, so that the season has not been without its thrills.

I was appointed Chief Hemerocalliarian of the Men's Garden Clubs of America this year, and each of the local clubs immediately proceeded to appoint a head hemerocalliarian. I started to canvass these individuals to see what they were growing and to give what encouragement I could to improve their plantings. This entailed a lot of correspondence and resulted in some warm friendships. You will find below a list of the head hemerocalliarians of 49 of the local Men's Garden Clubs of America, and I would suggest that if you have a problem and you live near one of them that you get in touch with him.

The year has been eventful in that daylilies have been added to most of the iris catalogs.

During the year I have written several articles to boost daylilies; one for the Flower Grower, September, 1947; one for Plants and Gardens, the Brooklyn Botanic Record, Summer, 1947; one for the Home Garden, May, 1947; and one for the New York Times, April 27, 1947.

In addition, I entered a daylily exhibit at the Highland Park Garden Show, which was co-sponsored by the Ravinia Garden Club, and the exhibit won a special award and first prize.

During the year I received reports of the plantings from the Trial Gardens of the American Plant Life Society and am attempting to follow them through.

The Midwest Hemerocallis Society held a rousing meeting this summer, in which many people interested in daylilies took part. This is a very enthusiastic group and there is no doubt but that they will accomplish a great deal in furthering the popularity of our favorite plant.

I took a trip to Jamaica this year and while there called upon the head of the Agriculture Department. He had never seen or heard of a daylily.

I came back by way of Florida but it was early in the season so I did not attempt to look up Mr. Wheeler, Mr. Hayward, or any others of the enthusiastic group around Winter Park or Miami.

The American Iris Society met in Evanston on June 7 and one of the points of call was my garden, not so much for the iris as to see the collection of daylilies. Those that were pre-eminent at the time were *Flavina, Earliana, Brunette* and *Little Cherub*. These people were also enthusiastic about my tree peonies and herbaceous hybrid peonies.

HEMEROCALLIS TESTING PROGRAM

MEN'S GARDEN CLUBS OF AMERICA—1947

CHIEF HEMEROCALLIARIAN—Elmer A. Claar, 1400 Lake Shore Drive, Chicago, Ill.

HEAD HEMEROCALLIARIANS:

Men's Garden Club of Akron (Ohio); O. L. Schneyer, R. D. 7, Box 163, Akron 3, Ohio.

The Men's Garden Club of Albany (New York); J. L. Perlman, 41 Ryckman Avenue, Albany 3, New York.

Men's Garden Club of Asheville (North Carolina); L. B. Ordway, 221 Westover Drive, Asheville, N. C.

Men's Garden Club of Atlanta (Georgia); Milton W. Blanton, 1442 Copeland Avenue, S. W., Atlanta, Georgia.

Auburn Men's Garden Club (Alabama); Dr. John R. Moore, P. O. Box 82, Auburn, Alabama.

The Men's Garden Club of Broome County (N. Y.); Tracy E. Darrow, 113 Leroy Street, Binghamton, New York.

Men's Garden Club of Champaign County (Ill.); J. T. Ledrum, 1014 W. Charles St., Champaign, Illinois.

Men's Garden Club of Chicago Region, Inc. (Ill.); James W. Coffey, Rm. 312, 228 N. LaSalle Street, Chicago, Illinois.

Men's Garden Club of Cleveland (Ohio); Allen H. Frost, 3893 Silsby Road, University Heights 18, Ohio.

Men's Garden Club of Corvallis (Oregon); Lee A. Powell, Route 1, Box 671, Corvallis, Oregon.

Tri-City Men's Rose & Garden Club (Davenport, Iowa & Rock Island & Moline, Illinois); Rev. Edwin C. Munson, 615 Forty-Fifth Street, Rock Island, Illinois.

Men's Garden Club of Denver (Colorado); LeMoine Bechtold, 1639 Pearl Street, Denver, Colorado.

Men's Garden Club of Des Moines (Iowa); Ralph Deitrick, 1315 25th Street, Des Moines 11, Iowa.

Men's Garden Club of Regional Detroit (Mich.); Henry J. Beyerle, 7691 Penrod Avenue, Detroit, Michigan.

Men's Garden Club of Elmhurst (Illinois); V. D. Comp, 555 Berkley Avenue, Elmhurst, Illinois.

Men's Garden Club of Snohomish County (Everett, Washington); Ed Manning, Route 1, Hartford, Washington.

Men's Garden Club of Fort Wayne (Indiana); C. T. Toothill, 3016 Webster Street, Fort Wayne, Indiana.

Men's Garden Club of Freeport (Illinois); J. A. Riner, 105 N. Harlem Avenue, Freeport, Illinois.

Grant's Pass Men's Garden Club (Oregon); Wilford C. Allen, 911 Washington Boulevard, Grant's Pass, Oregon.

Men's Garden Club of Great Neck (New York); Ralph Bailey, 17 Bellingham Lane, Great Neck, New York.

Men's Garden Club of Highland Park (Illinois); William Riddle, 1444 Marion Avenue West, Highland Park, Illinois.

Men's Garden Club of Hinsdale (Illinois); Hubert A. Fischer, Meadow Gardens, Route 2, 63rd Street, Hinsdale, Illinois.

Men's Garden Club of Houston (Texas); Pat E. Welch, 3809 Gertin Street, Houston 3, Texas.

The Horticultural Society of Jackson (Michigan); John Dorfmeister, 608 S. Grinnell Street, Jackson, Michigan.

Men's Garden Club of Jackson (Mississippi); T. G. Morel, 723 Wingfield Street, Jackson, Miss.

Men's Garden Club of Jacksonville (Florida); J. R. Waters, 1429 Edgewood Avenue, Jacksonville, Florida.

Men's Garden Club of Knoxville (Tennessee); J. R. Holcombe, Woodburn Drive, Knoxville, Tennessee.

Men's Garden Club of Lancaster (Penna.); Menno Swarr, 28 Parkside Avenue, Lancaster, Penna.

Memphis Men's Garden Club (Tennessee); John E. Pierce, 2583 Jackson Avenue, Memphis, Tennessee.

Men's Garden Club of Minneapolis (Minnesota); F. A. Upsher Smith, 2002 Iglehart Street, St. Paul 4, Minnesota.

New Trier Men's Garden Club (Illinois); Elmer A. Claar, 1400 Lake Shore Drive, Chicago, Illinois.

Men's Garden Club of New York (New York); Ralph Bailey, 17 Bellingham Lane, Great Neck, New York.

Oakland Business Men's Garden Club (California); Jas. H. Cobbledick, Sr., 1774 Woodhaven, Oakland 11, California.

Men's Pioneer Garden Club (Pine Bluff, Arkansas); George Gandy, 1200 E. 8th Street, Pine Bluff, Arkansas.

Men's Garden Club of Pittsburgh (Penna); Louis Steiner, 2309 Birtley Avenue, Pittsburgh 26, Penna.

Men's Garden Club of Portland (Oregon); Art Steele, 217 Russett, Portland, Oregon.

Men's Garden Club of St. Louis (Missouri); Wm. C. Sisco, 6032 Clemens Avenue, St. Louis 12, Missouri.

Men's Garden Club of St. Paul (Minnesota); N. P. Collis, 1544 Edgecumbe Road, St. Paul 5, Minnesota.

Men's Garden Club of Salem (Oregon); E. D. Burres, 230 S. 21st Street, Salem, Oregon.

Men's Garden Club of Savannah (Georgia); S. C. Forbes, 525 E. 55th Street, Savannah, Georgia.

Men's Garden Club of Syracuse (New York); Victor J. Adamy, R. D., Fabius, New York.

Men's Garden Club of Toledo (Ohio); Wm. F. Bremer, 910 Secor Road, Toledo, Ohio.

Walla Walla Men's Garden Club (Washington); Dr. Philip H. Pope, 925 Alvarado Terrace, Walla Walla, Washington.

Men's Garden Club of Watertown (New York); Ronald Fields, R. D. 3, Watertown, New York.

Men's Garden Club of Waukegan (Illinois); Robert Murdock, Zion, Illinois.

Men's Garden Club of Webster Groves (Missouri); Charles M. Warden, 327 Greeley Avenue, Webster Groves, Missouri.

Men's Garden Club of Westfield (New Jersey); D. J. C. Drew, 771 Boulevard, Westfield, New Jersey.

The Steel City Garden Club (Youngstown, Ohio); Homer E. Casgrain, 37 Court Street, Canfield, Ohio.

THE MIDWEST HEMEROCALLIS SOCIETY

MRS. GRETCHEN HARSHBARGER, *President*

The Midwest Hemerocallis Society, a year old and 650 members strong, celebrated its first birthday with a Flower Show at Shenandoah, Iowa, July 19-20, 1947. Approximately 5,000 enthusiastic gardeners from 17 states, including Texas, Montana, and New York, visited the nursery town for the occasion, armed with exhibits, notebooks and pencils, kodachrome slides and movies. Hotels and private homes being overbrimming, a dormitory was set up in the basement of one of the churches.

The show was extremely informal with no set rules for judging since the goal was to educate and enthuse. Everywhere was the light-hearted atmosphere of a family reunion, the only complaint being that one had a hard time seeing all the show because one kept meeting such interesting people! The flexible program included many demonstrations which went on with the gusto of a three-ring circus. The corsage-maker emphasized how to use hemerocallis in corsage work; the pottery wheel turned out vases for arrangements; and the arrangers took cut stalks of hemerocallis and blended them into artistic masterpieces before your eyes.

Two hundred forty-five people brought exhibits which were unusually well labeled. Since hemerocallis enthusiasts are also interested in other flowers, and since the Round Robin letter groups and American Penstemon Society were participating guests, there was a profusion of every sort of flower including exhibits of phlox, lilies, wild flowers, penstemons, plantain-lilies (20 varieties), shrubs, coleus, Rex Begonias, and plants with variegated foliage.

Flower kodachromes and movies were shown almost continuously in the "Eskimo Theater" which had been improvised from a basement nursery storeroom. There one could sit and enjoy beauty while resting

ones feet! One visitor wrote "I think I actually spent 6 hours at the 'theater' and I did not see one picture the second time and I didn't see all of the pictures." Among those shown were some from Sam Caldwell (Geddes Douglas seedlings), J. Marion Shull, M. Frederick Stuntz, Darrell Crawford, Vivian Christenson, Ben Darby, Mrs. Helen Fischer, and H. M. Russell.

Though the amateur exhibits were excellent, including many named varieties and some promising seedlings, it was around the growers tables that interest was most keen. Owing to the difficulty of transporting open blooms, and the even more touchy task of trying to bring blossoms that would open the following day, only growers within driving distance attempted displays. Mr. H. A. Zager of Des Moines brought arm loads of carefully labeled stalks of varieties in commerce. Most of these had been selected so that they would have open blossoms both days.

Hans Sass and Henry Sass showed a group of their seedlings including the huge yellow *Midwest Star,* and the appropriately named *Orange Beauty.* Seedlings yet under number included a velvety bright red.

H. M. Hill and his son Robert of Lafontaine, Kansas brought some of their seedlings and displayed them between their parent flowers, which was most illuminating. A worthy offspring had resulted from crossing *Orange Beauty* and *Valiant,* two famous oranges. Hybrids of *Painted Lady* by *Hesperus* and *Golden West* were also intriguing.

Merritt Whitten's seedlings were exceptional for their tall scapes.

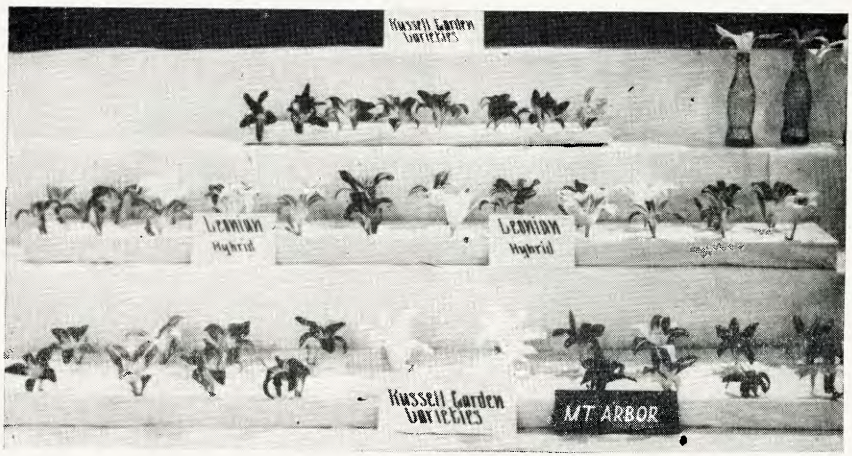


Fig. 177. A portion of the Growers' exhibits at the 1947 Midwest Hemerocallis Society Daylily Show.

Mt. Arbor Nursery, a large wholesale firm from Shenandoah, showed Leonian Hybrids and named Russell varieties which were shown to advantage in large flat metal trays covered with white material. Holes at intervals allowed the blossoms to reach damp moss below. This display was renewed the second morning.

Though the finest new varieties were conspicuously on display indoors and out, in gardens and as specimen blooms in bottles, a popular vote elected *Hyperion* as "Queen" of the Show! Runners up were *Midwest Star* (Sass) and *Painted Lady* (Russell). Apparently people who visited the Show still like their daylilies to be yellow.

Thanks to an unexpected and mercifully-timed cool spell everyone was able to enjoy the Official Test Garden which is located in full sun behind the KFNF radio studio on the grounds of the Henry Field Seed and Nursery Co. Most of the approximately 175 varieties were set the spring of 1947 so the blooms were not typical.

New officers of the society elected at the luncheon business meeting attended by 150 members are: Gretchen Harshbarger, president, North Liberty, Iowa; Viola Richards, Vice President, Greencastle, Indiana; Pearl Sherwood, Secretary-Treasurer, Atlantic, Iowa. Merritt Whitten of Nebraska City, Nebraska, will edit the Yearbook.

Believing that *Hemerocallis* are essentially a garden flower and should be studied in gardens for a full understanding, a group of regional garden tours are being planned for next summer. Members will be notified of dates and places in plenty of time to mark the dates on their calendars.

We want to thank the American Plant Life Society for their wonderful friendship and aid, and hope that as we mature and develop we can return the kindnesses in some measure.

[LEONIAN—Continued from page 25.]

Clemson College, and a period as Assistant Professor of Botany and Plant Pathology in the New Mexico State College and Experiment Station, he returned to the University of Michigan. There he studied mycology under Dr. Kaufmann and received the Ph. D. degree in 1922. That year he was appointed Assistant Plant Pathologist in the College of Agriculture and Experiment Station at West Virginia University. Here he became Professor of Mycology and Mycologist in the Experiment Station in 1936, the position he held to the time of his death.

As a scientist, Dr. Leonian's early work was with the study and control of certain plant diseases. His experience led him into studies of physiology of fungi, growth factors in fungi and bacteria, and, finally, into mineral and vitamin metabolism of some of the lower organisms. In the meantime he became interested in flower development as an avocation and over a period of twenty years did a great deal with delphiniums and oriental poppies as well as with the *Hemerocallis*.

2. SPECIOLOGY

[EVOLUTION, DESCRIPTION, CLASSIFICATION AND PHYLOGENY]

REVIEW OF PROCEDURES FOR DAYLILY DESCRIPTION, SCORING AND NAME REGISTRATION, 1940-1947

HAMILTON P. TRAUB

In 1940 the Society adopted the Official Data Card for the description of *Hemerocallis* clones (HERBERTIA 7: 98-102. 1940), and also a tentative daylily scoring procedure with the understanding that it was to serve as a starting point, and therefore subject to later revision (HERBERTIA 7: 125-128. 1940). The pages of HERBERTIA were opened for the registration of daylily names in 1935.

J. Marion Shull's important article in which he describes the use of the data card is reproduced in this issue of HERBERTIA for ready reference. Mr. Shull's work was so thoroughly done that it is not "dated" and reads as if it had just been written.

The scoring procedure adopted in 1940 has been used in the official daylily ratings made at the Regional Daylily Trial Garden, University of Florida, but World War II had already begun when the procedure was adopted, and daylily testing was suspended at most of the other trial gardens for the duration of the war. The work of testing has now been resumed at all of the trial gardens and the time has arrived when the scoring procedure should be reconsidered from the standpoint of any needed revisions by the Daylily Jury made up of those in charge of the Regional Daylily Trial Gardens.

The scale of points for rating daylilies (from HERBERTIA, 1940) is quoted below:

RATING SCHEDULE

All species and clones, from the standpoint of garden subjects, are to be given a numerical rating, using numbers from 1 to 10 for whole numbers, and decimals for values between whole numbers,—3.4; 6.5; 9.7; 6.8; 8.3, etc., depending on the merits of each species or clone as a garden subject. The following values are to be associated with the numerals:

Excellent	9.0 to 9.9
Good	8.0 to 8.9
Fair	7.6 to 7.9
Poor	7.5 and below

In making ratings use should be made of the scale of points for daylilies as set forth in the official score card (Table 1.). All clones rating lower than 7.6 should be considered as discards, but it should be

realized that clones that rate below 7.6 in one climatic region may rate much higher in another. Daylily ratings therefore are to be on a regional basis.

Table 1. Score Card for Rating Daylily Clones

[This score card was adopted in 1940, with the understanding that it "is subject to future revision and is to be considered as a starting point."]

Character to be scored:	Method of rating:	Possible score: 100
Vigor—Plant must be able to stand up under climatic conditions under which it is grown; if too weak, deduct at least ¾ of possible score		10
Foliage—Foliage should be considered from standpoint of its garden decorative value, but deciduous habit should not be penalized in the North		5
Scape, and number of flowers to scape—The flower should be considered from standpoint of sturdiness; should not be too sturdy nor too weak; however, such a scape as that of *Wau-Bun* should be considered as perfect for its type. Consider cleanliness; deduct ½ of possible score if lacking in this particular		15
Flower shape and form—Many shapes will be recognized so long as they are beautiful		15
Flower size—All sizes of flowers will be recognized so long as they are well proportioned with reference to the scape—a small flower on a stout scape, for instance, is quite objectionable, and should be penalized a full 8 points		8
Flower color and texture—The main emphasis should be put on purity of color rather than on mere novelty		35*
Flower odor—If odor is absent or unpleasant, deduct points accordingly; if present and pleasant, count the full 2 points		2
Flower durability—If flower fades in morning in full sunshine, deduct 7 points; if it fades in afternoon, deduct 3 points. Flowers that do not fade or that improve in full sunshine are to receive the full 10 points		10

Dr. Brittingham, of the Texas A. & M. College, has amplified the score card and we look forward to the publication of his suggestions in 1948 Herbertia.

The adoption of an entirely satisfactory score card for the rating of ornamental plants presents many difficulties for artistic standards in such a rating system need to be broad enough to satisfy the great

* This has been weighted so that no clone with inferior flower color will pass.

majority. However, we should not throw up our hands in despair, but seek patiently for a workable standard.

In the meantime, it might be desirable to use a similar rating system at the trial gardens along the lines suggested for amateurs by Mr. Gilmer and the writer. Both of these articles appear in this issue of HERBERTIA. At least, the clones could be rated as "Fair," "Good" or "Excellent" for the particular climatic regions where they are tested, the standard used being set up by the one in charge of the trial garden.

The pages of HERBERTIA, since 1935, have been open for the registration of daylily names, and the recording of daylily descriptions. One of the chief objectives in mind was to prevent the use of the same name for more than one clone. To this end the project of a comprehensive Daylily Check List, from 1890, when the first named hybrid clone was introduced, to the present time, was undertaken by the Society. Dr. MacDaniels started the work in 1940, but on account of war work the project could not be completed, and Prof. Norton took up the work in 1943, carrying it along alone until 1946, when Mr. Stuntz joined him as collaborator. The work will be completed in the winter of 1947-1948, and the check list will be published in 1948.

In 1947, the Midwest Hemerocallis Society (organized in 1946) agreed to join the American Plant Life Society as joint sponsor of the Check List. For future consideration of common problems in connection with the registration of daylily names, an eight member joint committee, four from each organization, is being organized. Apparently other common problems from now on can be solved most efficiently by similar joint committees.

OFFICIAL DATA CARD FOR HEMEROCALLIS*

J. MARION SHULL, *Maryland*

Interest in the Daylily, or *Hemerocallis,* has grown by leaps and bounds in recent years and is still growing. The number of breeders now working with this interesting material have so multiplied their numbers and so extended the variation of color and form and habit of growth that ordinary methods of description have broken down, are no longer adequate to provide the desired means of comparison or differentiation.

This happens in any plant group under similar circumstances, and the daylily has now reached that stage where some uniform scheme of registry and description is necessary if useless and confusing duplications are to be avoided.

Already the leading commercial catalogs dealing with *Hemerocallis*

* The data card for daylilies here presented, prepared by J. Marion Shull, a member of the Daylily Committee, was officially adopted by the Board of Directors of the Society in 1940. This data card fills a long felt want, and Mr. Shull is to be congratulated on his excellent job. It is recommended that such a card properly filled out accompany each new request for registration, and that it be used to describe clones generally so that all descriptive work will be on a comparative basis.—Ed. [1940 foot-note]

[1947 foot-note] This article is reprinted from HERBERTIA 7: 98-102. 1940.

present many descriptions that do not sufficiently differentiate. Sometimes the same clone will be described on the basis of different salient features, or again two distinct clones may be described only to the extent of features in which they are similar and the reader is correspondingly confused or left unenlightened.

The data card here presented is designed to provide quick and accurate reporting of all clones on a basis that will permit instant close comparison one with another. To use the card it is only necessary to underscore the appropriate descriptive word, or if it is desired to indicate a position intermediate between them the underscore simply passes from one to the other. By this means a highly accurate description is available for quick reference. Where added information seems desirable it can be covered in the ample space left for remarks. To show how simply and accurately the Data Card operates, and to introduce its use to those working with *Hemerocallis,* Dr. Traub has kindly contributed one with nearly complete marking descriptive of his variety, *La Tulipe.* This is reproduced herewith as an illustration [Plate 304].

This Data Card is reasonably self explaining but what follows may help to secure a uniform and unhesitating interpretation. Name of clone is placed in upper left corner of the card, on both sides to serve as a guide for alphabetic filing and easy reference.

Under "growth" the plant as a whole in its vegetative performance is described. Weak growers will only seldom be listed, for unless some extreme merit of flower, blooming season, or what not, justifies perpetuation such weak growers should never be retained. "Habit" deals with the making of long or short rhizomes or runners, the former resulting in such aggressive spreading as shown in *Europa* and *Margaret Perry,* a trait that makes these and similar clones undesirable in the intimate garden, but great for broad landscaping, whereas those with short rhizomes form compact clumps that may remain many years with very slight encroachment on neighboring garden freeholders. Root characters are of less immediate importance in the garden but may help in identification of clones.

"Rate of increase," the rate of multiplication of new fans, varies no doubt partly with soils and climatic conditions but it is also a matter of hereditary difference. With me *George Yeld* is very slow of increase and *Mikado* quite the reverse.

Height of foliage mass does not refer to length of leaves but to the naturally standing mass which is of importance in landscape effect. Foliage may stand stiff and erect or may arch over gracefully, or it may actually sprawl, and these attitudes, with difference in normal color from yellow- to blue-green are of significance in the garden plant. Some remain with reduced but still green foliage throughout the winter and so are characterized as evergreen whereas clones like *H. Middendorffii* disappear entirely even by late summer and have earned the descriptive term "deciduous."

There is great variation in the scape or flowering stem. Of course all will lean over away from nearby shade and toward the light but even in the open some will arch over instead of standing erect, even to

AMERICAN AMARYLLIS SOCIETY OFFICIAL DATA CARD—HEMEROCALLIS

NAME La Tulipe WHERE GROWN Orlando, Fla.

ORIGINATOR H. P. Traub INTRODUCER same YEAR 1939

PARENTAGE secured by using mixture of 25 or more pollens.

GROWTH—Weak, moderate, vigorous. Habit: spreading, compact. Roots: fleshy, slender, cylindrical, fibrous; long, short. Rate of increase: slow, rapid. Height of foliage mass 1½ ft.

FOLIAGE—Erect, arching, recumbent; slender, broad; yellow-green, blue-green; evergreen, deciduous.

SCAPE—Erect, drooping; slender, heavy, graceful, stiff. Branches: none, few, many compound.

Height 2½ ft. No. of buds 6-8 Season: early, medium, late. Bloom periods 2

Date 1st bloom mid 2pr., last Late June.

FLOWER (as a whole)— Large, medium, small. Single, double. Front view: spidery, star-like, full.

Side view: funnel, wide spread, recurved; regular, irregular, bizarre. Blooming: day, night, extended.

Diameter as naturally standing 3" in. Fragrance: wanting, pronounced; pleasant, unpleasant.

Carriage: vertical, horizontal. Fading, sun resistant. Quick shedding, persistent.

*COLOR—Self, bicolor, polychrome, blend. Color effect in mass Dark cardinal 6-L-8

Segments: Petals _____ in. long; _____ in. wide. Color "

" Sepals _____ in. long; _____ in. wide. Color "lighter Dark Cardinal

Color of throat Sulfur Yellow Color of eye zone scarcely perceptible

REMARKS † Flower wide shaped, and longer than wide;

†† Size of segments not determined so far

SUBSTANCE—Thin, medium, heavy. TEXTURE—Smooth, crinkled, spangled.

CHIEF MERITS OR OUTSTANDING QUALITIES (OVER)

Clear with distinct growth habit & flower shape

NAME La Tulipe AWARDS 1st. Class Certificate A.A.S. 1940

REMARKS IN GENERAL:

Beautiful and outstanding, but is most important for further breeding work;

Fades somewhat in late afternoon in full sun, and should be given partial shade for best results.

* Refer to A Dictionary of Color by A. Maerz and M. R. Paul or to Royal Horticultural Society Colour Chart, when possible.

NAME OF PERSON REPORTING H. P. Traub

DATE 11-15-40 ADDRESS U.S. Hort. Sta., Beltsville, Md.

For full description of card read article by J. Marion Shull in 1940 Herbertia. Fill in blank spaces and underline words which describe daylily named. Please give FULL INFORMATION.

Official Data Card for Hemerocallis, actual size as printed on two sides of a card (3 by 5 inches), showing front and reverse sides; filled out for the clone, **La Tulipe.** This shows how simply and completely the description can be made in spite of the small space allotted. Note under "Foliage," how a medium or intermediate between "slender" and "broad" is indicated; and again under "Flower," how the intermediate as to sun resistance is shown, and is re-inforced under "Remarks in General." [Completed card should now be sent to Prof. Norton or Mr. Stuntz.]

The Data were taken from a garden diary, and the card could not be completely filled out, lacking the flower-segment length and breadth data. Nor is the parentage indicated—in this case it is unknown as indicated.

Plate 304

the extreme of sprawling indicated by "recumbent." Some stems are slender and wiry, others thick, and either may be stiff or graceful in carriage. Branching may go all the way from capitate (wanting) as in *H. Middendorffii*, to compound as in *Queen Mary* and the multifloras. Compound branching is a prime quality for on this depends the number of blooms that may be out at one time as well as the total number of flowers per scape. Number of buds (flowers) will naturally be set at the maximum by the person reporting and this is all right except that stems obviously abnormal, such as may sometimes result from fascination or possibly from frost injury, should not be made the basis of bud count.

In the lower South some clones bloom repeatedly and even in more northern latitudes some at least occasionally bloom a second time, so provision is made of noting this feature under "blooming periods," but this is not to be confused with date of first bloom in locality where reported.

It is not possible to cover every variation of flower character but the principal characteristics are here included. By "spidery" is meant a flower whose segments are long and strap-like. With somewhat wider and pointed segments the flower becomes "star-like", while the term "full" has long been in use for flowers with broad or decidedly overlapping segments. This description is further augmented under petals and sepals where provision is made for actual measurement of length and width.

The "side view" is more variable but several main attitudes are provided for on the way from a narrowly open *Cissy Giusseppe* to the wide-spread and recurved *Shirley*. Aside from the general aspect there may be great irregularity of carriage owing variously to a long thrust-out lower segment, an unusual angle of flower face, the twisting or curling of segments, or something of a hose-in-hose effect where petals and sepals bend back at different levels. Clones like *Ophir* and *Sir Michael Foster* are quite regular but *Wau-Bun* and others may be designated as "irregular" or even "bizarre" with added mention under "remarks" when desirable.

Under "blooming" reference is had to the time of day during which flowers are effective. Day bloomers are those that open in the morning and close by evening or night and include the great bulk of the effective garden varieties. Even among these there is considerable variation. *Europa* is a sleepy-head, not well open till around nine o'clock, and retires fairly early in the evening. Many others open during the night, greet the break of day fully out, and remain in full display till after dusk. Others like *Calypso* open in the afternoon or evening and remain till ten o'clock or noon of the following day, dependent somewhat on light and temperature. These are the most useful of the night bloomers. An occasional night bloomer operates only at night and over a short period, not open until dusk and gone before morning, and are only useful for gardens enjoyed at night or for cut flowers at night, when most daylilies are a dead loss. For those few whose periods extend twenty-four hours or more the term "extended" is used.

"Carriage" covers flower position relative to the stem and is almost though not quite as varied as in the liliums.

Many daylilies bleach or fade in hot bright sunshine. Lemon yellow may bleach to near white by midafternoon—but that does not warrant describing them as "white" daylilies. Darker colors are more likely to suffer because they absorb more heat than do lighter colors. These are apt to face to more nearly the color of manilla wrapping paper. In a few cases the so-called "pink" daylilies become more nearly pink in late afternoon than in the morning—may in rare instances be a lovelier color than before fading. Others both dark and light remain practically unaffected by the sun. A clone need not be discarded because it lacks resistance to strong sunshine but this weakness needs to be known and the variety given a position in whole or at least partial shade.

After blooming, those clones are most useful that drop their spent flowers quickly so provision is made for recording desirable quick shedding or indicating the persistence of spent flowers which gives a messy, unclean appearance unless deliberate care is taken to remove them day by day.

Under "color" four general types are recognized; the selfs in which there is no marked variation from one color throughout the segments. Clones like *Hyperion, Goldeni, Ophir,* are typical selfs, the greenish tone at throat not voiding the term. "Bicolor" best applies to those wherein the color of petal segments is notably different from that of the sepals. With several distinct colors prominent in the same flower the term "polychrome" is correct. "Blend", on the other hand, is not so definite. It can only mean a more or less actual blending of such colors as occur habitually in daylilies, where the colors do not stand out clearly against each other or in definite patterns. It can not be specific as in Iris where "blend" means the combining of yellow with anthocyanin purples. Still it will be a useful descriptive term in certain cases. Special pattern or peculiariarities of color arrangement must be left for inclusion under "remarks".

When possible the color of petals and sepals should be recorded in terms of a standard color nomenclature (A Dictionary of Color, by A. Marez and M. R. Paul; or the "Royal Horticultural Society Colour Chart"), but aside from these more minute details a given variety will possess a mass color value, as lemon yellow, golden, orange, brown, etc., in garden effect, and for this reason a place is provided for recording this broader statement of color. A *Mikado,* despite its striking petal spots, may still classify as yellow in mass.

In some varieties the throat color is quite distinct and in many there is a heightening of color on petals just beyond the throat producing a roughly circular or triangular eye effect that has come to be known as the "eye-zone". It may be so faint as to be scarcely distinguishable or it may be very pronounced. It may be an enhancement or a detraction but in either case it provides a useful mark of varietal differentiation and when distinctive needs to be included in the description.

Substance and texture may seem of minor importance in a flower that lasts but a day. However, texture, the peculiar variations of flower surfaces, may be of considerable value at close range, where the spangled

or gold dust effect, or a pattern of intricate crinkling may be fully appreciated.

The card still leaves some voids, such as the occasional distinctive midrib, the color of unopened buds, or the differing color of the outer surfaces of segments, but these rarer items can best be taken care of under "remarks".

For the sake of future development it would be desirable to have all older clones subjected to a uniform description made possible by this data card at as early a date as possible, and then it might be well to stipulate that a properly scored card be filed with each new request for registration.

REPORTS FROM REGIONAL DAYLILY TRIAL GARDENS

[Reports from a number of Regional Daylily Trial Gardens have been received, and are reproduced below.] See also page 156.

1. EVALUATION OF DAYLILIES FOR NORTHERN FLORIDA

JOHN V. WATKINS, *Assistant Professor of Horticulture, University of Florida*

These evaluations are based on observations made and data taken in the Daylily Display Garden on the campus of the University of Florida, in the garden of the writer and in the garden of friends. The ratings have been arrived at after much deliberation and are greatly influenced by the remarks of fellow gardeners. In arriving at numerical values, the official score card for rating daylily clones on page 126, 1940 HERBERTIA has been used.

Table 1.—Additional Daylily Evaluations for Northern Florida, 1947.

Aladdin	8.4	*Honey Redhead*	8.6
Amherst	9.1	*Indian Chief*	9.1
Annis Victoria Russell	8.6	*La Tulipe*	9.1
Baronet	9.6	*Lidice*	8.1
Black Falcon	9.1	*Mayor Starzynski*	8.4
Bobolink	9.1	*Mignon*	7.0
Brackel	9.0	*Minnie*	8.3
Brunette	7.1	*Monarch*	7.8
Buckeye	7.1	*Nebraska*	8.5
Cabellero	9.6	*Ohred*	9.0
Clayton No. 1	9.0	*Peony Red*	8.4
Crystal Fairy	8.7	*Royal Ruby*	9.5
Daisy Whistler	8.4	*Ruby Supreme*	9.6
Dolly Varden	8.4	*Sachem*	9.6
Duchess of Windsor	9.0	*San Juan*	9.6
Easter Morn	9.5	*Scarlett O'Hara*	9.1
Fire Red	8.1	*Stampede*	9.1
Ganymede	9.4	*Symphony*	8.6
General MacArthur	9.1	*Theodore Mead*	9.4
Hesperus	8.5	*Triumph*	8.1
Halo	8.5	*Wekiwa*	8.6
Herkimer Johnson	8.4	*Zouave*	8.1

Table 2.—Daylily Winter Foliage Character in Northern Florida

[F=full garden value throughout winter; s=lacking in winter garden value.]

F *Annis Victoria Russell*
F *Aladdin*
F *Araby*
F *Aurillo*
s *Black Falcon*
s *Brunette*
s *Buckeye*
F *Caballero*
s *Caralline*
F *Carnival*
F *Clayton 1*
F *Cleo*
s *Corinne*
s *Craemore Henna*
F *Daisy Whistler*
s *Dolly Varden*
F *Dr. Stout*
F *Duchess of Windsor*
F *Duncan*
F *Elaine*
F *Emberglow*
F *Estelle Friend*
F *Fire Red*
F *Fred Howard*
F *Garden Lady*
F *General MacArthur*
F *George Kelso*
F *Golden Glow*
F *Granada*
s *Helen Wheeler*
s *Hesperus*
s *Honey Red Head*
F *Indian Chief*
F *Jimmie Junior*
s *John Blaser*
F *Kanapaha*
F *La Tulipe*
F *Lady Franklin*
F *Lidice*
F *Mayor Starzynski*
s *Mignon*
s *Mildred Orpet*
s *Minnie*
F *Miss Jennie*
s *Monarch*
s *Moonbeam*
s *Mongol*
s *Nebraska*
F *Ohred*
F *Paul Ihrig*
F *Peony Red*
s *Pink Lass*
s *Pink Lustre*
F *Reba Cooper*
s *Revolute*
F *Rouge Vermillion*
F *Ruby Supreme*
F *Russell Wolfe*
F *Sachem*
F *San Juan*
F *Scarlet O'Hara*
s *Symphony*
s *Takoma*
F *The Yearling*
F *Theodore Mead*
F *Triumph*
F *Victory Montevideo*
s *Wekiwa*
F *Welaka*
s *White Lady*
F *Yeldrin*
F *Zouave*

Daylily Display Garden at the University Of Florida

The Daylily Display Garden at the University of Florida, which was started in the early thirties, is still a feature of the campus, although, today, it is restricted to two long borders. Table 3 shows that only twenty-eight varieties and one species are on display in 1947. This reduction is made necessary by the labor situation and the greatly increased enrollment at the University.

Since the Regional Test Gardens were conceived, the unit here has been maintained in the best possible spirit and tradition. Annually, collections have been sent out to the other gardens, seedlings have been received for valuation from the following breeders—Hayward, Norton, Taylor, Traub, Watkins and Wheeler. Ratings for many of these seedlings have been published in Herbertia, others can be found in Table 1.

Following the January, 1947 renovation, hundreds of divisions of commercial varieties of Hemerocallis were distributed among the married students who reside in the veterans' housing units on the campus of

the University of Florida. These young people eagerly accepted these plants and it is hoped that an interest in Hemerocallis may be developed by some of our students as they live with these worthy perennials during their college years.

Table 3.—Daylilies in the Display Garden—University of Florida, 1947

Baronet
Bertrand Farr
Bicolor
Cabellero
Cypriana
Dauntless
Duncan
Emily Hume
General MacArthur
Hemerocallis aurantiaca
Kanapaha
La Tulipe
Linda
Marcelle
Mildred Orpet
Mrs. John J. Tigert
Parthenope
Patricia
Port
Radiant
Ruby Supreme
Sachem
San Juan
Semperflorens
Serenade
Sir Michael Foster
Swan
Vulcan
Welaka

2. DAYLILY TRIAL GARDEN AT SOUTHWESTERN LOUISIANA INSTITUTE

Ira S. Nelson, *Professor of Horticulture*

A trial garden or test garden for daylilies was established by the Society at Southwestern Louisiana Institute, Lafayette, Louisiana in 1942. While this garden has never developed to its full stature, it has served in no small way as a display garden. During the war years it often was neglected for weeks at a time. Few records of the various varieties were kept. Labels often became misplaced and very few varieties were added after 1943. Yet, in spite of all these handicaps, and in spite of all the evils which accompany a war, this garden was visited frequently by people of the Gulf coastal area.

In looking back over the past few years, I wish to record a few things concerning this garden which may not only be of general interest, but also of some specific value to those who will determine the policy of this and similar gardens in the future.

Since there was no specific plan given for the planting of the garden, it was laid out in beds which measured five by twenty feet. Grass walks five feet wide separated the beds. This size bed was used to conform to the other beds in the floriculture unit at S. L. I. While the size bed may not be the most desirable, it has proved to be thoroughly useable. These beds each accommodate 42 plants at 18 inch intervals. A space of 9 inches was left between the ends of the bed and the plants and 12 inches on the sides. The original plan called for ultimately placing 9 plants of each variety in a block. Most of the varieties, however, were planted in blocks of three running the narrow way of the bed. Blocks of three plants each proved sufficient volume of each variety for

adequate display. Little difficulty has been experienced to date in keeping the varieties in bounds.

Approximately 100 varieties are growing in the garden. Many of these are near duplicates. Although some few are rather outstanding, the bulk of them are little better than could be expected from an equal number of seedlings from good parent stock. Most of the varieties have long been in the trade and do not represent the newer developments. However, a few of the Traub varieties, which are in the garden are standouts.

Each season the garden has attracted a considerable number of visitors. There is now evidence in the gardens of this section of the country that this trial garden is stimulating the daylily enthusiasm.

Besides serving as a display garden, it has been a source of pollen for amateur hybridizers. This function may bear richer fruits than its other functions. Pollen has been given freely to all who have asked for it.

Of the few records kept only those giving the date of first bloom are worth recording here. Bloom dates were taken only on the varieties which bloomed in 1943. It should be pointed out here that most varieties after becoming established will bloom twice a year in Lafayette, Louisiana. Some few will bloom three times per year. Winter temperatures at Lafayette seldom get below 20° F. An occasional 15° F. may be expected every 5 to 10 years. Heavy frost may be frequent in some winters, but hard freezes occur only a few times a year if at all. Winter temperatures experienced in Lafayette do not seem to have any permanent effect on any of the varieties included in the trial garden. Evergreen varieties seem to multiply at a more rapid rate than many of the deciduous sorts.

The floriculture unit at Southwestern Louisiana Institute is being moved to new quarters to make way for a mid-winter fair building. The daylily trial garden also is being moved at the same time. The new garden will be laid out in a similar pattern to the present garden. The ordeal of moving the garden should be completed by September 1st. August seems to be an ideal time to move day lilies in this section.

By way of evaluating the trial garden for the duration of the war years, it can be honestly said that it aroused a great deal of interest in daylilies simply by having varieties unknown to this section on display. As a source of pollen it stimulated considerable interest in amateur hybridizing. The garden fell short in that it has not been kept up to date and very few records have been kept on performance of varieties.

HEMEROCALLIS NOTES, 1943

Clone	Date of First Bloom	Scape
Aurantica	May 1	Strong—30″-34″
Amarillo	May 5	Strong—30″-32″
Amaryllis	May 21	26″-28″
Bijou	May 18	28″-30″

Bagdad	June 10		
Cinnabar	May 17		24″-26″
Cressida	May 16	Strong—	26″-28″
Crown Prince	May 9	Strong—	28″-30″
Dawn Play	June 10		
D. D. Wyman	June 10		
Dauntless	June 12		
Estmere	March 16		
E. H. Bowles	June 11		
Emily Hume	May 17		26″-28″
Flava	May 19	Weak	24″-26″
Fulva Rosea	June 10		
Gelbett Seedling No. I	May 22	Strong—	28″-30″
Gelbett Seedling No. II	May 20	Strong—	34″-36″
Gelbett Seedling No. IV	May 23	Strong—	24″-26″
Gelbett Seedling No. X	May 23	Strong—	24″-26″
Goldeni	May 5	Weak	4″
Gem	April 27		28″-30″
Hyperion	June 12		
Iris Perry	May 20		26″-28″
Imperator	May 20		28″-30″
J. R. Mann	April 20		24″-26″
J. A. Crawford	May 5		34″-36″
Linda	June 12		
Lemona	April 8	Weak	20″-24″
Mikado		Medium	18″-20″
Maggie Napoleonville	April 26	Firm	28″-30″
Margaret Perry	May 21	Strong	
Modesty		Short	
Midas	May 22	Short	
Mrs. A. H. Austin	June 14		
Mrs. John Tigert		Uneven strong	
Multiflora Summer Hybrids	May 22	Weak	
Ophir	April 20	Strong—	28″-30″
Orange Vase	April 27	Very short	
Patricia	May 20	Strong—	28″-30″
Rajah	June 14	Weak	
Sunkiss	April 27	Strong—	34″
Serenade	May 13	Weak	26″-28″
Sweet Briar	May 20	Strong—	34″-36″
Semperflorens	April 27	Strong—	28″-30″

Sir Michael Foster	June 7	Strong—30″-34″
Thelma Perry	May 19	Slender Weak
Vesta	May 14	Weak
Vicountess Byng	May 16	Weak
Vulcan	May 1	30″-34″

3. DAYLILIES IN SOUTHERN CALIFORNIA

W. Quinn Buck,

Division of Ornamental Horticulture, College of Agriculture,

University of California at Los Angeles.

The great colonies of *Hemerocallis fulva clone Europa* along the roadsides and near an old stone farmhouse in Pennsylvania first aroused my interest in the genus, and I cannot help regreting that our growing conditions here are less favorable to such incredible luxuriance.

Our moderate winters do not give enough winter chilling for some; our cool nights seem to affect certain varieties so that they do not open perfectly or with full color intensity; and our dry summers necessitate vigilance by the grower to see that the plants get sufficient water.

Hemerocallis flava and *Hemerocallis minor*, and probably *H. Forresti*, do not grow and flower normally due to insufficient winter chilling. *Gold Dust* and *Sovereign* are two of the older varieties which do not get sufficient cold. *Wekiwa* does not have the depth of color here that it has further inland or in the East. *Nebraska* seldom opens well, and *Araby* and *Sybil* have a rolling or curling of the petals that spoils the shape. These factors and my own personal tastes are the basis of the classifications below.

The daylilies which seem to be excellent and those best adapted to Southern California include the following:

Chengtu	**Golden West**	**Mikado**	**Sonny**	**Wau-Bun**
Dauntless	**Hesperus**	**Patricia**	**Soudan**	
Fulva	**Kanapaha**	**Purple Finch**	**Swan**	
Fulva maculata	**Linda**	**Rajah**	**Taruga**	
Fulva rosea	**Majestic**	**Royal Ruby**	**Triumph**	

Clones which would be classed as very good include these:

Afterglow	**Debutante**	**Honey Redhead**	**Purple Flash**	**The Alamo**
Aladdin	**Dominion**	**Hyperion**	**Revolute**	**Valiant**
Aurantiaca	**Dorthy McDade**	**J. A. Crawford**	**Royal**	**Warpath**
Baronet	**E. W. Yandre**	**J. R. Mann**	**Royalty**	**Warrior**
B. H. Farr	**Festival**	**Mayor Starzynski**	**Sachem**	**Welaka**
Black Falcon	**Garden Lady**	**Morocco Red**	**San Juan**	**Winsome**
Buccaneer	**The Gem**	**Mrs. A. H. Austin**	**Sir Michael Foster**	**Yeldrin**
Buckeye	**Golden Bell**	**Mrs. John Tigert**	**Stalwart**	**Zouave**
Caballero	**Golden Dream**	**Mrs. W. H. Wyman**	**Su-Lin**	

Chrome Orange	**Gold Imperial**	**Multiflora**	**Supreme**
Criterion	**Hankow**	**Port**	**Symphony**

Varieties sufficiently good to warrant use in our gardens make up this group:

Amaryllis	**Dazzler**	**Golden Shadows**	**Mongol**	**Radiant**
Anna Betscher	**Demon**	**Heather Rose**	**Moonbeam**	**Regal Lady**
Bagdad	**Dr. Stout**	**Hiawatha**	**Old Vintage**	**Spitfire**
Burning Star	**Earliana**	**Imperator**	**Pink Lustre**	**Sundew**
Cinnabar	**Emily Hume**	**Ivory Chalice**	**Purple Waters**	**Theron**
Circe	**Geo. Yeld**	**Margaret Perry**	**Pygmean**	**Vulcan**

A last classification is of those which are poor and some which are worthless in the garden. Some of these may be quite good in other sections of the country.

Annis Victoria Russell	**Dark Eyes**	**Minor**	**Rosita**	**Viscountess Byng**
Araby	**Dawn**	**Mrs. Jones**	**Serenade**	**Wekiwa**
Boutonniere	**Evangeline**	**Multiflora Sum. Hyb.**	**Sovereign**	**White Lady**
Brunette	**Fair Morn**	**Nebraska**	**Sunset**	
Calypso	**Florida**	**Nocerensis**	**Sunny West**	
Cecil Houdyshel	**Gold Dust**	**Peachblow**	**Sybil**	
Cissy Guiseppi	**Melo**	**Princess**	**Thunbergii**	

Mrs. Nesmith's *Royal Ruby* and *Purple Finch* are fine reds. Dr. Stout's *Majestic* is a wonderful thing, and his *Triumph* is another fine orange. *Soudan* (Stout) is unquestionably the best daylily we grow here because it is so well adapted to our climate and is such a beautiful variety.

THE DAYLILY CHECK LIST

M. Frederick Stuntz, (*Compiler*)

While it seems that it should have been possible to publish the list of daylilies during the time since this project was first started there are many good reasons why this has not been accomplished.

1. Simply a list of names with no evidence of origin or identification of clones would be of little value; although such a list could be published immediately.
2. The production of new varieties has been greater than we imagined; and to trace and record the source of over 3,000 names has required more time than was anticipated.
3. There have been many duplications, new clones having been given names already applied to others. This often requires considerable correspondence in order to find out who has prior right to retain the name; and to record the new name chosen by the originator to replace the one duplicated. These synonyms will be cross referenced in the Daylily Check List. Most of such duplications can be prevented when the Check List is available.

4. While practically everyone who has named daylilies did cooperate there are about a half dozen that have not sent us their complete lists. While we have been able, by the assistance of friends who have loaned us lists and catalogues, to identify most of the names, there are many new ones not published, which should be included to make the Check List complete; and we hope that these breeders will realize that it is to their advantage to have all varieties recorded.

5. Work has had to be suspended during the summer months when both Prof. Norton and Mr. Stuntz, who together are charged with the preparation of the Check List, must devote most of their time to their Gardens.

6. All of this work is done in the "spare" time of the compilers and without pecuniary compensation; but we hope to assemble the data necessary for the printer during the coming year.

In the meantime we trust that you will cooperate with us; and that all persons who contemplate naming new seedlings will send the names to Mr. Stuntz. After the names have been checked with our files to avoid duplications, the brief description necessary to make the names valid should be sent. This includes height, season, color; also when known—parentage, time of day or night blooming, fragrance, whether day or night blooming, and address of introducer.

Address: M. Frederick Stuntz, 6505 Main St., Williamsville 21, N. Y.

GENERAL COMPARISON OF DAYLILIES AND 1947 BLOOMING RECORDS

George Gilmer, *Virginia*

Grade A Clones

Grade A means outstanding by comparison with my other plants of the same color and season of bloom. *Gold Dust* is rated A because I have nothing better at such an early date. It blooms under all conditions. A record breaking freeze this year withered stems of *Wau-Bun* with buds over two inches long and did not hurt *Gold Dust*. If it bloomed a month later it would be discontinued.

To rate at all plants must have beautiful bloom in the morning. To rate A they should have bloom at 5:00 P. M., uninjured by our hottest sun. A few of Grade A reds and pinks are slightly injured by a full day of bright sun. They will be moved to Grade B or discontinued in most cases, as soon as those on trial are rated. Perhaps a third or more of the A's will be moved to Grade B or discontinued in the next three years.

Some of the plants rated A may be rated B or even less by others who have had these trial plants long enough to rate them. Some that I rate B may be rated A by others, because they do not have all my A's or because they do not object as much as I do to afternoon fading or poor foliage in summer or autumn or because of different conditions of climate, soil or judgment of values.

Grade B Clones

Grade B are good plants but have some weakness such as afternoon fading, poor foliage at some season, or not as good as similar A plants. In general if lost they would not be replaced, but they are too good or too different to discard as yet. Practically all B's would have rated A ten years ago and a goodly number would have gotten A grade even five years ago. As soon as the grading of sixty-one now on trial is completed at least a dozen grade A will step down to B and this will push about the same number of B's into the discontinued class, now numbering 69. Others on trial will rate B and cause more B's to be dropped.

In three years I expect at least two-thirds of B's to be discontinued. Some B's might be rated A by others because they do not have my A plants that push them down or because of a different system of valuation and personal choice of colors, form, climatic conditions, etc.

Rating is a relative matter. The standing of all plants where improvement is as rapid as in daylilies is fluid. Many new plants are introduced each year. The hybidizer in most cases believes his plant similar to the one now in commerce, but superior. Each time he is right it means a lower rating or discontinuance of some other plant. With more than three thousand introductions there is a slim chance of any superior new plant being so distinctive as not to affect the standing of some now in commerce.

T=Under Trial

This means that a plant is still under observation with its rating undetermined. I try to add a dozen or more varieties each year in my trial list.

Discontinued

I have not named those discontinued. If nothing good can be said it is generally best to keep quiet. There is little chance warning buyers against all of 90% of some three thousand introductions no longer worth growing. That leaves 300 or more. I can hardly think that there are that many good ones sufficiently different to be worth growing at this time. Therefore, naming some 69 I have dropped out of such a great quantity could serve no useful purpose. And besides, some of these discards may prove to be good or excellent in other climatic regions.

Grade A and B Clones, and Clones Under Trial

Adventure (T); *Afterglow* (B), fades, otherwise A; *Aladdin* (A); *Anna Zenger* (T); *Annis Victoria* (A); *Apricot* (B); *August Orange* (T); *August Pioneer* (A); rated A because late bloomer; *Autumn Prince* (B);

Baghdad (B); *Bagette* (T); *Baronet* (T); *Bertrand Farr* (B), fades and poor foliage late in season, otherwise A; *Berwyn* (T); *Betscher No. 5* (T); *Betty* (T); *Black Prince* (B); *Blanche Hooker* (T); *Boutonniere* (B);

Carnival (Traub) (A); *Chengtu* (A), blooms late and different foliage and growth; *Cinnabar* (B); *Circe* (B); *Clarice* (B); *Clarinda* (T); *Colleena* (B); *Colonel Besby* (T); promising; *Corinne Robinson* (B); *Crown of Gold* (B), rated B because earlier than most; *Dauntless* (A); *Dawn O'Day* (T); *Dr. Stout* (A); *Dorothy McDade* (A), good late yellow; *Duchess of Windsor* (A);

Earlianna (T); *Elaine* (B); *El Capitan* (T); *Elizabeth* (T); *Emberglow* (A); *Emily Dickinson* (T); *Evangeline* (T);

Fantasia (T); *Festival* (B); *Fire Red* (A), no fading; *Flava* (B), would discontinue if not so early; *Fred Howard* (A); *Fulva Maculata* (B); *Gay Troubador* (T); *Genevieve* (A), excellent but not introduced by Norton as yet; *George Kelso* (A); *Georgia* (A), one of Dr. Stout's best; unexcelled; *Gita* (T); *Gold Dust* (A), earliest; not midseason quality; *Gold Empire* (T); *Golden Fleece* (B), similar to *Dorothy McDade; Golden Triangle* (T); *Granada* (A);

Hankow (A), rated A because late; *Helen Wheeler* (A); *Honey Red Head* (T);

Indian Chief (A); *In Flight* (B); *Iowa* (T);

John Blaser (T); *Joy Russell* (A), good late light yellow;

Krishna (T);

Lamar Russell (T); *La Tulipe* (B); *Lemon Tulip* (T); *Lidice* (A); *Linda*, dull color, long blooming season;

Majestic (B); *Malcolm Russell* (B); *Manchu* (T); *Margaret Palmer* (T); *Massasoit* (B), one of the tallest; *Matador* (A); *Mayor Starzynski* (A); *Mexico* (T); *Midas* (B); *H. Middendorffii* (B), species; *Mignon* (T); *Mikado* (B); *Mildred Orpet* (B); *Minnie* (B); *Mission Bells* (T); *Mitra* (T); *Monterey* (T); *Mount Vernon* (T); *Mrs. B. F. Bonner* (A); *Miss Welder* (B); *Mykawa* (T);

Now Glory (T);

Omaha (T); *Ophir* (B);

Portia (T); my son's seedling, so I do not rate; *Papagaio* (T); *Patricia* (A); *Peony Red* (B); *Pierre Sue* (T); *Pink Charm* (B); *Play Time* (B); *Port* (B); *Princess* (B); *Purity* (T); *Purple Waters* (B); will keep until one nearer purple can be found.

Queen of Gonzales (A); *Queen of May* (T); *Queen of Monterey* (T), will not rate above B; *Queen Wilhelmina* (A);

Rajah (A); *Ranchio Diana* (B), small flowers freely produced; *Reba Cooper* (A); *Red Bird* (A); *Red Gem* (T); *Reinbeck* (T); *Richard* (T); *Rosalind* (B); *Rose Gem* (T); *Royalty* (B); *Russell Wolfe* (B);

Sachem (B); *Saffron Yellow* (T); *San Juan* (A); *Santa Lucia* (T); *Santa Maria* (A), wrong label, true name unknown; *Serenade* (B); *Sonny* (B); *Soudan* (B); *Spit Fire* (T); *Spring Delight* (T); *Stalwart* (A); *Stephen Foster* (T); *Summer Eve* (B); like *Genevieve* but not as good; *Sunkist* (T); *Susanna* (T); *Sweetbriar* (A); *Sylvia* (T); *Symphony* (B);

Tara (A); *Taruga* (A); *Tejas* (T); *Theodore Mead* (A); *Theron* (B);

Valeria (T); *Victory Montevideo* (A); *Vivian Toole* (T); *Vivossa*

(B); *Vulcan* (B); fades;

War Path (A), excellent red; *Wau-Bun* (A); *Wekiwa* (A), excellent red; *Wolof* (B).

Daylily Blooming Records, 1947

None are entered unless they are grown on well established plants. Dates are for main crop bloom. A rare early or late recurrent bloom is omitted. Height of foliage and height of scape (bloom) are indicated in inches.

Gold Dust—May 10 to May 27; Height foliage 20; Height bloom 23.

Aladdin—May 25 to June 15; also some September bloom; Height foliage 22; Bloom 25.

Wau-Bun—May 30 to June 27; Height foliage 21; Bloom 25.

Victory Montevideo—May 31 to June 18; Height foliage 17; Bloom 26.

Symphony—May 29 to June 12; Height foliage 24; Bloom 31.

Lidice—June 2 to July 6, Height foliage 20; Bloom 20.

Bagdad—June 2 to July 1; Height foliage 30; Bloom 40.

Queen of Gonzales—June 9 to June 19; Height foliage 24; Bloom 28.

Serenade—June 9 to June 28; Height foliage 25; Bloom 35.

Dominion—June 9 to June 29; Height foliage 17; Bloom 26.

Caballero—June 10 to July 20; Height foliage 22; Bloom 35.

Starlight—June 10 to July 5; Height foliage 28; Bloom 36.

Midas—June 10 to July 1; Height foliage 24; Bloom 36.

Theodore Mead—June 10 to June 26; Height foliage 20; Bloom 27.

Fred Howard—June 11 to July 16; Height foliage 18; Bloom 24.

La Tulipe—June 11 to July 15; Height foliage 22, Bloom 26.

Mrs. A. H. Austin—June 11 to July 6, Height 24; Bloom 35.

Mikado—June 11 to July 1; Height of foliage 24; Bloom 36.

Saturn—June 12 to July 2; Height of foliage 21; Bloom 34.

Sachem—June 14 to June 29; Height foliage 23; Bloom 26.

Spring Delight—June 14 to July 20; Height foliage

Festival—June 14 to July 18; Height foliage 30; Bloom 36.

Linda—June 14 to July 21; Height foliage 20; Bloom 35.

War Path—June 15 to July 12; Height foliage 24; Bloom 30. Should be taller on larger plants.

Persian Princess—June 15 to July 12; Height foliage 25; Bloom 33.

Reba Cooper—June 15 to July 2; Height foliage 24; Bloom 32.

Purple Waters—June 17 to July 13; Height foliage 25; Bloom 29.

Vulcan—June 16 to July 14; Height foliage 22; Bloom 30.

Oscoela II—June 19 to July 3; Height foliage 20; Bloom 29.

Mayor Starzynski—June 20 to July 14; Height foliage 22, Bloom 35.

Massasoit—June 21 to July 15; Height foliage 33; Bloom 66.

San Juan—June 21 to July 12; Height foliage 30; Bloom 38.
Lustrous—June 20 to July 17; Height foliage 26; Bloom 35.
Patricia—June 23 to July 19; Height foliage 20; Bloom 32.
Sweet Briar—June 23 to July 17; Height foliage 30; Bloom 36.
Dauntless—June 25 to July 15; Height foliage 20; Bloom 26.
Majestic—June 25 to July 14; Height foliage 25; Bloom 33.
Duchess of Windsor—June 27 to July 20; Height foliage 20; Bloom 26.
Tara—June 26 to July 19; Height foliage 24; Bloom 35.
Wekiwa—June 26 to July 29; Height foliage 24; Bloom 36.
Indian Chief—June 26 to July 10; Height foliage 23; Bloom 30.
Rajah—June 27 to July 26; Height foliage 20; Bloom 33.
Fire Red—June 28 to July 15; Height foliage 25; Bloom 35.
Rosalind—June 28 to July 21; Height foliage 24; Bloom 36.
Mongol—June 29 to July 29; Height foliage 23; Bloom 42.
Stalwart—June 28 to July 27; Height foliage 30; Bloom 50.
Annis Victoria—June 25 to July 13; Height foliage 23; Bloom 35.
Afterglow—June 29 to July 11; Height foliage 26; Bloom 42.
Linda—June 29 to July 20; Height foliage 20; Bloom 36.
Vivosa—June 30 to July 16; Height foliage 26; Bloom 36.
Purple Elf—June 30 to July 16; Height foliage 27; Bloom 45.
Granada—June 30 to July 20; Height foliage 20; Bloom 42.
Dr. Stout—June 30 to July 26; Height foliage 32; Bloom 36.
Mission Bells—June 30 to July 10; Height foliage 20; Bloom 25. Less than one year old.
Princess—June 30 to July 12; Height foliage 26; Bloom 30.
Red Bird—June 30 to July 15; Height foliage 20; Bloom 31.
Corrine Robinson—July 2 to July 18; Height foliage 25; Bloom 29.
Rancho Diana—June 19 to July 10; Height foliage 22; Bloom 28.
Genevieve—June 20 to July 21; Height foliage 36; Bloom 40.
Dolly Varden—June 19 to July 16; Height foliage 30; Bloom 40.
Thereon—June 18 to July 1; Height foliage 22; Bloom 30.
Victory Taierchwang—June 18 to July 12; Height foliage 20; Bloom 28.
Taruga—June 18 to July 6; Height foliage 18; Bloom 28.
Ophir—June 19 to July 4; Height foliage 24; Bloom 26.
B. H. Farr—June 19 to July 4; Height foliage 24; Bloom 26.
Royalty—June 19 to July 12; Height foliage 23; Bloom 33.
Port—June 20 to July 6; Height foliage 22; Bloom 27.
Hyperion—July 1 to July 24; Height foliage 30; Bloom 34.
Wolof—July 2 to July 27; Height foliage 23; Bloom 36.
Russel Wolfe—July 2 to July 27; Height foliage 23; Bloom 42.

Summer Eve—July 5 to July 27; Height foliage 20; Bloom 28.
Morocco Red—July 5 to July 28; Height foliage 26; Bloom 36.
Honey Red Head—July 5 to July 20; Height foliage . Plant too small to be fair specimen.
Elaine—July 5 to July 24; Height foliage 24; Bloom 34.
Matador—July 5 to July 30; Height foliage 24; Bloom 42.
Pink Charm—July 9 to August 3; Height foliage 33; Bloom 46.
Cressida—July 9 to July 27; Height foliage 23; Bloom 30.
Georgia—July 13 to July 30; Height foliage 24; Bloom 33.
Red Gem—July 13 to July 28; Height foliage 21; Bloom 35.
Joy Russell—July 14 to August 1; Height foliage 15; Bloom 36.
Golden Fleece—July 14 to August 13.
Dorothy McDade—July 4 to August 9; Height foliage 25; Bloom 36.
Hankow—July 16 to estimated September 5; Height foliage 24; Bloom 36.
Chengtu—July 19 to August 24; Height foliage 20; Bloom 42.
Boutonniere—July 26 to September 1; Height foliage 21; Bloom 38.
August Pioneer—July 19 to September 10; Height foliage 20; Bloom 46.
Autumn Prince—August 6 to September 20; Height foliage 2; Bloom 43.

DAYLILY TRIALS IN NORTH CAROLINA, 1947

ELIZABETH LAWRENCE, *North Carolina*

The two daylilies that died out of the twenty-nine that Dr. Traub sent me for trial in March 1944, were replaced in August 1945. Both are vigorous plants now, so their death must have been accidental, and not due to the effect of the southern climate. Two others, *Dr. Hughes* and *Berwyn,* were added in August 1945. This year some of these daylilies bloomed for the fourth time.

With the exception of the very early ones, like *Dr. Regel,* which were very poor, this has been the best season that I have ever known for daylilies. It has been a late season and a cool one with plenty of rain. In cool (not too cold however) damp weather daylilies are at their best. They are said to stand heat and drought better than other perennials, and this is true, but they are at their best only when they have an abundance of moisture. I was amazed this summer to find how much larger and taller *Hyperion* was in the damp borders of the garden at Longview (in North Hampton County) than in my garden where it is in a very dry place.

The daylilies on trial were in a part of the garden that is usually moist, but I kept them watered in dry weather, and mulched them with cow manure and leaf mould after their bloom was over. They are in afternoon shade. The ones that have done the best as to bloom are *Reba Cooper, Queen Wilhelmina, Victory Taierhchwang* and *Carnival,* with an increase of from eight to ten stalks last year, to fifteen to seven-

teen this year. And *John Blaser* increased from three stalks last year to twelve stalks this year. I do not know whether it is the late season or the increase in the length of the time in bloom, but last year none of these daylilies was in bloom in August, and only *Queen Wilhelmina* at the end of July, while this year, on July twenty sixth, *Carnival, Golden Glow, Mayor Starzynski, Fred Howard,* and *Elaine* are in bloom as well. *Elaine* will bloom well into August, and there is a reapeat coming on *Rouge Vermillion.*

This year all of Dr. Traubs daylilies began to bloom between May the twenty first (first bloom of *Victory Montevideo*) and June the twentieth (first bloom of *Berwyn*). This year's dates for the first bloom of some of the others will give an idea of the season.

Mikado	May 29	*Margaret Perry*	June 20
Amaryllis	June 1	*Hyperion*	June 29
Goldeni	June 4	*Chengtu*	July 8
Golden Dream	June 18	*Boutonniere*	July 18

To me the most outstanding daylily in this group is *Berwyn.* It is one of the clearest and most sparkling reds that I have seen in any daylily, a color a little deeper than scarlet. The flowers open wide (which always seems to me more effective), are of medium size, and there are up to eighteen on a stalk. In this its second season it produced four stalks and was in bloom for thirty days.

Peony Red is a daylily with flowers of an unusual color, but a weak constitution. It has never had but one flower stalk in a season, and there are few flowers to the stalk. However Isabelle Henderson reports that a small root I gave her bloomed the first season (but spent the winter under glass) and produced four stalks the second season, with a more vigorous growth than that of the original clump.

A few plants, like a few people, have all of the dependable qualities and beauty beside. *Carnival* is one of these. I know of no plant in the garden that has made a better show. This year it produced seventeen fine stiff stalks which remained in bloom from mid-June until the end of July. It happened to be against a background of cosmos "Orange Flare" which seemed to bring out the brillance of the glowing Nopal Red flowers with their golden throats.

Elaine, now in its second year, though it has only three stalks has been in bloom since June second, and will bloom well into August. The flowers are very large, to five inches long, and of a clear salmon that is not to be found in Ridgway. The petals curl at the edges. The throat is restricted. This last may not be a fault, but it seems to me that wide open flowers are more effective. However, for variety's sake we should have many different shapes, including the *Elaine type.*

Dr. Hughes bloomed this year for the first time, and bloomed twice; from May the twenty ninth to late June, and from July thirteenth to the twenty-second. There were four stalks with as many as fifteen flowers to the stalk, the stalks twenty-six inches tall. The flowers are neither large nor of an unusual color (they are deep chrome with a fulvous dust) but I can see that it may be a good garden perennial.

TABLE 1. Daylily performance records, 1944-1947

Year planted	Name of clone	Height	No. of stalks	Flowers per stalk	Blooming season	Days in bloom
Spr. '44	**Victory Montevideo**	28″	6	11	May 13 to July	48
" "	**Emberglow**	36″	8	16	May 25 to Jne. 20	26
" "	**Mayor Starzynski**	50″	13	28	May 25 to Jul. 16	53
" "	**Indian Chief**	50″	4	18	May 27 to Jne. 23	27
" "	**Lidice**	36″	7	58	May 29 to Jne. 30	33
" "	**Reba Cooper**	50″	17	14	May 29 into July	40
" "	**Mildred Orpet**	45″	(no records taken)		First bloom May 30	
" "	**Fred Howard**	36″	8	17	May 26 to Jul. 30 (again in Aug.)	35
" "	**La Tulipe**	med.	4	28	June 2 to Jul. 8	36
" "	**Peony Red**	30″	(plant divided)		May 30 to Jne. 20	21
Aug. '45	**Dr. Hughes**	26″	4	15	May 29 to late Jne.	28
Spr. '44	**Theodore Mead**	28″	7	7	May 27 to Jne. 30	35
" "	**George Kelso**	60″	13	many	May 29 to Jne. 20	22
" "	**San Juan**	45″	4	13	Jne. 2 to Jul. 19	47
" "	**Queen Wilhelmina**	45″	15	28	Jne. 5 to Jul. 30	55
" "	**Granada**	48″	5	38	Jne. 5 to Jul. 5	30
" "	**Dr. Stout**	42″	10	28	Jne. 5 to Jul. 15	40
" "	**Victory Taierhchwang**	42″	16	33	Jne. 10 to Jul. 8	28
" "	**Golden Glow**	36″	5	17	Jne. 7 to 20; Jul. 14 to 25	24
" "	**Carnival**	40″	17	23	Jne. 14 to Jul. 30	46
" "	**Elaine**	28″	3	15	Jne. 2 to Jul.; Aug.	28+
" "	**Wekiwa**	44″	7	(no record)	Jne. 5 to 30	25
" "	**Fire Red**	36″	2	13	Jne. 16 to 30	14
" "	**Corinne Robinson**	40″	3	18	Jne. 8 to 26	18
" "	**Helen Wheeler**	44″	3	34	Jne. 14 to Jul. 13	29
" "	**John Blaser**	42″	12	20	Jne. 7 to Jul. 20 (cut flowers)	43
" "	**Rouge Vermilion**	32″	3	14	Jne. 15 to Jul. 12; Aug.	27+
" "	**Duchess of Windsor**	32″	9	10	Jne. 14 to Jul. 6; Late Jul.	22+
" "	**Russell Wolfe**	63″	4	many	Jne. 15 to Jul. 20	25
Aug. '45	**Berwyn**	32″	4	18	Jne. 20 to Jul. 20	30
Spr. '44	**Monterey** (No. 704)	36″	(no records)			

John Blaser is a rather late blooming clone with very stiff straight stalks, twelve of them the second year. The flowers are light cadmium (Ridgway), the petals are narrow with edges curled and crimped. It is noted from Dr. Traub's report that this is a cut-flower selection, and next season it will be tested from that standpoint.

Rouge Vermilion is a striking color, between English and Carnelian Red. It is not a vigorous grower, but has good straight stalks. I regard stiff stalks as one of the best points in a daylily. No matter how beautiful the flower is, you cannot appreciate it if the stalks are leaning over into the foliage.

Baker Wynne, who has also been trying Dr. Traub's seedlings, rates *Dr. Stout* as one of the finest. It is tall and floriferous with large tawny flowers on stiff well-branched stems. The flowers are covered with a fulvous dust. The season is about three weeks.

Duchess of Windsor is rather low growing, with stems less than three feet tall. The flowers are amber with a deeper throat and a faint halo. They are very fragrant. The petals are of a thick texture and very wide. It is slow to increase, but not weak in growth. The first year it bloomed on May ninth, but that does not seem to be characteristic, for it has bloomed in the middle of June for the last two years.

George Kelso is one of the tallest, with stalks five feet high, and

large bicolor flowers of strongly contrasting colors. It blooms freely for a period of three weeks.

Helen Wheeler has been described as slow of increase, but it has made a good growth for the two years that I have had it, and produced three sturdy stalks the second season. The stalks are nearly four feet. The flowers are Ridgways ferruginous. They are wide open with much recurved petals.

Corinne Robinson is not a strong grower with me. Perhaps this is the fault of the situation, which is at the dry end of the row, but at any rate it has not done well. The very fragrant flowers are lemon chrome. They appear from the middle to the end of June. [Editorial note—This may be misnamed. *Corinne Robinson* is a pastel pink.]

Reba Cooper is one of the most vigorous and floriferous of all. It is an early one, commencing to bloom by the middle or end of May, and lasting until late in June. The flaring flowers are of ochraceous salmon with a faint halo of dragon's-blood red.

A number of these clones have proliferations on the stalks. Isabelle Henderson has planted some of these. She says that the first year they make miniature clumps with several small fans instead of a single large one, with flowers about half the normal size. The second blooming is usually normal.

Addendum, August 7, 1947: The last bloom appeared on *Fred Howard* to-day; the first bloom on it opened on May 26. This is apparently a record for one clone. *Elaine* and *Rouge Vermilion* still have a number of buds.

SUGGESTIONS ON EVALUATION OF DAYLILY CLONES BY AMATEURS

Hamilton P. Traub, *Maryland*

The term, "amateur", in the sense in which it is used here refers to one who is attached to or cultivates a particular pursuit, as for instance, the growing or breeding of daylilies, for amusement or personal gratification without pursuing it professionally as a means of livelihood or for gain. It is natural therefore that the number of amateur daylily growers will always very greatly outnumber the professionals. The term "amateur" is often confused with "novice". A novice, in this connection, is a beginner, and therefore both the amateur and the professional may be novices. As they acquire more experience they graduate into the class of advanced or experienced amateurs and professionals, as the case may be.

Over 3,000 daylily clones have now been described. Many of these are already in the discard, but the amateur is bewildered by the great mass of clones. The number of available clones will always be much greater than the number that he can grow at any one time. He therefore needs to make a selection. In order to develop critical judgement of daylily clones in the amateur, it would be worth while to encourage him to evaluate systematically the clones that he is growing. Such

critical judgment can be acquired by (a) accurately describing by means of the data card the clones grown, and by (b) giving a general rating to each clone under the climatic conditions of the region in which he lives. Such evaluations are of course primarily for his own personal use. With reference to scoring procedure, the amateur could begin with a simple rating method such as is used at present by Mr. Gilmer, and later, if he so desires, he could gradually take up the use of a score card as he gains more experience. Since some clones may rate differently in various climatic regions it should be understood that the ratings as given by any amateur apply only to the conditions under which the clones were tested.

Daylilies may be classified in a number of ways on the basis of (1) the best 15, 25, 50 or 100; (2) actual flowering season under particular climatic conditions; (3) flower color; (4) plant height, (5) foliage character, etc. However, a very complicated rating form, taking too many viewpoints into consideration at one time, is unworkable, and it is desirable, therefore, to base it on as few as possible. It is suggested that the first three viewpoints indicated above be emphasized. Under the first, the amateur grower can use his judgment in giving due weight to most of the other viewpoints in a simple rating system according to a score of fair (F); good (G); or excellent (E), as grown under the particular conditions of his garden, and he can then select the best up to a particular number. Under the second and third viewpoints indicated above, the important considerations of obtaining a long blooming season and having the finest colors in his flowers are given proper weight. *This is therefore a compromise that should serve as a minimum, and the amateur should go as much farther as his inclination and time permit.*

Although the official rating card on page 126, 1940 Herbertia, and as reproduced in the present volume of Hebertia, may be used in making the ratings, numerical ratings from now on should be strictly avoided by individual amateurs so as to preclude any confusion with the official numerical ratings on a regional basis by the Midwest Hemerocallis Society and the American Plant Life Society. The amateur should always use the symbols F, G, and E in place of numerals.

The selection of clones on the basis of color could be left to the amateur within the number of clones rated as best by him. The symbols Y (=yellow); O (= orange); R (= red); and B (= blend or polychrome), etc., could follow the clone name to indicate color as interpreted by the amateur. If he wants to go farther into color classification, he should consult such a system as the simplified color chart published by the New England Gladiolus Society, using the symbols there employed, or the system used by the American Iris Society. Mr. Stuntz is preparing an article showing how this latter system may be adapted for use with *Hemerocallis* but this may not arrive in time for publication in this issue—if it arrives too late it will be included in 1948 Herbertia. If the symbols suggested in the present article are tentatively used, "*Patricia,* (E-Y)" would mean that the clone rates excellent and the general color class is yellow. If the system that Mr. Stuntz presents is followed, the general variation within yellow would also be indicated by appropriate symbols.

SUMMARY FORM FOR SELECTION OF HEMEROCALLIS CLONES BY AMATEURS

Location of garden: ..... Grower ..... Date .....

(**Symbols:** Rating of clones—F = **fair;** G = **good;** and E = **excellent.** Color description— Y = yellow; LY = light yellow; O = orange; OR = orange red; R = red; DR = dark red; Pk = pink; B = blend; P = polychrome, etc. For other characters see text.)

EARLY	EARLY MIDSEASON	LATE MIDSEASON	LATE
I. My 15 best daylilies (On the assumption that I could choose and grow only 15 clones.)			
1.	4.	9.	13.
2.	5.	10.	14.
3.	6.	11.	15.
	7.	12.	
	8.		
II. My 25 best daylilies, including those under I (15), above, and the following 10 clones: (On the assumption that I could choose and grow only 25 clones.)			
16.	18.	21.	24.
17.	19.	22.	25.
	20.	23.	
III. My 50 best daylilies, including those under I (15), and II (10), above, and the following 25 clones: (On the assumption that I could choose and grow only 50 clones.)			
26,	31.	39.	46.
27.	32.	40.	47.
28.	33.	41.	48.
29.	34.	42.	49.
30.	35.	43.	50.
	36	44.	
	37.	45.	
	38.		
IV. My 100 best daylilies, including those under I (15), II (10) and III (25), above, and the following 50 clones: (On the assumption that I could choose and grow only 100 clones.)			
51.	61.	76.	91.
52.	62.	77.	92.
53.	63.	78.	93.
54.	64.	79.	94.
55.	65.	80.	95.
56.	66.	81.	96.
57.	67.	82.	97.
58.	68.	83.	98.
59.	69.	84.	99.
60.	70.	85.	100.
	71.	86.	
	72.	87.	
	73.	88.	
	74.	89.	
	75.	90.	

Note.—Total number of clones by seasons: Early, 20; Early midseason, 31; Late Midseason, 29; and Late, 20.

The full development of the daylily as a garden flower has only begun, and great advances are still awaited. Any evaluations by the amateur should be only tentative and for his personal use, and should be revised annually if necessary as more clones are tested, and as his discrimination develops. The amateur should therefore be always on the outlook for still better clones, but some of the present ones of course that are near perfection, like the *Patricia* Daylily, will be retained permanently. It is realized that at present, especially in the "early" and "late" seasonal classes, there may not be a sufficient number of clones rating "good" or "higher", in fact there may be only a limited number in all, and it may be necessary to include temperarily clones with ratings below "good" as the best now available, but such clones should be replaced by similar ones rating "good" or higher as soon as such are available to the amateur. The choice of clones should not be influenced by price as such, either high or low. The amateur of course grows the clones he can afford to buy, and there are many fine low priced clones. However, if he can afford higher priced ones, then a wider choice is possible.

Although the form to be given below has been devised primarily for amateurs, professionals may also find it convenient to use it. In actual practice, the amateur should first describe the clone according to the data card, and this should be followed by a general overall rating, and by filling in the numbered spaces of the form for his 15, 25, 50 or 100 best clones, depending on the number he grows. First the name of the clone, followed by the name of the originator and year of introduction in parentheses ( ), then the rating as F, G, or E, as the case may be, and then the symbol or symbols for the general color classification, etc.

It should be noted that the total number of clones by seasons is: "Early", 20; "Early Midseason", 31; "Late Midseason", 29; and "Late", 20. There may not be a sufficient number of clones available to fill in all of the "Early" and "Late" spaces at present, and these should be left blank in order to emphasize the importance of breeding work in these seasonal classes. Most available clones are in the midseason classes.

In order to illustrate how the form may be used, Miss Kell in Texas and Mr. Claar in Illinois have kindly consented to use the form, indicating their selections as of 1947. These of course are not final and are subject to revision on their part.

DAYLILY SELECTIONS, 1947

ELMER A. CLAAR, *Chairman,*
Hemerocallis Committee,
American Plant Life Society

I received an advance copy of Dr. Traub's article giving suggestions to amateurs about evaluating daylilies together with the request that I fill out the form to include my selections for 1947. This has been one of the most difficult assignments that I have ever had, but it was a stimulating exercise that will sharpen my ideas about the qualities that daylily clones should possess in order to qualify for a place on such a list. My selections for 1947 are given in Table 1, and the following comments apply to the various sections in that table.

My best 15 daylilies. (See Table 1). If I could have only fifteen daylilies, I believe I would select those shown in Table 1, group I. This does not mean that I like these daylilies any better than or as well as some other daylilies that appear in the next groups. In fact, in Group Two, I like *Winsome* better than any other intermediate and *Queen of Gonzalez* has more substance and is a superb flower in its color class, but *Wau-Bun* is lovely and wins the call in the intermediates because it is a recurrent bloomer and blooms in the fall, although it has a weak stem. *Wekiva* also is an excellent daylily and wins because it is a recurrent bloomer.

Among the summer bloomers I was unable to make up my mind between *Mongol* and *Garden Charm,* the latter a newcomer to my garden and a marvelous golden yellow of Mr. Bechtold's. It seems that these two varied from day to day and I just couldn't make up my mind as to which was the better. Sass's *Orange Beauty* also is new to my garden. It has about everything one can ask for in an orange daylily. I think it is Hans Sass's best daylily. Russell's *Meteor* is very similar to Bechtold's *Loveliness.* I put the former in the first group and *Loveliness* in the next group, giving *Meteor* the preference because it is a recurrent bloomer. *Trial Blazer,* Russell's dark red is a recurrent bloomer, being even better in the fall than in the summer.

My best 25 daylilies. (See Table 1.) The selection of the first fifteen presented this problem: pink, raspberry and maroon daylilies have not been included in the first group although they are different types and very nice. I have put them in the second group because I have seen a number of seedlings that are coming on in these color classes which I think are superior to the present named varieties. As far as introduced varieties are concerned, there is no reason why they should not be in the first group except that it is limited to fifteen.

My best 50 daylilies. (See Table 1.) In the third group, of twenty-five plus the 25 already considered, two of the varieties might need an explanation.

Calypso is a night bloomer, and as it bloomed for me it was a particularly lovely plant both during the day and at night, comparing favorably with anything else in the garden at the time.

Perry's *J. S. Gaynor* is about all that you could ask in a beautiful flower and a fine plant. It has been extensively used in hybridizing by a number of individuals working on daylilies.

Even in the third group of twenty-five plus 25 already considered, there are a number of color classes that could be included among the best.

Table 1. Ninety-eight best daylilies, selected by Elmer A. Claar, as of September 1947.

(Symbols used to indicate approximate color values—Y = yellow; LY = light yellow; O = orange; OR = orange red; Pk = pink (so-called); R = red; DR = dark red; Pur = purple; Br = brown; Ed = eyed; P = polychrome; Bi = bicolor.)

EARLY	MID-SEASON	LATE
I. My best 15 daylilies.		
1. **Flavinia** (Y)	(EARLY MIDSEASON)	9. **Ruby Supreme** (OR)
	2. **Wau-Bun** (LY)	10. **Trail Blazer** (R)
	3. **Wekiwa** (R)	11. **Potentate** (Pur)
	MIDSEASON (SUMMER)	12. **Painted Lady** (P)
	4. **Vespers** (LY)	13. **Meteor** (Ed)
	5. **Hesperus** (LY)	14. **Garden Charm** (Y)
	6. **Mongol** (Y)	15. **Far North** (LY)
	7. **Orange Beauty** (O)	
	8. **Royal Ruby** (OR)	
II. My best 25 daylilies, including those under I(15), above, and the following 10 clones:		
16. **Earliana** (Y)	(EARLY MIDSEASON)	21. **Sweet Briar** (Pk)
	17. **Winsome** (LY)	22. **Piquante** (R)
	18. **Queen of Gonzales** (O)	23. **Dawn Play** (LR)
	MIDSEASON (SUMMER)	24. **Morocco Red** (DR)
	19. **Mission Bells** (LY)	25. **Loviliness** (Ed)
	20. **Golden West** (OY)	
III. My best 50 daylilies, including those under I(15), and II(10), above and the following 25 clones:		
26. **Flava** (Y)	(EARLY MIDSEASON)	37. **J. S. Gaynor** (Y)
27. **Judge Orr** (O)	28. **Little Cherub** (LY)	38. **Golden West** (OY)
	29. **Sungold** (Y)	39. **Debutante** (Bi)
	30. **Gloryanna** (Y)	40. **Bold Courtier** (Bi)
	31. **Symphony** (Bi)	41. **Blood Root** (OR)
	32. **Zouave** (Bi)	42. **Tejas** (R)
	33. **Dominion** (P)	43. **Honey Redhead** (P)
	34. **Brunette** (Br)	44. **Dr. Stout** (P)
	MIDSEASON (SUMMER)	45. **Enchantress** (P)
	35. **Canari** (LY)	46. **Afterglow** (P)
	36. **Calypso** (Y)	47. **Taruga** (P)
		48. **Black Falcon** (Pur)
		49. **Dorothy McDade** (Y)
		50. **Hankow** (Ed)

IV. My best 98 daylilies, including those under I(15), II(10) and III(25), above, and the following clones:

51. **Apricot** (LY)

(EARLY MIDSEASON)

52. **Estmere** (Y)
53. **Queen of May** (OY)
54. **Chrome Orange** (O)

MIDSEASON (SUMMER)

55. **Moonbeam** (Y)
56. **Ophir** (Y)
57. **Doeskin** (Y)
58. **Hyperion** (Y)
59. **Lady Hesketh** (Y)
60. **Patricia** (Y)
61. **Mrs. B. F. Bonner** (Y)
62. **Princess** (Y)
63. **Circe** (Y)
64. **Yeldrin** (Y)
65. **Lidice** (O)
66. **Irene** (O)
67. **Majestic** (O)
68. **Golden Dream** (O)
69. **Georgia** (Pk)
70. **Pink Charm** (Pk)
71. **Pink Lustre** (Pk)
72. **Rosalind** (Pk)
73. **Royalty** (R)
74. **Sachem** (R)
75. **Port** (R)
76. **Seminole Chief** (R)
77. **Minnie** (R)
78. **Kanapaha** (R)
79. **Craemore Ruby** (R)
80. **Black Prince**
81. **Purple & Gold** (R)
82. **Wolof** (R)
83. **Petra** (R)
84. **Afterglow** (P)
85. **Salmon Rose** (P)
86. **Linda** (P)
87. **George Yeld** (P)
88. **Brackel** (P)
89. **Tracery** (Ed)
90. **Festival** (Ed)
91. **Mrs. John Tigert** (Ed)
92. **Mikado** (Ed)
93. **Su-Lin** (Bi)
94. **Betty Slick** (Bi)
95. **Cabellero** (Bi)
96. **Athlone** (Bi)
97. **Garden Lady** (Bi)
98. **Autumn Prince** (Y)

For example, I have included *Black Falcon, Debutante* and *Bold Courtier* because these plants are among the finest blooms that we have of their particular types. It shows how difficult it is to select any fifteen, twenty-five or fifty plants.

My best ninety-eight daylilies. (See Table 1.) When we come to the fourth group of forty-eight, plus the 50 already considered, we have our most difficult problem. For example, in the bicolors, I do not know of anything better than *Su-Lin* in the pastels, and *Betty Slick, Athlone* and *Garden Lady* certainly are tops.

It is doubtful, in my opinion, if we have any real pinks among the introduced varieties at the present time—they merely simulate pink. By pink I mean the pink of *Dianthus.* From the seedlings I have seen, we can expect a great improvement in this color class in the near future.

The appalling thing about a list of this kind is that it obviously can be only my personal preference, and this is so unstable that I imagine if you were to meet me and discuss the matter with me you might persuade me to substitute a number of other varieties for those I have selected in these various classes. When I look through my list of daylilies, I am dismayed by the number of fine things I have left out.

A number of Mr. Bechtold's plants did not bloom for me this year. I have just received ten plants from Mr. Henry Sass, which, naturally,

I have not seen in bloom. I have all the plants in Mrs. Nesmith's last year's catalog, plus some from the year before. Only a few of them bloomed but among the most impressive was *Far North,* which was very big and very late. I also liked *Tracery* very much. I planted *Cantabile* from Kellogg's Over-the-Garden-Wall but have not seen it bloom as yet.

This list does not include a number of plants which I acquired from Mrs. Nesmith, Mrs. Bright Taylor, Messrs. Hans Sass, Henry Sass, Paul Cook, LeMoine Bechtold, Kellogg's Over-the-Garden-Wall, Stout's introductions of last year, Clint McDade's plants, and others which have not bloomed typically for me, so I cannot report on them.

Even then, as I look over my list of those that bloomed for me, I feel that this list is merely suggestive and is done as well as I can do it at this time. I believe all of these are worth growing.

DAYLILY TRIALS IN NORTHWEST TEXAS

Willie May Kell, *Texas*

The first daylily to start the season is *Orangeman.* While it is an old one, it flowers so early in the spring and repeats for even a longer period in the fall. It has flowered from September 5th to the 20th of November. *Dumortieri, Middendorfii,* and *Minor* are all early dwarfs coming right along next to *Orangeman.* These three are old and are completely deciduous, but there are none to take their place. *Apricot* is said to be an improvement but is difficult to distinguish from *Dumortieri.*

Another quite early one, though not a dwarf, is *Buckeye,* a distinctive flower. *Zouave* comes about two weeks after these earliest ones, and then blooms again in the fall. It is a choice and beautiful creation. It often has as many as four blooms open at one time on one scape, not just in one cluster at the top but spaced on short branches along the main stem, making it a beautiful show for arranging as a cut flower. *Earliana,* a semi-dwarf, blooms early and repeats in the fall. *Duncan* is the earliest of the real reds, as it has flowered the 3rd or 4th of May for three successive springs. It is an ox-blood red with a velvety appearance and a diameter of five and three-fourth inches, wide-spread, with sepals curling back, throat of Indian yellow. It flowered for thirty three days. *Gloriana* and *Queen of May* are two early yellows which bloom again in the fall. That is one *Queen of May* does flower again in the fall but a second plant from another dealer does not bloom early nor does it repeat in the fall. *Victory Montevideo,* a garnet brown, blooms from the middle of May until the second week in June.

Cressida, Florham, Thumbergi, Lemona and *Lemon King* are now so outclassed by the new ones, they are no longer worth keeping.

In the old yellows, *The Gem, Dr. Regel, Mrs. J. R. Mann, Flava major* and *minor,* and *Amaryllis* (= a daylily clone) are very much the same yellow and flower along together. *Flava major* is the best of the group, a strong grower, and does not burn as much in the sun.

Amaryllis (= a daylily clone) is a very free bloomer, and seeds easily and robustly.

Mandarin, Lady Esther, Yellow Hammer, Golden Dream, Gold Standard, Harvest Moon, were appreciated when first obtained but are now passed by for better ones. *J. A. Crawford* and *Ophir* are two still favored. *Calypso,* blooming at night, still holds a place not taken in Dresden

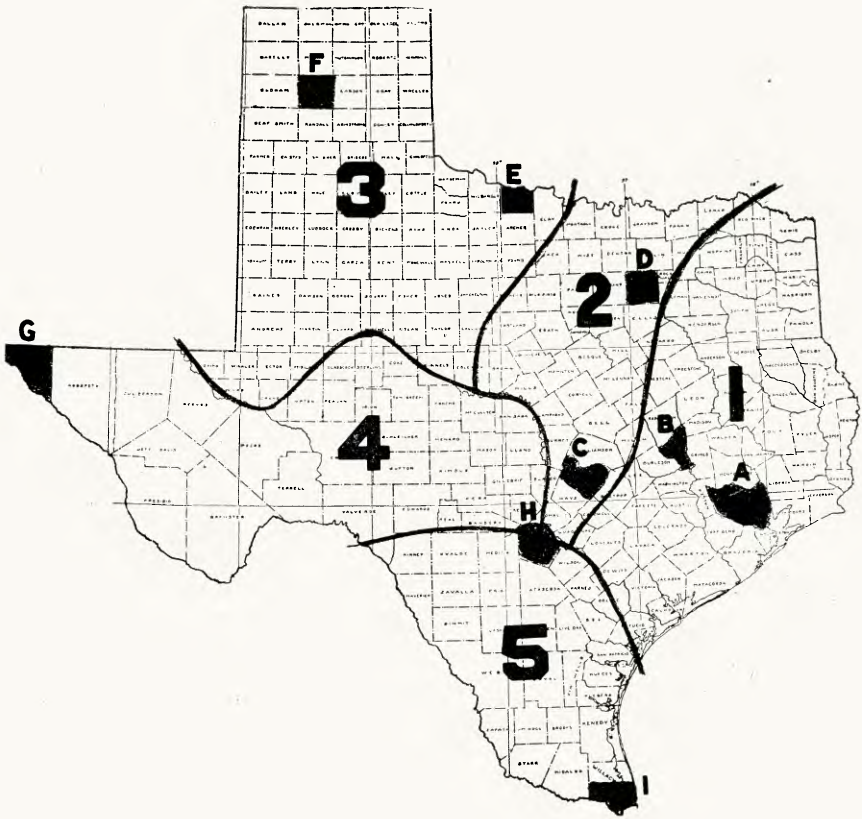


Fig. 178. **Outline Map of Texas,** showing climatic regions from the standpoint of **Hemerocallis** culture: 1. **East Texas,** shaded area A, Harris County, incl. City of Houston; shaded area B, Brazos County, incl. Main Station of Texas A. & M. College; 2. **Central Texas,** shaded area C, Travis County, incl. City of Austin; shaded area D, Dallas County, incl. City of Dallas; 3. **Northwest Texas,** shaded area E, Wichita County, where Miss Willie May Kell's garden is located; shaded area F, Potter County, incl. City of Amarillo; 4. **West Texas,** shaded area G, El Paso County, incl. City of El Paso; 5. **South Texas,** shaded area H, Bexar County, incl. City of San Antonio; and shaded area I, Cameron County, incl. City of Brownsville.

yellow. *Harvest Moon* blooms at night and *Lady Esther* holds open at night. *Golden West* is a tall, large-flowered, beautiful yellow, a strong grower. *Taruga* and *Star of Gold,* while spidery in form, are large-flowered, light yellows which are especially beautiful with white lilies. *Monarch, Soudan, Modesty, Dorothy McDade, J. S. Gaynor,* and *Singa-*

pore are desirable light yellows. But the choice of all light yellows in form and color is *Patricia.* It has a perfection of form and substance comparable to a true lily. The average gardener prefers *Hyperion* but it is given second place after *Patricia. Princess* is a good light yellow but is a slow grower and requires better growing conditions than the average to keep its flower up to the size it should be. *Waubun* is a good lemon yellow blooming the middle of May, two weeks ahead of the average. *Moonbeam* and *Sunny West* are choice night bloomers. *Hesperus,* and *White Lady* are good light yellows and so are *Sir Michael Foster* and *Pale Moon.* But *Pale Moon* together with *Anna Betscher* and *Thelma Perry* disappear in Winter.

Duchess of Windsor, a Barium Yellow with a very soft halo is a beautiful flower in size, form, and color and lasts through the night. *Dauntless,* a Chrome Yellow, with a slight halo is a good flower which remains open at night, but it is another which completely disappears in winter. *Ralph Wheeler* is a Canary Yellow with a slight halo but it is a slow grower, not too robust, and the substance is so thin, the sun and wind burn it badly.

Goldeni and *Orange King* are both Cadium Orange and very similiar. This is a difficult shade to use with the average flowers so, with the choice of many new ones, are out classed, as are *Chrome Orange, Emily Hume* and *Dondald Wyman.*

Nebraska, a large flower, is in a distinctive class of yellow as it is Saffron. It has good form and is a strong grower. But *The Swan* is also a Saffron and a larger, bolder flower. *George Yeld* is a shade darker than Saffron but blends with these two.

Lady Hesketh, Bardeley, Sunset, and *Lady Byng* are no longer of interest, nor are *Dawn* and *Bay State.*

Fulva Europa, Rosea, and *Maculata, Margaret Perry, Hankow, Chengtu* are all so invasive that, unless one has plenty of space to use them far from any other daylilies, they should not be used as it is difficult to keep them in their proper place. They crowd out less robust varieties. This is true of *Kwanso* and *Flore pleno,* also.

Marcelle and *Aristocrat* are both choice flowers, larger than the average and with distinct individuality. *Confucius, Elizabeth Wheeler* and one, not true to the name under which it was sold, are tall growing, brilliant daylilies. *Elizabeth Wheeler* has a scape of 54 inches. Confucius and the mis-named one have a diameter of six inches.

Antoinette, Granada, Mayor Starzynski and *Dr. Stout* make a striking combination. *Bagdad* harmonizes in color with these but has such a small flower it is usually used with *Bijou* and *Boutonniere* as all three are small flowered and blend well.

Talisman, Dolly Varden, Bertrand Farr, Corinne Robinson and *Elaine* are a nearer approach to pink than any previously obtained. *Bertrand Farr* is larger and better than *Dolly Varden,* but *Talisman* is a better shade than *Bertrand Farr. Elaine* was said to be a weak grower. While it is slow, it is not weak. The flower is choice in form and color and has strong substance.

When *Theron* first flowered, one realized what great progress had

been reached in hybridizing daylilies. It is still very choice and desirable. It is a strong fall bloomer. But *Amherst* now surpasses it. *Amherst* has a flower five inches in diameter to *Theron's* four inches. Both are purple madder but the Chinese Yellow throat of *Amherst* is less prominent than the larger area of Aureolin in *Theron*. Then the petals of *Amherst* are not twisted, making for a showier flower.

Afterglow is still alone in its color class, a lovely soft salmon, with an apricot throat. Although it is a weak, slow grower, and required the third plant before it was established, it is well worth the effort. It is not a large flower but has a good form. *Baronet* is another which should be in every collection as it is almost equal to the old monthly blooming rose with its repeated flowering periods, starting in the third week in May and only ending with the first hard freeze of December.

There are five daylilies so unusual in coloring that the color charts have no shades near enough to satisfy. All are beautiful and distinctive. *Victoria, Hazel Sawyer* and *Paul Ihrig* make a charming arrangement. *La Tulipe* and *Peony Red* make a striking contrast.

Toreador is a much larger and improved *Rosalind.* Still on trial are *Craemore Henna, Craemore Ruby, Dawn Play, Milady, Sweet Briar, Clarion, Carnival* and *General MacArthur.* Dr. Leonian hybrids may be of value for hybridizing but not for cut flowers.

Berwyn and *Luridum* are two good cardinal reds. *Port,* a blood-red, small flower, when produced was most welcomed but now has been surpassed by *Ming Toy. Ming Toy* was classed in a semi-dwarf but with a scape seven inches shorter than *Port* merits the dwarf class. Its flower is slightly larger than *Port.* One reason for this is it is so wide spread. *Ming Toy* is a beautiful velvety red which resists the burning Texas sun, is a robust, vigorous grower and flowered for three weeks although it was only planted in February of 1946. While *Tom Thumb* planted alongside at the same time has barely lived.

Rajah, Fire Red, and *Mrs. John Tigert* are yellow reds but all have prominent, rich red eye zones which blend with the deeper reds. Beautiful, choice reds, good growers, in many shades of red, from the lighter to deep, velvety reds, shades which do not have a proper place in the color charts, are—*Charleen, Amazon, Dominion, Red Bird, Sachem, Wekiwa, Tahiti Belle, Victory Taierhchwang, Ruby Supreme, Brackel, Wolof, San Juan* and *Vulcan.*

Mikado is distinctive and repeats in the fall and sometimes in between with as large and fine a flower as in the flush of spring bloom. *George Kelso* is the earliest pastel, a good flower, and a strong grower. *Lady Franklin* and *Pink Lustre* combine well although *Lady Franklin* is superior in form and color. *Reba Cooper* and *Linda* are both choice flowers. *Byng of Vimy,* while too spidery in form, is still a lovely pastel which has not been duplicated, having petals of lightest Spanish orange with sepals of apricot.

Kanapaha, Empress, Indian Chief, and *Rosita* did not live. But two only planted last fall, give promise of being strong growers with choice flowers—*Rose Gem* and *Georgia. Royal Lady* is a beautiful new one, a maroon with throat and midrib of mimosa yellow. The petals

are twisted and the sepals curl back, making it a wide spread, striking flower. It has heavy substance.

The newer daylilies appear to suffer from the heat and drought of this semi-arid climate (Fig. 178). Two planted in 1941 and well established, died during the summer of 1946 when they were not well watered. And they certainly require good, fertile soil, refusing to take the poor conditions under which the old ones have endured and multiplied, almost too vigorously sometimes for more delicate plants near them. During the worst freeze remembered by the oldest settlers this January, not a single daylily was lost. December planted ones take a good hold and grow vigorously, but those attempted in May suffer so from summer heat and drought that, if they live, remain weak for a long time. October planted ones take hold and grow the best of all, but this is also especially true of iris. Many varieties begin to close as the light of day begins to lessen, but some stay open through the night.

MY BEST 50 DAYLILIES AS OF 1947

[After the above article was written, Dr. Traub sent me an advance copy of his article, suggesting that I list my best 50 daylilies according to the plan outlined. The abbreviations used are: RATINGS—F = **Fair;** G = **Good;** E = **Excellent;** COLORS—Y = yellow; O = orange; R = red; and B = blend or polychrome; STATURE—Df = dwarf; SDf = semi-dwarf; SRb = semi-robust; Rb = robust; and Gt = giant.]

EARLY	EARLY-MIDSEASON	LATE-MIDSEASON	LATE
1. **Orangeman** (F; O; SRb)	5. **Amherst** (G; R; SRb)	40. **Dorothy McDade** (F; Y; Rb)	50. **Autumn Red** (G; R; SRb)
2. **Duncan** (G; R; Rb)	6. **Afterglow** (F; B; SDf)	41. **Hyperion** (G; Y; Rb)	
3. **Victory Montevideo** (G; R; Rb)	7. **Amazon** (G; R; SRb)	42. **Nebraska** (F; Y; Rb)	
4. **Zouave** (G; B; Rb)	8. **Antoinette** (G; B; Rb)	43. **Port** (G; R; SDf)	
	9. **Baronet** (G; B; Rb)	44. **Pink Lustre** (G; B; Rb)	
	10. **Bertrand Farr** G; B; Rb)	45. **Red Bird** (G; R; Rb)	
	11. **Brackel** (G; R; Rb)	46. **The Swan** (F; Y; SRb)	
	12. **Confucius** (G; B; Rb)	47. **Victoria** (F; B; SRb)	
	13. **Charleen** (G; R; SRb)	48. **Wekiwa** (G; R; Rb)	
	14. **Duchess of Windsor** (E; Y; Rb)	49. **Wolof** (G; R; Rb)	
	15. **Dominion** (G; R; Rb)		
	16. **Dr. Stout** (E; B; Rb)		
	17. **Elaine** (G; B; SRb)		
	18. **Elizabeth Wheeler** (G; R; Gt)		
	19. **George Kelso** (G; B; Rb)		

[EARLY-MIDSEASON; Continued on page 67.]

[EARLY-MIDSEASON; Continued from page 66.]

20. **Granada** (G; B; Rb)
21. **Golden West** (F; Y; Gt)
22. **Hazel Sawyer** (G; B; SRb)
23. **La Tulipe** (G; R; Rb)
24. **Lady Franklin** (G; R; Rb)
25. **Marcelle** (E; O; Rb)
26. **Mikado** (F; O; Rb)
27. **Ming Toy** (E; R; SDf)
28. **Mayor Starzynski** (G; B; SRb)
29. **Patricia** (E; Y; Rb)
30. **Paul Ihrig** (G; B; SRb)
31. **Peony Red** (G; R; Rb)
32. **Reba Cooper** (G; B; SRb)
33. **Ruby Supreme** (G; R; Rb)
34. **Sachem** (G; R; Rb)
35. **San Juan** (G; R; Rb)
36. **Tahiti Belle** (G; R; Rb)
37. **Taruga** (F; Y; Rb)
38. **Theron** (G; R; SRb)
39. **Talisman** (G; B; Rb)

New Clones under Trial. Blanche Hooker; August Orange; Bobolink; Caprice; Fantasia; Judge Orr; Rose Gem; Georgia Sibyl; Spitfire; Cecil Houdyshel; Adventure; Berwyn; Rouge Vermilion; Scarlet Sunset; Haile Selassie; Tom Thumb; H. gracilis; Bolivar; McDades Pastel; Royal Lady; Mignon; Craemore Henna; Craemore Ruby; Dawn Play; Milady, Sweet Briar; Clarion; Carnival; General MacArthur.

Clones are not rated until the plants are well established since it would be obviously unfair to do so when it is well known that in most cases typical flowers are not produced for the first year or two after plants are set out. The fact that a clone does not do well in Northwest Texas however, is no criterion as to its performance in another climatic region. All tests point to the fact that recommendations of daylilies must be on a regional basis since apparently many clones do well in one region and not as well in another. It is therefore obvious that a list of discards is out of order for it would be valid only under the conditions of the trials and might confuse those growing the same clones elsewhere.

DAYLILY CHOICES

J. B. S. Norton, *Maryland*

How could one select only one daylily if that was all he could have. Well, I had a hard time to do it but finally picked *Semperflorens.* I could not find anything wrong with it, and it blooms for a long time in late spring when few others are in flower and often looks better still in the fall.

For only five, *Semperflorens* is selected for May and June, *Mikado* for June and July, *Patricia* for July, *Colonel Besley* for August, and *Duchess of Windsor,* extra, for the blooming peak.

To make 10 the following five are added just for their beauty: *Bertrand Farr, Caballero, Garden Lady, George Kelso,* and *Baronet.*

For 25 we can spread out a little and include 15 more beauties: *Mongol* for its very large clear yellow, *Ophir,* a large lily-form yellow, *Seminole Chief,* my best red, *Ortencia* for its artistic form, *Ruby Supreme* for a large bold red, *Black Prince* for the best form in very dark, *Dauntless,* almost a twin for the *Duchess of Windsor,* but taller, *Afterglow,* exquisite and unusual color, *H. aurantiaca major,* unusual form and size (hope it stands the winter), *Bicolor,* a flock of rose and yellow butterflies, *Clarion,* rosiest of the "roseas", *Joanna Hutchins,* very fine orange, *Linda,* pattern of beauty, *Mildred Orpet,* delicate lady, *Enchantress,* blush on cream, *Variegated Kwanso* for its white striped leaves.

The next 25 of superior kinds gives us 50: *Damosel,* pinkest, *Rajah,* eyed red, *Redbird,* brilliant rosy red, *Theron,* dark purple brown, *Gypsy Lass,* blending of orange tones, *Hesperus,* great orchid like light yellow, *Aztec Gold,* similar in orange, *Hyperion,* large well formed pale, *Miss Jennie,* soft buff, throat lightly shaded, *Maculata,* large light fulva, *Peony Red, Port,* multiflorous small red, *Minnie,* dark velvety red, *Gay Troubadour,* vivacious, *Su-Lin,* delicate pink, *Rosalind,* mother of roses, *Peachtree Beauty,* large pinkish buff, *Modesty,* large pale yellow, *Victory Montevideo,* early red, *Dorothy Dawn,* large creamy pink, *Lidice,* creped orange, *Helen Wheeler,* peachy pink, *Dorothy McDade,* a later *Hyperion, Craemore Henna,* unusual red, *Dr. Stout,* orange and fulvous.

Now let's make it 100 by adding these another 50 good ones—at their best fine, or fitting some season with none better: *La Tulipe, Dr. Hughes, Sister Sallie, Richard, Wekiwa, Gaiety, Zouave, Havilah, Geronimo, Swan, H. multiflora, E. W. Yandre, Granada, Mayor Starzynski, Rosaflare, J. A. Crawford, Mae, WauBun, Gloaming, Sir Michael Foster, Boutonniere, Purple Waters, Princess, Indian Chief, Brunette, Gypsy, Queen of May, Elizabeth, Bold Commando, Aurantiaca, Ajax, Golden West, Apricot, Jimmie Junior, Aflame, Sirius, Mary Ellen, Mrs. W. H. Wyman, H. flava, Gracilis, May Morn, Mrs. J. R. Mann, Sovereign, Sungold, J. S. Gaynor, Aladdin, Persian Princess, Iris Perry, Star of Gold, Europa.*

Many of the finest clones are omitted because they are not yet named, or because I have not seen them often enough. The above selections are mostly based on daily observations of over 400 named kinds in

my garden. Not all the other 300 plus have been discarded. I could still like thousands of different ones. I see that this list is different from some lists I made last year. I still learn, as Leonardo said when he was 90 years old; at least I am glad I can still change.

ALLIUM TRICOCCUM

Hamilton P. Traub

Plants of *Allium tricoccum* Aiton with almost mature seed capsules attached were kindly sent to the writer on August 15, 1947 by Thomas K. Barrie, Coudersport, Pennsylvania, and reached their destination in perfect condition due to the excellent packing job. Mr. Barrie writes that the bulbs were collected in "not too dense woods, known here as hardwood timber country (beach, birch, maple)..... they grow in..... soil.....covered with about one inch of black woods loam and leaves. They will grow in any fairly heavy garden soil, and in partial shade. I would have been unable to locate these bulbs, only for the seed heads which you will note are still attached, the leaves are gone."

According to Mr. Barrie, *Allium tricoccum* is known locally as "Potter County Leek". He offers the following very interesting comments. He states that the "supposition is with the natives here, if one eats a mess of these leeks in the spring, there will be no need to see the doctor for the rest of the year as far as a cold is concerned, and as far as that goes, no doctor would want to go near a person for at least a week after they have been eaten—I believe they have an edge on garlic. I do however eat quite a few each spring myself, and rather like them eaten like spring onions. We have a Grange here, and the members put on a leek supper once each year, and there is quite a turnout at $1.00 per person. They cook them—in this case the door is as far as I generally go."

The bulbs with attached seed capsules almost mature were planted and the seeds allowed to mature. It is interesting to note that only a relatively few capsules actually matured three seeds per capsule (one in each locule), as is shown in Table 1.

TABLE 1. **Allium tricocc**um Aiton; typical results: number of seeds matured per capsule, and diameter of seeds; plants collected by Thomas K. Barrie, Coudersport, Penna, 1947.

Umbel number:	Capsule number:	Number of seeds per capsule	Diameter of seeds; mm.	Umbel number:	Capsule number:	Number of seeds per capsule	Diameter of seeds; mm.
1	1	1	3.1	2	1	3	3.1;3.3;3.1
	2	1	3.1		2	2	3.2;3.2
	3	2	3.2;2.9		3	2	3.2;3.1
	4	1	3.1		4	1	2.7
	5	1	3.0		5	1	2.8
	6	2	2.8;3.2		6	2	3.1;3.1
	7	1	2.9		7	2	2.8;2.9
	8	1	3.3		8	2	3.1;2.8
	9	2	2.7;3.2				
	10	2	2.9;3.0				
	11	2	2.8;3.1				
	12	2	3.2;2.7				

Apparently in this case, although the plants were growing in their native habitat, something intervened to greatly reduce the seed set per capsule. What caused this we have no way of knowing. Probably Mr. Barrie will favor us with a report on this in a future issue of HERBERTIA.

It should also be noted (Table 1) that the globose seeds (which are black), vary from 2.7 mm. to 3.3 mm. in diameter. The number of capsules (flowers) varies from 8 to 12 per umbel.

According to Vvedensky (in Herbertia 1944), the sections *Anguinum* G. Don, and *Ophioscordon* (Wallroth) Endl., are both characterized by a 3-seeded capsule with globose seeds, but the rootstock in the former (*Anguinum*) is rhizomatous, whereas the bulb of the latter (*Ophioscorodon*) is not rhizomatous. Recently W. T. Stearn (Jour. Roy. Hort. Soc. LXXII, p. 36. 1947) proposed the section *Validallium* (Small) Stearn, syn. genus *Validallium* Small, in Small, Fl. S. E. United States, 264 (1903), Man. S. E. Flora, 289 (1933), to accomodate *Allium tricoccum* on the basis of "its solitary ovules". According to Stearn, *Allium tricoccum* "is much more akin to the Old World species *A. Victorialis* L., of the sect. *Anguinum* G. Don and *A. ursinum* L. of sect. *Ophioscorodon* (Wallr) Endl., with which it agrees in being a broad-leaved woodland plant with rounded seeds, but its solitary ovules justify its being placed in a new section." He cites the work of Haynes and Owenbey (Rhodora 48: 61-63. 1946) in which "two well-defined ecological races" are distinguished, "the one (a) inhabiting low moist woods and having reddish-petioled elliptic leaves, 4-7 cm. broad and flower-stems 25-34 cm. high, the other (b) inhabiting upland woods and having greenish-petioled lanceolate leaves 1.3-3 cm broad and flower-stems less than 25 cm. high". The form collected by Mr. Barrie apparently should belong to the first mentioned.

STARCH FROM **ALSTROEMERIA**

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Most readers of *Herbertia* are familiar with the *Alstroemerias* which are grown in this country only as ornamentals. It is probably not common knowledge that these plants have possible commercial uses because of the starch stored in their tuberous roots. Reichert (1) reported in 1913 that, in Chile, starch from several species of *Alstroemeria* was marketed as *Talcahuano arrowroot.* It is commercially unknown, however, in the United States. Unless this starch should have unusual characteristics which would fit it for special purposes, it could not be expected to compete economically in this country with corn starch.

The present study of *Alstroemeria* starch properties was not, however, undertaken primarily in the hope of finding a commercial outlet for the starch, but rather as part of an investigation designed to obtain fundamental physicochemical information on starches in general.

Our attention was first drawn to *Alstroemeria* starch by the description and photomicrographs of granules from *A. ligtu, A. aurantiaca,* and *A. brasiliensis* published by Reichert (loc. cit.). The large compound granules of *A. ligtu,* especially, are very different in appearance from any of the more common starches which have been studied in considerable detail. Since these *Alstroemeria* starch granules have unusual physical characteristics it seemed possible that some of the *Alstroemeria* starches might give pastes with unique properties. For this reason, starch from two available species of *Alstroemeria* was included in a study of the granule and paste characteristics of a number of starches from widely varying sources.

The methods used for characterizing the starch during this investigation have been described in an earlier paper (2).

PREPARATION OF THE STARCH

Starch was separated from the tuberous roots of *A. aurantiaca* and *A. chilensis,* which were obtained through the courtesy of Mr. Harry L. Stinson, Seattle, Washington, in *August,* 1944. They were processed within three days after their arrival at the Laboratory. For this short period they were stored at 40° F. During the entire cleaning and processing, low temperature was maintained by icing in order to inhibit the action of starch-degrading enzymes which are present in the roots.

Immediately before processing, the roots were cleaned by washing with cold distilled water and small rootlets and decaying pieces were removed. The sound material was rinsed with distilled water and ground through a meat chopper with 3/16-inch plate. Starch was separated from

[1] One of the laboratories of the Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

the finely ground pulp by passing a slurry of the ground roots in distilled water over No. 13 standard bolting silk. The starch milk which passed through the silk was centrifuged to separate the starch from the water. The starch was further cleaned by washing several times with distilled water. It was separated from each wash water either by centrifuging or by sedimentation in a tall cylinder. After each centrifuging, the upper layer of cell-wall debris was scraped away from the starch layer.

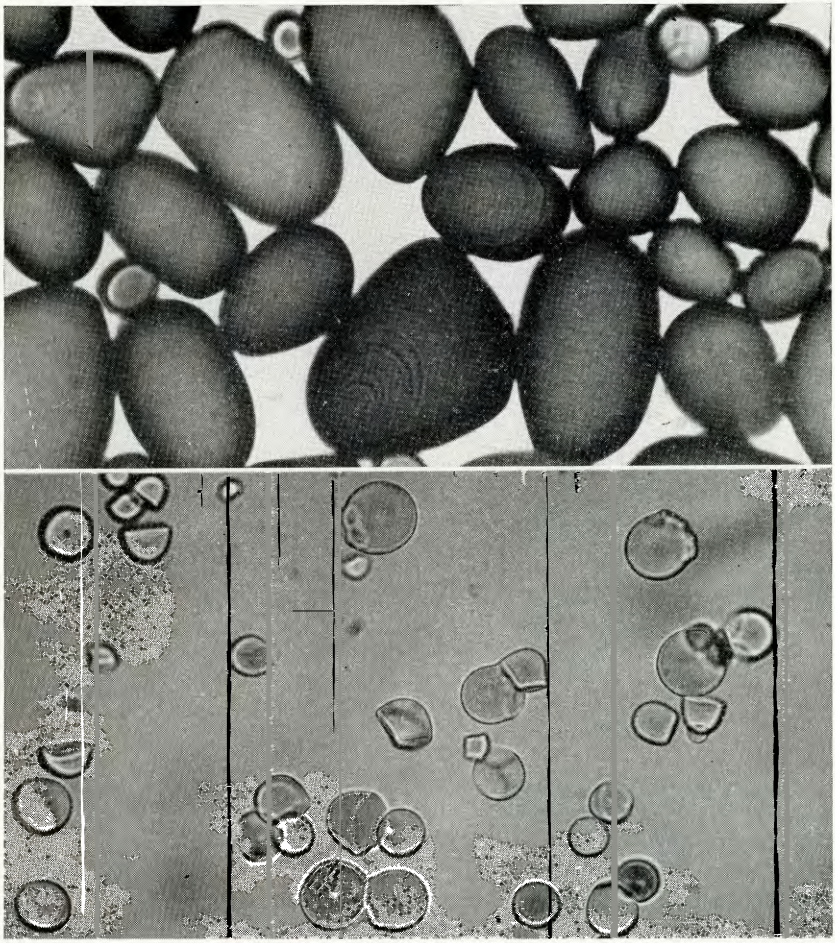


Fig. 179. (Upper) Potato starch granules. (Lower) Tapioca starch granules. Magnification 500x.

The purified starch was dried to a moisture content of about 15 percent in a forced draft oven at 104° F. Since the methods employed for preparing the starch were the mildest at our disposal, it is felt that the samples obtained were as near native starch as could be prepared.

Yields of 410 gm. and 56 gm. of air-dry starch were obtained from 4700 gm. and 4000 gm. of *A. chilensis* and *A. aurantiaca,* respectively. The yield from *A. chilensis* was about that usually obtained from Katahdin potatoes by the same method.

GRANULE CHARACTERISTICS

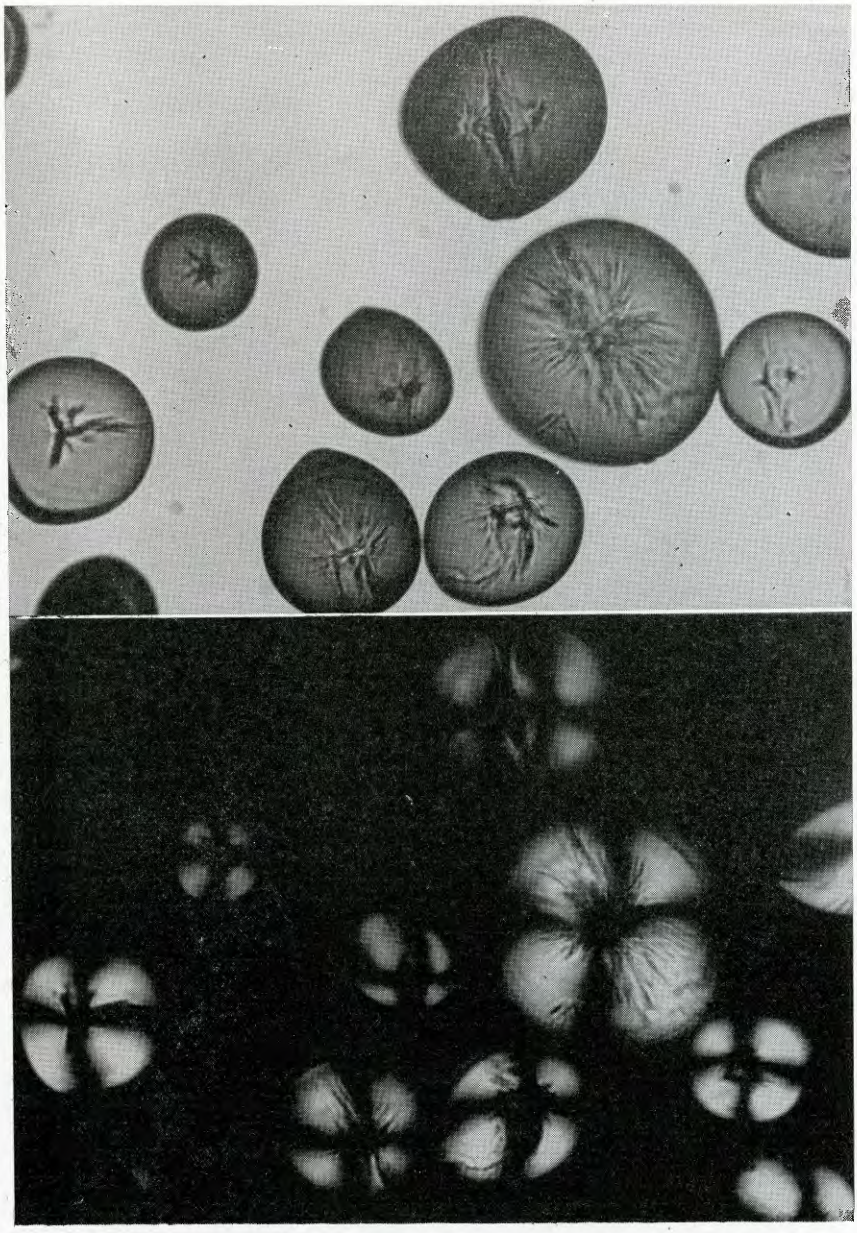
Some species of *Alstroemeria* have simple granules, while in others the granules are compound (Reichert, loc. cit.). Simple ungelatinized granules show one cross each when viewed between crossed Nicol prisms. Nearly all of the granules from *A. aurantiaca* are simple. Their appearance is shown in Plate 305 (upper) and (lower). The uppermost granule in Plate 305 (upper) and (lower) is a compound granule composed of two constituent granules. Each simple granule, whether alone or incorporated as a constituent within a compound granule, has a central "nucleus," called a "hilum," which appears either as a black dot or as a dark star-shaped area with radiating fissures. The intersection of the arms of the cross (Plate 305, lower) occurs at the hilum.

Compound granules of *A. chilensis* are shown in Plate 306 (upper) and (lower). Two to eight constituent granules are closely packed together in each of these. The hila of the constituent granules are so arranged that they form a prominent central pattern in the compound granule (Plate 306, upper). Between crossed Nicol prisms a "laced effect" is observed (Plate 306, lower) due to the intersection, at the hila, of the crosses of the constituent granules. These compound granules of *A. chilensis* look much like those of *A. ligtu* which were described and pictured by Reichert (loc. cit.).

The so-called root starches of commerce, including potato, arrowroot, tapioca and sweet potato starches, consist mostly of simple granules, although double granules occasionally occur. Typical potato and tapioca starch granules are shown in figure 179 (upper) and (lower).

The compound granules of *A. chilensis* are about the same size as the simple granules of *A. aurantiaca,* but somewhat different in shape, as can be observed by comparing Plates 305 and 306. On the average, both are larger than potato starch granules, which are the largest of those in our common commercial starches. (Canna starch, however, has granules considerably larger than those of *Alstroemeria).* The average granule size of *Alstroemeria* is shown in table 1 in comparison with that of tapioca, potato, and corn starches.

When starch granules are heated in water, they lose their birefringence (i.e., they no longer exhibit a cross between crossed Nicol prisms) and they swell to several times their original size. The loss of birefringence results from changes taking place within the granule,—a phenomenon known as "gelatinization." A starch is broadly characterized by the temperature at which gelatinization occurs. Not all the granules in any starch sample gelatinize at the same temperature, however; hence each starch has a gelatinization temperature range. At the lower limit of the range a few granules are just beginning to lose their birefringence, while at the upper limit all of the granules have entirely lost birefrin-



(Upper) Granules of **Alstroemeria aurantiaca** starch. Note the double granule at the top. (Lower) Same field as (Upper) between crossed Nicol prisms. Note the single cross in most granules as compared with "laced effect" in the compound granules shown in Plate 306, (Lower). Magnification 500x.

Plate 305

gence. Usually large granules gelatinize at a lower temperature than small ones, but factors other than granule size also affect the gelatinization temperature.

The two species of *Alstroemeria* starch studied started to gelatinize at a lower temperature than tapioca or potato starch, but otherwise had a similar gelatinization temperature range. Data are given in table 1.

Following gelatinization, starch granules usually swell greatly. Simple granules then look like inflated sacs, the size and shape depending upon the kind of starch. Swollen granules of *A. aurantiaca* are shown in Plate 307 (upper). During swelling, compound granules often break apart into the individual constituent granules. Or the constituent granules may continue to hold to each other even when greatly swollen. For the most part, the constituent granules of *A. chilensis* tend to cling together, so that peculiar and unusual forms result, as shown in Plate 307 (lower).

Root starches, in general, contain less nitrogen and more ash than cereal starches. The *Alstroemeria* starches studied, like high-grade tapioca starch, contained even less nitrogen than ordinary potato starch, but they had more ash than the average tapioca or potato starch. Analytical results are recorded in table 1.

CHEMICAL NATURE OF ALSTROEMERIA STARCH

Two kinds of starch molecules are known to exist. In one, called "amylose," the glucose residues of which starch is composed are arranged in a linear manner; in the other, known as "amylopectin," the arrangement of the glucose residues is non-linear, i.e., perhaps branched or folded. Most starches consist of about 20 to 30 percent amylose and 60 to 70 percent amylopectin. Seeds of a few plants (the so-called "glutinous" or "waxy" cereals) have starch comprised largely, if not wholly, of amylopectin. Starch from wrinkled-seeded, garden-type peas is composed of about 60 percent amylose and the remainder amylopectin (2).

Because the characteristics of the paste made by heating starch granules in water depend largely upon the ratio of amylose to amylopectin in the starch, a knowledge of this ratio is important. Such information is most conveniently obtained by determining the iodine-sorptive capacity of the starch. By taking one-half the number of milligrams of iodine sorbed by one gram of the starch, a value is obtained which approximates the percent of amylose present (2). This calculation involves the assumption that amylose from all sources sorbs about the same amount of iodine.

The iodine-sorptive capacities of the two *Alstroemeria* starches studied were within the range of those of commercial starches (see table 1), indicating an amylose content of about 20 to 25 percent.

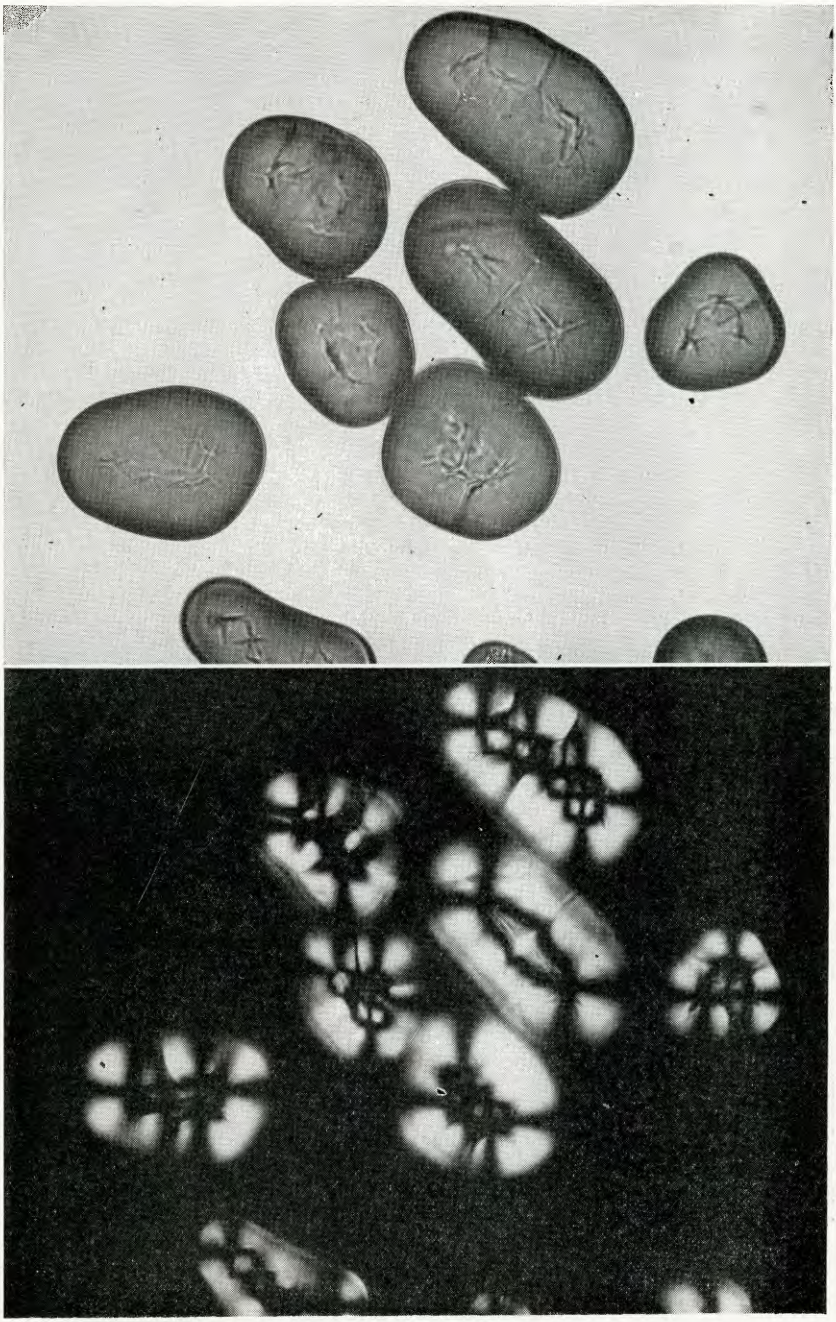
PASTE CHARACTERISTICS

In paste characteristics, *Alstroemeria* starches resemble potato or tapioca starch more than corn starch. (See table 1). *Alstroemeria* starch pastes are long and tacky, i.e., viscid and sticky, in contrast to the short,

Table 1.—A comparison of *Alstroemeria* starch characteristics with those of starch from other sources.

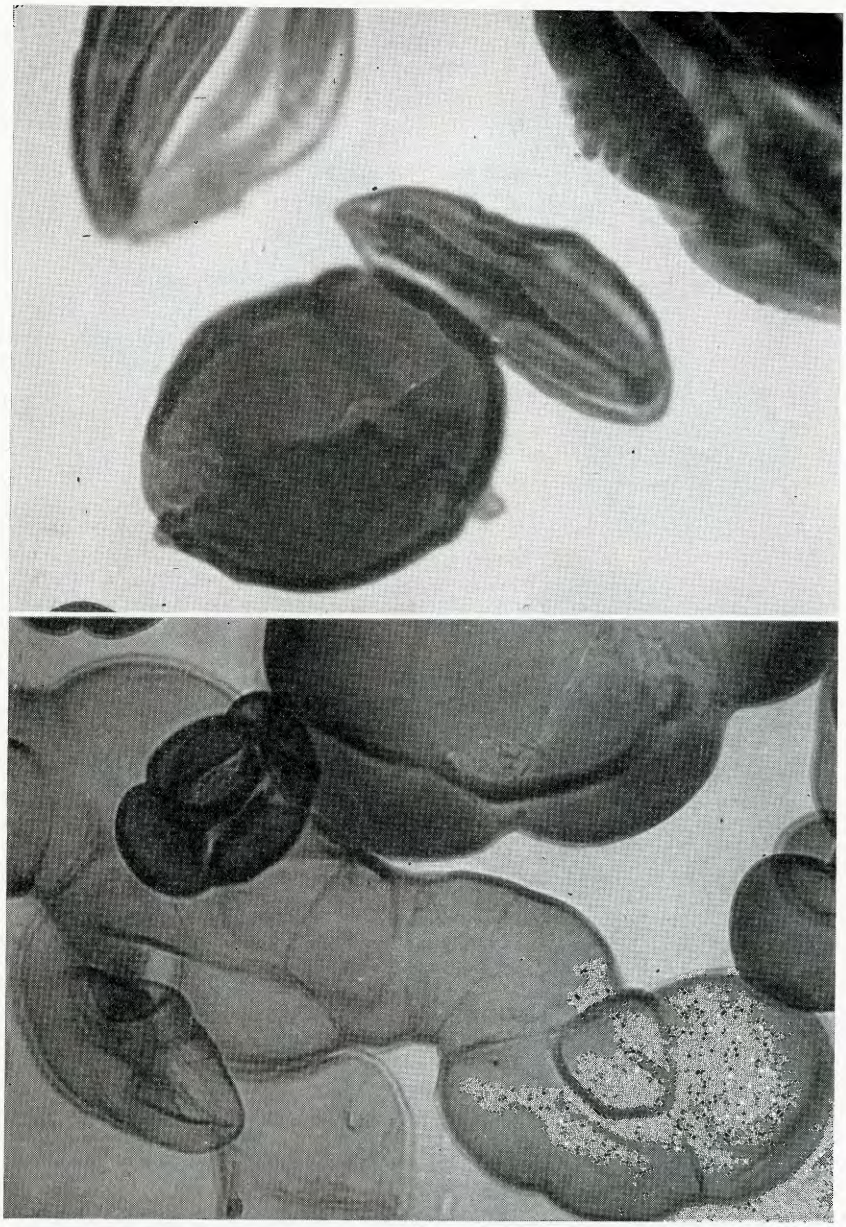
		Alstroemeria chilensis	*Alstroemeria aurantiaca*	Tapioca	Potato	Corn
Granule size	Maximum	113 x 180μ	133 x 167μ	35 x 35μ	60 x 100μ	30 x 30μ
	Average	87 x 112μ	89 x 102μ	15 x 15μ	50 x 75μ	15 x 15μ
	Minimum	53 x 57μ	47 x 47μ	5 x 5μ	10 x 10μ	5 x 5μ
Gelatinization temperature		31° - 71° C.	34° - 65° C.	61° - 66° C.	49° - 64° C.	47° -78° C.
Analyses *	Nitrogen	0.01%	0.01%	0.01%	0.02%	0.04%
	Ash	0.64%	1.06%	0.09%	0.40%	0.06%
Iodine sorptive capacity	I_2/gm. starch	50 mg.	42 mg.	37 mg.	43 mg.	53 mg.
Paste characteristics	(a) Length and tackiness	Very long and tacky	Very long and tacky	Very long and tacky	Less tacky than *Alstroemeria*	Short; not tacky
	(b) Turbidity	Opalescent and translucent	Opalescent and translucent	Opalescent and translucent	Opalescent and translucent	Semi-opaque
	(c) Viscosity	High	High	High	High	Low
	(d) Retrogradation	Slow	Slow	Slow	More rapid than *Alstroemeria*	Rapid

* Moisture-free basis



(Upper) Compound granules of **Alstroemeria chilensis** starch. (Lower) Same field between crossed Nicol prisms. Magnification 500x.

Plate 306



(Upper) Gelatinized starch granules of **Alstroemeria aurantiaca.** (Lower) Gelatinized starch granules of **Alstroemeria chilensis.** Magnification 235x

Plate 307

non-tacky pastes of most cereal starches. (Corn starch pudding mix gives a short paste, for example). When first prepared, pastes of *Alstroemeria* starch are opalescent and translucent, but slowly become more opaque (i.e., "retrograde"). Their viscosity is high, in the general range of that of potato and tapioca starch pastes.

POSSIBLE USES FOR ALSTROEMERIA STARCH

The relative commercial importance of a starch in any given region is determined primarily by the abundance and hence the cost of the commodity from which it is obtained. In the United States, corn starch is the least expensive and therefore, the most widely used starch. In Europe, on the other hand, where special varieties of potatoes are grown for their high starch content, potato starch occupies first place.

If there is only a minor difference between two starches in their suitability for a given purpose, the cheaper rather than the better one may be used because of economic advantage (3). There are some cases, however, in which a relatively expensive starch is employed because its paste characteristics uniquely adapt it for specific applications. Starches giving long, tacky, highly viscous pastes which retrograde slowly are especially desired in some cases for sizing of paper and textiles, for the preparation of adhesives used in the production of envelopes, paper bags, and postage stamps, and for food use as, for example, in prepared pudding and pie mixes. For some of these purposes, tapioca starch is employed in this country, even when its cost is considerably above that of corn starch.

Alstroemeria starch is so similar to tapioca starch in its paste characteristics that, if both were on the market, cost would probably be the determining factor. Even under conditions such that the starches could be sold at equal cost, it is doubtful whether a starch newly introduced to the market could compete with one of the same characteristics already commercially established. It is hardly probable, therefore, that *Alstroemeria* will become of industrial importance in this country as a source of starch.

SUMMARY

Starches have been prepared from the tuberous roots of *Alstroemeria aurantiaca* and *A. chilensis*, and their properties studied. The granules of the former are simple, while those of the latter have an unusual compound nature. Both give pastes similar in characteristics to pastes of other so-called root starches, such as potato and tapioca starch.

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THE GENUS PYROLIRION

J. C. Th. Uphof

William Herbert [1] proposed the genus *Pyrolirion* in 1821, in his "Appendix." The name was derived from two Greek words meaning "fire" and "lily," respectively, and the generic group was taken over by the same author [2] in his well known monograph of the Amaryllis Family in 1837. Herbert knew perfectly well the characteristics of the genera that he described in 1821, but later Baker [3] included *Pyrolirion* under *Zephyranthes,* to which, undoubtedly, it is related. Following Baker, the Index Kewensis, p. 667, refers the species of *Pyrolirion* to *Zephyranthes.* It is therefore understandable that Pax and Hoffman [4] followed these authorities, and reduced *Pyrolirion* to a subgenus of *Zephyranthes.*

Earlier, however, Otto Stapf had prepared his extensive description of *Habranthus robustus* to accompany Plate 9126 in Curtis' Botanical Magazine in 1926. During his studies he came to the conclusion that *Pyrolirion* and certain other genera that had been distinctly outlined by Herbert, should be maintained. An important difference to Herbert was the habit of the perianth which he describes in *Pyrolirion* as erect; in *Zephyranthes* as sub-erect, and in *Habranthus* as declinate. In *Amaryllis* (syn. *Hippeastrum)* the perianth is declinate but the tube is abbreviated whereas in *Habranthus* the perianth is declinate but the tube is not abbreviated. Sealy [5] gives us a clear comparison between *Pyrolirion* and *Zephyranthes* with reference to the characteristics of the spathe, perianth, stamens and stigma. The reader is referred to this masterful exposition of the generic limits of the genera *Pyrolirion, Zephyranthes, Habranthus* and *Amaryllis* (syn. *Hippeastrum.)*

Genus PYROLIRION Herbert

Bulbous plants, bulbs usually more or less ovate; older bulbs surrounded by offsets; leaves narrow, somewhat erect, attenuate at both ends. Spathe bifid, tubular, formed into a sheath below. Scape one-flowered. Bractioles absent. Flowers erect. Perigone conspicious, relatively large. Tube narrow cylindrical in the lower part, spreading recurved. Filaments erect. Anthers incumbent. Style almost erect to erect; stigma trifid; its segments spatulate.

When Herbert proposed the genus *Pyrolirion* he admitted three species,—*P. flammeum, P. aureum* and *P. flavum.* Since that time the number of species has been increased but slightly. The generally accepted additions are *P. boliviense* and *P. xiphopetalum* by Baker.

1 William Herbert. An Appendix (to Edward's Botanical Register; Treatise on Amaryllae). London, 1821. p. 37.

2 William Herbert. Amaryllidaceae. London, 1937. pp. 183-184.

3 J. G. Baker. Handbook of Amarylleae. London, 1888.

4 F. Pax und K. Hoffman. Amaryllidaceae in Engler und Prantl; Die Natuerlichen Pflanzenfamilien. 2 aut. 15a: 406-407. 1930.

5 J. R. Sealy. **Zephyranthes, Pyrolirion, Habranthus** and **Hippeastrum.** Journ. Roy. Hort. Soc. 62: 195-209. 1937.

With the genus *Pyrolirion* may be mentioned *Zephyranthes Beustii* Schinz, Z. *Briquetii* Macbride, Z. *parvula* Killipp all native to Peru and *Z. pseudocolchicum* Kranzl from Bolivia, however, a more detailed study will be necessary to be able to decide whether these four species form part of *Pyrolirion*. No material could be studied for comparison during the war period.

Description of the species

1. *Pyrolirion aurantiacum* Lemaire in Le Jardin Fleuriste. Plate 377, 1854.

Description.—Bulb small, surrounded by a blackish tunic. Leaves from 2 to 6, sometimes 8, occurring about the same time as the scape, linear, convex below, somewhat canaliculate, attenuate-obtuse, longer than

Fig. 179a. **Pyrolirion aureum.**
Photo by Edith B. Strout.

the scape, of a beautiful green, somewhat glaucous. The scape is fistulous, cylindric, glaucous, somewhat striate. Spathe membranous. Flowers orange. Perianth infundibuliform-campanulate, large, sessile, 7 to 8 cm. long; tube 1.5 to 2 cm. long and 8 to 10 mm. wide. Segments about 3 cm. long and toward the middle, 12 to 14 mm. wide. Apex becoming gradually pointed. Filaments reaching to the throat of the perianth, inserted at the extreme base. Anthers oblong. Style about as long or longer than the stamens, cylindric, straight. Stigma distinctly deeply 3-cleft. Ovary cylindric, slightly 3-angled. Ovules numerous.

Notes.—This attractive species differs from *P. aureum* by its sessile flowers, its straight style, its stamens and the striated scape. It is distinguished from *P. flammeum* by its more numerous leaves, its longer scape and much larger flowers.

2. *Pyrolirion aureum* Herbert in Appendix Bot. Reg. 37, 1821.—Amaryllidaceae, 183, 1837.—*Zephyranthes aurea* (Herb.) Baker Handb. Amaryllidae 37, 1888.—*Amaryllis aurea* Ruiz et Pavon Flora Peruv. T. 286 A. 17.

Description.—Bulb roundish, 2.5 to 3 cm. in thickness. Leaves 4 to 5, linear, 3 dm. in length and 6 mm. wide. Produced with the flowers in December and January. Scape 1.5 to 3 dm. long. Spathe membranous, 3 cm. long, the lower half cylindric. Limb of the perianth erect, brightly yellow; tube funnel-shaped, being longer than the segments, dilated in the middle; the throat furnished with minutely toothed scales; segments acute, equal in length, 3 cm. long, 10 to 12 mm. wide. Stamens adnate toward the middle to the tube of the perianth. Filaments erect, reaching almost the apex of the segments. Ovary sessile.

Notes.—This species has been found in Valle de Lima, Peru, where plants were seen in the corn-fields and in other localities. Matthews Nr. 400.

3. *Pyrolirion boliviense* (Baker) Sealy, Journ. Roy. Hort. Soc. 62: 207, 1937.—*Zephyranthes boliviensis* Baker Hanb. Amaryllidae 38, 1888.

Description.—Bulbs roundish, 2½ to 3 cm. in thickness; tunic 3 to 7.5 cm. in length. Leaves have not been described. Scape 1.5 to 3dm. long, slender. Spathe 2 to 2.5 cm. long. Limb of the perianth erect, 5 cm. long, whitish; tube as long as the segments, cylindric below, the upper half funnel-shaped. Segments of the same length, oblong-lanceolate, 6 to 8 mm. in width. Stamens adnate to the middle of the tube; anthers opposing the base of the segments. Ovary sessile; style trifid to the base, overlapping the stamens.

Notes.—Native to Bolivia near Sorata at an altitude of 2500 to 3000 meters. Mandon 1194 in part. Flowers appear in September.

4. *Pyrolirion flammeum* Herbert in Appendix Bot. Reg. 37, 1821.—Amaryllidaceae 184, 1837.—*Zephyranthes flammea* Baker. Hand. Amaryllidae. 38, 1888.—*Amaryllis flammea* Ruiz et Pavon. Flora Peruv. T. 286 B. 17.

Description.—According to Baker this species: "Just like *Z. aurea,* but the color of the flower flame-red. Segments furnished with small truncate crenate membranous scales at base . . ."

Notes.—Reported from Valle de Lima, Peru, Pavon.

5. *Pyrolirion xiphopetala* (Baker) Sealy, in Journ. Roy. Hort. Soc. 62: 208, 1937. *Zephyranthes xiphopetala* Baker, in Henry H. Rusby, On the Collections of Mr. Miguel Bang in Bolivia. Part II. Mem. Torrey Bot. Club. 4: 268, 1896.

Description.—Bulb round, 3 to 4 cm. in diameter. Outer scales membranous, brown. Leaves have not been observed, they develop more than likely not during the flowering period. Scape 15 to 30 cm. long, terminated by an erect, sessile flower, surrounded at the base by a white membranous spathe, 1-valved, 2½ cm. or less in length. Perianth erect, infundibuliform, clear yellow, 4 to 5 cm. long. Tube of the perianth 8 mm. long, cylindrical below the dilated apex. Segments lanceolate, 4 mm. wide near the middle, becoming narrow toward the apex. Length

of the stamens is half of that of the lobes of the perianth. Anthers spirally curled up. Style deeply trifid, overtopping the anthers.

Notes.—The original description is based on a specimen found in the vicinity of Cochabamba, Bolivia, Bang nr. 890, 1891. It was collected by Mr. Miguel Bang together with numerous other species from Bolivia. He was educated in gardening at Kew and went in 1883 to Bolivia for the purpose of collecting Orchids and later on also collected herbarium specimens from that region for different institutions. His collection of Amaryllids was identified by J. G. Baker.

THE TRIBE GALANTHEAE

HAMILTON P. TRAUB AND HAROLD N. MOLDENKE

[Criteria: Karyology, x = 7, 8, 9, 10, 11, 12. Ovary inferior; scape leafless; divisions of the perigone free (tepals) in *Lapiedra, Galanthus* and *Leucojum,* excepting in subgenus *Acis,* in which the divisions are barely united at the base (= tepaltube and tepalsegs); tepals in *Lapiedra,* and tepals, or tepalsegs in subgenus *Acis,* tepals in *Leucojum* subequal; tepals in *Galanthus* dimorphic; plants are either (a) schistandrous (in *Lapiedra),* or (b) porandrous (in *Leucojum* and *Galanthus);* style filiform or strumose.]

With keen insight William Herbert (1837) discerned that the species included in this group—*Galantheae,* commonly called Snowbells on the European Continent and Snowdrops in Britain—show an evolutionary tendency to become porandrous. This means that the anthers open only partially and the pollen is discharged through two small holes at the summit, or there may be a lateral slit of the anther (running nearly to the base), which is superadded to the terminal pore. The porandrous condition may be advantageous to pollination in drooping flowers, and mutations in the direction of porandrosity would therefore tend to be preserved when pedicels are cernuous. Since such evolution is from schistandrous ancestors with anthers that split for their entire length, we may expect to find more primitive species that still retain this character and that arose also from the common ancestral stock, unless these have become extinct, or the collaterally evolved line or lines have taken another direction and have passed the tribal boundaries as delimited for the *Galantheae.* In this connection it should be noted that Herbert (1837) discerned an affinity between *Lapiedra* Lag. and the rest of the *Galantheae.* Although he placed *Lapiedra* next to *Gethyllis* Linn. and *Sternbergia* W. & K., he asserted that *Lapiedra* may "prove to be porandrous in which case it would stand amongst *Galantheae,* probably next to *Leucojum*". Although apparently it was later found that *Lapiedra* is schistandrous, it has been included in this natural group since 1887, when Pax admitted it to his *Galanthinae.* Before 1887, this genus was variously placed, but Pax apparently considered the characters of the leafless scape, and the lack of a tepaltube in most cases, of sufficient importance to place it here. The systematic position of *Lapiedra* now appears to be secure among the *Galantheae,* but it must be realized that all of the needed evidence has not been assembled. It is particularly important to determine the chromosome complement before considering the case closed.

This natural plant group was recognized by Herbert (1836) as section *Galantheae,* reported by Lindley but accredited to Herbert, and later (Herbert, 1837) as suborder *Galantheae,* Order *Amaryllidaceae.* In 1836 he included the genera *Galanthus* Linn., *Acis* Salisb., and *Leucojum* Linn., and in 1837 the genus *Erinosma* Herb. was added. Kunth (1850) as well as Baker (1878) recognized this group, but unfortunately the latter fell under the spell of the Bentham & Hooker f. (1883) classifica-

tion of the *Amaryllidaceae,* and in his final work (Amaryll. 1888) adopted it. As has been previously indicated, Bentham & Hooker f. (1883) ignored the classification of Herbert in most particulars. In this case, *Acis* Salisb., *Erinosma* Herb., and the two genera—*Nivaria* Medic., proposed in 1790, and *Ruminia* Parl., proposed in 1858—were reduced to the synonomy of *Leucojum* Linn. This reduction on the whole was apparently justified, but it was unfortunate that the genus *Leucojum* together with *Lapiedra* and *Galanthus* were grouped under the "blanket" subtribe *Genuinae,* of his tribe *Amarylleae.*

However, this lead was not generally acceptable, for Pax (1887) and Pax & Hoffman (1930) recognized the group as subtribe *Galanthinae,* but without citing the work of Herbert (1836, 1837), and included *Galanthus, Lapiedra* and *Leucojum.* Hutchinson (1934) again elevated the group to tribal rank—Tribe *Galantheae*—without giving any literature citations or a diagnosis; and on this basis the tribe was recognized by Traub (1938). Up to now this tribal designation has not been properly accredited.

The Tribe *Galantheae* as recognized in the present work is founded on *Galanthus* Linn. as the type, and with *Lapiedra* Lag. and *Leucojum* Linn, as additional genera. On the basis of the criteria indicated at the beginning of this article, the Tribe *Galantheae* can be readily separated from the other tribes of the *Amaryllidaceae.*

The karyology of the species included in the *Galantheae* has not as yet been adequately studied except in *Leucojum.* The chromosome complement in *Lapiedra* is still unknown, and in *Galanthus* the basic numbers have been established for only three out of a total of nineteen species. On the basis of the available evidence, the pattern for the basic numbers, x = 7, 11, 12, supports the grouping of this tribe under the Subfamily *Euamaryllidoideae* Traub.

Tribe GALANTHEAE (Herbert ex Baker) Hutchinson, Baker, Jour. Bot. 18: 161-162. 1878; Hutchinson, Fam. Fl. Pl. 2: 132. 1934; Traub, Herbertia 5:112. 1938.

Syn.—Sect. *Galantheae* Herbert, in Lindley Nat. Syst. Bot. ed. 2. 329. 1836; suborder *Galantheae* Herbert, Amaryll. 63: 188-189, 329-333, 410. 1837; order *Galantheae* Salisb. Gen. Pl. Fragm. 96. 1866; subtribe *Galanthinae* (without citations) Pax, Engl. & Prantl, Nat. Pflanzenfam. ed. 1. 2(5): 105. 1887; Pax & Hoffman, Engl. & Prantl, Nat. Pflanzenfam. ed. 2. 15a: 403-404. 1930.

Type genus.—*Galanthus* Linn.

Diagnosis.—Karyology: *Lapiedra,* no reports; *Leucojum,* x = 7, 8, 9, 11; *Galanthus,* x = 7, 10, 12. Bulbous herbs; leaves lorate, narrow-linear, or filiform; scape leafless; spathe-valves 1 or 2; umbel 1- to 8-flowered; ovary inferior; perigone white, or white tipped with green or yellow, or tinged red, or rarely rose-red; divisions of the perigone free (= tepals), or slightly united at the base (= tepaltube and tepalsegs); tepals or tepalsegs subequal or dimorphic; plants usually porandrous,

rarely schistandrous; fruit a loculicidally dehiscing 3-valved capsule; seeds turgid, subglobose or ellipsoid; seed coats pale or black. Three recognized genera, *Lapiedra* Lag., *Leucojum* Linn. and *Galanthus* Linn. (type).

The probable relationship of the three genera from an evolutionary standpoint is indicated in the following key:

Key to the genera of the Tribe GALANTEAE

1a. Plants schistandrous; tepals fairly equal, style filiform (southern Spain) ..... 1. *Lapiedra*

1b. Plants porandrous:

2a. Divisions of the perigone subequal, free (= tepals), or sometimes slightly united at base (= tepaltube) and tepalsegs); style filiform or strumose (Europe and western Asia) ..... 2. *Leucojum*

2b. Divisions of the perigone distinctly dimorphic, free (= tepals); style filiform (Europe and western Asia) ..... 3. *Galanthus*

THE GENUS **LAPIEDRA**

As indicated in the key for the genera of Tribe *Galantheae, Lapiedra* is the most primitive member of the group in the scale of evolution for the perigone is fairly regular, the anthers are attached to the filaments at the middle, the plant is apparently schistrandrous—the anther locules splitting for their entire length—and the style is filiform.

The genus *Lapiedra,* based on *Lapiedra Martinezii* Lag., was proposed by Lagasca (1816). According to Herbert (1837, p. 410), the generic name *Lapiedra* was derived from the Latin and Spanish words for stone, *Lapis* and *piedra.* However, it appears to be more probable, to the present writers, that the name was coined from the Spanish words *la* (= the) and *piedra* (= stone), implying that it is found growing in rocky soil.

Herbert (1837) changed the name of the one species to *Lapiedra Placiana* Herb., on the basis of the pre-Linnean name *Sparganium Placae* (Clus. Rar. Pl. Hist. 164. 1601.). In a hasty postscript at the very end of the text (Herbert, Amaryll. "p. 416". 1837) Herbert states, after the receipt of a plant of *Pancratium pariflorum* Redoute (= *Vagaria parviflora*) which he considered as identical with *L. Placiana* Herb., that "The name *Lapiedra Placiana* must therefore be removed from the *Oporanthiform* section, and substituted for *Vagaria parviflora,* which must be expunged". However, Herbert was in error in considering *L. Placiana* Herb. (= *L. Martinezii* Lag.) as identical with *Vagaria parviflora.* The species, *Lapiedra Martinezii* Lag. is distinct and remains as the basis of the genus *Lapiedra.* This interpretation is in harmony with Bentham & Hooker f. (1883), Pax (1887), Baker (1888) and Pax & Hoffman (1930), who recognize the genera *Vagaria* and *Lapiedra,* but do not mention Herbert's conclusions in 1837.

In 1896, a second species, *Lapiedra chilensis* F. Philippi, native to Chili, was proposed. Probably this will prove to be a type with an inferior ovary belonging with the *Allieae,* which abound in Chili. Evolution in this direction in the *Allieae* is a possibility, but it is also possible that it might belong with the inferior-ovaried amaryllids that also are numerous in that country. In the first case it would be a recent development, but in the latter instance, it might represent a primitive relict species. In either case, it would be logical to consider it as the basis of a new genus. *Lapiedra chilensis* F. Phil. is widely separated geographically from *L. Martinezii* Lag., the type of the genus, native to southern Spain. Although this in itself does not rule out the possibility of primary relationship, it should recommend a very critical approach in checking the hypothesis of close affinity. However, pending further investigation, it is maintained here tentatively because there is no other logical course suggested at present. Botanists working in the vicinity of Chuchini, Chili, are requested to make new collections of this plant and send specimens, living bulbs if possible, to the writers so that the karyological and gross morphological characters may be studied more in detail. Only on this basis will it be possible to assign the plant to its final place in a natural classification. In case *Lapiedra chilensis* F. Phil. should later be finally assigned to *Lapiedra,* the following distinctions between it and the type species would serve to rank them from an evolutionary point of view:

1a. Ovules many per locule, umbel 2- to 4-flowered (Chili) ..... *chilensis*

1b. Ovules (= seeds) 1 to 2 per locule, umbel 4- to 8-flowered (southern Spain) ..... *Martinezii*

A translation of the type description of *Lapiedra chilensis* F. Phil., is reproduced here for the convenience of those interested in the subject:

Lapiedra chilensis F. Philippi, in Anal. Univ. Chile, xciii: 144-145, Lam. VI. 1896.

"Scape very slender, up to 10 cm. tall, scarcely 1 mm thick in the dried specimen; flowers 2.4, umbellate; spathe-valves 2, lanceolate, longer than the pedicels; pedicels subtended at the base by setaceous bracts as long as or longer than the pedicels; tepals of the perigone equal, spreading, linear, acute, white with three purple nerves at the center; filaments calillary, half as long as the tepals, purple; anthers saggitate at the base, scarcely half as long as the filaments, yellow.

"Discovered by the famous Guillermo Geisse on the estate "Chuchini" near Illapel in February."

The illustration (Lam. VI) that accompanies the type description shows numerous ovules per locule. F. Philippi's statement that the anatomy of *Lapiedra chilensis* F. Phil., corresponds to that reported in Engler and Prantl (ed. 1) for *Galantheae* cannot be considered as conclusive evidence of close affinity.

In Index Kewensis, the authorship is given as "F. Phil., ex R. A.

Phil.'', but the text shows plainly that F. Philippi alone proposed the species.

For the present, the genus *Lapiedra* Lag. will be treated as monotypic.

Genus 1. LAPIEDRA Lagasca

Nov. Sp. et Gen. 14. 1816; Herbert, Amaryll. 188-189. 1937, Kunth, Enum. Pl. 5: 694. 1850; Baker, Amaryll. 21. 1888.

DIAGNOSIS.—Karyology, no reports. Spathe-valves 2; ovary superior, 3-celled; perigone regular, tepals 6, subequal, spreading, persistent; stamens 6, epigynous, filaments filiform, anthers lanceolate, deeply saggitate at the base, erect (or horizontal ?); style filiform, stigma simple; capsule small, deeply 3-lobed, loculicidally 3-valved; seeds 1 or 2 in a cell, turgid, with shining black crustaceous coats. Apparently monotypic.

1. LAPIEDRA MARTINEZII Lagasca, in Nov. Sp. et Gen. 14. 1816; Kunth, Enum. Pl. 5: 694. 1850; Boiss., Voy. Bot. pl. 171. 1839-45; Baker, amaryll. 21. 1888.

SYN.—*Lapiedra Placiana* Herb., Amaryll. 188-189. 1837; *Crinum Martenizii* Sprengel, Syst. 2: 56. 1825-28.

DESCRIPTION.—Bulb ovoid, 5 cm. in diameter, neck long (absent according to Boissier, Voy. Bot. pl. 171); leaves 2 or 3, lorate, developed after the flowers, kneeled with white; scape slender, ancipitous, 15 cm. tall; umbel 4- to 8-flowered; spathe-valves 2, membranous, linear; pedicels not cernuus, longer than the flowers; perigone regular, tepals 6, lanceolate, subequal, persistent, 9 mm. long, white, with a broad green keel; stamens epigynous, filaments filiform, anthers lanceolate, deeply saggitate at the base, erect (horizontal according to Boissier, Voy. Bot. pl. 171); ovary 3-celled, ovules several in a cell, superposed; style filiform, stigma simple; capsule small, 7 mm. in diam., deeply 3-lobed, loculicidally 3-valved; seeds 1 or 2 in a cell, turgid, with shining black crustaceous coats.

RANGE.—Southern Spain.

NOTES.—A study of the chromosome complement of *Lapiedra Martinezii* is urgently needed. It is hoped that Dr. A. Fernandes at the University of Coimbra, Portugal, or one of his students, will find time to do this public service.

The description of Baker (1888) is slightly at variance with that of Boissier (1839-45) as indicated in the above description.

THE GENUS LEUCOJUM

The species of *Leucojum* are porandrous and the perigone may consist of tepals or of a tepaltube that is barely evident and tepalsegs, but in either case the tepals or tepalsegs are subequal. The style may be either filiform or strumose.

Linnaeus, in Species Plantarum (1753), recognized two species of

Leucojum Linn.—*L. vernum* Linn., the type, and *L. autumnale* Linn. Salisbury (1807) proposed a new genus, *Acis* Salisb., on the basis of *L. autumnale* Linn. Herbert (1837) admitted three species under *Leucojum*,—*L. aestivum*, Linn. *L. pulchellum* Salisb., and *L. Hernandezianum* Camb. He also recognized the genus *Acis Salisb.*, and proposed another genus, *Erinosma* Herb., with *L. vernum* Linn, as the type.

Kunth (1850) recognized the three genera, *Leucojum*, *Erinosma* and *Acis*, but Baker (1878) reduced *Erinosma* and *Acis*, together with *Ruminia* Parl. to the synonomy of *Leucojum*. However, he recognized as subgenera under *Leucojum* two groups formerly considered as genera, *Erinosma* Herb., and *Acis* Salisb., the latter including also *Ruminia* Parl. as a synonym. Bentham & Hooker f. (1883) followed Baker (1878) but added a third subgenus, *Euleucojum* B. & H. f. on the basis of *L. aestivum*. Finally, Baker (1888) proposed a fourth subgenus, *Ruminia* (Parl.) Baker, on the basis of *L. roseum*, and admitted a total of 9 species under the four subgenera.

In the present work, the four subgenera as recognized by Baker (1888) are maintained, and a total of 11 species are admitted.

Genus 2. LEUCOJUM Linnaeus

Sp. Pl. ed. 1289. 1753; Gen. Pl. ed. 5.140. 1754; Jussieu, Gen. Pl. 55. 1789; Jaume St.-Hilaire, Exp. Fam. Nat. 1: 139. 1805; Link, errore *Leucoyum*, Enum. Pl. 1: 510. 1821; Herbert, Amaryll. 332-333. 1837. Kunth, Enum. Pl. 5: 471-477. 1850; Baker, Jour. Bot. 16: 161-162. 1878; Gard. Chron. 399. 1879; Bentham & Hooker f., Gen. Pl. 3(2): 720. 1883, errore *Leucoium;* Pax, Engl. & Prantl, Nat. Pflanzenfam. ed. 1. 2(5): 105. 1887; Baker, Amaryll. 18-21. 1888; Pax & Hoffman, Engl. & Prantl, Nat. Pflanzenfam. ed. 2. 15a: 404. 1930.

Syn.—*Nivaria* Medic., in Act. Acad. Theod. Palat. vi. Phys. 421. 1790; Moench, Meth. 279. 1794; *Acis* Salisb., Parad. Lond. sub t. 74. 1807; *Erinosma* Herb., Amaryll. 330. 1837; *Ruminia* Parl., Due Nouv. Gen. Monocot. 3: ex ej. Fl. Ital. iii. 84. 1858.

Type species: *Leucojum vernum* Linn.

Diagnosis.—Karyology, x = 7, 8, 9, 11. Rootstock a tunicated bulb; leaves filiform, or lorate with slender or broader blades; spathe usually single; umbel 1- to several-flowered, flowers white, tinged with red, or green, rarely rose red; perigone usually of tepals, tepaltube with tepalsegs rarely (subg. Acis) present; tepals or tepalsegs subequal, ovate or oblong, spreading; stamens epigynous, porandrous; filaments filiform, shorter than the linear-oblong basifixed anthers; ovary inferior, 3-celled; ovules many in a cell, superposed; style filiform or strumose near the apex; stigma minute, capitate; fruit a capsule, finally dehiscing loculisidally into 3 valves from the top; seeds subglobose, usually black. Eleven recognized species, ranging from the rim of the Mediterranean, and from western Europe, Portugal, Spain, and France to the Crimea and Armenia.

Karyology

The karyology of the genus *Leucojum* fortunately has been admirably worked out by Neves (1939) who has published formulas for seven of the eleven recognized species as shown in Table 1. With this basic information at hand it is now possible to make a synthesis considering also the morphological data.

TABLE 1

Karyology of the Genus *Leucojum* [1]

Chromosome number, 2x, and formula[2]	Species	Subgenus
2x=22=2:LL+4·Lp+4:L.+4:1.+4:m.+4:m.′	1. *L. aestivum* Linn.	I. EULEUCOJUM (x=11)
2x=22=2:LL+4:Lp+4:L.+2:1.+2:′1.+6:m.+2:m.′	2. *L. pulchellum* Salisb.	
2x=22=2:LL+14:Lp+4:L.+2:L.′	3. *L. vernum* Linn.	II. ERINOSMA (x=11)
2x=18=4:LL+2:Lm+2:Lp+2:L.+6:m.+2:m.′	4. *L. hyemale* DC.	III. RUMINIA (x=9)
2x=?=?	5. *L. tingitanum* Baker	
2x=?=?	6. *L. Fontianum* Marie	
2x=16=2:LL+2:mm+2:Lm+2:1m+2:Lp+2:L.+2:pp+2:p.	7. *L. roseum* Martin	IV. ACIS (x=7, 8)
2x=?=?	8. *L. longifolium* J. Gay ex Salisb.	
2x=14=2:LL+4:ll+2:Lm+2:Lp+2:Lp′+2:L.	9. *L. trichophyllum* Schousb.	
2x=?=?	10. *L. valentinum* Pau	
2x=14=6:LL+2:ll+2:Lm+2:Lp+2:L.′	11. *L. autumnale* Linn.	

[1] The karyological data in the table are from Neves Bol. Soc. Brot. 13: 545-572. 1939).

[2] The system used by Neves to describe the ideograms (chromosome complements) of *Leucojum* species was devised by Fernandes. This system indicates the relative length of the chromosome and approximate position of the centromere. The letters L, M, and P are taken from the Latin words, *longus* (long), *medius* (medium) and *parvus* (short), to which are added the intermediate types l and i; m; and p. An apostrophe indicates the satellite chromosome.

This happens to be an instance where the karyological data quite readily corroborate the key to the species, given later in the article, that was prepared on the basis of the gross morphology.

The highest basic number, x=11, is correlated with lorate leaves, absence of a tepaltube, strumose style, and unlobed epigynous disc. Within this group, a greater number of chromosomal types in the basic complement is associated with 4- to 8-flowered umbel, black crustaceous

seed coats, and absence of a conspicuous strophiole (subg. *Euleucojum*); and a reduced number of chromosomal types in the basic complement, is correlated with the 1-flowered umbel, pale membranous seed coat, and a conspicuous strophiole (subg. *Erinosma*).

The lower basic number, x=9, is associated with narrow-linear leaves, absence of the tepaltube, filiform style, and 6-lobed epigynous disc (subg. *Ruminia*).

The lowest basic numbers, x=7, 8, are correlated with narrow-linear or filiform leaves, very short tepaltube, unlobed epigynous disc, and filiform style (subg. *Acis*).

Neves (1939) concludes that the basic number, x=11, is apparently derived from x=7, although he observes that Sato (1937) admits the possibility that in *Leucojum autumnale,* the smaller number, 2x=14, may have evolved by fusion or translocation of part of the chromosomes of the ancestral type (2x=24).

From an evolutionary standpoint, the present writers believe that the latter viewpoint is the sounder one. The primitive types are most likely those with lorate or narrow-linear leaves and without a tepaltube. The more advanced species are those with narrow-linear or filiform leaves and with a tepaltube. From this standpoint it appears that Salisbury (1807) was justified in proposing the genus *Acis* Salisb., to accomodate the species centering around *Leucojum autumnale.* In this connection it is also of interest to note that attempts by the senior author to cross *L. autumnale* with *L. aestivum* did not give viable seeds for the ovules began to develop but later aborted. For the present, however, *Acis* is retained as a subgenus under *Leucojum.*

Doubtful and Rejected Species

There has been little confusion concerning the delimitation of the genus *Leucojum* and consequently the species that have to be rejected are few.

1. *Leucojum strumosum* Ait. Hort. Kew, ed. 1. 1: 407. 1789. =*Hessea filifolia.*

2. *Leucojum* (errore *Leucoium) capitulatum* Lour. Fl. Cochinch. 199. 1790; J. A. & J. H. Schultes, in Roem. & Schult., Linnaeus, Syst. Veg. 7(2): 786-787. 1830.

According to Herbert (1837), this "is unquestionably a *Curculigo* or *Molineria.* They [J. A. & J. H. Schultes] have been misled by the alleged thickness of the points of the limb, without considering the plicate leaves and the hairy exterior of the perianth."

3. *Leucojum biflorum* Larranaga, Escritos D. A. Larranaga (Publ. Inst. Hist. Geog. Urug.) 2: 131. 1923, non Simonkai (1879).

The epithet proposed by Larranaga is a later homonym, and the proposed species is therefore without a name. Furthermore, the identity of the proposed species is highly uncertain. In the absence of a type specimen or illustration, the incomplete description given by Larranaga —"Spathe 2-valved; umbel 2-flowered; style filiform; stamens short"— is not sufficient to characterize it, and it is highly improbable that it

will ever be identified. There is a possibility that Larranaga refers to a naturalized form of *L. trichophyllum*, *L. longifolium* or *L. autumnale*, but we can never be certain on the basis of the description furnished.

Key to the subgenera and species or Genus. 2. LEUCOJUM

1a. Divisions of the perigone free (=tepals); leaves lorate or narrow-linear; epyginous disc lobed or not lobed; style strumose or filiform; plants vernal:
2a Leaves lorate or narrow-linear; epigynous disc not lobed; style strumose in upper portion below apex:
3a. Umbel 4- to 8-flowered, seeds with black crustaceous coats, (x=11) ..... Subgenus 1. EULEUCOJUM
4a. Leaves to 1.3 cm. wide (Central and southern Europe, from France to the Crimea and Armenia ..... 1. *aestivum*
4b. Leaves narrow-linear (Sardinia and Balearic Islands) 2. *pulchellum*
3b. Umbel 1- to 2-flowered; seeds with pale membranous coats and conspicuous strophiole (x=11) ..... Subgenus 2. ERINOSMA
Peduncle 2-edged, hollow (Central Europe, from Transylvania, Bosnia, the Tyrol to France) ..... 3. *vernum*
2b. Leaves narrow-linear; epigynous disc with 6 quadrate lobes at edge; style filiform (x=9) ..... Subgenus 3. RUMINIA
Scape 1-flowered (France: Nice, Mentone and Villafranca) .... 4. *hyemale*
1b. Divisions of the perigone barely united at base (=tepaltube and telapsegs); leaves narrow-linear or filiform; epigynous disc not lobed; style filiform; plants vernal or autumnal (x=7, 8) ..... Subgenus 4. ACIS
5a. Leaves narrow-linear:
6a. Umbel 5- or 6-flowered; scape 3—4.5 cm. tall (Morocco) 5. *tingitanum*
6b. Umbel 4- or 5-flowered; scape 10—12 cm. tall (Morocco) 6. *Fontianum*
5b. Leaves filiform:
7a. Flowers rose-red, plants autumnal; umbel usually 1-flowered (Corsica) ..... 7. *roseum*
7b. Flowers white, cream or tinged with pink; plants autumnal or vernal:
8a. Plants vernal; leaves up to 30 cm. long; umbel 1—4—flowered:
9a. Leaves 2 or 3; umbel 1—3—flowered; tepalsegs 5-nerved (Corsica) ..... 8. *longifolium*
9b. Leaves 3; umbel 2—4—flowered; tepalsegs laxly 7-nerved (Spain, Portugal, Morocco and Algeria) ..... 9. *trichophyllum*
8b. Plants autumnal; leaves up to 22 cm. long; umbel 1—4—flowered:
10a. Spathe 2-valved, flowers creamy white (Spain) ..... 10. *Valentinum*
10b. Spathe usually 1-valved, rarely 2-valved; flowers white or tinged pink (Portugal, Morocco, Algeria, and the Ionian Islands) ..... 11. *autumnale*

Subgenus 1. EULEUCOJUM Benth. & Hook. f.

Gen. Pl. 3(II): 720. 1883; Baker, Amaryll. 19. 1888.

TYPE SPECIES.—*Leucojum aestivum* Linn.

DIAGNOSIS.—Epigynous disc not lobed; leaves lorate; spathe 1-valved; umbel 1- to 8-flowered; flowers vernal, white tipped with green; style strumose in upper portion below apex; seeds crustaceous, black, without a strophiole.

1. LEUCOJUM AESTIVUM Linn. Syst. ed. 10. 975. 1759; Smith & Sowerby, English Bot. ed. 1, vol. 9, pl. 621. 1799; Bot. Mag. t. 1210. 1809; Red. Lil. 3(23): pl. 135. 1805; Herbert, Amaryll. 332. 1837; Baker, Gard. Chron. i. 399. 1879; Amaryll. 19. 1888.

SYN.—*Leucojum autumnale* Gouan., Hort. Monsp. 163. 1768; *Nivaria aestivalis* Moench, Meth. 93. 1794; *Nivaria monadelphia* Medic., in Act. Acad. Theod. Palat. Phys. vi. 422. 1790.

DESCRIPTION.—Karyology, 2x=20—24 (Heitz, 1926); x=11, 2x=22 (La Cour, 1931, Nagao & Takusagawa, 1932); 2x=22 (Sato, 1937, 1938; Inariyama, 1937; Neves, 1939). Bulb ovoid, 2.5—3.8 cm. in diameter; leaves lorate, obtuse, green, 3—4.5 dm. long, about 1.3 cm. broad; peduncle ancipitous, hollow, about 3 dm. tall; umbel 4- to 8-flowered; spathe 1-valved, lanceolate, 3.8—5 cm. long; pedicels long, cernuous; tepals broad-oblong 1.3—2 cm. long, white, tipped with green; stamens half as long as the tepals; anthers longer than filaments; style longer than stamens, green and slightly strumose towards the tip; capsule subglobose, 2 cm. in diameter; seeds with a thick black shining crustaceous coat.

RANGE.—Southern and central Europe and Asia Minor; from the Crimea and Armenia to France and Great Britain.

NOTES.—Flowers in Great Britain at end of April and beginning of May. A robust garden variety of *L. aestivum, Gravetye Giant,* produces from 6 to 8 large flowers to the umbel, and blooms during April and May in Northeastern United States but earlier in the Pacific Coast Region, and the South.

2. LEUCOJUM PULCHELLUM Salisb., Parad. Lond. t. 74. 1807 (errore *Leucoium)*; Herbert, Amaryll. 332-333. 1837; Baker, Amaryll. 19. 1888.

SYN.—*Leucojum Hernandezii* Camb., in Mem. Mus. Par. xiv. 315. 1827; *Leucojum Hernandezianum* Schult. f., Syst. vii. 784.

DESCRIPTION.—*Karyology,* 2x=20—24 (Heitz, 1926); 2x=22 (Neves, 1939). Differs from *L. aestivum* by its smaller flowers and capsule and narrower leaves. It flowers two weeks earlier than *L. aestivum.*

RANGE.—Sardinia and Balearic Islands.

NOTES.—The description of Baker (1888) given above, is somewhat at variance with the type description of Salisbury (1807),—"Leaves appearing in November, of a deeper green and generally broader than in *L. aestivum,* very entire, quite smooth. Flowers smaller, from three weeks to a month earlier, exhaling a more perceptible and unpleasant smell. Peduncle the same color as the leaves, very entire at the edges,

not glaucous and crenulated as in *L. aestivum*. Pedicals from 3 to 7, slender and very long, of a dark green color, as well as the fruit. Petals white, with a green spot below the top, their nerves not so conspicuous . . . . Filaments white, anthers yellow, inserted at the base . . . . style white, with a green spot below the top, club-shaped. Stigma truncated, seeds 13—20 in a cell, black, oval, shining."

Variety *majus* (Bailey, Cyclo. Hort. 1939, vol. 2, p. 1849) is reported as a selected large flowered form.

Subgenus 2. ERINOSMA (Herbert) Baker

Jour. Bot. 7: 166. 1878; Amaryll. 19. 1888.

Syn.—Genus *Erinosma* Herbert, Amaryll. 330. 1837.

Type species.—*Leucojum vernum* Linn.

Diagnosis—Epigynous disc not lobed; leaves lorate; spathe 1-valved; umbel 1-flowered, rarely 2-flowered, flowers vernal, perigone white tipped with green or yellow; style strumose on the upper portion below the apex; seeds with pale crustaceous coats, and provided with a conspicuous strophiole.

3. Leucojum vernum Linn. Sp. Pl. ed. 1. 289. 1753; Jacq. Austr. pl. 312. 1776; Curtis's Bot. Mag. pl. 46. 1788; Baker, Amaryll. 19. 1888.

Syn.—*Leucojum vernus* All. Fl. Pedem 2: 155 1785; *Nivaria hexanthera* Medic., in Act. Acad. Theod. Palat. Phys. 6: 422. 1790; *Nivara verna* Moench, Meth. 279. 1794; *Leucojum vernale* Salisb. Prod. 219. 1796; *Leucojum transsilvanicum* Porcius, Anal. Acad. Romane, ser. 2. 14: 274. 1893. (See also citations under var. *Vagneri*, below.)

Description.—Karyology: x=12, 2x=24 (Overton, 1893); ex=20 (Heitz, 1926); 2x=22 (Sato, 1937, 1938, Neves, 1939). Bulb globose, 2—2.5 cm. in diameter, outer tunics thin, pale green; leaves 3 or 4, lorate, 9—13 mm. (usually 7—8 mm.) broad, finally 1.5—2.3 dm. long; peduncle 2-edged, hollow, 1.5—3 dm. tall; umbel 1-flowered; spathe single, lanceolate; pedicel cernuus, about as long as the ovary; ovary turbinate; tepals white tipped with green, (or yellow?), broad-oblong, 2 cm. long; stamens half as long as the tepals; filaments much shorter than the anthers; style clavate below the apex; capsule green, turbinate, 1.3 cm. in diameter; seeds with a thin coat and small strophiole.

Range.—Central Europe; from Transylvania, Bosnia and the Tyrol to France.

Notes.—Flowers in early March in Britain, according to Baker (1888).

3a. Leucojum vernum L. var. Vagneri Stapf, Schedae ad Flor. exs. Austro-Hung. 4: pl. 86, no. 1480. 1886; Baker, Amaryll. 19. 1888.

Syn.—*Erinosma carpathicum* Herb. Curtis's Bot. Mag. pl. 1993. 1818; Amaryll. 331. 1837; Czetz, Erd. Mus. Kolozsvárt, 6: 14.; Baker, Amaryll. 19. 1888; *Leucojum carpathicum* Steud. Nom. ed. II. 2:37. 1841; Salisb. Gen. Pl. Fragm. 96. 1866; *Leucojum vernum* L., Baumgarten, Enum. Transil. 1: 285. 1846; *Leucojum aestivum* Schur, Enum. Pl. Transsil. 658. 1866; Czetz, Erd. Mus. Kolozsvárt, 6: 16. non Linn.;

Leucojum biflorum Simonkai, Koezlem. 14: 135. 1879; *Leucojum vernum* L. var. *biflorum* (Simonkia)-Porcius, Anal. Acad. Romane, ser. 2. 14: 272-274. 1893.

Description.—Karyology: reported as "var. *carpathicum,*" 2x=22 (Sato, 1937, 1938). Plant robust; leaves 1—1.6 cm. wide; umbel 2-flowered; otherwise similar to the type.

Range.—Transylvania, and Hungary.

Notes.—*Erinosma carpathicum* Herb., included under synonyms above, is a form in which the tepals are tipped with yellow instead of green. The plant that is sometimes offered as "*Leucojum vernum* var. *carpathicum*" in the United States may be referrable to *Leucojum vernum* var. *Vagneri.*

Subgenus 3. RUMINIA (Parlatore) Baker

Amaryll. 20-21. 1888.

Syn.—Genus *Ruminia* Parl., Due Nouv. Gen. Monocot. 3. 1854; Fl. Ital. 3: 84. 1858.

Type species.—*Leucojum hyemale* D. C.

Diagnosis.—Epigynous disc with 6 lobes; leaves narrow-linear; spathe 2-valved; flowers vernal, usually solitary, white tinged with green; style filiform.

4. Leucojum hyemale A. P. de Candolle, Flore Française, 5 (Tome) 327. 1815 (err. *Leucoium hiemale)*; Baker, Bot. Mag. t. 6711. 1883; Amaryll. 20-21. 1888.

Syn.—*Leucojum autumnale* Balbis, Misc. Alt., Turin Acad. Sci. Mem. 1806, pp. 212-213, non Linn.; *Leucojum nicaeënse* Ardoino, Fl. Aples-Marit. 371. 1867; *Acis hiemalis* M. Roem. Syn. Ensat. 24. 1847; *Acis hyemalis* Sweet, Brit. Fl. Gard. 3: sub pl. 297. 1829; Herbert, Amaryll. 332. 1837; *Ruminia hyemalis* Parl., Due Nouv. Gen. Monocot. 3. 1854; Fl. Ital. 3: 84. 1858; *Ruminia nicaeënsis* Jord. et Fourr., Ic. Fl. Europe, 26. t. 65. f. 108. ; *Galanthus autumnalis* All. Auct. Fl. Pedem. 33. 1789.

Description.—Karyology, 2x=18 (Neves, 1939). Bulb globose, 1.3 cm. in diameter, tunics brown; leaves 2 to 4, narrow-linear, contemporary with the flowers, finally 3 dm. long; peduncle 1-1.5 dm. tall; umbel usually 1-flowered; spathe 2-valved; pedicel short, cernuous; tepals 9-12 mm. long, white, tinged with green outside, oblong; anthers 5 mm. long, filaments scarcely any; ovary with the disc produced into 6 minute scales; capsule depressed-globose, 9 mm. in diameter.

Range.—France: Nice and Villafranca; coastal rocks.

Notes.—Flowers in April, hence the name is misleading.

Subgenus 4. ACIS (Salisbury) Baker

Jour. Bot. 7: 166. 1878; Amaryll. 19-20. 1888.

Syn.—Genus *Acis* Salisb., Parad. Lond. sub t. 74. 1807; Gen. Pl. Fragm. 96. 1866; Herbert, Amaryll. 331-332. 1837.

Type species.—*Leucojum autumnale* Linn.

DIAGNOSIS.—Epigynous disc not lobed; leaves linear or filiform; spathe 2-valved; umbel 1- to 6-flowered, flowers vernal or autumnal, white, white tinged with red, or rose red; perigone-limb divided almost to base (= slight tepaltube plus tepalsegs); style filiform. Five recognized species.

5. LEUCOJUM TINGITANUM Baker, Jour. Linn. Soc. 16: 678. 1878, non *L. tigitanum* Font Quer; Baker, Amaryll. 20. 1888.

DESCRIPTION.—Karyology, no reports. Closely allied to *L. trichophyllum;* leaves narrow-linear, 3 dm. long, contemporary with the flowers; peduncle much stouter than in *L. trichophyllum,* 3-4.5 dm. tall; umbel 5- or 6-flowered; spathe-valves 2, lanceolate, membranous; tepalsegs white, 1.3-1.5 cm. long, oblanceolate; stamens 7 mm. long; filaments shorter than the anthers.

RANGE.—Morocco, vicinity of Tangier.

NOTES.—Vernal.

6. LEUCOJUM FONTIANUM Marie in Johandiez & Marie, Cat. Pl. Moroc. iii. 870. 1934.

SYN.—*Leucojum tigitanum* Font Quer in Cavanillesia v. 47-49. 1932 non *L. tingitanum* Baker.

DESCRIPTION.—Karyology, no reports. Bulbs ovoid-globose, tunics dusky-colored; leaves 4 or 5, appearing with the flowers, erect, thick, linear, almost flat, about 20 cm. long, 6-8 mm. wide at the base, 3-5 mm. wide toward apex, obtuse; scape shorter than the leaves, 10-12 cm. tall, flattened, 3-3.5 mm. thick; spathe-valves 2, membranous throughout, 2-2.5 cm. long, lanceolate-linear, rather obtuse, venose, white; umbel 4-flowered, pedicels very unequal, about 1 mm. thick, the longer ones 2.5-3 cm., and the shorter 6-10 mm. long; tepalsegs of the perigone 1.2-2.4 cm. long, setepalsegs obovate, 8-9 mm. broad, all mucronate and cucullate, white, unspotted; anthers 4 mm. long; filaments 1.5 mm. long; style slightly longer than the stamens, filiform, its apex not incrassate; ovary subglobose, 2.5-3 mm. in diameter.

RANGE.—Morocco: at the peak of Djebel Alam Mountain (Beni Aros, according to Moroccan maps) at 1400 meters altitude, in silicaceous sandy soil.

NOTES.—Type material was collected after it had passed anthesis, May 7, 1930.

7. LEUCOJUM ROSEUM Martin, Bibl. Physic. 344. 1804; Loisel. Fl. Gall. ed. 1, 190. 1806; Reichenb. Ic. pl. 944-946. 1832; Pl. Crit. 8: pl. 704. 1830; Baker Amaryll. 20. 1888.

SYN.—*Acis rosea* Sweet, Brit. Fl. Gard. 3: pl. 297. 1829; *Acis roseus* Sweet ex Loud., Hort. Brit. suppl. 3: 432. 1850.

DESCRIPTION.—Karyology, 2x=16 (Neves, 1939). Bulb globose, 6—13 mm. in diameter; tunics pale; leaves filiform, only one borne with the flowers, up to 5 produced after the flowers; peduncle very slender, 5—10 cm. tall; umbel usually 1-flowered; pedicels very short, cernuous; spathe 2-valved, valves small; tepalsegs 9 mm. long, rose red, oblanceolate; stamens 5 mm. long, filaments very short; capsule very small, globose.

RANGE.—Corsica; mountains.

NOTES.—Flowers in September and October.

8. LEUCOJUM LONGIFOLIUM J. Gay ex Salisb., in Flora, XVI. 491. 1833; Gren. & Godr., Fl. Fr. iii. 252. 1855; Baker, Amaryll. 20. 1888.

SYN.—*Acis longifolia* M. Roem., Syn. Ensat. 25. 1847; Jord. et Fourr. Ic. t. 65, f. 107; *Leucojum trichophyllum* Reichenb., Ic. Pl. Crit. 8: pl. 703. 1830, non Schousb.

DESCRIPTION.—Karyology, no reports. Bulb ovid, 1.3 cm. in diameter, tunics thin, pale brown; leaves 2 or 3, filiform, very slender, flaccid, longer than the peduncle, 1.5—3 dm. long; peduncle very slender, 7.6—15 cm. tall; umbel 1- to 3-flowered; spathe-valves 2, linear; pedicels short; tepalsegs white, 6—9 mm. long, oblanceolate, 5-nerved; stamens 4 mm. long; filaments very short.

RANGE.—Corsica; on mountains at altitudes, 4500—6000 ft.

NOTES.—Flowers in April and May.

9. LEUCOJUM TRICHOPHYLLUM Schousboe, Vextr. Morokko 1: 154. 1800; Ker-Gawl. Bot. Reg. 7: pl. 544. 1821; Baker, Amaryll. 19. 1888; Dur. & Schinz, Consp. Fl. Afr. 5: 242. 1893.

SYN—*Acis trichophylla* Sweet, Brit. Fl. Gard. 3: sub pl. 297. 1829; *Acis Broteri* Jord. & Fourr., Ic. Pl. Europe, 25, pl. 64, fig. 105.

DESCRIPTION.—Karyology, 2x=14, (Neves, 1939). Bulb ovoid, 1.3-2 cm. in diameter, tunics pale brown; leaves about 3, filiform, as long as the peduncle, contemporary with the flowers; peduncle very slender, 1.5-3 dm. tall; umbel 2- to 4-flowered; spathe-valves 2, lanceolate; pedicel long, cernuous; tepalsegs white, 1.3-2 cm. long, rarely 2-2.5 cm. long, oblanceolate-oblong, laxly 7-nerved; stamens 4 mm. long; filaments very short; capsule turbinate, 9 mm. long.

RANGE.—Spain, Portugal, Morocco and Algiers.

9a. LEUCOJUM TRICHOPHYLLUM Schousboe var. GRANDIFLORUM (P. DC.) Baker, Amaryll. 19. 1888; Dur. & Schinz, Consp. Fl. Afr. 5: 242. 1893.

SYN.—*Leucojum grandiflorum* P. DC. in Red. Lil. 4(37): pl. 217. 1808; *Acis grandiflora* Sweet, Brit. Fl. Gard. 3: sub pl. 297. 1829; *Acis grandiflora* Herb. Amaryll. 332, pl. 30, fig. 4, 1837.

DESCRIPTION.—Tepalsegs 2-2.5 cm. long.

10. LEUCOJUM VALENTINUM Pau, in Boletin Soc. Argonesa Cien. Nat. 13: 42. 1914; C. H. Grey, Hardy Bulbs, 2: 56; 1938.

Description.—Karyology: no reports. Leaves filiform, appearing after the flowers; scape 10 cm. tall, somewhat twisted, striate; spathe 2-valved; umbel 1- to 3-flowered; pedicels unequal, longer than the milk-white flowers; petepals 7 mm. x 11 mm., elliptic-oblong and obtuse; setepals oblong or broadly linear and mucronate, 5 mm. x 14 mm.; disk epigynous, with green lobes about the length of the filaments; style filiform.

Range.—Spain; eastern foothills, Sierra de Espadan (Beltram).

Notes.—Flowers in August to September. According to Pau, who

based his description on living and dried specimens, this species differs from *L. autumnale* particularly with reference to the stamens.

According to Pau (1938), this species belongs in the subgenus *Ruminia*. This conclusion is apparently based on the presence of an epigynous disk "with green lobes about the length of the filaments."

Col. Grey (1938) describes the species as follows: "Leaves filiform, developed after flowering; scape more or less twisted, striate, 1-1.3 dm. long; spathe-valves 2; umbel 1- to 3-flowered; flowers cream white; pedicels cernuous, unequal in length, always longer than the flowers; setepalsegs broadly linear, mucronate, more than 2.5 cm. long; petepalsegs oblong-elliptic, obtuse, somewhat shorter; anthers green, as long as the filaments. Col. Grey (1938) observes, "apart from its two spathe-valves and large stamens, [it] is very close to *L. autumnale*".

11. *Leucojum autumnale* Linn. Sp. Pl. ed. I. 289. 1753; Bot. Mag. t. 960. 1806; Salisb. Parad. Lond. t. 21. 1806; Baker, Amaryll. 20. 1888; Dur. & Schinz, Consp. Fl. Afr. 5: 242. 1893.

Syn.—*Leucoium auctumnale* J. F. Gmel. Syst. Nat., 2: 534. 1791; *Leucojum vernum* Guelddenst., Reisen Russl. 1: 149. 1787, non Linn.; *Acis autumnalis* (combination implied) Salisb. Parad. Lond. sub t. 74, 1807; *Acis oporantha* Jord. et Fourr. Brev. Pl. Nov. fasc. 1. 51. 1866; *Acis cephalonica* J. Gay (cited by Baker, Amaryll. 20. 1888).

Description.—Karyology, 2x=14 (Heitz, 1926; Sato, 1937, 1938; Neves, 1939). Bulb globose, 1.3 cm. in diameter, tunic thin, pale brown, neck of bulb up to 2.5-5 cm. long; leaves filiform, very slender, usually produced after the flowers; peduncle very slender, 7.6-23 cm. tall; umbel 1- to 3-flowered; spathe 1-valved; pedicels longer than the spathe, cernuous; tepalsegs 9-13 mm. long, white tinged with red, oblanceolate-oblong, laxly 5- to 7-nerved; stamens half as long as the tepals; filaments very short; capsule globose, 5 mm. in diameter.

Range.—Portugal and Morocco to the Ionian Islands.

Notes.—Flowers in autumn.

Acis oporantha Jord. & Fourr. (cited as a synonym above), native to western Spain, around Naval-Maral, has a 2-flowered umbel; and *Acis cephalonica* J. Gay (cited as a synonym above) has a 2-valved spathe.

11a. *Leucojum autumnale* Linn. var. *pulchellum* Durand & Schinz, Consp. Fl. Afr. 5: 242. 1893.

Syn.—*Acis pulchella* Jord. et Fourr., Brev. Pl. Nov. fasc. 1, p. 51. 1866; Baker, Amaryll. 20. 1888.

Description.—Karyology, no reports. Leaves filiform, appearing with the flowers, shorter than the scape; peduncle reddish; umbel 2-flowered; pedicels erect, slightly curved at the apex; spathe rather long; flowers white, shading to rosy at the base, pendulous; tepalsegs elliptic-oblong; setepalsegs slightly 3-toothed; petepalsegs acute; stamens half as long as the perigone; style longer than the stamens; capsule subglobose, truncate on top.

Range.—Algeria; Daroussa near Bone.

Notes.—Collected by the Rev. A. Joannon. Jordan & Fourreau (1866) state that the plant is noteworthy because of its relatively large flowers that are rosy toward the base, the truly pendulous flowers, and the leaves which appear with the flowers.

For the past several years, the senior author has been growing a plant that is apparently referrable to *L. autumnale* var. *pulchellum*. When first grown out of doors in Monterey County, California in 1944, it flowered in late summer-autumn, the leaves appearing with the flowers. The umbel was 2-flowered. The plant was without leaves in summer. However, when grown as a pot-plant in Maryland (8 small bulbs evenly spaced in an 8-inch pot), it multuplied rapidly and proved to be evergreen, and practically everblooming when supplied with an abundance of moisture and fertilizer ("Vigoro"). It multiplied so rapidly that there was decided overcrowding within two years so that it was best to start anew with 8 small bulbs in an 8-inch pot.

Under out-door culture the original description of Jordan and Fourreau fitted in most particulars, but under pot-culture as indicated above, the original description needed emendation in certain particulars. This shows the effect of environmental conditions on plant species: in pot culture (1) the leaves vary from (a) filiform (thread-like) to (b) channeled on top, 0.75 mm. x 1.5 mm. in the lower part, and tapering to filiform near the tip; (2) the umbel is 2- to 4-flowered, usually 2- to 3-flowered, rarely 4-flowered; (3) the spathe is 1- to 2-valved; (4) the flowers are relatively larger; (5) the stamens are less than half as long as the perigone; and (6) the tepals are 3-dentate, but in case of the setepals, the central tooth (= mucronate) is somewhat longer than the other two; and in case of the petepals, the teeth are more or less equal.

The seeds were not described by Jordan and Fourreau. As grown under pot culture, the globose, black seeds average about 1.5 mm. x 2 mm.

Since *Leucojum autumnale* var. *pulchellum* is practically everblooming under pot-culture, the senior author was able to transfer pollen from *Leucujum aestivum* to the stigmas of the former in spring when both were in flower. In all of the many attempts, the ovules were apparently fertilized for they began development, but later the ovules aborted. This opens up the possibility of culturing the recently fertilized ovules on sterile media and thus to obtain hybrid individuals. In this way the slight rose color of variety *pulchellum*, and possibly also the deeper rose color of *L. roseum*, may be transferred to a race of large-flowered hybrids.

The fact that the species with a slight tepaltube (subgenus *Acis*) do not cross in nature with large-flowering species lacking the tepaltube, apparently indicates that Salisbury was essentially correct in giving the former group generic rank. The presence of the tepaltube is a sufficient morphological difference for generic distinction. However, for the present the subgenus *Acis* is retained under *Leucojum*.

THE GENUS GALANTHUS

Although the species of *Galanthus* are porandrous, shedding pollen through terminal pores as in *Leucojum,* they have evolved in a different direction with respect to the tepals which have become dimorphic—the petepals are distinctly smaller than the setepals. However, with respect to some other characters the *Galanthus* species are relatively primitive in having a filiform style, and no tepaltube.

Linnaeus included the genus *Galanthus* in Species Plantarum (1753) on the basis of a single species, *Galanthus nivalis* Linn. Bieberstein (1819) recognized a second species, *Galanthus plicatus* Bieb. Ruprecht (1868) proposed a species under the name, *Galanthus latifolius* Rupr., which however is a later homonym for *Galanthus latifolius* Salisb., a synonym of *Galanthus plicatus* Bieb., was validly published in 1866. Ruprecht's species is obviously without a name (cf. species no. 11. *Galanthus platyphyllus,* below). Boissier (1884) added two species, *Galanthus graecus* Orph. ex Boiss., and *Galanthus Olgae* Orph. ex Boiss. Hooker f. (1875) proposed a sixth species, *Galanthus Elwesii* Hook. f. Baker (1888) recognized the six above mentioned species, but since the appearance of his work in 1888, thirteen additional species have been proposed. It should be realized that after a more thorough study a large proportion of these may prove to be untenable. Baker, who proposed seven species since 1888, admits that three of these—*G. Perryi* Baker, *G. Alleni* Baker, and *G. grandiflorus* Baker—may be natural hybrids. In the present work, nineteen species, including the six proposed before 1888, are admitted tentatively pending a more through investigation of the subject that is urgently needed.

Genus 3. GALANTHUS Linnaeus

Sp. Pl. ed. 1. 288. 1753; Gen. Pl. ed. 5. 140. 1754; Herbert, Amaryll. 329-330. 1837; Bentham & Hooker f., Gen. Pl. 3(2) : 719. 1883; Pax, Engl. & Prantl. Nat. Pflanzefam. ed. 1. 2(5) : 105. 1887; Baker, Amaryll. 16-18. 1888; Pax & Hoffman, Engl. & Prantl, Nat. Pflanzenfam. ed. 2. 15a: 403-404. 1930.

Syn.—*Acrocorion* Adan., Fam. Pl. 2: 57. 1763; *Aerokorion* Scop., Ann. IV. Hist. Nat. 96. 1770; *Galactanthus* Lem., in Orb. Dict. 5: 763. 1849.

Type species.—*Galanthus nivalis* Linn.

Diagnosis.—Karyology: inadequately investigated, x=7, 10, 12. Rootstock a tunicated bulb, one tunic wrapped tightly around the base of the stem and leaves; leaves 2 or 3, lorate; peduncle solid; spathe usually monophyllous, very rarely 2-valved; umbel usually 1-flowered, very rarely 2-flowered; pedicels cernuous; perigone dimorphic, tepals 6, petepals smaller than the setepals, tepaltube absent; tepals white, or white and green; petepals very rarely tipped with yellow; setepals oblong-spatulate, petepals much shorter, obovate, emarginate, stiffly erect; stamens 6, epigynous, porandrous; filaments very short; anthers basifixed, lanceolate, usually acuminate, hidden in the petepals; ovary inferior, globose, 3-celled; ovules many in a cell, superposed; style fili-

form, longer than the stamens; stigma capitate, minute; fruit a capsule, finally loculicidally 3-valved; seeds ellipsoid, strophiolate, coats pale, thin. Nineteen species including some that are tentatively recognized.

Karyology and Classification

The number of species recognized has now increased to such an extent that it is advisable to make an attempt to group them on the basis of apparent evolutionary tendencies as shown by the karyology and gross morphology. Unfortunately, the karyology of the genus *Galanthus* has not been as extensively investigated as in the case of the genus *Leucojum* for only three closely related species out of a total of eighteen have received attention from this standpoint. Complete data with citations, if any, to the karyology are given under the respective species. Data showing the entire range of the chromosome complements for the three species about which such data is available are summarized in the following table:

Genus and probable basic or x numbers; and species	$2x$[1]	Authors
Galanthus x=7, 10, 12		
nivalis Linn.	20, 24	Transkowsky (1930)
	24, 25, 28	Sato (1937, 1938)
cicilicus Baker	24	Heitz (1926)
Elwesii Hook. f.	24, 48	Sato (1937, 1938)

On the basis of this limited data, it is not possible to arrive at any profound correlations between the karyological findings and the gross morphological characters. Any present classification must therefore still be based mainly on the latter foundation.

According to Boissier (1884), who recognized six species, there are two main groups. In one, with only *G. latifolius* (cf. species no. 11, *G. platyphyllus*, below), the anthers are oblong and not appendiculated, and in the second group, representing the remainder, the anthers are prolonged at the top into an apiculus. Baker (Gard. Chron. 9: 298. 1891) questioned the validity of this criterion as the basis for classification because it is sometimes applicable and sometimes not (in *G. Alleni* Baker, for instance). However, *G. Alleni* is suspect as a natural hybrid. Only further extensive study can settle this point.

It should be noted that the species centering around *Galanthus nivalis* Linn. as the biological type have leaves that are simply channeled down the face and are without reduplicate edges, whereas those centering around *Galanthus plicatus* Bieb., have leaves broadly channeled

1 Either observed directly, or calculated from observations of meiosis in pollen or pollen mother cells.

down the face and are with reduplicate edges. These evolutionary tendencies in the group appear to be the only ones discerned so far that are of sufficient importance for use as the basis of subgeneric groupings.

Key to the subgenera and species of Genus 3. GALANTHUS

1a. Leaves simply channeled down the face ..... Subgenus1. EUGALANTHUS
2a. Leaves 6 to 10 mm. broad:
3a. Plants vernal:
4a. Scape 2-edged (southern and central Europe to Caucasus) ..... 1. *nivalis*
4b. Scape subterete, plant smaller in all its parts (Bulgaria and Romania) ..... 2. *gracilis*
3b. Plants autumnal (Greece) ..... 3. *Olgae*
2b. Leaves 1.2 to 2.5 cm. broad:
5a. Leaves variously glaucous in color:
6a. Leaves very glaucous, except green in *G. caucasicus* var. *caspius;* scape up to 1.5 dm. tall:
7a. Setepals oblong-spatulate, 2—3.2 cm. long, and 1.3—2 cm. broad (Asia Minor) ..... 4. *Elwesii*
7b. Setepals shorter and narrower than in *G. Elwesii* (Isle of Chois) ..... 5. *graecus*
7c. Setepals obovate-unguiculate (Caucasus) ..... 6. *caucasicus*
6b. Leaves moderately glaucous, scape 1.5—2 dm. tall (Bulgaria) ..... 7. *maximus*
6c. Leaves only slightly glaucous, scape 5 cm. tall (Caucasus) ..... 8. *Perryi*
5b. Leaves not glaucous, dull or bright green in color:
8a. Leaves dull green:
9a. Petepals ½ as long as setepals (Caucasus) ..... 9. *Alleni*
9b. Petepals 2/3 as long as setepals (Caucasus) ..... 10. *transcaucasicus*
8b. Leaves bright green:
10a. Leaves 2—2.5 cm. broad; spathe without reflexed edges:
11a. Stamens ¾ as long as petepals (Caucasus) ..... 11. *platyphyllus*
11b. Stamens not more than ½ as long as the petepals (North-central Asia Minor) ..... 12. *Fosteri*
10b. Leaves 1.3—1.5 broad, spathe without reflexed edges; or, when 1.8—2 cm. broad, then spathe with reflexed edges:
12a. Scape 1.3—1.5 dm. tall; setepals oblong, concave on the face (Asia Minor) ..... 13. *cicilicus*
12b. Scape 1.8—2 dm. tall; setepals oblong-spatulate (Isle of Nikaria) ..... 14. *Ikariae*

1b. Edges of leaves reduplicate ..... Subgenus 2. PLICATANTHUS
13a. Leaves up to 9 cm. long (Caucasus) ..... 15. *alpinus*
13b. Leaves from 1.5 to 5 dm. long:
14a. Petepals marked with green at top only:
15a. Leaves glaucous:
16a. Petapals green on upper half, with a white edge (Crimea and Dobruja) ..... 16. *plicatus*
16b. Petepals green on almost half of upper part, without a white edge (Habitat unknown) ..... 17. *grandiflorus*

15b. Leaves yellowish-green (Transcaucasia) ..... 18. *Woronowii*
14a. Petepals marked with green at top and on lower part of back (Southeastern Europe) ..... 19. *byzantinus*

Subgenus 1. **EUGALANTHUS** Traub & Moldenke, **subg. nov.**

Folia tantummodo supra canaliculata, marginibus non reduplicatis, subglauca usque ad glaucissima, vel colore claro-viridia usque ad obscuro-viridia. Species typica—*Galanthus nivalis* Linn.

DIAGNOSIS.—Leaves simply channeled down the face, not reduplicate at the edges; slightly glaucous to very glaucous, or bright to dull green in color.

TYPE SPECIES.—*Galanthus nivalis* Linn.

1. GALANTHUS NIVALIS Linnaeus, Sp. Pl. ed. I. 288. 1753; Smith & Sowerby, English Bot. ed. 1, vol. 1, pl. 19, 1790; Redouté, Lil. 4 (34) : pl. 200. 1807; Herbert, Amaryll. 330. 1837; Baker, Amaryll. 16-17. 1888.

SYN.—*Galanthus Clusii* Alloni, Auct. Fl. Pedem. 33. 1785; *Galanthus montana* (=*montanus)* Schur, Enum. Pl. Transsilv. 658. 1866; *Galanthus plicatus* Hohen., Pl. Elisazethpol, 228. 1833; *Galanthus reflexus* Herb. ex. Lindl., Bot. Reg. 31: Misc. 44. 1845; *Galanthus corcyrensis* Leicht. ex. Le Jardin, 139. 1888; *Galanthus Sharlocki* Casp. ex Gard. Chron. i. 243. 1888; *Galanthus Sharloki* (Casp.) ex Baker, Amaryll. 17. 1888; *Galanthus umbricus* Dammann, Cat. 4. 1889; *Galanthus plicatus* Guss., Pl. Rar. 140. 1826, non Salisb., non Bieb., non Hohen.; *Galanthus Alexandrii* Porcius, Anal. Acad. Romane, Ser. 2. 14: 274. 1893; *Galanthus octobrensis* Hort. ex Vilmorin's Blumeng. ed. 3. Sieb. & Voss. i. 1006. 1895. (See also Subsp. 1. *Imperati* (Bertol.) Baker, below, and synonyms under it.)

DESCRIPTION.—Karyology, x=12 (Stenar, 1925, Perry, 1932); x=10, 12 (Transkowsky, 1930); 2x=24 (Heitz, 1926); 2x=24, 25, 28 (Sato, 1937, 1938). Bulb globose, 1.3-2.5 cm. in diameter; basel sheath truncate, 5-7.6 cm. long, slit down one side; leaves linear, glaucous, finally 1.5-2.3 dm. long, 6-9 mm. broad, simply channeled down the face; peduncle 7.6-15 cm. tall; spathe green, with hyaline edge; setepals oblong, 1.3-2.5 cm. long; petepals half as long, obovate-cuneate, deeply emarginate, with only a green patch around the sinus; anthers lanceolate, 7 mm. long, gradually acuminate.

RANGE.—Widely distributed through southern and central Europe, from the Pyrenees to the Caucasus.

NOTES.—Flowers in February and March. *Galanthus reflexus* Herb., from Mt. Gargarus, cited under synonyms above, has much smaller flowers than the type, and petepals are reflexed at apex; *Galanthus corcyrensis* Leicht. ex Le Jardin, cited above, (var. *praecox)* from Corfu, flowers in December; *Galanthus octobrensis* Hort. ex Vilmorin, flowers in England at the end of October; *Galanthus nivalis* var. *lutescens* Hort. (Baker, Amaryll. 17. 1888), has a yellowish ovary, and petepals tipped with yellow instead of green; var. *poculiformis* Hort. *(Baker,* l. c.) has petepals plain white in color, and nearly as long as the setepals; *Galanthus Sharlocki* Casp., cited under synonyms above, has two long, herbaceous spathe-

valves; sometimes a 2-flowered umbel, and setepals with a green spot at the tip. *Galanthus viridi-apice* Hort. ex Van Tubergen (C. H. Grey, Hardy Bulbs 2: 32. 1938) with large flowers, tepals deeply green-margined, and flowering from February to March, may be a form of *Galanthus nivalis.* Herbert (Amaryll. 330. 1837) lists *G. nivalis* var. *hortensis* Herb., having "Flowers semi-double; with a more or less perfect anther in some of the flowers." A double garden variety of *G. nivalis,* under the name, *Galanthus plenus,* is available in the trade at the present time. *Galanthus Atkinsii* Hort. (The Garden, vol. 74, page 154.) is apparently a garden variety of *Galanthus nivalis.*

1a. GALANTHUS NIVALIS subspecies 1. IMPERATI (Bertol.) Baker, Amaryll. 17. 1888.

SYN.—*Galanthus Imperati* Bertol. Fl. It 1. 4: 5. 1839; *Galanthus plicatus* Tenore, non Bieb.; *Galanthus Clusii* Fisch. ex Steud. Nom. ed. 2. 1: 653. 1840; *Galanthus Melvillei* Hort. ex Vilmorin's Blumeng. ed. 3. Sieb. & Voss. 1: 1006. 1895.

DESCRIPTION.—Karyology, no reports. Leaves broader than in the type, and flowers larger; setepals 2.5-3.2 cm. long, more spatulate and narrower at base than in type.

RANGE.—Italy: Naples and Genova.

2. GALANTHUS GRACILIS Celakovsky, in Sitz. Boehm, Ges. Wiss. i. 195, t. 9. 1891; Fl. Bulg. 539. 1891.

SYN.—*Galanthus bulgaricus* Velen., Fl. Bulg. 539. 1891, in synon.

DESCRIPTION.—Karyology, no reports. Bulb oval, basal sheath truncate, entire, rarely shortly split; leaves appearing with the flowers, linear-cuneate, finally broader, subcucullate at apex, narrowed into a sheath at base, upper surface channeled, keeled with a slender simple midrib, glaucescent-pruniose; scape slender, subterete, somewhat flattened toward the base, with rounded edges, not distinctly 2-edged, subequaling or slightly exceeding the leaves; spathe narrow, thin; ovary subglobose or oval-globose; setepals white, oval or oblong, concave, narrowed at the base; petepals ½ to 1/3 as long as the setepals, oblong-cuneate, more deeply split at the apex with an acute sinus, the outer surface green on the lower half or beyond, above this marked with two green spots, rarely rather clearly transversely zonate, the inner surface plicate-nerved with 6-8 narrow green nerves of which 4 are longer than the others, their lobes subquadrate, subtruncate, entire, slightly recurved at the margin; anthers yellow, not saffron-colored, almost three times as long as the filaments, distinctly widened at the base, cordate-emarginate, abruptly attenuate at the apex, produced into a subulate tip.

RANGE.—Bulgaria and Romania (Ostrumelien).

NOTES.—Flowers in February and March.

Galanthus gracilis is described as one of the finest species, but apparently is not widely known in cultivation. It differs from *G. nivalis* in a number of characters, including among others, a less robust habit, being usually significantly smaller in all its parts, a more slender, not sharply 2-edged scape; and leaves with a keel composed of only one nerve.

According to Baker (Gard. Chron. 13 (1): 656. 1893), *G. gracilis*

"is very nearly allied to *G. Elwesii,* being similar in stature, and in having a large blotch at the base of the inner segments of the perianth, of which, however, the apical lobes are oblong, and not at all crisped at the edge. It appears to be widely spread in Bulgaria."

3. GALANTHUS OLGAE Orphanides ex Boissier, Fl. Orient. 5: 146. 1884; Baker, Amaryll. 18. 1888.

SYN.—*Galanthus Algae-Reginae* Hort. ex Gard. & For. 1: 499. 1888; *Galanthus Reginae-Olgae* Hort. ex Le Jardin, 140. 1888.

DESCRIPTION.—Karyology, no reports. Sheath radical, truncate, laterally and shortly split at the apex; leaves 2, produced after the flowers, elongate, linear, obtuse (in the dry state), rather flat, very glaucous beneath, 15-20 cm. long, about 6 mm. wide; scape somewhat longer than the leaves; flowers drooping, rather large, white; setepals elongate-elliptic, obtuse, narrowed into a claw, 2.5 cm. long, 6-7 mm. wide, petepals half as long, cuneate, longitudinally many-lined, shortly obcordate, with rounded lobes, in the dry state apparently not green-spotted; stamens 2/5 as long as the petepals; anthers long-subulate-acuminate; filaments very short.

RANGE.—Greece: Taygeto Mountain.

NOTES.—Flowers in October, and is especially notable on that account.

5. GALANTHUS GRAECUS Orphanides ex Boissier, Pl. Orient. 5: 145. 1884; Baker, Amaryll. 17. 1888.

DESCRIPTION.—Karyology, no reports. Sheath radical, truncate and laterally split at the apex; leaves 2, appearing with the flowers, rather broadly linear, channeled, obtuse, glaucous, 6-10 mm. broad; scape slightly shorter than the leaves, slightly compressed; flower pendulous, setepals white, oblong-elliptic, concave, attenuate at the base; petepals half as long, obovate, the lower part green, the apex very shortly and obtusely bilobed and with 2 green spots; stamens ¾ as long as the petepals; anthers 4 to 5 times as long as the filaments, slightly winged-appendaged (appendiculate) at the apex.

RANGE.—Greece: upper region of Mount Pellinos on the Island of Chios, altitude 1,158 meters.

NOTES.—Flowers in April. Boissier observes that the flower is "of the size of *Galanthus nivalis,* almost intermediate between it and *Galanthus Elwesii,* differing from *G. nivalis* in the interior divisions [petepals] being less cuneate, less deeply bilobed, and the lower portion green not white, from *G. Elwesii* in the smaller flower, the exterior divisions (setepals) being narrower and the lobes of the interior divisions [petepals] not quadrate nor undulate-crisped."

4. GALANTHUS ELWESII Hook. f., Bot. Mag. t. 6166. 1875; Baker, Amaryll. 17. 1888.

SYN.—*Galanthus globosus* Wilks, in Garden i. 393. 1887.

DESCRIPTION.—Karyology: type, 2x=24 (Heitz, 1926), 2x=24, 48 (Sato, 1937, 1938); var. *robustus,* 2x=24, var. *praecox,* 2x=24, (Heitz, 1926). Bulb globose, larger than in *G. nivalis,* 2 cm. in diam., tunics thick, fleshy; sheath membranous, mouth oblique and cleft on one side, 2.5-7.6 cm. long; leaves 2, simply channeled down the face, 1.5-2 dm. long, (broader than in *G. nivalis)* 2 cm. broad, obtuse, not plaited but always

twisted, very glaucous, sheathing the base of the peduncle; scape 1.5 dm. tall, oblong on transverse section; spathe single, 2.5-5 cm. long, convolute, border membranous; ovary obovoid, 1.3 cm. long; perigone 3.8 cm. in diameter or more when spread out; setepals white, broadly obovate, obtuse, concave (oblong-spatulate), 2-3.2 cm. long, 1.3-2 cm. broad; petepals oblong-cuneate, constricted somewhat above the middle, 2-lobed at tip, the lobes obliquely truncate and spreading, green, with a white wrinkled border and a broad white horizontal band above the middle, the outer surface smooth, the inner deeply ribbed; filaments very short; anthers 7 mm. long, narrowed gradually from the base to apex, and with long prolongations and subulate recurved tips; capsule turbinate.

RANGE.—Asia Minor; mts., alt. 610-1548 m.

NOTES.—Flowers in February. Hooker f. (1875) observes, that *Galanthus Elwesii* "is a native of the summits of Yamanlardagh mountains, north of the Gulf of Smyrna, where it was discovered by M. Balansa in 1854, and whence dried specimens were distributed under the name of *G. plicatus,* being so named by M. J. Gay of Paris. I am indebted to Mr. Elwes . . . for pointing out its distinctive character from *G. plicatus,* and which Mr. Baker has confirmed." The form, *G. globosus* Wilks, cited as a synonym above, has globose flowers, setepals very broad, and the umbel is often 2-flowered. Miller and Taylor (Bailey, Cyclo. Hort. 1939, vol. 2, p. 1309) list the following as varieties of *G. Elwesii*—var. *Cassaba,* var. *ochrospilus,* var. *unguiculatus,* var. *Erithrae,* var. *Whittallii,* and var. *robustus.*

6. GALANTHUS CAUCASICUS (Baker) Grossheim, in Grossheim & Schischk., Shed. Herb. Pl. Or. Exsicc. 4. 1924; et Fl. Caucasia 1: 244. 1928.

SYN.—*Galanthus Redoutei* von Ruprecht ex E. Rupr., in Regel, Gartenfl. 12: 177-178, in synon. 1863; *Galanthus nivalis* var. *Redoutei* (von Ruprecht ex E. Rupr.) E. Rupr., in Regel, Gartenfl. 12: pl. 400, fig. 2. 1863; et Trans. Russ. Hort. Soc. pl. 126. 1863; in Regel, Gartenfl. 23: 202. 1874; *Galanthus nivalis* var. *major* E. Rupr., in Regel, Gartenfl. 17: 130-133. 1868, except reference to Redouté, Lil., pl. 200; *Galanthus nivalis* var. *caspius* E. Rupr., in Regel, Gartenfl. 17: 133. 1868; *Galanthus nivalis* var. *Redoutei* Bossier, Fl. Orient. 5: 144-145. 1884, except reference to Redouté, Lil., pl. 200; *Galanthus nivalis* subsp. *caucasicus* Baker, Gard. Chron. (1): 313. 1887 [type description]; Amaryll. 16. 1888; *Galanthus nivalis* var. *virescens* Baker, Amaryll. 17. 1888.

TYPE: Plate 400, fig. 2, in Regel, Gartenfl. 12: 1863.

DESCRIPTION.—Karyology: no reports. Bulb globose, 1.3 cm. in diam.; tunics many, brown, membranous; leaf-sheath cylindrical, membranous, 2.5-5 cm. long, truncate at the apex; leaves lorate, more glaucous than in *G. nivalis* (green in var. *caspius),* 1.3 cm. broad, simply channeled down the face, shorter than the peduncle when it begins to flower, but finally as long; peduncle very glaucous, 7.6-15 cm. long; spathe usually simple, rarely bifid; pedicel cernuous, shorter than the spathe; ovary green, turbinate, vertically plicate; setepals pure white, obovate-unguiculate, broader, more convex on the back, and with a narrower claw than in *G. nivalis,* 2-2.5 cm. long; petepals half as long, obovate-cuneate, with a

deep notch and two erect rounded lobes, only marked with green on the outside in a horseshoe-shaped patch around the notch, but within streaked with green and white more than half-way down; anthers deep orange, narrowed gradually from the cordate base to the apex; filaments very short, white.

RANGE.—Caucasus.

NOTES.—According to E. Ruprecht (1863), this species was introduced from the Caucasus by von Ruprecht, a member of the St. Petersburg Academy, to the St. Petersburg Garden Society prior to 1863, under the name *Galanthus Redoutei.* E. Ruprecht supposed that the Academy member, von Ruprecht, did so in allusion to plate 200 in Redouté's Liliacees, a plate which refers to *Galanthus nivalis,* but it should be noted that this is only a supposition.

E. Ruprecht (1863) described the plant under consideration under the names *Galanthus Redoutei,* and *G. nivalis* var. *Redoutei,* but included the former in the synonomy of the latter, and thus accepted the latter name. However, in 1868, he listed under *Galanthus nivalis* the two varieties "*major* Redoute" and "*caspius* Ruprecht." The former apparently is supposed to represent the plant indicated as *G. Redoutei* and *G. nivalis* var. *Redoutei* in 1863. Later (Regel, Gartenfl. 23: 202. 1874), however, he states that *Galanthus Redoutei* or *G. nivalis* var. *Redoutei,* often blooms 3 to 6 days before *G. nivalis,* the leaves are larger and broader than the type, but a distinctive character on which to base a species is lacking. In order that we may understand E. Ruprecht's viewpoint in 1868, it is of interest to consider his descriptions,—

Galanthus nivalis var. *Redoutei* (syn.—*Galanthus Redoutei),* with type illustration, pl. 400, fig. 2, in Regel, Gartenfl. 12: 177-178. 1863. The description is very brief: "Leaves broader, shorter and more glaucous than in the typical *G. nivalis;* flowers somewhat smaller."

Galanthus nivalis Linn. the type, according to Ruprecht (1868): Bulb subovoid, not agglomerate; leaves not revolute at margin, linear, rarely almost lanceolate, mostly slightly glaucescent, 4-8 mm. wide; scape 5-15 cm. tall; outer petals [setepals] 1-2 cm. long, 1/3 to 2/5 as wide: ovary cylindric-oblong or ovate."

Galanthus nivalis var. *major* Redoute ex Ruprecht (1868): "Larger in all its parts than the typical plant; bulb subglobose; leaves intensely glaucous, oblong, 8-12 mm. wide, firm; scape sometimes 30 cm. tall; outer petals [setepals] especially broader, 1.8-2 cm. long, 1/2 to 1/3 as wide."

Galanthus nivalis var. *caspius* Ruprecht (1868): "Almost 30 cm. tall, flaccid; leaves 8-12 mm. broad, almost linear (in the dried state). green, equaling or surpassing the flowering scape."

The above descriptions indicate that the differences are apparently mainly in size of plant parts, and degree of the glaucous character of the leaves, and thus bear out E. Ruprecht's final conclusion. However, Baker (1887) proposed *G. nivalis* subsp. *caucasicus* Baker, and described it (in Baker, Amaryll. 17. 1888) as "Leaves broader than in the type, finally 20-22 cm. long, 2 cm. wide; petals [tepals] usually 2-2.5 cm. long, oblong-spatulate, with a very narrow claw.—Caucasus only. Flowers later than the type. Includes *G. nivalis,* vars. *G. Redoutei, major* and *caspius* of

Ruprecht." It should be noted that *G. nivalis* var. *Redoutei,* according to E. Ruprecht, often flowers 3 to 6 days before *G. nivalis,* the type; and that according to Baker (1887), subspecies *caucasicus* shows greatest affinity to *G. Imperiati* of southern Europe and *G. Elwesii* from Asia Minor.

Grossheim (1924, 1928) raised Baker's subspecies to specific rank—*Galanthus caucasicus* (Baker) Grossheim. It is obvious therefore that this species is on trial. If it cannot be demonstrated as a distinct species in nature, it will have to be reduced again to the rank of a subspecies. Plant explorers are urged to make every effort to furnish living and dried specimens of the plant in question so that its status can be cleared up.

7. Galanthus maximus Velenovsky, Fl. Bulg. 540. 1891.

Description.—Karyology, no reports. Sheath radical, membranous, horizontally truncate; leaves 2, slightly over 15-20 cm. long, 1.2-1.5 cm. wide, appearing with the flowers, broadly linear, scarcely narrowed at the base, slightly channeled (not plicate nor revolute at the margin), obtuse and shortly cucullate-attenuate at the apex; scape 15-20 cm. tall, almost equaling the leaves; flower pendulous; ovary 7 mm. wide and long; setepals 2.5 cm. x 13 mm., broadly obovate, decidedly concave (with the margins almost involute), rather more abruptly contracted at the base; petepals 12 mm. x 6 mm., half as long as the setepals, oblong, constricted for a short distance at the middle, obcordate, the entire interior surface green, on the exterior surface the lower part green and the upper part with 2 green spots, the lobes quadrate, obtuse, divergent (neither plicate-carinate within nor with the margin undulate-crisped); stamens half as long as the petepals; anthers yolk-yellow, 4-5 times as long as the filaments, rather broadly appendiculate at the apex.

Range.—Bulgaria: montane region at the City of Orhanie, and at Stiven.

Notes.—Flowers at the beginning of spring.

Velenovsky observes that this is "The largest species in the genus, with its large flower exceeding the size of that in *Galanthus Elwesii* and *G. plicatus.*_ From the former it differs among other characters, in the interior divisions [petepals] being neither undulate nor plicate-carinate nor evidently cuneate, from the latter in its leaves being neither plicate nor revolute on the margin. The basal sheath is abruptly horizontally truncate (in the form of a cup), not split on the side, as is the case in other *Galanthus* species.

Baker (Gard. Chron. 13 (1): 656. 1893) observes that "The Bulgarian *G. maximus,* of Velenowsky, is also nearly allied [as is Baker's *G. grandiflorus*] to G. Elwesii, and has a truncate basal sheath, leaves not reflexed at the margin, obovate, very concave outer perianth-segments, abruptly contracted at the base and the inner segments with a large green blotch on the lower part of the back and not crisped divergent quadrate apical lobes."

8. Galanthus Perryi Baker, Gard. Chron. 13: 258. 1893.

Description.—Karyology: no reports. Bulb globose, 2.5 cm. in diam.; sheaths truncate, 3.8-5 cm. long; leaves at blooming time much shorter than the peduncle, about 5 cm. long, 1.3 cm. broad, slightly glaucous on both sides, nearly flat, edges not at all reflexed; peduncle

slender, 1.3-1.5 dm. tall; pedicel about as long as the inner spathe-valve; ovary green, globose, 3-4 mm. in diam.; setepals oblong, very convex on the back, 1.6-2 cm. long; petepals half as long, deeply emarginate at the apex, with a green horseshoe-shaped mark around the apical sinus, green inside, except at the edge, with distinct vertical white stripes; stamens much shorter than the petepals; anthers apiculate.

RANGE.—Caucasus.

NOTES.—Flowers in February. According to Baker (1893) this species is "intermediate between *G. latifolius* [cf. species no. 11. *G. platyphyllus*, below], and very nearly allied to *G. Alleni*. If *G. Alleni* is a hybrid between *latifolius* [=*G. platyphyllus*] and *caucasicus*, this is probably a hybrid also, the strain of *latifolius* [=*G. platyphyllus*] preponderating in *Alleni*, and of *caucasicus* in *Perryi*."

9. GALANTHUS ALLENI Baker, Gard. Chron. 9: 298. 1891.

DESCRIPTION.—Karyology: no reports. Bulb globose, 1.3 cm. in diam., with a dense tuft of long slender root-fibres; leaf-sheath cylindrical, 5-7.6 cm. long; leaves 2, with a flat blade about 5 cm. long, 1.3 cm. broad, protruded from the sheath when the plant is in flower at the end of February; not bright green as in species no. 11, but dull green, and slightly glaucescent; peduncle 1.5-1.8. dm. long; spathe linear, about 2.5 cm. long; ovary globose, green, trisulcate 4 mm. long and broad; setepals obovate, very convex, 2 cm. long, 1.3 cm. broad; petepals less than half as long as the setepals, emarginate, with a single horseshoe-shaped green blotch around the sinus; anthers 4 mm. long, sometimes muticous, sometimes distinctly apiculate; filaments very short; style overtopping the anthers.

RANGE.—Caucasus (according to the Index Kewensis).

NOTES.—The reader is referred to the notes under *G. Perryi*, above.

10. GALANTHUS TRANSCAUCASICUS Fomin, in Grossheim, Flora Caucasicus 1: 244. 1928.

DESCRIPTION.—Karyology; no reports. Leaves dull green, simply channeled down the face, linear, with a blunt apex, up to 1.5 cm. wide; peduncle shorter than or equaling the leaves; setepals 2-2.5 cm. long, oval, somewhat elongated; petepals two-thirds as long as the setepals, spot semi-circular; anthers with a needle-like apiculus.

RANGE.—Transcaucasia.

NOTES.—The description is somewhat incomplete. It may be that the species was described more fully earlier, but no other reference could be found.

11. **Galanthus platyphyllus** Traub & Moldenke, **nom. nov.**

SYN.—*Galanthus latifolius* Ruprecht, Regel, Gartenfl. 17: 130, pl. 578, fig. 1, 1868, non Salisb. (1866); Baker, Gard. Chron. fig. 32c. 1879; 404, fig. 80. 1881; Baker, Amaryll. 17-18. 1888.

DESCRIPTION.—Karyology: no reports. Bulb 2.5 cm. in diam.; sheath short, truncate; leaves lorate, bright green, 2-2.5 cm. broad, simply channeled down the face; setepals oblong-spatulate, 1.3-2 cm. long; petepals with only a green patch round the sinus both inside and outside; anthers narrowed suddenly to an acute point.

RANGE.—Caucasus, alt. 1,829 to 2,743 meters.

NOTES.—Flowers in May.

When the fragment of Salisbury's Genera Plantarum was published in 1866, the binomial, *Galanthus latifolius* Salisb., based on Bot. Mag. pl. 2162, was included as a substitute name for *Galanthus plicatus* Bieb. Salisbury's name, although validly published, is a synonym of *G. plicatus* Bieb. Ruprecht (1868) apparently was unaware of this fact when he used the name, *Galanthus latifolius* Rupr. for a new species two years later. This name is therefore a later homonym and must be rejected. The new name, *Galanthus platyphyllus* Traub & Moldenke is proposed for Ruprecht's species.

12. GALANTHUS FOSTERI Baker, Gard. Chron. 5: 458. 1889.

DESCRIPTION.—Karyology: no reports. Leaves bright green, 1.5 dm. long at flowering time, 2-2.5 cm. broad, simply concave down the face; peduncle slender, faintly 2-edged, much shorter than the leaves; spathe-valve green, linear-lanceolate, 5 cm long; pedical 3.8 cm. long, cernuous at the apex; ovary subglobose, 8 mm. in diam. at flowering time; setepals oblong spatulate, very convex on the back, rarely tipped with green, 2.5-3 cm. long, 1.3-2 cm. broad at the middle, narrowed to a claw, 6 mm. broad; petepals obovate-cuneate, not so closely connivent as in *G. Elwesii*, 1.3 cm. long, 8 mm. broad, with a shallow apical indentation, the two apical lobes semi-orbicular, erect, not at all spreading nor crisped, the apical sinus with a horseshoe-shaped green blotch under it, the lower half of petepal covered with another obovate-oblong green blotch; inner surface all green, with white vertical lines, except a narrow white border; stamens 6 mm. long, anthers with a distinct white apical spur above the yellow pollen-bearing portion; style just overtopping the anthers.

RANGE.—North-central Asia Minor; Province of Sirwas.

NOTES.—Flowers in late March. Baker (1889) observes, "So far as the flower goes, it looks most like the larger forms of *G. Elwesii*, but the leaves are broad and bright green, like those of *G. latifolius* [=*G. platyphyllus*], and the apical lobes of the inner perianth segments are short and erect, as they are said to be in *G. graecus* . . . In *G. Elwesii* the inner segments are narrowed suddenly just below the apical lobes, which are square and much larger than in *G. Fosteri*, spreading at the tip, and more or less crisped. In *G. Elwesii* the inner segments form a narrower tube than in any other species. Both *Elwesii* and *Fosteri* have a large green blotch on the lower part of the body of the inner segments. In *G. Fosteri* the stamens are not more than half as long as the inner segments, whilst in *nivalis*, *Elwesii* and *latifolius* [=*platyphyllus*] they are ¾ as long. The anthers of *Fosteri* have a distinct apiculus as in *nivalis* and *Elwesii*." Named for Prof. M. Foster, who imported the original bulbs into England.

13. GALANTHUS CICILICUS Baker, Gard. Chron. 21: 214. 1896.

DESCRIPTION.—Karyology: 2x=24 (Heitz, 1926). Bulb ovoid, 1.3 cm. in diam.; outer tunics brown; basal sheath reaching a length of 7.6 cm.; leaves 2 or 3, bright green, flat, narrowly linear, reaching a length of 1.3-1.5 dm. at the flowering season, and a breadth of less than 3 cm., narrowed gradually from the middle to a very narrow base, edge not recurved, back whitish; peduncle as long as the leaves; spathe-valves lanceolate, under 2.5 cm. long; pedicel short, cernuous; ovary turbinate, 3-4 mm.

in diam.; setepals oblong, concave on the face, 2 cm. long, 6-8 mm. broad; petepals half as long as the setepals, obovate-cuneate, emarginate, somewhat reflexed and crenulate at the apex, with only the apical horseshoe-shaped green blotch round the sinus; anthers apiculate, reaching somewhat more than half-way up the petepals.

RANGE.—Asia Minor: Cicilian Taurus, alt. 560 m.

NOTES.—Flowers from November to March. Baker (1896) observes, "The absence or presence of a green blotch over the lower part of the back of the inner segments of the perianth is, I believe, a constant characteristic, and it divides the Spring Snowdrops into two groups, in one of which are *nivalis* and *cicilicus* and in the other *Elwesii* and *Fosteri.*" He further states that *G. cicilicus* "Differs from *Fosteri* by its less robust habit, much narrower lobes, narrowed gradually from the middle to a very narrow base, and by the want of the large green blotch over the lower half of the back of the inner segments of the perianth which *Fosteri* has in common with *Elwesii.*"

14. GALANTHUS IKARIAE Baker, Gard. Chron. 13: 506. 1893; Curtis' Bot. Mag. pl. 9474.

DESCRIPTION.—Karyology: no reports. Bulb unknown; sheath 5 cm. long, truncate at apex; leaves lorate, somewhat shorter than the scape, projecting 1-1.3 dm. from it at flowering time, bright glossy green. 1.3-2 cm. broad, the margin not at all recurved; scape 1.8-2 dm. tall; spathe linear, with reflexed edges, 3.8 cm. long; pedicel shorter than the spathe ovary oblong, 8 mm. long; setepals oblong-spatulate, nearly 2.5 cm. long; petepals cuneate, half as long, emarginate, with square apical lobes crisped at the edge, and with a tendency to recurve at the tip, the single apical green blotch occupying half of the outside of the petepals; anthers orange-yellow, minutely mucronate.

RANGE.—Isle of Nikaria, off the west coast of Asia Minor.

NOTES.—Flowers in April. Named for the Isle of Nikaria, the classical Icaria. Baker (1893) observes, "It has the bright green leaves of *G. Fosteri,* the quadrate lobes of the inner perianth segments with crisped edges of *G. Elwesii,* and the single apical blotch upon the inner segments of *G. nivalis.*_ Mr. Allen compares the leaves to those of a *Leucojum.*"

Subgenus 2. **PLICATANTHUS** Traub & Moldenke, **subg. nov.**

Folia supra late canaliculata, marginibus reduplicatis, glauca usque ad glaucissima vel flavo-viridia. Species typica: *Galanthus plicatus* Bieb.

DIAGNOSIS.—Leaves broadly channeled down the face, reduplicate at the edges; glaucous to very glaucous or yellowish-green in color.

TYPE SPECIES.—*Galanthus plicatus* Bieb.

15. GALANTHUS ALPINUS Sosnowsky, in Monit. Jard. Bot. Tiflis, 19: 26. 1911.

DESCRIPTION.—Karyology, no reports. Bulb large, ovate, exterior tunics dirty-colored; leaves broadly lanceolate-spathulate, the upper portion broad, gradually attenuate toward the base, rather acute, the young leaves cucullate at the apex, the adult ones almost flat, glaucous, keeled beneath, 2—plicate, cartilaginous in a very narrow margin, 8-9 cm. long, to 2 cm. wide, shorter than the scape during anthesis; scape 6-8 cm. tall;

spathe rather large, narrowly membranous at the margin and in the central part, transversed by two broad green striations; sepetals broadly spathulate, shortly clawed at the base, rounded-cucullate and spoon-shaped at the apex, about 1.5 cm. long; petepals about half as long, cuneate-cordate, retuse, green-spotted, the spots narrowly triangular, long-cordate and paler on the inner surface; anthers sagittate, a third as long as the petepals; sepaline anthers attenuate at the base, petaline anthers submuticous; filaments short; flowers very fragrant.

RANGE.—Transcaucasus; Georgia: Mt. Lomis-mta near Borzhom, in the alpine region (7200 feet).

16. GALANTHUS PLICATUS Marschall von Bieberstein, Flora taurico-caucasica, 3 (suppl.): 255. 1819, non Guss., nec Hohen.; Bot. Mag. pl. 2162. 1820; Bot. Reg. 7: pl. 545. 1821; Herbert, Amaryll. 330. 1837; Baker, Amaryll. 18. 1888.

SYN.—*Galanthus nivalis* Falk, Beitr. 2: 156. 1786; *Galanthus latifolius* Salisb. Gen. Pl. Fragm. 95. 1866, non Ruprecht (1868).

DESCRIPTION.—Karyology: no reports. Bulb larger than in *G. nivalis;* leaves very glaucous, finally 3 dm. long, 2.5 cm. broad, broadly channeled down the face, and edges reduplicate; setepals oblong from a very narrow base, very convex on the back, 2-2.5 cm. long, widely spreading or even reflexed; petepals deeply emarginate, green on the upper half, with a white edge; anthers lanceolate-acuminate, 7 mm. long.

RANGE.—Crimea and Dobruja; mts.

NOTES.—Baker (1888) states that the Caucasus plant often called *G. plicatus* is "*nivalis* subspecies *caucasicus*" [=*G. caucasicus* (Baker) Grossheim].

17. GALANTHUS GRANDIFLORUS Baker, Gard. Chron. 13(1); 656. 1893.

SYN.—*Galanthus maximus* Baker, Gard. Chron. 13(1): 354. 1893, non Velenowsky (1891).

DESCRIPTION.—Bulb globose, fully 2.5 cm. in diameter; sheath 10 cm. long, oblique or truncate at the throat; leaves reaching a length of 20-23 cm. above the sheath at flowering time, 1.3-2 cm. broad, slightly glaucous above, very glaucous below with a concave tip and distinctly recurved edges; peduncle as long as the leaves or a little longer, in all above 30 cm. tall; spathe 5 cm long, linear, with very revolute edges; pedicel rather shorter than the spathe; ovary 6-8 mm. long; setepals oblong-spatulate, 2.5 cm. long, 8-12 mm. broad, convex on the back; petepals obovate-cuneate, 1.3 cm. long, with round uncrisped erect apical lobes, and a large blotch of green round the sinus extending nearly half-way down; anthers apiculate, 6 mm. long.

RANGE.—Unknown (May be a hybrid.)

NOTES.—Flowers during the first half of March in England.

Baker described the plant under consideration as a new species or "hybrid?", on the basis of material received from Mrs. Backhouse, of Sutton Court, near Hereford, England. Baker states, "If not a true species, it is, no doubt, as Mrs. Backhouse suggests, a hybrid between *G. plicatus* and one of the large varieties of *nivalis,* such as *Imperati, Melvillei* or *Redoutei.*"

Baker points out that this Snowdrop is notable for its relatively large bulb, and that it "is remarkable for its very robust habit, large leaves, spathe and flower, and long pedicel. The leaves have a distinctly recurved edge, as in *G. plicatus,* and are very glaucous beneath. The flowers resemble those of the large forms of *G. nivalis.* The anthers are distinctly mucronate, and there is present an apical green blotch on the back of the inner segments of the perianth, but this extends nearly half-way down."

18. Galanthus Woronowii Losinsk., in Komarov, Fl. URSS. 4: 479, 749. 1935. (Type in the Herbarium, Inst. Bot. Russian Acad. Sci.)

Description.—Karyology, no reports. Bulb large, 3-4 cm. in diameter; leaves 15-20 cm. long, 1.5 cm. wide, yellowish-green, broadly linear, attenuate and callose at the apex, flat, longer than the scape after anthesis and introrsely plicate; scape 20-25 cm. tall, cylindric-costate; setepals 2 cm. long, 1.3 cm. wide, ovate, elliptic; petepals 11 mm. long, 8 mm. wide, flat, cuneate at the base, cordate at the apex, with green cordate spots; anthers mucronate; flowers odorous.

Range.—Mountains of Transcaucasus and central Caucasus.

Notes.—According to the author of the species, "It differs from *G. caucasicus* (Baker) Grossh. in its plicate leaves, from *G. plicatus* Bieb. in its smaller flowers and its yellow-green and also introrsely plicate leaves."

19. Galanthus byzantinus Baker, Gard. Chron. 13: 226. 1893.

Description.—Karyology: no reports. Bulb middle-sized, globose; leaves at flowering time shorter than the scape, 7.6 cm. broad, glaucous on both sides, especially beneath, broadly channeled down the face, the margins, as in the Crimean Snowdrop, *G. plicatus,* distinctly and permanently recurved; scape slender, 1.5 dm. tall; spathe linear, deeply channeled down the face; pedicel as long as or shorter than the spathe; ovary obovate, hardly at all glaucous; setepals oblong, convex on the back, 2 cm. long, 8 mm. broad; petepals half as long as setepals, obovate-cuneate, deeply emarginate with a green horseshoe-shaped mark round the sinus, the edge of the lobes somewhat reflexed, and crisped, and another green blotch covering the lower part of their back; stamens much shorter than the petepals; anthers orange, very apiculate.

Range.—Southeastern Europe, (Eur. or.), according to the Index Kewensis.

Notes.—Flowers in February. According to Baker (1893) this species is "Intermediate between *G. plicatus* and *G. Elwesii.* It has glaucous leaves broadly channeled down the face, with distinctly reflexed edges, as in the former and inner perianth segments marked with green, not only at the top, but also on the lower part of the back, as in the latter."

INDEX TO GENERA AND SPECIES

(Note.—Valid genera and species appear in **bold type.** Figures after names refer to page numbers in text.)

ADDENDA

Erinosma vernum Herb., Amaryll. 331. 1837=*Leucojum vernum Linn.*

Galanthus vernus Alloni, Fl. Pedem. 2: 155. 1785=*Leucojum vernum* Linn.

Lapiedra gracilis Baker, Jour. Linn. Soc. 16: 678. 1878=*Tapienanthus humilis*

Leucojum aestivale Steud., in Steud. Nom. ed. 2. 2: 196. 1841=*Leucojum aestivum* Linn.

Leucojum grandiflorum Vent., in Salisb., Gen. Pl, Fragm. 96. 1866=*Leucojum autumnale* Linn.

According to "A. O." (Gard. Chron. CXXII: 185, fig. 90, 1947), *Galanthus caucasicus* (Baker) Grossh., has broader and longer leaves, 2 to 2.3 dm. long, and 2 cm. broad, and larger flowers produced a little later than those of *G. nivalis* Linn. On the basis indicated by "A. O." *G. caucasicus* might be maintained as a species for it would be sexually isolated from *G. nivalis* due to a later flowering season.

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AMARYLLID GENERA AND SPECIES

[In this department the descriptions of amaryllid genera and species, particularly recent ones, translated from foreign languages, will be published from time to time so that these will be available to American and British readers.—*Harold N. Moldenke*]

Genus HANNONIA Braun-Blanquet et Marie

Bull. Soc. d'Hist. Nat. l'Afr. Nord, 22: 104-105. 1931.

Allied to the genus *Cyrtanthus,* but differing from it in having a straight, erect perigone, (lacking the long tepaltube with dilated throat), with the tepalsegs much longer than the tepaltube, and with the three nerves of the tepalsegs forming a green band due to their nearness to each other. From *Sternbergia,* to which it is also related, it differs in its white, 2-flowered umbel. [Monotypic.]

1. HANNONIA HESPERIDUM Braun-Blanquet et Marie, l. c.

Description.—Plant entirely smooth. Rootstock a single bulb, subglobose, ovid, 20-25 x 20 mm., with a long neck, up to 4 cm. long; bulb and neck covered with a black membranous coat; outermost leaf reduced to a scarious sheath, provided with a very short blade; inner leaves 2 or 3, linear, *flat, glaucous,* rather fleshy, about 2 mm. broad, up to 22 cm. long, the apex conspicuously obtuse; scape 10-12 cm. long, *terete,* hollow, glaucous; spathe 2-valved, the valves scarious, whitish, lanceolate, rather acutish, appressed to the perigone for about half their length; umbel 2-flowered, pedicels short; flowers about 18 mm. long; tepaltube white, short, scarcely 5 mm. long; tepalsegs linear-lanceolate, broadened below the apex, gradually and evenly attenuate toward the base, the apex subcucullate, acute, mucronate (the mucro green and barbulate), white within, white outside but *marked with a single band formed by the three green nerves that are very close together,* subequal, about 11 x 2 mm.; paraperigone absent; filament terete, white, 3 stamens equaling the tepalsegs, 3 shorter; anthers yellow, attached at the middle, oblong, the apex rounded-truncate, the base shortly emarginate; style *white,* terete, equaling the stamens; stigma scarcely thickened, obscurely 3-lobed; ovary about 2 mm. long, green, 3-celled; 5 or 6 ovules in each cell.

Range.—Morocco; grows in rock-fissures at the Atlantic Ocean shore near the Promontory of Hercules (Gap Ghir), at an altitude of 50-100 meters.

Notes.—Sparingly in flower in March and April when the type material was collected. Type specimens have been deposited in the herbarium of the University of Algiers, and in the Braun-Blanquet herbarium.

Genus ALLIUM Linn.

ALLIUM PAUCIFLORUM Larranaga, Escritos D. A. Larranaga (publ. Inst. Hist. Geog. Uruguay) 2: 135. 1923.

"Scape leafless, terete, subequaling the linear leaves; umbel laxly few-flowered (about 7-flowered); stamens subulate, oval at the base. May 26, 1809."

ALLIUM BIFLORUM Larranaga, l. c.

"Scape leafless, terete; leaves and stamens subulate. September, 1810."

ALLIUM TRIFLORUM Larranaga, l. c.

"Scape leafless, terete, umbel 3-flowered; leaves linear; stamens subulate, half as long as the perigone. May 8, 1814."

ALLIUM UNIFLORUM Larranaga, l. c.

"Umbel 1-flowered; perigone tubular. June 22, 1809."

"Note [by Larranaga].—These four species are widely separated from the rest of the genus [*Allium*], and possibly may be grouped together to form a new genus, which could possibly include also *A. gracile* of Jamaica, and other American species of *Allium*. Apparently this genus [*Allium*] is very rare on this continent. The description of these species should shed more light on these conjectures."

[AMARYLLIDS NORTHWEST—Continued from page 171.]

With the shortening of the hours of labor an ever increasing number of gardeners are putting up small greenhouses in which they can defy the vicissitudes of weather and grow many of these more tender and exotic plants and lengthen and augment the season of colorful bloom. May their tribe continue to increase.

AMARYLLID REGISTRATION SERVICE TERMINOLOGY

The meanings of the terms—origination, originator; registration, registrant; introduction, introducer; and distribution, distributor—as used in connection with the AMARYLLID REGISTRATION SERVICE have not been published in HERBERTIA up to the present. To make good this deficiency, the following definitions are presented. The terms as used in connection with the registration of *Hemerocallis* clones (classed with the amaryllids) will be reconsidered in 1948 by the JOINT COMMITTEE ON HEMEROCALLIS REGISTRATION sponsored jointly by the AMERICAN PLANT LIFE SOCIETY and the MIDWEST HEMEROCALLIS SOCIETY.

It should be noted that the originator may assume also the roles of registrant, introducer and distributor; or that the latter three roles could be assumed by one or more other persons or organizations.

The well-known definition that a clone consists of all of its ramets is recognized.

ORIGINATION; ORIGINATOR.—The term, originator, refers to the person or organization actually concerned in the plant breeding procedure that gives rise to the clone or clones. Anyone obtaining a clone or clones from another, or selecting clones for introduction from progeny produced by another, is obviously under moral obligation to acknowledge this fact when introducing any such clone or clones, no matter whether such clone or clones, or the progeny from which the clone is selected, have been acquired as a gift or for a consideration.

REGISTRATION; REGISTRANT; REGISTRAR.—The term, registration, refers to an arrangement whereby the names and descriptions of bona fide clones are recorded by the registrar by date (and number if desired) for the registration agency either before or after publication of the names with descriptions of the clones. Normally the registration should take place before publication. The normal procedure is as follows: the registrant, the person or organization registering the clone, sends in to the registrar the description with proposed name, or the proposed name only (for which there must be a bona fide clone in existence) in order to find out if the name is already in use. If it is not already in use according to available records, it will be registered, but if the name is already in use then an unused name must be substituted. In cases where only the proposed name is first sent in, the description must also be submitted as soon as practicable in order to complete the registration. Names only are not subject to registration. These rules obviously apply only to the organization and persons concerned for it is out of the question for one organization to presume to legislate for the whole world. However, in actual practice the registration service practically eliminates duplicated names for those concerned with the advancement of a particular plant group, who introduce clones, *sooner or later,* avail themselves of that service and thus keep in actual touch with one another through the registrar.

To obtain priority for the name under the INTERNATIONAL RULES OF BOTANICAL NOMENCLATURE, which *include also cultivated plants as a branch of botany; first publication of the name with a description that*

covers the clone is required. All *later uses* of the same name in any particular plant group are referred to as *later homonyms, and are invalid names under the International Rules.* Publication of amaryllid names may be in HERBERTIA or elsewhere, either before or after registration, but preferably the former. Publication should be in *dated* publications, including *dated* trade lists and catalogs.

INTRODUCTION; INTRODUCER.—The term, introducer, has been used in this connection in the general sense on the basis of the definition in Webster's Dictionary—"to bring into knowledge or understanding of something." The introducer is therefore the person or organization bringing the name with description to public knowledge. It is assumed that the registrant-introducer is acting in good faith, and actually has a distinct new clone for each name with description submitted, and that that clone will be distributed in a reasonable time, except for a valid reason, or that at least that the original seedling or mutation with or without ramets is growing under test where those interested could view it under supervision of the owner. It has been suggested that the term, describer, would be a better one to use in place of the term, introducer, but that is a matter for future consideration.

DISTRIBUTION; DISTRIBUTOR.—The term, distributor, refers to the one who actually first transfers ramets of a clone to others either free of charge or by sale.

—HAMILTON P. TRAUB

COLOR CLASSIFICATION FOR DAYLILIES

M. FREDERICK STUNTZ

So many have asked for an explanation about the manner of indicating the general color values of daylilies in the forthcoming Check List of Daylilies that the following brief description of the system to be followed is given.

First of all, we desire to make it clear that nothing in this article is intended to impose any difficulty upon those sending us new names for registration. The introducer (or originator) is privileged to define the colors in any way that seems most fitting in his own words. The registrar will then translate this description to conform to the standard method of color classification used. This is in essence, the same as that which has been used with signal success by the American Iris Society for many years.

This method is easily applied to daylilies for the number of segments (tepalsegs in daylilies) in each is the same. In daylilies the predominant color is usually found in the petals (petepalsegs in daylilies), whereas in irises it is the standards; and the subordinate color is usually in the sepals (setepalsegs in daylilies), according to the falls in irises.

The color symbols are intended to convey only a general idea of the colors in each flower. The system is comprehensive enough so that it could be applied to any flower; and, while as yet we have no white nor blue daylilies, provision is made for them, when they are attained.

In order to make the color classification as simple as possible only the generic color names are used and are abbreviated as follows:

The letter R will stand for red, B for blue, Y for yellow, W for white, and S for shot, blends, or polychromes. One of these letters will be used to designate the predominant color effect of the flowers of every clone.

In addition to the primary color abbreviations, R, B, Y, etc., the secondary or modifying color will be designated by the numbers 1 to 9. These numbers, three for each color; i. e., 1, 2, 3, for blue; 4, 5, 6 for yellow; 7, 8, 9 for red; will also determine whether it is a self,—1, 4, 7 practically the same color in both petals (Petepalsegs) and sepals (setepalsegs); mottled, margined, or veined,—2, 5, 8; or a bicolor [petals (Petepalsegs) a different color than the sepals (setepalsegs)],—3, 6, 9. This is readily visualized in the following table:

	Blue toned	Yellow toned	Pink or Red toned
Selfs or near selfs	1	4	7
Margined, mottled or veined	2	5	8
Bicolors	3	6	9

After the letter and number will follow the letters for light, L; for medium tone, M; for Dark, D. If the sepals (setepalsegs) are darker than the petals (Petepalsegs), the abbreviation "rev." (=revolute or reverse) will be added.

The few examples following are not arbitrary, and are merely cited by the writer, who has had only limited experience in observing the color of daylilies, as a beginning toward a better selection in each color range later; and he would appreciate any suggestions.

R1 represents a red self with enough blue to make it a red-purple; and perhaps the best example at this time is *Potentate* (=RID), or *Black Falcon* (=RID). There is no blue-purple daylily, but should we ever get one, it would be designated as B7.

R2 is a red with the subordinate color blue in some variation such as feathered edges, splashes or veins, as in *Cherokee Maid* (=R2D), or *Amherst* (=R2D).

R3 is a red bicolor or bi-tone such as *Persian Princess* (=R3D). This may not be a good example for there are few daylilies with enough blue in the color to come under this classification.

R4 is a red self with yellow infusion such as *Dawn* (=R4L), *Baronet* (=R4M), *Brackel* (=R4D), *Cissie Guisseppi* (=R4D). Clones like *Imperator* (=R4D) and *Iris Perry* (=R5M) could also be classified as Y8, but since the general impression is red-orange, they are placed in this category. Another good example is *Indian Chief* (=R4M).

R5 is a red with yellow toned edges, veins or markings like *Honey Redhead* (=R5D); or *June Boissier* (=R5L).

R6 is a red and yellow bi-color or bi-tone such as *Woodridge* (=R6M); or *Zouave* (=R6D). *Bicolor* (=R6M) and *Caballero* (=R6M) come very close to being Y9M and could just as appropriately be placed in that color class.

R7 is a pure red self, or as near as we have come to it in daylilies, such as *Royal Ruby* (=R7M), *Ruby Supreme* (=R7M), *Berwyn* (=R7M), *Port* (=R7M), *Theron* (=R7D), *Vulcan* (=R7D). While *Hemerocallis fulva rosea* and *Rosalind* (=R7M) are placed in this class, they could also be classed as two-tone reds (pink) R9L.

R8 is a red self with markings in a different tone of red. *Kanapaha* (=R8M) with its lighter toned edges would come in this class; *Orlando* (=R8M), *Redahd* (=R8), also belong here.

R9 is a red bi-color, or with sepals (setepalsegs) such as *La Tulipe* (=R9D); *Rajah* (=R9M); *Pascagoula* (=R9D); *Dominion* (=R9M).

Time forbids going into detailed examples of the other color classes. *Mongol* (Y4D) ,while not as dark a yellow as *Golden West* (Y4D), is darker than most in the medium yellow class. *Orange Beauty* (Y4D) one of the richest of all yellow daylilies, is not orange but predominantly yellow. *Dr. Stout* (Y8M) is a decided yellow orange and could be classed as Y7M but on account of the Brazil flecking is placed in Y8M. The same applies to *Halo Wheeler* (Y8M) and *Halo Yeld* (Y8M), both predominantly yellow, but on account of the large halo are given the subordinate number 8. While *D. D. Wyman* (Y7M) has a noticeable tawny splash on the petals (petepalsegs) it is hardly sufficient to classify it as Y9M, and therefore it is placed in Y7M.

Spotted varieties, like *Mikado* (S7M), are indicated by placing them in the shot or blend class.

Cinnabar (S7M) is a decided blend with the red tone predominating.

All of this will be fully explained in greater detail at the beginning of the Check List. We are hoping to receive during the coming winter all outstanding lists, especially the missing ones from some of the largest introducers, so that the Check List can be finally completed. Thus with the kind assistance of the members of the hemerocallis clan, we believe that a good beginning can be made toward a complete listing and description of daylilies.

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 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 collection of hybrids to these cooperating agencies in order that the new daylily clones may be impartially evaluated.

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

Pinocchio. Medium small flower with wide, overlapping segments somewhat recurved on ends. Petals 1¼″, peach pink with eye zone of light garnet. Sepals a shade lighter. Plant small with narrow leaves. Scapes wiry, 36″, erect, 15 to 20 buds. *(Serenade X Mikado)*

Myrna. Medium large flower with wide segments recurved at the tips. A rosy purple self, near magenta. About 25 buds to the scape which stands 30″ high, somewhat arching. Strong growing plant, very hardy, increases rapidly and makes a showy garden subject. *(B. H. Farr X Theron)*

Rosash. Large flower with wide segments, crinkled and somewhat twisted. Irregular trumpet shape. Color is Attar of Roses (M&P 4H10). Robust plant with strong scapes about 38″ tall.

Saratoga. Very large flower up to 6½″. Petals 1¾″ wide, slightly recurved, rusty red. Sepals over 1″ wide, recurved, buff yellow with embossed edges. This flower was selected for its beautiful form, large size and sturdy stalk. The plant is a strong grower and the flower lasts well into the evening. Scape 38″ tall.

Taffy. A large pastel in tones of light yellow, buff and peach pink. The wide segments have a silky texture, the colors so blended that an iridescent effect is produced. The flower is very open with segments much recurved. Strong plant. Stalks somewhat arching and about 36″ tall. *(B. H. Farr X Blondie)*

Introduced by John V. Watkins, University of Florida, Gainesville, Fla.

Tamiami—Plant very robust in northern Florida, multiplying rapidly to form large clumps. Foliage upright, sharp-pointed, to about 18 inches, strongly evergreen, attractive the year around.

The scapes are slender, somewhat declinate and form no proliferations.

The flower is large (14.5 cm.), spreading, giving a bold day-long garden effect as it does not roll or fade badly in the April sun. Color outside, Mirabelle, 10-J-7 (Marez & Paul, A Dictionary of Color) color throat, near yellow ochre 11-L-7.

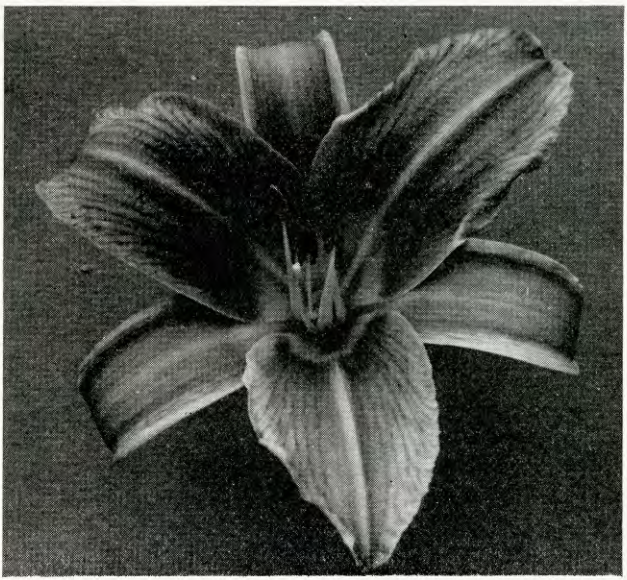


Fig. 180. Hybrid Daylily—**Tamiami.**
Photo by John V. Watkins.

The sepal (10 cm. x 2.5 cm.) is self-colored, Pompeian red 4-J-10*, and there is no differentiation of margin or mid-rib. The sepal is slightly recurved. The petal (10.5 cm. x 4 cm.) is self-colored Pompeian red 4-J-10, with the veining but slightly darker. The petal is very slightly recurved if at all.

This seedling, resulting from five generations of selective breeding, flowered first on April 10, 1943 and was chosen for naming and propa-

gation on April 20, 1945. None of the available commercial clones exhibit the outstanding soft pink garden tone that is the salient feature of this selection. *Tamiami* is in propagation and will be introduced to Florida gardeners in 1950.

Introduced by M. B. Matlack, Arlington, Va.

Midnight Sun. Scapes 3½ to 4 feet high with a good branching habit and 16 to 22 six inch buds; flower 5½ to 6½ inches wide, pure orange with almost no green color in the throat, graceful long petals 1½ inches wide, sepals ⅞ inch wide, the surface smooth with a good pleasing finish, petal margins slightly waved or ruffled, texture good; opening after sunrise and remaining open until midnight on cool nights.

Introduced by W. R. Ballard, Hyattsville, Md.

Color Contrast. Scape 2 feet high; flower width 4 inches, sepals sun-flower, flushing petal color on edge, recurved, petals 1 inch wide, pinched in at end, chrysanthemum; day blooming in August.

Dainty Pastel. Scape 2 feet high; flower 2½ inches wide, segments strongly recurved, sepals empire yellow, petals over 1 inch wide, salmon merging into sepal color at midrib, margin frilled on one side; day blooming in August.

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

California. Scape 2 feet high, widely short branched; flowers wide bell shaped, 4 inches wide, cadmium self, substance excellent, petals 1 inch wide, sepals ¼ inch; day blooming, beginning to bloom Aug. 10, extending into September.

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

Bomb Burst. 30″, 4½″, 22 hours, heavy substance, sepals orange chrome thinly edged morocco red, petals with crimped edges, orange chrome stippled lightly with morocco red to a halo at beginning of orange chrome throat, reverses the same, tips frequently pinched and thickened, yellow to green, opening late June (*Calypso* x *Cressida*).

Bronze Nymph. 34″; 4″, 16 hours, medium heavy substance, petals wavy with ridged mid-bands, sepals twisted wavy, bronzy deep chrome overflushed English red, heavier on sepals than petals, reverses deep chrome flushed English red, opens late June (*Cressida* x *Hyperion*).

Lively Dawn. 40″, 6½″, 15 hours, heavy substance, lily form, tips of sepals twist and reflex, edges of petals ruffled, self of deep orange chrome, opens mid-June (*Golden Dream* x *Calypso*).

Marion Williams. (inform. intro. 1946), 30″, 6½″, 14 hours, medium heavy substance, narrow segments, star form, petals mars orange, mid-bands orange yellow, sepals deep chrome flushed on edges with mars orange, opens late June (*Alamo* x *Dawn*).

Nimbus. 36″, 5″, 21 hours, medium heavy substance, *petal* edges undulate, *pale apricot buff,* edges delicately flushed orange rufous, *sepals* more heavily flushed orange rufous, halo of pompeian red, color in half shade, while in sun is a pale apricot buff with pale halo of pompeian red, and if cool and wet is dusted with pink; opens mid-June (*Cressida* x *Calypso*).

Introduced by L. Ernest Plouf, Lawrence, Mass.

Stratford Panel. 4 ft. July-Aug. Rich gold 6″ stellate flower; firm, very open distinct form; slightly pinched inner segments flare and twist giving grace; in contrast, outer segments smooth with neatly embossed edges; speckled tan area; heavy chamois substance; round outline; floriferous; slender erect stems; keeps well late.

Tagalong. 3½ ft. Aug.-Sept. Late and long blooming season; fine chamois substance; small rich soft orange flower gold-glistening; gold throat; slight fulvous area on inner segments; good erect stem.

Towntie. 3 ft. July-Aug. Pure lemon miniature; 2½″ trumpet; firm substance; good form and keeping quality; slender erect wiry stem.

African Mosque. 3 ft. Aug. Deep burnt yellow 5″ flaring flower; throat olive-cast, wide and effective; inner segments full and nicely crinkled; large, wide open, full and Amaryllis-like; excellent substance; keeps until dark. Features: form, firmness of substance, color and size.

Algerian Sortie. 4 ft. July-Aug. Inner segments pink-rose with broad cream midrib; very full and crinkled; outer segments cream flushed rose; canary throat; no fulvous tones; decidedly and roundly recurved; good stem; robust; good habit. A large well formed firm flower. Classified among the pinks.

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

Queen Titania. Height 48 inches, flowering in July; flower 4 inches across, maize yellow, faintly flushed old rose, with a faint banding of same, pale buff yellow edge and midrib; by color chart: pale ochraceous buff, veined and flushed carrot red, darker banding. Dainty colored and very free flowering.

Etna. (*Bold Warrior* x *Temple Fire*). Height 38 inches; flower 5¼ inches wide, petals 1¼, slightly recurving, Brazil red, overcast velvety Morocco red, faint yellow midrib, greenish throat; July bloom. A dark velvety carmine red, unfading, with an iridescent sheen.

Cornelia (*Mrs. Crawford* x *Milady*). Height 42 inches; flowers in July, 5 inches across, petals 1⅝ wide, light eugenia red, edge buff yellow, throat veined carrot red on green yellow; all segments wavy and slightly reflexed. A charming rosy tone that fades to a softer coloring.

Eugenia. Height 42 inches; flowers in July and August, 5 inches across, closed lily-like form, all segments fluted and slightly recurved,

Eugenia red with raised creamy midrib, throat deep chrome, petals 1¼ inches wide. An unfading rosy red.

Mariposa. Height 42 inches; flowers in July, 4½ inches across, light cadmium yellow, a heavy banding of purplish madder brown on the petals, sepals with a slight zoning, petals deeply reflexed. A very distinct form; looks like a Mariposa lily.

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

Scarlet Sunset. This is the most vivid red of any daylily which has bloomed for me, definitely a true scarlet and with the penetrating quality of fire. The throat is orange as also are the lines of the petal midribs. The flower is only medium large but opens widely and has a distinction of form. The petals are frilled and slightly recurved or twisted at the tips. Its stems are up to three feet and somewhat branched. A mid season bloomer in Florida.

William Penn. This huge flower, carried on 40 inch stems, is a garden show piece. It is widely open, forming a large, shallow throat and its beautifully frilled and creped segments are recurved only slightly. In coloring it is reddish chocolate in varying shades, all over suffused with intense violet tones which produces an iridescent effect. Measured by the Standard Color Card the colors run from the lighter Attar of Roses through Rose Ash, to Raisin and the much deeper Catawba in the eye zone section, but with considerably more violet than in any of these. Relieving this otherwise very dark flower is a throat of brightest canary yellow. The flowering stems on occasion have proliferations. It blooms late in the season in Florida.

Brandywine. A large flower of rich, deep mahogany coloring, shading to a purple eye zone. The throat is bright orange and extends in wide bands into the petals, gradually narrowing into lines. The orange coloring shows through the midrib section of the sepals. The flower is compact, full, very wide segments, the sepals being quite recurved while the petals open flat with the tips sometimes twisted or recurved. Stems 30″.

Demi-Tasse. This is a semi dwarf bicolor in magenta and orange. The flower is small with a deep throat, thus making it appear even smaller than it really is. The stems are 16″ and have produced up to 34 flowers to a stem.

Madam Butterfly. An eye spot flower of striking color combination. The flower color is light orange, wide eye spots surrounding the throat being a rusty reddish light chocolate. The flower is large, segments wide, well open, recurved and twisted at the tips. The petals are creped and frilled. Stems are 36″.

Editorial Note.—The *Hemerocallis* clones, *Ming Toy, Olympus, Psyche* and *Vega,* introduced by Mr. Wheeler in 1947, will be described in 1948 Herbertia.

Introduced by Mrs. Bright Taylor, Ocala, Florida.

Suez, Height 3½′. Evergreen foliage. Flower, standing 4½″, quite recurved, two-toned purple red, off turtle dove (Pl. 55 L 1) veined darker. Throat, sulphur yellow (Pl. 10 J 1) shading to primuline yellow (Pl. 10 L 5) star shaped. Effective garden plant, better in semi-shade. Petals 3⅞″ x 1⅜″; sepals 3¾″ x ⅞″.

Shalimar, Height 40″. Evergreen foliage. Flower standing, 5″. Two-toned centric between salmon and saffron (Pl. 10 C 8). Petals wavy with faint veining, giving darker effect; sepals slightly recurved. Throat jonquil (Pl. 9 J 5). Well branched and floriferous.

Lochinvar, Height 30″. Evergreen foliage. Large, widely opened flower with broad shallow throat. Petals, ember red (Pl. 5 K 10) faint eye zone 3½″ x 1½″; sepals same, 3½″ x 1″. Throat very wide cadmium yellow (Pl. 9 L 8). Early bloomer, with long flowering season.

Garden Flame, Height 3′. Evergreen foliage. Large flower. Petals 4″ x 1¾″, totem red (Pl. 4 J 12). Sepals 4½″ x 1″, slightly lighter. Throat near sunkist (Pl. 9 L 9).

Sweet Alice, Height 34″. Foliage semi-dormant. Flower ember glow (Pl. 3 G 10). Diameter of flower standing, 4¼″. Throat golden yellow (Pl. 10 L 7) petals 3¾″ x 1¼″. Sepals 3¾″ x ⅞″. Faint mid rib. Flowers just top foliage mass, are very floriferous and in the garden give a rosy effect.

NOTE: Color references are to Paul and Maerz' "A Dictionary of Color".

HYBRID AMARYLLIS CLONES

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

Freckles; Leopoldii type B; white with pink spots and stripes.

Gold Dust; Leopoldii type A; orange red, flower 8½″ in diameter.

Jack Frost; Reginae type B; white with pink stripes and frostings.

Lightning; Reginae type B; white with pink stripes which run lengthwise of tepalsegs to near the end.

3. GENETICS AND BREEDING

FASCINATING DAYLILIES—THE BEGINNING OF A HOBBY

J. Marion Shull, *Maryland*

When I made my first Hemerocallis cross in 1927 I had little idea how fascinating the game would become in later years. I had been working with Iris for more than a decade and because of their extreme range of color variation, apparently rivaled only by that of the pansy, was not surprised at the ever increasing modulations of color in succeeding generations.

But in Hemorocallis there did not seem such a wealth of variability to work with. There were the light lemon of *Hemerocallis flava,* the "Lemon Lily" of old gardens; the richer plain yellow of *H. middendorfii;* the tawny but variable color of *H. fulva* with its well-defined eye-zone of a deeper color, and *H. Dumortierii* with the questionably desirable darker color on back faces of segments that tended to dull the color effect in the garden. There were other varieties to be had but mostly they were within this same color range. There were no reds.

To a breeder working with Iris this did not seem a very promising lot of colors to work with, but I did apply some pollen of *H. fulva* to stigmas of *H. serotina,* then more commonly known by the usual catalog name of *H. Thunbergii,* the name under which I had received it from my Mother's Ohio garden.

Since *H. fulva* reputedly would not set seed I did not make any attempt to breed the two varieties in reverse but with pollen of *Fulva* on stigmas of *Thunbergii* I got a small batch of seed, just 9 to be exact, and from these nine only three eventually "hatched" and came into bloom, two of them so identically like the mother *Thunbergii* that I could not distinguish them in any way from each other or from the seed parent, but the remaining plant was so utterly unlike either parent that I became greatly interested in it and its future possibilities. It had broader petals than either parent, was more regular than *Fulva,* with slight ruffling at petal margins. The body color was rich yellow tending toward orange, and instead of the sharply-defined eye of the male parent, there was an overlay of flecked red gradually intensifying to nearly solid color as it approached the lighter cadmium yellow of the throat. Over-all effect of the flower at a little distance was a bright orange.

Having kept rather closely in touch with the work of my brother, Dr. George H. Shull, of the Carnegie Institution's Station for Experimental Evolution at Cold Spring Harbor, where he had recently discovered and demonstrated the value of controlled hybridity in field corn, a discovery destined to completely revolutionize the growing of corn throughout the country, it was only natural that I should look to this obviously hybrid *Hemerocallis* for interesting results in future generations.

Like its male parent, *H. fulva,* it would not set seed to its own pollen, further demonstrating its general hybrid character. Even with other pollens it was very reluctant to set seed. Ovaries would respond to pollination and begin to grow, then after doubling or tripling in size become a dark but unnatural green shortly to move toward yellow and then drop off. About one pollination in twenty would escape this fate and produce seed, but very sparingly.

Fig. 181. (Upper left) "Thulva" [*H. serotina (Thungergii)* x *H. fulva (Europa)*]. Shull, 1927. (Upper right) "Mahog", "Thulva" x *Florham.* Shull, 1933. (Lower left) "Mahog Sister", also "Thulva" x *Florham,* Shull 1933. (Lower right) F-2 (Shull), "Mahog" x *Hyperion,* Shull, 1938. All drawn by J. Marion Shull.

Bred to the variety *Florham,* a yellow self of somewhat clouded ancestry, the resulting seed gave two sisters, both bicolors in varying degree although no definitely bicolor character is to be found in either immediate parent or in either of the grandparents. One had petals of solid Mahogany Red with light yellow center stripe, and sepal segments of Sienna Yellow; the other was many degrees lighter but equally bicolor, petals yellow with nearly solid reddish overlay, sepals bright,

nearly clear yellow. Both flowers had ruffle edged petals and only a suggestion of an eye, not clearly defined.

These in turn entered into the breeding material of succeeding years. For convenience of recording, the first hybrid became known as "Thulva" (Fig. 181) a mixed name combining both parental sources; members of the next generation were dubbed "Mahog" (Fig. 181) short gardenese for Mahogany Red, and "Mahog Sister" (Fig. 181) respectively.

"Mahog" was then mated with *Hyperion.* Again the resulting family was quite small, only four sisters coming to maturity. These grew in row F and were therefore designated as F-1, F-2, F-3 and F-4 in series for garden record convenience. F-2 was a yellow self despite its bicolor "Mahog" mother. F-1 (Fig. 181) was very slightly bicolor in character, the petals lightly flashed with russet and with a delicate

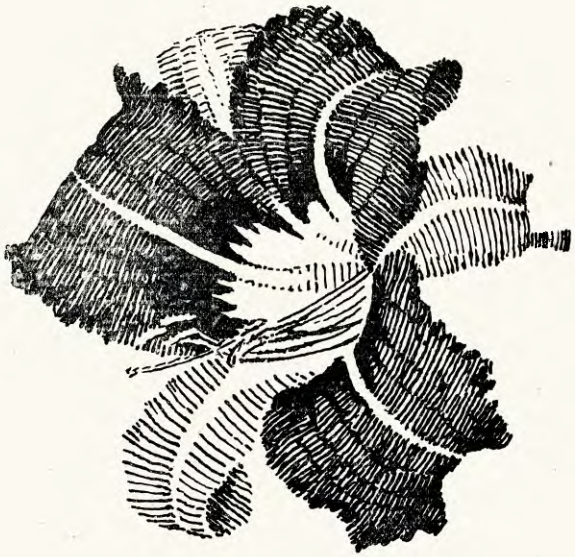


Fig 182. Hybrid Dayily—F-3 Shull, a ruffled bicolor, "Mahog" X *Hyperion.* Shull 1938. Drawing by J. Marion Shull.

but well-defined new-moon crescent in the eye-zone. F-4 was practically a self but lightly tinged with russet throughout. F-3 (Fig. 182) on the other hand was strongly bicolor, an intensification of its mother with strong Mahogany Red petals that were wider and more ruffled than in "Mahog." Sepals brighter and also ruffled and with light center stripe in both sepals and petals. The eye is darker and more sharply defined than in parent "Mahog."

Here I would like to repeat for emphasis that so far these reports are not from selected choice or unusual individuals from large families,

but are entire families, and the fascination is derived largely from the degree of variation within such very small numbers.

F-3 has proved itself valuable in further mating though strange to say the reciprocal family, wherein *Hyperion* was used as the seed-parent with pollen from F-3, there was no significant indication of the latter in any of the offspring. There was some variation in color from light lemon to rich banana, but all were yellow selfs of large size. One, subsequently named *Musette,* had oblanceolate petals, and one opened at dusk in the evening while the rest were normal day-bloomers. One of them burns white in hot sun while the rest are sun-fast. Thus do full sisters vary incomprehensibly.

At this point the English variety, *Iris Perry,* said to be derived from *Aurantiaca,* was brought into the picture and pollen of this used on "Thulva." From this union came the beautiful broad-petaled and ruffled-edge orange later named *Gipsy Lass.* "Mahog Sister" by *Iris Perry* gave the companion piece *Gorgio,* a bright yellow with near-white mid-stripe in the broad petals.

Next *Rajah* was admitted to the breeding lines, also *Vulcan,* but the former proved more valuable in that it contributed to reds of greater distinction, resistance to fading or burning, also freedom from rain spotting, as against such weaknesses when *Vulcan* was used.

Returning momentarily to the use of F-3 with *Rajah* as pollen parent the offspring tended generally to have long curly twisty petals far beyond the *Wau-Bun type.* Liking for this form depends largely on personal taste but I find some of them very charming and all of them interesting.

With this curly-twisty type in mind as largely derived from F-3 the next adventure called for mating it with *Duchess of Windsor* whose broad, regular, slightly ruffled Narcissus-like flower introduced a new element to the growing ancestral picture. What, for instance, would happen to the offspring when one strain attempted to pass on long curly-twisty petals, and the other, broad ruffled petals? The answer is now partly given in the gay ruffling of the extraordinary and unique *Fluffy Ruffles.* Most of its sisters inherit the broad petalage, and some degree of ruffling varying from the bouffancy of *Fluffy Ruffles* herself to the more regular marginal ruffling of fancy seamstress work found in one bright yellow sister.

Next step in this connected ancestral series is to see what will come out of a mating of *Fluffy Ruffles* with the rich vermilion red *Color Guard.* There is the suggested possibility of a broad-petaled bright red, extravagantly ruffled, sun-fast and free from rain spotting. Maybe it won't happen, but at least one is warranted by past experience to dream of such a creation anyhow. That is where much of the fascination of working with daylilies comes in. They are so utterly unpredictable as to detail and yet are almost certain to present new combinations of unfailing interest.

With the passing of time and the growth of interest and experience, larger families became the vogue so that report on all members of a family from here on would hardly be warranted.

"Thulva" and *Iris Perry* were bred reciprocally, and the ensuing families were recorded as families B and C respectively and may properly be looked upon as full sisters, as relationships go in the plant world, since they possess both parents in common despite their reverse status as father or mother. B-1 and C-2 of these families are not greatly unlike in their approach toward red but C-2 is more nearly self-colored, near Mahogany Red (Ridgway) whereas B-1 shows a darker and more defined eye.

B-1 bred with *Rajah* as the pollen parent, gave a number of fine reds, *Color Guard* being the best; runner-up a very large, slightly bicolor, flamboyant flower that although not officially registered, gets known in the garden as "Big Blowzy." Other reds from this same source are generally sun-fast, neither fading or burning, and do not spot in the rain. On the other hand reds to maroons derived from a mating of C-2 with *Vulcan* are apt to fade or burn in hot sun, and spot easily in the rain. Another member of family C, C-3, became *Gipsy Lass,* an orange that is entirely unaffected by sun or rain.

All of which goes once more to enforce the fact that no one variety should ever be designated as a "good parent" by itself. It is the happy mating of complementary individuals that makes for good offspring be they Humans or *Hemerocallis.*

THE LEONIAN HEMEROCALLIS BREEDING STOCK

Nell Lanham Leonian, *West Virginia*

Mr. Leonian became interested in flower improvement more than twenty years ago when he first became interested in delphiniums. His sucess with that flower led him to experiment with others which included *Iris, columbine,* and oriental poppies. Then in the early thirties he became acquainted with the beautiful daylilies in shades of yellow and bright orange which appeared on the market about that time. Later when he received a gift of a few reds his first thought was to try his hand at fusing the unusual color of the reds with the nearly perfect form of the yellows. This he did by a program of careful selection and cross pollination over a period of several years. As time went on he really became more interested in the development of color quality than in any definite form. However, his interest in color grew and as any shade, which seemed unusual, appeared, he made the best possible use of it in his breeding program to fix color. By the time his work ended, he had a great range of color in his plot. There were flowers of delicate peach, deep, bright orange and bronze at one end of the scale with exotic shades of pink, rose, red, and maroon at the other. As blossoms appeared on the new seedlings each year only the ones which most nearly approached his ideal of color were used as parent plants. Always the plants which were predominantly away from red or pastels were discarded.

The procedure he used in breeding plants decided Mr. Leonian's policy as to disposal of his product. He believed that he could im-

prove his plants with each year so that by the time any particular plant was ready for introduction it would be outmoded by the newer things in his garden. Therefore, he pioneered in the sale of daylilies as hybrids and did much to encourage the propagation of the plant by seeds.

Now that my sons and I are carrying on with the development of the unusual in *Hemerocallis*, we are using the same method but expanding the plot so that selection may be more exacting as time goes on. We aspire to the production of color tones that are true, rich, and unusual in a flower of excellent form whether the form be one of slender curving petals or of the frilled broad type. We expect the daylily to become more and more popular in American gardens as they improve in quality. There is no flower which requires so little care and special handling and at the same time makes an effective display for such a long blooming season.

MAKING NEW DAYLILIES

J. B. S. Norton, *Maryland*

For about 20 years I have been interested in producing new daylilies and have here brought together some of the things learned as a brief outline of the process.

The philosophy back of the making of new kinds of hemerocallis begins in the creative instinct of man which may grow out of curiosity and desire to explore the unknown. The love of the beautiful also develops the artistic sense and the effort to produce beautiful things. There may also be the urge of competition, to try to do something bigger or better than others have. The satisfaction of having something that will please other persons may be another factor. Last, in descending order is the need for something to trade for the satisfaction of other needs or wants. There might be the higher feeling of cooperation with the divine in creation, but this is probably not often thought of.

But why work on daylilies rather than some other flower? 1st. The possibilities are great. There are a great many chances of making new combinations. 2nd. Their hardiness saves time, thought, and effort not needed for keeping them alive. 3rd. Their beauty and variety gives more interesting experiences to the producer and enables him to interest a greater number of other persons. 4th, The field is new and yet largely undeveloped and interest in the many types of flower has not yet become static.

After these thoughts on incentives, let us pass to methods. The first thing is to get material to work with. The more species, varieties and clones one has to cross and select from, the more chances there are of getting desirable new combinations. There is a feeling that one should go back to the wild species, which contain all the chances that exist, and that species are pure entities, while the garden varieties are artificial mixtures. But the species are only groups of individuals that some one thinks are enough alike to be considered the same. The more closely one examines the plants grown from the seeds of one wild plant

the more inheritable differences he can see in them. Some of the wild *Hemerocallis* plants may already have a hybrid constitution. Perhaps no one has yet inbred them enough to get pure lines for recrossing as is now done with the new high yielding kinds of corn.

Unless one wants to make an accurate scientific study of daylily characteristics, he should recognize his obligation to predecessors and start with their productions which may have already had eliminated from them some of their less desirable qualities. A collection of a few hundred clones, with the greatest variety of characteristics from a number of different sources will soon give one all he can do to find out what will come out of them.

If one is not too ambitious, a small back yard well organized, will yield enough to be worth while. If one makes *Hemerocallis* breeding a major project, one or more acres is needed. The type of soil is not important. Any ordinary farm or garden ground, easily worked, with moderate fertility and moisture is all right. Some shade on the south and west will help to bring out the more delicate colors of some of the most beautiful kinds. A small show garden on a main highway or near a city gives opportunity to exhibit the selected kinds grown under the best conditions. The production area can be on a not too distant farm. Compost or rotted manure with a little fertilizer is the best treatment. Though *Hemerocallis* will endure almost any conditions, and stand drouth, they respond well to good culture and plenty of water.

The best way to select varieties is to see them in bloom. In the show gardens they can be planted with plenty of room and arranged by height, colors or other attractive method, to show to the best advantage to observers. The named stock for propagation and distribution will have to be classified alphabetically or in some other way so they can be easily found. Few people can handle very many kinds by memory. Rhizomate kinds need plenty of room to keep them from mixing.

The most difficult part of the work is to keep a large number of kinds correctly identified in the garden. The slightest piece of a crown left in or on the ground may grow and contaminate later plantings on land supposed to be clean. Seed may fall down and grow in a clump and produce what might appear to be a sport. All kinds of accidents may happen. A plot-book with the location of each plant with record of its origin and character must be kept, and annual corrections made during the flowering season, and field labels placed and replaced continually. No kind of label that is entirely satisfactory has yet been discovered. A six to eight inch wooden pot label printed on with capital letters with a wax pencil will do for temporary use. Thin 1x12 inch stakes painted white and lettered with durable dark paint can be used for permanent plots.

One can decide on what kind of flower and plant he wants to produce. An ideal can be, and generally is, adopted to breed toward. This is logical and scientific, but strange to say, the nearer the ideal is approached the more interest is lost. One can go on without an ideal except to produce attractive and beautiful flowers, selecting every form of beauty that comes up out of the unknown. In any case you never

know just what you are going to get out of the thousands of genes shaken up in the hybridizing box. There are plenty of chances for elation and for disappointment, yet the more the offspring of definite parentages is studied the more certain the results become.

An easy way of working is to put the pollen from some excellent kinds on every kind you have and see what you get, but for more intelligent work, keep records of one or both parents.

If accurate pedigree records are not to be kept, the hybridizing methods are much more simple than most gardeners are led to believe. You can produce many hundred hybrid seeds in an hour, almost automatically, after practice, using the mind mostly for selecting what to cross. Start as soon in the morning as the anthers are open exposing the pollen. If records of parentage are not to be kept, a stamen from the selected pollen clone can be carried in the hand and the pollen touched to the stigmas of the intended mother plants until the pollen is all used, then another stamen is taken and used, and so on.

If parentage records are desired, hold a bunch of small string tags with three fingers of the left hand, with a short wax pencil in the right. After the pollen is applied the stamen can be held in the lips till the next flower, while an abbreviation for the pollen clone is written on the tag. Then with the thumb and fore finger of each hand the tag string is put over the tube of the flower, the tag through the loop and the loop slipped down onto the flower pedicel. The few chances of getting other pollen on the stigmas can be ignored.

When the seed pods begin to crack, generally while still green, they are gathered into envelopes on which the parentage is written and the seed shelled out then or later in the day, before they begin to dampen the envelopes.

The seed can be sown immediately, or in the fall, or winter, or saved till spring, either in the house or greenhouse, frame, or out doors. Planting them in the place where they are to grow until flowering, saves labor and avoids the check in growth due to transplanting, but the seedlings may be too close together or too far apart. If grown inside with favorable light and temperature and set in the garden in the spring, the time before flowering is often reduced several months.

The seedlings can be grown in rows just far enough apart to get between them, and three to six inches in the row. Most of them will be discarded when they bloom in two or three years, leaving the selected ones plenty of room to develop their full character. The term "seedling" is often applied to all unnamed plants, but it is not a very accurate term to so use.

Perhaps the most difficult process comes now, to decide which to save and which to discard. One should have independence enough to save what he likes. But if he is planning to put new kinds on the market, the beginner needs the advice of more than one experienced daylily grower, if for no other reason, to develop some artistic sense of his own by seeing how widely others differ on what constitutes excellence. The criteria laid down by noted breeders as to plant, season.

vigor, and other things, must be kept in mind. However, beauty of flower is the first consideration, and without it all other qualities are worthless.

A clone should not be considered fully evaluated until the clump has been divided and grown in a different situation for at least two years.

Many things remain to be sought for in hybrid *Hemerocallis*. A few improvements may be mentioned: purer pink, red, purple and white flowers, better resistance to climatic influences, longer blooming season, better early and late kinds, longer life of flowers, wider petals and especially wider sepals, bicolors with sepals darker, other color patterns, better surface texture, extension of the areas to other parts, a study of the characteristics of buds, bracts and leaves leading to a fine enough classification to enable the different kinds to be recognized when the names are lost and more cooperation between growers and breeders.

WHY NEGLECT THE NIGHT-BLOOMERS?

W. R. Ballard, *Maryland*

As to blooming habits, daylilies may be divided into (1) day bloomers, (2) night bloomers, and (3) night-and-day bloomers. Probably the great majority of the existing varieties belong to the first class.

The second class which derives from *Hemerocallis citrina* begins to open its flowers "shortly before sunset, are widely open during the night, and they usually close early in the following forenoon especially on warm, sunny days." One of the earliest of the named varieties to be introduced was *Calypso*.

The night-and-day bloomers are characterized by flowers which open late in the afternoon and continue to remain open during the following day or longer . Norton's *Woodridge* is a good example of this class.

Who has worked out the genetics of the night-bloomers? Is this a dominant or recessive character? Is it possible that the night-and-day bloomers are the result of crossing the day and the night bloomers? If true, may this not be the lead for developing varieties with flowers which remain in good condition over a longer period than those most of the standard varieties?

Daylilies make very satisfying flower arrangements either with blended colors or with sharp contrasts. For evening decorations, however, most of the present day varieties are a wash-out. They either go to sleep or lose their brilliant coloring so that their appearance is anything but pleasing. Here is where the night bloomers come into their own. Opening, as they do, late in the afternoon they still have their fresh beauty unimpaired. Most of the clones of this group which I have seen are varying shades of yellow or bi-colors. It would be a distinct advantage if the color range could be extended to include the reds and pinks.

Logically, of course, the type which should be developed is that of the night-and-day bloomers, for the night bloomers are a disappointment as far as their garden effect is concerned, since for most of the way they are quite unpresentable.

If anyone has worked out the method for developing the night-and-day bloomers, it would be a worthwhile project for daylily breeders to set about increasing the range of color, and particularly good substance. From my observations it appears that many of the night bloomers have very poor substance and are easily injured by rains or exposure to the hot sun.

It may be a mistaken idea that most daylily breeders are considering only garden effect in the development of this popular flower, but it would seem that the necessity of increasing the popularity of the daylily by providing suitable types for house decoration or flower shows in the evening has largely been overlooked. At any rate it would be interesting to have a fuller discussion of this phase by those best qualified by knowledge and experience to give the facts.

DAYLILY BREEDING AS A HOBBY

Lewis A. Hurst, *Maryland*

The question most frequently asked by visitors to our *Hemerocallis* garden is why I chose the hybridizing of daylilies as my retirement hobby—and hobby it is for at no time have I been interested in its commercial returns. The answer is that I had begun some of this work on a very small scale a few years prior to retirement and found very fascinating the study of the infinite variation in form, color, color combinations, texture, habits of growth, and temperamental reactions to weather conditions, etc., which are characteristic of this plant.

After retirement, I had anticipated growing no more than one or two hundred seedlings each year, but a sunny vacant lot of about a third of an acre with rich soil was my undoing. Daylilies were less care and certainly added more to the landscape than rag weeds and tall grasses that had to be mowed and burned over each spring. So in the last three years the greater part of the area has gradually come to be a late-May-to-August color picture composed of plants purchased from other growers for breeding, and my own hybrids, blooming in very great profusion, many of them for the first time. The most interesting to me, however, are our own seedling selections which we each year single out as the choice of the new crosses, and grow on until better ones arrive to take their places.

I plant the seeds in the fall before the ground freezes—late October usually—planting the seeds in two to three inch bands (rows), twelve inches from center to center of rows thus reducing the weed hazard by more perfectly shading the ground. During the first season, I thin out and transplant some to vacancies where germination fails, or where premature plants are killed by freezing when unseasonably warm weather in late fall causes too early germination. However, in general

the plants grow on as planted. We get about forty to fifty per cent bloom the second season after crosses are made. Because of the crowded conditions in the seed bed, we usually allow the plants to bloom for about three years when practically all of the plants will have shown colors. But in the meantime a partial thinning out process is practiced in two ways; one by relegating to the compost heap at once the plants whose blooms show but little promise, and the other by transplanting a few selections from each year's crosses to the trial plots for growing on for further study. Some of the methods employed may be open to adverse criticism, I know, but they have served very satisfactorily in the case of such a temporary garden as ours, operated without outside help.

An ever-changing, unpredictable color patch as our daylily garden is an exciting hobby every day from the first blooms in early spring until the last flowers pass out with the early freezes in the fall. The peak of bloom occurs in July.

No doubt many others who are working with this pastime are deriving as much pleasure from it as we have. We entered the game for the fun of it and the outdoor exercise that it offered, but now at 73, I plan to operate with greatly reduced numbers of seedlings, using for hybridizing, chiefly the choicest from our own breeding efforts, some of which are quite promising, or at least, very interesting.

FOUR HYBRID DAYLILIES

C. W. Culpepper, *Virginia*

In 1946 Herbertia, the present writer described very briefly his first four hybrid daylily introductions. These are considered a little more in detail in the present paper along with some thoughts on ideals and methods in daylily breeding.

Adventure. The yellow day lilies have long been of such excellence in many respects that not as much attention has been given to their further improvement as they deserve. Any seedling with superior qualities in any respect therefore should be noted and considered in any selection work. The variety here described is the result of many years of crossing and selection. It has been named *Adventure* because it is the first variety introduced in my adventure into the unbounded realm of daylily improvement. It is a third or fourth generation descendant of *Patricia* x *Stalwart*. Of its many excellent qualities it is most noteworthy for the finish and texture of its flowers, being considered delicately attractive in this respect. The color of the petals and sepals is Deep Chrome to Cadmium Yellow of Ridgway. The flowers open widely the petals curving gracefully outward being only slightly reflexed. The margins of the petals are somewhat frilled which makes the flower free of the stiff formality characteristic of some of the yellow varieties. The flowering stems are three to four feet tall, moderately stiff and well branched. The plant is a good grower but responds well to good culture producing an abundance of large flowers under such treatment. It sets

seed freely with the pollen or many other varieties which offers opportunity for combining its good characteristics with those of other varieties to obtain still better forms.

Big Glory. The variety *Ophir* has long been a standard of excellence in growing habits. It thrives under a wide range of soil and climatic conditions producing an abundance of flowers upon sturdy well branched stems. Its flowers do not open as widely as might be wished and are sometimes considered a little coarse. It sets seed sparingly, crosses with it being difficult to obtain. It, therefore, seems that any variety having the good growing habits of *Ophir* but with a better quality of flower would be very desirable. It is felt that the variety here described is a step forward in the improvement of the *Ophir* strain. It has been named *Big Glory* because of the large size and beauty of its flowers. It is seedling of *Ophir* crossed with an unnamed seedling. The color of the flower is Capucine Yellow to Deep Chrome of Ridgway. The form and finish of the flower is different from that of *Ophir* and is considered to be an improvement by many. It is semi-flaring, large, often having a spread of seven to eight inches and borne upon sturdy well branched stems. Its flowering season is the same as that of *Ophir*. It sets seed sparingly but somewhat better than *Ophir* which gives opportunity for further improvement of this strain.

Albedo. There is a very great need for better late varieties in all color groups. One might endeavor to secure these by crossing the midseason varieties with the small flowered late multiflora and from the seedlings select the large flowered late types and inter crossing these and their progeny until the desired forms appear. Another method would be to inter cross the latest large flowered varieties and from these seedlings select the latest good forms as parents for a second generation and so on. I have not had much success with the first method though not enough has been done to disparage the method. However, I have developed some midseason late strains right out of the midseason varieties. These seem to be useful for further work as well as being equally useful as garden ornamentals. One of these is *Albedo*, so named not because of its whiteness but because the flower reflects the morning sunlight somewhat suggestive of the manner of reflection in freshly fallen snow. It is a midseason late in flowering habit blooming at the same time as *Dorthy McDade* from which it differs widely in form, finish and texture of its flowers. The petals are a light yellow being close to Pinard Yellow of Ridgway and their margins are moderately frilled giving the flower an airy appearance. The flower is spreading with a very short throat in which almost no green appears. The petals are one to one and one half inches wide and curve outward without being rolled back appreciably. It is of complex parentage, not entirely known, but having the blood of Hyperion in its ancestry. It sets seed rather sparingly but enough are produced to appear to be useful in further development of late varieties. It is introduced with the hope that it may be useful to some breeder as well as give a bit of pleasure to some lover of this favorite flower.

Acceptor. One complaint against the *Hemerocallis* is that the flowers last only for one day. It is recognized by all that to a large extent this is compensated for by the production of flowers that open successively over a considerable period of time. However, the length of the flowering period does vary very greatly in different strains. Often the selection of varieties is made upon the color and form of the flower and the length of the flowering period is very largely left out of consideration. The variety here described is so outstanding in the length of the flowering period that it has been thought worth while distributing it for this character alone. *Acceptor* of course has many other good qualities. It was so named because it accepts pollen from a remarkably large number of varieties giving well developed pods with good seed. In 1946 the pollen of more than thirty varieties was applied to the flowers of *Acceptor* with two or three varieties only failing to work successfully. The length of the flowering period is shown by the fact that in one year the last flower of Queen of May was used to pollinate the first flower of *Acceptor* and the first flower of August Pioneer was used to pollinate the last flower of *Acceptor*. It is a seedling of *San Juan* x *Theron* and it has many of the characteristics of both parents. It has the sturdy stem of *San Juan* and the excellent branching habit of *Theron*. It has the deep green vigorous foliage of *San Juan* and the good growing habits of *Theron*. The flower is usually deeper in color than either parent The color is Blackish Red-Purple of Ridgway. It has a light yellow throat and a light yellow line lengthwise through the center of the petals. Like both its parents it fades considerably with full exposure to sunlight on very hot days. It does not replace either of its parents but does combine many of the qualities of both. It is too early yet to say how far the long-season blooming habit is transmitted to its offspring.

SELECTIVE HEMEROCALLIS BREEDING AT THE UNIVERSITY OF FLORIDA

JOHN V. WATKINS, *University of Florida*

In the early thirties, selective breeding in *Hemerocallis* was begun by John V. Watkins at the University of Florida. Early in the work it seemed to this hybridizer that there was a real need for a strain of dwarf evergreen plants that would bear tiny blossoms of cherry-red during early April. By carefully controlled cross-pollinations, several generations of plants have been produced which have yielded thousands of seedlings. From these, two sisters have been selected which most nearly approach the ideal which was set up at the inception of the project. It is hoped that a sufficient stock may be worked up so that these seedlings can be described, named and distributed in the Deep South by 1950.

Another family of plants was utilized in an attempt to produce a fast-growing, evergreen daylily that would bear flowers of '*mulberry fruit*' color on four-parted scapes early in April. *Theron*, *Persian Prin-*

cess and *Black Falcon* all of which are deciduous, very reluctant growers and very late bloomers, in Florida were used in original pollinations. About five generations have now been bred, and many promising evergreen seedlings may be viewed in the seedling plots. None of these show all of the characters that this hybridizer wrote into the original hypothetical description. It is planned to continue selective breeding within this family of blacks.

ECONOMY IN GROWING DAYLILY SEEDLINGS

J. S. Cooley, *Maryland*

Any short cut in growing daylily seedlings should be very acceptable to the amateur breeder of which there are more and more every year. The necessary work for growing a few thousand of daylily seedlings to flowering is at best considerable. If one has a new crop of seedlings every year to work over one soon begins to look for every possible labor saving device.

The writer has tried several methods of sowing the seeds and growing the resulting seedlings with varying degrees of success. Sowing the seeds in a bed outside in early fall was not satisfactory, because many of the seedlings emerged that fall and suffered winter injury and many of them actually died. Sowing the seeds in a cold frame in the fall largely overcame this difficulty but transplanting the seedlings in early spring entailed too much work. There was the additional objection that the seedlings were often transplanted too early and were injured by a late frost. Very young seedlings that emerge in late fall may die of winter injury when more mature plants would not have been affected. Likewise it is common knowledge that a thoroughly hardy plant may be killed by frost when it is taken from the warmth of a cold frame and exposed to even light frost. Another method was to sow the seeds outside in the spring, but this has the objection that any seeds that require a cold treatment to make them germinate do not emerge that summer.

The method finally adopted was to sow the seeds outside in November late enough that they will not germinate that fall. The seeds are sowed rather thickly (several to the inch) in rich friable soil and covered about 1 inch deep with rotten compost such as that made from a rotting pile of brush. The seedlings emerge in the early spring. A fine stand is almost always obtained. They are left in the seedling rows the first summer. The rows should be at least 2 feet wide. The next spring the seedlings are transplanted as soon as danger of the ground freezing is over. This method has the advantage of eliminating during the first winter and before transplanting any that are frost tender. It also precludes the possible loss of some young seedlings that are naturally hardy and are uninjured when left undisturbed in the seedling row. Transplanting in the second summer has the added advantage that it usually saves one year of cultivating and caring for the transplanted seedlings cover a larger area.

When the seedlings are transplanted to their permanent location they are set as close as possible and still allow for proper development, which is about 3 to 4 inches apart in the rows that are spaced 8 to 10 inches apart. With a fertile soil and good culture most of the seedlings will have bloomed by 2 years after transplanting. The ones selected, if any, can be removed for further observation and the rest discarded.

It may seem a pity to destroy all but the few that show promise of being better than any already in cultivation. Such a practice must of necessity involve the destruction of some high quality plants. It is much better however to destroy some that may be nearly as good as the best than give out for public distribution clones that may be less than the best.

A daylily planting may last for many years and for that reason the initial planting should be as good as is extant at that time. Furthermore it requires no more space or care for a good daylily variety than for a poor one. It seems to me therefore that the practice of distributing unproven seedlings tends ultimately to injure daylily advancement.

DOUBLE DAFFODILS [1]

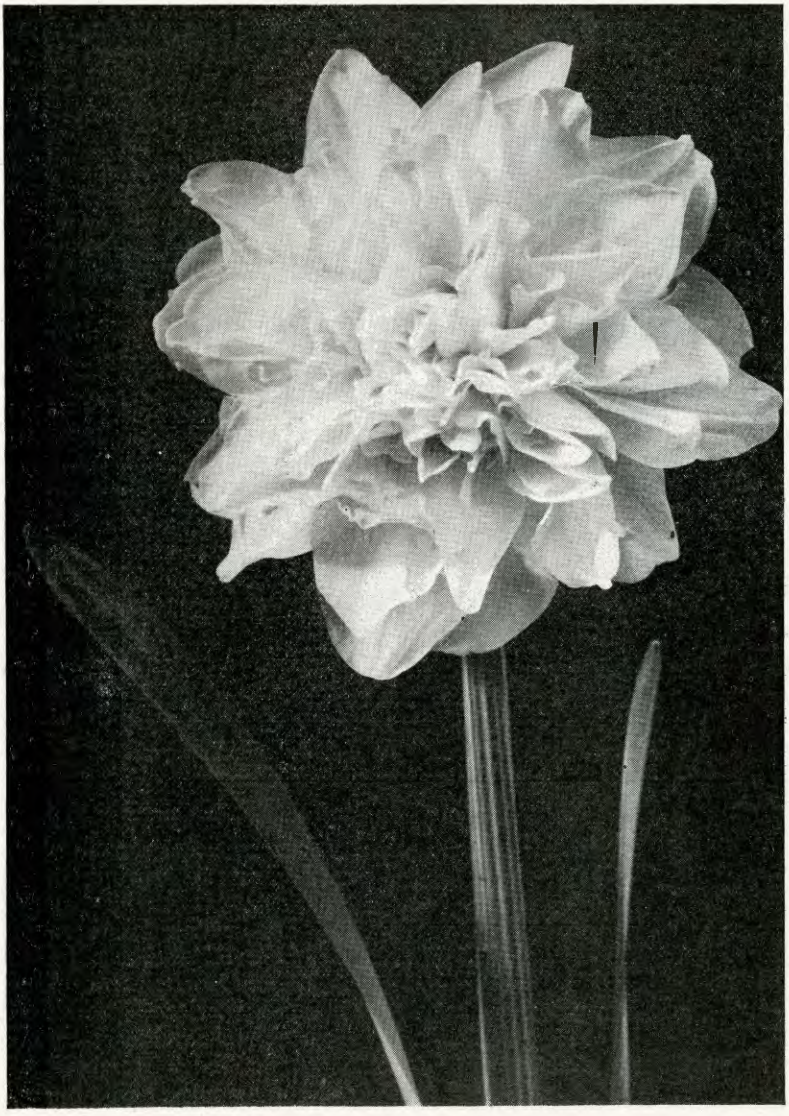
ORNATUS, *England*

As plants for garden decoration pure and simple, the double Daffodils are no doubt less desirable than the more plentiful single types, as they are more liable to damage, owing to the weight of the flowers, from strong winds or heavy showers. Nevertheless, they are of considerable use and deservedly popular as cut flowers for vases, or grown as pot plants, or in fibre in bowls, while the old yellow *Narcissus Telamonius* var. *plenus* is largely used for naturalizing in woodland and outlying parts of the garden, and is one of the few doubles that may be forced for early use.

Another old variety, also useful, very beautiful, pure white, and sweetly-scented, is one that flowers at the other end of the season, viz. in May, the "Gardenia-flowered" *Narcissus poeticus* var. *flore pleno.* This does best when planted in deep, moist soil and allowed to become established; unless these conditions are allowed for, it has a tendency to go blind on occasion. An earlier double white is the variety *Daphne,* one plant of which was originally found by Mr. Culpin, of Spalding, among a batch of *N. poeticus* var. *ornatus,* from which it was no doubt a sport. From this one plant has been worked up what must be a very large stock, and the bulbs may now be obtained for about a shilling each. These double white varieties have a high value for market and florists' purposes, being largely used as a ground work in wreaths and floral designs.

To Mr. W. F. M. Copeland, of Southampton, belongs the credit of having raised improved varieties of double Daffodils. His variety *Mary*

[1] Reprinted by permission from Gardeners' Chronicle (London) 106:118-119. 1939. The illustrations that accompany the article were kindly furnished by Jan de Graaff, Sandy, Oregon.

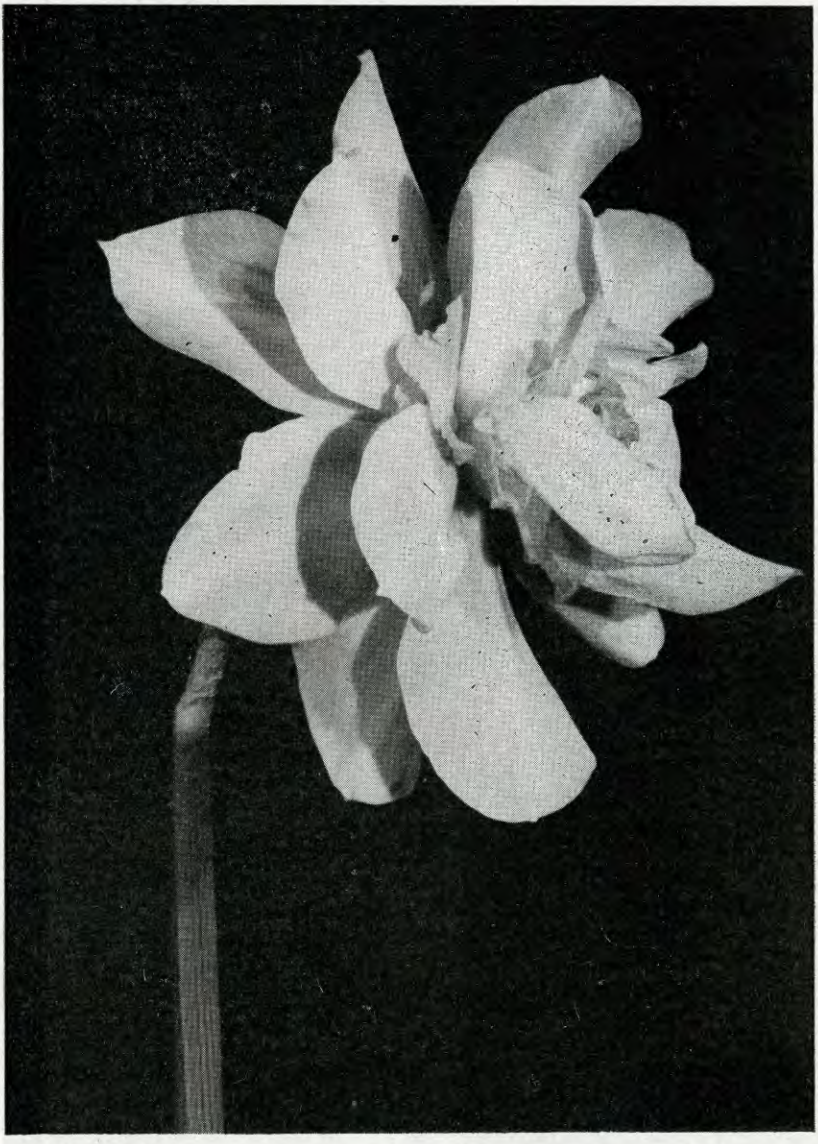


Hybrid *Narcissus—Irene Copeland.*
Photo by Jan de Graaff

Plate 308

Hybrid *Narcissus—Cheerfulness*
Photo by Jan de Graaff

Plate 309



Hybrid *Narcissus—Twink*
Photo by Jan de Graaff

Plate 310

Copeland, raised, he tells me, from an un-named *poeticus* x *Orange Phoenix* (or *Eggs and Bacon*), is probably the most beautiful and popular of the whole double-flowered race. It is a flower of very perfect and symmetrical form, the encircling petals being creamy-white, and the inner ones orange-red and creamy-white, alternately distributed, building up a remarkably brilliant and attractive flower, which seldom fails to obtain highest honors when exhibited. Mr. Copeland has raised a good many other doubles, but the best known and most frequently seen of these are *Irene Copeland,* lemon and white; (Plate 308); and *Mrs. William Copeland,* a large, substantial, full flower of pale color which is a very strong grower and long laster. When referring to *Irene Copeland* I ought to have said that it is valuable for its earliness and its amenability to forcing.

The late Mrs. R. C. Backhouse raised several doubles, the best known of these, perhaps being *Texas,* an enormous red and yellow flower; *Fiery Knight,* and *Insulinde,* of brilliant coloring; the latter variety gained a First Class Certificate at Haarlem in 1934. It was in evidence at the R. H. S. Meeting on March 7 this year [1939], and appealed to me as very striking; I should term it a semi-double, of wide and spreading form and rich coloring; I noted it as quite an outstanding variety.

The late Rev. G. H. Engleheart, in his later years, raised several fine double white Daffodils, of which Engleheart's *Carnation* (A. M., R. H. S., 1933), and Engleheart's *White Rose* are examples; the latter was awarded the R. H. S. First Class Certificate, and is perhaps the most beautiful double-white Daffodil yet seen.

A Daffodil that has recently become remarkably popular is the double *poeticus* variety *Cheerfulness* (Plate 309), which originated as a sport from Van der Schoot's *Elvira.* The coloring is creamy-white and yellow; besides being an attractive border plant, it does well in pots or bowls, and is a favorite in the markets, being very effective when "boxed".

A very large and full flower of soft yellow color which has been in good form at the shows this year (1939) is *Inglescombe,* introduced by the late Mr. J. Walker so long ago as 1914, while *Primrose Phoenix,* another somewhat of this type, is of soft lemon coloring and looks attractive in a vase; there appears to be no record of its raiser, but it gained an Award of Merit so long ago as 1902.

Holland's Glory, introduced by Van Leeuwen, has been stated to be a double sport from *Emperor;* when at its best it is a fine exhibition flower, but at times it comes rather coarse and unshapely. A double not much seen now is of Mr. W. A. Watts' raising, *Linos* by name; it is interesting to Daffodil breeders by reason of its unusual pedigree; it was raised from a cross made between *Beacon* and *N. Telamonius* var. *plenus.* Here I am reminded that Mr. Copeland tells me that in his experience the product of first crosses made with *N. Telamonius* var. *plenus* are usually of doubtful constitution, whereas the second generation gives more vigorous and stronger-growing plants.

A double raised by de Graaff and named *Twink* (Plate 310), is a desirable variety, more especially by reason of its forcing qualities; I have seen it exhibited in good condition quite early in the year; it is a flower of pale yellow, deepening to orange in the center, and is a good border or decorative variety. *Argent* and *Dubloon* were two of Engleheart's earlier raising; the former is a graceful semi-double and a nice cut flower of soft yellow and white, while the latter, from a cross made between *N. poeticus* var. *ornatus* and *N. Telamonius* var. *plenus,* is of similar coloring but more double; this variety makes a notably pretty group when naturalized.

A pretty semi-double, pure white, a late flower with very long stems, is *Triplex,* which I do not think has been seen at the shows here since it gained an Award of Merit at Chelsea Show in 1929, as the stock went to Holland; it also took a similar Award at Haarlem in 1938 and it is a somewhat Camellia-like variety with rather flattened, snow-white petals, symmetrically arranged. It was raised by Mr. F. Herbert Chapman, its parents being *Moonbeam* and a *poeticus* seedling, from which cross came several other semi-doubles. It is interesting to speculate on the why and wherefore of doubles (or semi-doubles) coming from such a cross as this. Some people tell us that the late double white (or Gardenia-flowered) came as a sport from *N. poeticus* var. *recurvus,* and as the latter was one of the parents of *Moonbeam,* it might be sugegsted that there was a family tendency here to throw doubles; but this, of course, is pure speculation.

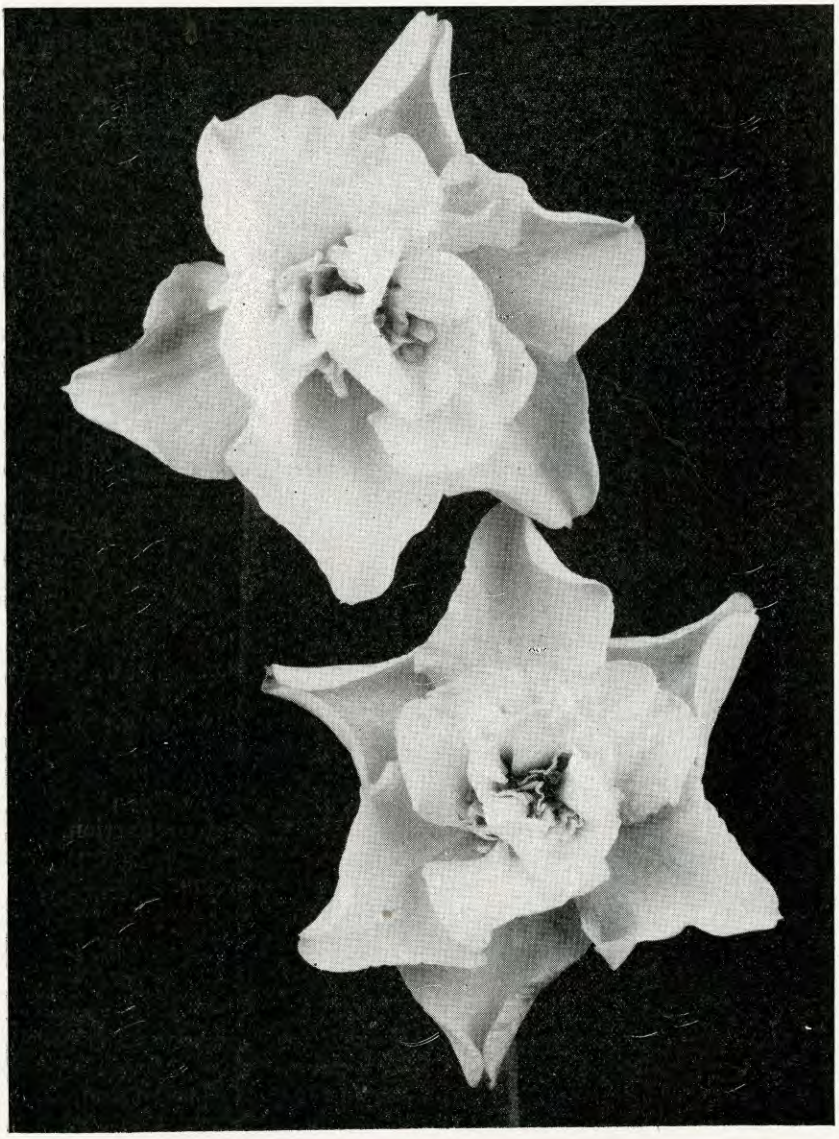
Before closing, I cannot omit mention of the old *N. cernuus* var. *plenus,* reputed to be a native English flower, and now very scarce and greatly prized, a graceful and beautiful silvery-white variety. Many will remember that great Daffodil lover, the late Miss Ellen Willmott, could sometimes be seen wearing a posy of it; it is difficult to keep or establish unless planted in a shady spot in pure loam, but such a gem is well worth taking special pains with.

In what is written above I have, I think, included the double Daffodils most frequently seen and most popular, but the list does not profess, of course, to include them all, and space forbids more than a mere mention of such varieties as *June de Miel,* delicate and graceful, white, with a yellow center; *Rip-van-Winkle,* a scarce little yellow double; *Snow Sprite* (Plate 311), and early double, white; the old *Codlins and Cream* and *Eggs and Bacon,* and a few others now seldom seen.

AMARYLLIS BREEDING IN THE NORTH

STANLEY JOHNSON, *Pennsylvania*

It is a fascinating thought to realize that we are able to assist in the development of new varieties of plant life and there is that certain pride resulting from successful plant breeding. Possibly you have heard the expression "Let the hybridizing to the experts while the amateur should grow the species and endeavor to obtain near perfection." Considering that the breeding of most plant life is not too complicated,



Hybrid *Narcissus—Snow Sprite*
Photo by Jan de Graaff

Plate 311

every amateur could do some hybridizing and obtain successful results.

There are several methods of obtaining new varieties. The first is by cross-pollination which undoubtedly is the most successful and reliable method. The second is by the discovery and selection of mutations or so called "Sports". This method is very uncertain and does not frequently occur in most plants. The last plan is by using the chemical colchicine. This drug increases the chromesomes of the plant. This technique is also uncertain and still in the experimental stage, until more scientific data is available it will be wise to leave this method to our scientists.

If you are interested in breeding any certain species of flowers, it is well to select at first a plant that is of simple construction and the essential organs are easily identified. My suggestion is working with *Amaryllis*. This flower has already proved itself to be of great value for study to botany students. After you have gained the knowledge and art of breeding you then can apply your experience to hybridizing other kinds of flowers.

It is possible that in the near future one of our experts on the *Amaryllis* will give us a point scoring system or a "standard of perfection" so that it will be possible for one to evaluate his results and achieve a scientific rating. This could be based on the following score-card, which I am submitting for consideration.

STANDARD OF PERFECTION SCORING SYSTEM

20	*Color*-Bright, attractive and useful minus 4 dull; -3 fades; -2 not attractive.
15	*Form*-Uniform and artistic; -4 deformed; -3 ordinary; -2 varying.
5	*Distinctiveness* in color, form etc.
20	*Size*
10	*Stem*-Strong, long, erect and in proportion; -3 weak; -3 crooked; -3 out of proportion.
10	*Foliage*-Healthy and in proportion; -5 poor weak; -3 poor proportion.
10	*Substance*-Petals firm and thick.
10	*Floriferousness*-Profuse and early; -3 shy; -4 late.

TOTAL SCORE, 100

This would eliminate the inferior varieties selected on the basis of first impression, or so called "I like it" varieties. The breeder would then have a good chance of developing new varieties of merit and distinction—better than existing standard varieties. It would also enable one to follow some certain line of breeding. The standard of perfection would be a most valuable guide to all growers. One would be able to definitely know what specimens are the ideal or perfect types, and the score card could be used as a "Yard-Stick" measure to rate ones seedlings.

When one comes to the actual work of hybridizing, the tools should consist of a small camel's hair brush and a pair of small tweezers. One's

selection of the plants or foundation stock should be made after careful study. It will be wise to buy only plants of the best varieties conforming to standards of the flower such as form, dimension and color.

The *Amaryllis* flower has a pistil and on the end is the stigma. Usually there are six stamens. Select some individual bud then watch for the expanding of the pedals. When the bud has opened, use the tweezers to nip off the six anthers atop the stamens which have not as yet discharged any pollen.

The next day examine the flowers and one will notice that the stigma has expanded or grown larger. The following day the stigma should be "receptive" so that pollination can take effect. One now must have another plant, the flower of which is in full bloom unless you have facilities for storing pollen. This will be your pollen plant so with your tweezers remove the anthers letting them drop into a very small box or saucer. Take your brush and carefully transfer this pollen from the anthers to the brush. Then apply the pollen directly on the stigma of the seed parent. If the pollen has "taken" it will be apparent after a short time by the enlarging ovary at the base of the pistil. It is wise to indicate or mark the plants used for breeding. They can be named or code numbered. Tie a small tag to the stem of the hybridized flower, showing the parentage. Mark tag as example (Seed parent X Pollen Parent), the letter X indicating "crossed with".

After the seed-pod has ripened and has almost dried it must be removed. The seed should be cleaned and they should be left to mature for a week by spreading on a low flat cardboard box. Keep away from direct sun light. The seed then can be placed in a small wood or paper box for storage until ready to use. Damp seed will quickly mildew. I prefer to immediately plant the seed in a medium of "vermiculite" or expanded mica. This is usually indoors or under glass during the summer months. The seedlings are kept growing during the winter months and planted in the garden in early May. *Amaryllis* prefer a light soil and irrigation is required during the dry summer months. The bulbs are dug in the fall, stored dry in a basement and again planted in the garden. You can expect most of the bulbs to flower the third year.

When the flower appears one will know the results of one's work. Each flower should be checked, scoring it with the "Standard of Perfection". Those that do not score 85 points should be destroyed. It is far better to get one or two outstanding new *Amaryllis* than to save 50 or more that show no improvements over existing varieties. One must work with the thought of progress toward developing superior strains.

PICOTEE HYBRID AMARYLLIS

TH. HOOG, *Haarlem, Holland*

It is perhaps fifteen or more years ago that the writer noticed amongst a batch of large-flowered white hybrid *Amaryllis*, at Messrs. van Tubergen's "Zwanenburg Nurseries" at Haarlem, Holland a plant

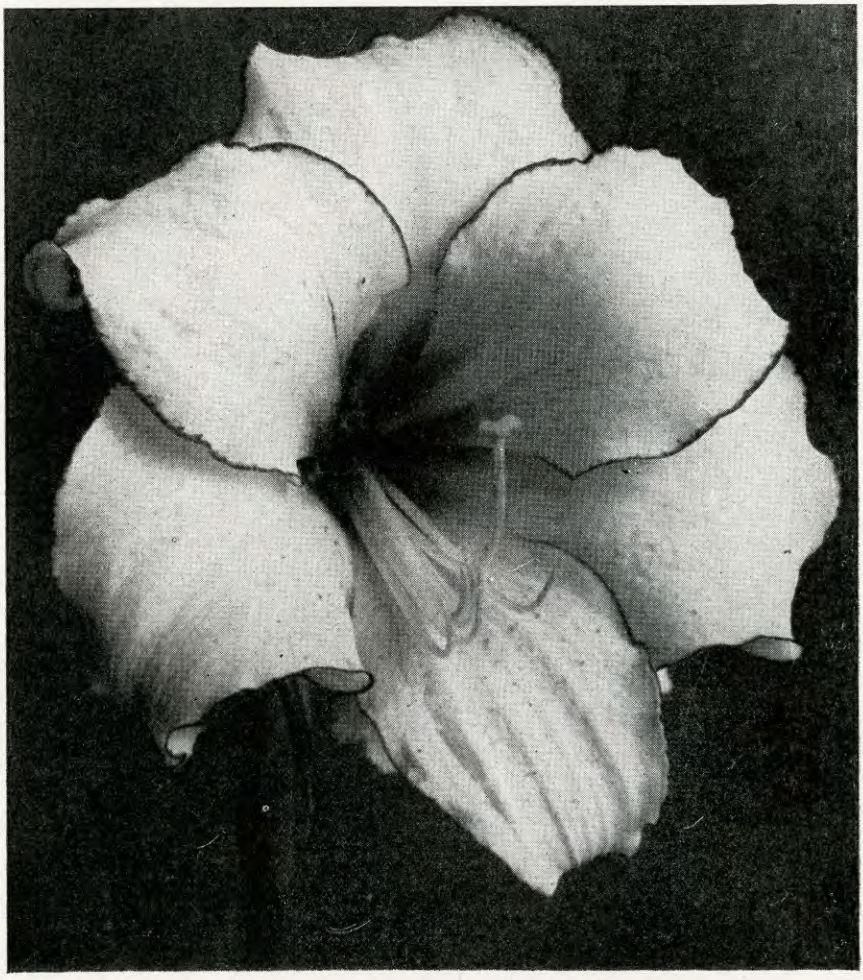


Fig. 183. Picotee Hybrid *Amaryllis*. Photo by W. J. van Borselen, Haarlem.

which was distinguished by a distinct narrow red rim along the edges of the segments. The flower itself was of poor quality, the stem was very weak and it carried but two flowers. By fertilising it with pollen of a variety which more or less had developed the same character, seed-

lings were raised which were of slightly better quality than the original plant. At first many plants appeared which besides the desired narrow pink edge also had reddish or pink stripes near the centre of the flower. These were eliminated and by always saving seeds of the best varieties, gradually great advances have been made. At present the flowers are fairly large, they have much substance, they are well-opened and the segments overlap. The colour is a pure white throughout with only a distinct pink rim on the edges. (Fig. 183) Although the majority have about three flowers on a spike, it is hoped that ultimately varieties with four flowers, out at the same time, will appear.

Like the pure white *Amaryllis* these Picotees flower quickly from seeds. A batch of seedlings of 1944 is just starting into flower—May 21st. 1946—so exactly two years after the sowing the first flowers opened. Owing to the difficulties of the last years they have not been grown so well as ought to have been done. The batch consists of 300 plants. In flower now are 20 plants, with only one rogue, all others true to type. As all growers of *Amaryllis* know, generally the coarsest types flower first, if therefore of a new batch of seedlings all the first bloomers are true to type, it may be assured safely that the strain is fixed and will breed true to type from now onwards.

ZEPHYRANTHES GRANDIFLORA LINDL.

Hamilton P. Traub

Zephyranthes grandiflora was first described by Lindley (Curtis's Bot. Mag. 902.) and the later names *Z. carinata* Herb. and *Z. Tsouii* Hu are therefore synonyms. *Z. grandiflora,* according to Sealy (1937) is native to the West Indies and Guatemala; Hume (1935) attributes it to Mexico.

Hume (Torrey Bot. Club 62: 404-405. 1935) has pointed out that "4-merious development, five stigmas and other abnormalities are so frequent in *Z. carinata* (=*Z. grandiflora*) as to be almost characteristic .....it may be a clone, perhaps a hybrid." The writer has recently had the opportunity of studying a number of individuals of this species (or ramets, in case it should be a clone), and on the basis of the material studied, Hume's statements are amply verified as shown in Table 1.

This evidence apparently supports Hume's conclusion that *Z. grandiflora* may be a clone, and in addition the clone may be subject to somatic bud mutations giving rise to various anomalous forms from the same bulb as shown by bulb No. 8 above. It appears to be very desirable for residents of Mexico and Central America to re-collect this species in its native habitat so that its status may be clarified. The form that we know may not be representative of the biological type of *Z. grandiflora* and may be a clone.

Vasku, in an article appearing elsewhere in this issue, mentions that one seed capsule set on one plant of *Z. grandiflora,* apparently by self-pollination, but as indicated in Table 1, the writer has up to the present obtained only one seed capsule by applying pollen of *Z.* P. I.

No. 110688. Whether this is a real cross, or is only parthenogenetic development will be revealed only after the seedlings flower.

Since the plant in cultivation as *Z. grandiflora* rarely sets seeds, it was thought desirable to reproduce a drawing of the gynoecium and fruit. This is shown in Figure 184. The gynoecium and fruit are described below, on the basis of the two flowers from bulb No. 8.—

Table 1. Flowering characteristics of Zephyranthes grandiflora

Bulb No. (ramet)	No. of tepalsegs	No. of stamens	No. of stigmas	Remarks
1	9	7	4	2 tepalsegs added on outside of regular perigone; 1 added on inside.
2	6	6	4	one stigma smaller than others.
3	6	6	3	No abnormalities.
4	6	6	3	No abnormalities.
5	9	10	8	3 tepalsegs added on inside of perigone; one stamen with tepal-like appendage; style compound, made by union of 2 styles; stigmas of various sizes.
6	8	8	4	2 tepalsegs added on outside of perigone; one extra stamen united to center of a tepalseg.
7	6	6	4	One compound filament from union of two, but with only 1 anther.
8	7	7	4	First flower,—seeds set after pollen from Z. No. 110688 was applied; capsule with 3 larger locules, and one smaller (See Fig. 184.)
8a	6	6	3	Second flower,—normal flower produced from bulb No. 8, above, about 12 days later.
9	7	7	3	Tepals added on outside of perigone.

Scape elongating after anthesis and reaching a final height of 30.5 cm.; peduncle 29 cm. tall, somewhat flattened, 6 X 3.5 mm. at base, tapering to 4 X 3 mm. at top below pedicel; spathe 1.8 cm. long, pedicel variable in length 2.5—3.5 cm. in normal; 1.5—2 in 4-merious stigmas; 3 mm. in diam.; capsule deeply lobed 1.8 cm. wide, locules four, one distinctly smaller than the others; seeds D-shaped, 9 mm. long, 4.5 mm. wide, black, not winged, 10 sound, 6 rudimentary seeds in locule No. 1,

Fig. 184, 4 sound, 11 rudimentary in locule (No. 2), 4 sound, 10 rudimentary in locule (No. 3), and 3 sound, 6 rudimentary, in locule (No. 4): ovary 3-celled 8 X 5 mm. (4-celled in 4-merious types, 8 X 5 mm., one cell smaller); style 5.5 to 7.0 cm. long, 1.5 mm. diam. (1.5 mm. diam. at base in 4-merious types at top); stigmas 3, 4 mm. long, recurved (3 mm. long in case of extra stigma in 4-merious flowers).

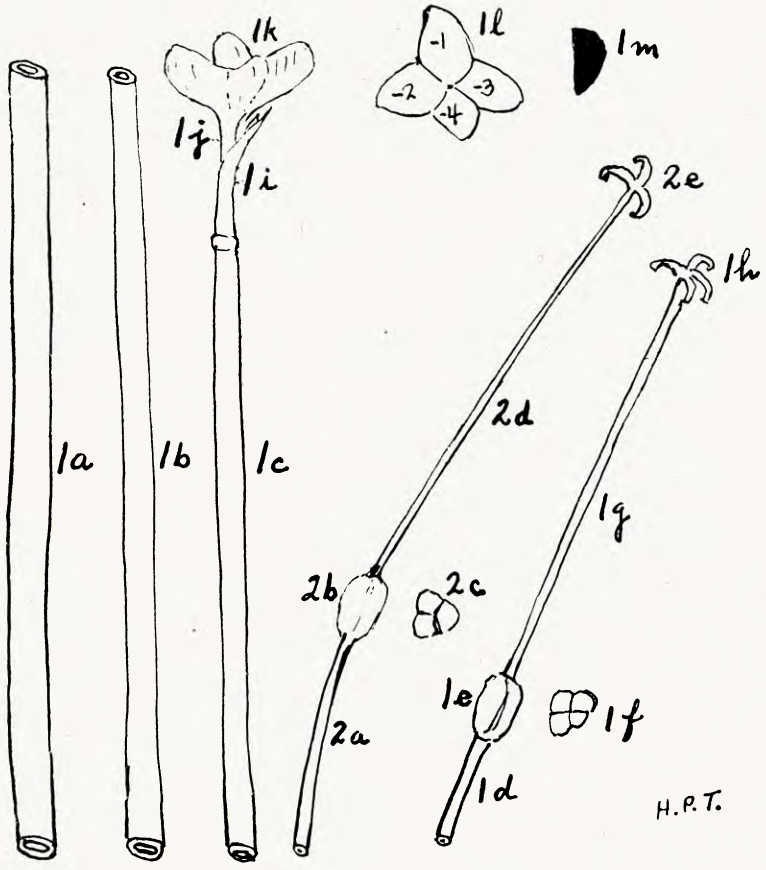


Fig. 184. **Zephyranthes grandiflora** Lindl. 1-d to 1-h, **pedicel** and **flower** (perigone removed), with 4-merious stigma; 1-a to 1-c; 1-i to 1-m, **same, with peduncle,** after maturity (no. 8, in Table 1): 1-a, 1-b and 1-c, **sections of peduncle** that is somewhat flattened; 1-i, **spathe;** 1-d and 1-j, **pedicel;** 1-e, exterior view of **ovary,** 1-f, cross-section of **ovary;** 1-g, **style,** thickening slightly toward apex; 1-h, 4 **stigmas,** one somewhat smaller; 1-k, ripened **capsule;** 1-l, cross-section of **capsule,** showing four **locules** (-1, -2, -3, -4), one **locule** (-4) somewhat smaller; 1-m, **seed.** 2-a to 2-e, **3-merious,** or **normal flower** (perigone removed). All approximately natural size.

DAYLILIES AT WHITNALL PARK

JOHN E. VOIGHT, *Acting Supt.,*
Botanical Gardens, Whitnall Park,
Hales Corners, Wisconsin

This is one of the Midwest's great display gardens which is gradually becoming a cultural center for this area. The gardens are extensive, and include a perennial garden, an annual garden, a rock garden, a rose garden and shrub mall, consisting of plantings of many descriptions. Some are laid out formally, others are informal but everywhere much attention has been given to providing everything in which the people of this community might be interested.

One of the many outstanding attractions is the DAYLILY TRIAL GARDEN (in cooperation with the AMERICAN PLANT LIFE SOCIETY) consisting of more than 125 clones of the newer introductions. Due to the war and post war conditions, it has not been possible to accomplish much with reference to expansion, although we have acquired a few named clones in the past year. At present, we are in the process (October 1947) of enlarging the daylily location, which will result in a better presentation, not only from a display viewpoint, but also from an educational one. We have made an effort, and will continue to do so, to bring together as complete a collection as possible, of the finer daylily clones available today. Our attendance this year will reach the half million mark which proves clearly that the people of this area are extremely interested in plants and are very fortunate in having been able to make possible such a modern horticultural and botanical center.

In conclusion we wish to thank all of those who have so unselfishly contributed to the gardens here at WHITNALL PARK. We are always pleased to receive your comments, as well as your suggestions for improvement. With best wishes for a successful Hemerocallis year, we remain until the next report in 1948 HERBERTIA.

4. AMARYLLID CULTURE

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

NOTES ON DAYLILY CULTURE

GEORGE GILMER, *Virginia*

Over three thousand daylilies have been named. It is safe to assume each hybridizer thought his darling a wonderful plant. My experience has been varied, 83% of one hybridizer's plants I rate A, and 20% of another's, and others in between. The conscientious worker tests each plant thoroughly and in different states and names and offers the public less than one in a thousand of his seedlings.

Some grade A plants of any hybridizer I know can be bought for $3.00 and sometimes less, while almost all except one ask up to $25.00 for some of their newest. Personally, I feel every plant WORTH $25.00 is so valuable that it should be kept exclusively for breeding and increasing until they are sufficiently plentiful to meet the demands at not more than $5.00. But if I had raised over a thousand pedigreed seedlings to get a worthy, I might want $25.00 or more for each rament to repay part of my labor and expense. Most successful hybridizers work mainly for the pleasure of creating an artistic masterpiece—but even artists must eat.

Either buy plants you have seen blooming after 4:00 o'clock in the afternoon or select those introduced by a reliable breeder. Some plants that are beautiful in the morning are unattractive by 4:00 P. M. Do not condemn plants or rate them low until they have been tried in different places, under varying amounts of sun and shade for several years. Remember if they are introduced by a reliable breeder they have done well for a number of persons and in different states and should do well for you.

SUN AND SHADE

A few plants like *Rosalind* and *Bagdad* have done better in part shade for me. Some like *Gold Dust* do equally well in full sun or up to two-thirds shade. *Patricia* disappointed me in half shade, when moved into the full sun I found it one of the best. My old Lemon Lily does not have more than 5% bloom in part shade, where *Gold Dust* thrives.

Often pink and red flowers hold their color better in part shade. I want only reds and pinks that do not fade like *Wekiwa, Fire Red, Matador, War Path, Helen Wheeler, Georgia.*

CULTIVATION

I have not cultivated my daylilies for years. They grow in scattered places where power cultivation is impracticable. I put a mulch of saw-

dust, weeds, leaves or wastes from the kitchen around them. This conserves the moisture in dry spells, prevents erosion and makes my clay black and porous with lots of earth worms.

I am careful not to work sawdust into the soil.

INCREASE

There is the widest variation in the rate of increase. *Duchess of Windsor* and *Sonny* multiply slowly, *Caballero* and *Mayor Starzynski* may make eight or more divisions at two years. Some like *Fulva, Rosalind, Handow, Chengtu, Rajah* spread by underground stems, others are always compact clumps. Some like *Circe* and *Soudan* have to be divided every four or five years to get handsome blooms, others appear not to mind crowding.

FERTILIZER

I have found it difficult to use fertilizer in sufficient moderation around young plants. A number of times I have burned them with excess fertilizer so their leaves would curl as in the driest spells. Then I have watered them freely to wash away some of the excess fertilizer and they have recovered. On the whole my young plants would have done as well without fertilizer. The trouble is not with the fertilizer, but with my use. It is hard for me to use a good thing sparingly. My established clumps are helped by fertilizer.

DISCARDING

This is a really tough part of growing daylilies. 90% at least are pretty and have good points, but all the varieties cannot be grown on a city lot, then too, I need some trees, shrubs and a few other flowers. I keep a record usually for at least three years after the plants are fair size of *foliage*, size, quality of bloom, season, shape, *afternoon fading*, general effect in the garden, cut-flower value, etc. Now when room is needed for new ones, I go over my list and part company with some of the least desirable—occasionally they were favorites of earlier years but now are surpassed by newer introductions. Sometimes they are plants that should never have been introduced.

INDIVIDUALITY

Daylilies are individual and should be handled as such to get the most out of them. Some are tall and vigorous, some small and slender. Blooms vary in color and season from May to September, time of opening, durability, size, shape, color pattern, odor—from fragrant to none, height of stalks, branching, etc. Some like *Tara* and *Vulcan* have buds on the bloom stems which develop leaves often six inches and miniature roots. If planted these aerial plantlets generally grow. They seldom bloom until two years old, but they are always identical with the parent plant.

Some try to have evergreen foliage. My *Chengtu* grew to a height of six inches last January, only to be killed back to the ground. Foliage

on others dies around September, some foliage gets spotted and unattractive about blooming season. I rate no plant A unless it has good foliage from spring to freezing and attractive blooms in the late afternoon. Most varieties form dense clumps. *Chengtu* has never made a dense clump for me. Most foliage is two to three feet high, one-half inch wide but *Mignon* has short narrow foliage more like grass. If you love your plants you will find lots of differences and almost personality in them.

This is just a personal note to friends, many of whom will differ with my judgment. It is not the work of an expert or a commercial grower.

DAYLILIES AND WARTIME NEGLECT

WYNDHAM HAYWARD, *Florida*

Five years of wartime difficulties in matters of labor and neglect, too little of one and too much of the other, paid off handsomely in many gardens in Florida and the lower South in the way of an acid test for various daylily varieties, demonstrating quite effectively just what varieties could or could not "stand the gaff."

In the writer's gardens at Winter Park, since 1941-42 there had been little opportunity for proper care and attention to be paid to the large commercial daylily planting. For three years, garden labor was absolutely unobtainable, and during four years the proprietor was engaged in other war-time work, and was unable to give the plants the cultivation, fertilization and weeding they should have had. Water was not an issue, as the planting is located on good high hammock type land, which is moist to moderation in all except extended dry spells. Watering is seldom a problem except for a few weeks after planting new stock.

In the winter of 1946-47, the writer was finally able to give the entire daylily patch a good weeding, the first in more than three years. It was interesting to observe the condition of the plants after their long neglect in thick weeds and grass. A few varieties were scarcely affected. Some had disappeared completely, and most of these will not be replaced, as "weak sisters." Important was the fact that most of the plants surviving in good shape were originations of Florida hybridizers, including varieties from the hand of Theodore L. Mead, Dr. Hamilton P. Traub and Ralph W. Wheeler.

During their long neglect, the plants had not shown any multiplication. Valuable varieties as *Duchess of Windsor* (Traub), *Ruby Supreme* (Wheeler), *Pink Charm* and *Starlight* (Nesmith), *Caballero, Vulcan* and *Princess* (Stout), came through their involuntary and regretful period of trial in reasonably good condition, but with the same number of divisions as was recorded for them in 1941-42. From this can be deduced the maxim that good attention is necessary to propagate Daylilies by natural division in the South.

Of Dr. Stout's varieties, *Soudan* came through in best condition,

and a long row of this bright golden yellow variety bloomed to perfection, as if it had never suffered the indignity of being covered with hay for so long, in the spring of 1947. *Patricia* and *Dauntless* survived but were not recovered sufficiently in 1947 to bloom well. *Bagdad, Rajah, Bijou, Chengtu, Linda, Circe, Serenade,* most of them deciduous, suffered severely, and were poor bloomers in 1947. Even *Mikado* failed to show vigor enough to survive in good shape, a long row being only about 25 per cent alive when uncovered.

But Wheeler's *Ruby Supreme,* Traub's *Duchess of Windsor,* Traub's *Indian Chief,* his *Happiness, Granada,* and others, Fisher's *Chisca,* another Southern daylily, and numerous varieties of the writer's origination came through their "ordeal by grass" in excellent shape, and it may be pointed out that most of these are evergreen in character more or less. Therefore it may be set down that maxim No. 2 gained from the experience is that evergreen varieties tend to survive under difficulties better in Florida and the lower South. This is nothing new, but was a prevailing belief which the results strongly supported.

On the other hand, there were a lesser number of deciduous varieties, including Leonian's *Cerberus,* his *Dr. Leon,* Mrs. Thos. Nesmith's *Pink Charm,* Dr. Stout's *Boutonniere,* his *Festival,* and *Hankow,* George Yeld's *Radiant,* and Amos Perry's *Margaret Perry,* which emerged from their long neglect in reasonably good shape. With a season's good care they should be back to normal again. Of the Sass varieties, *Moonbeam* and *Star of Gold* came through successfully, the latter blooming to perfection in the spring of 1947. Most of Amos Perry's creations, except *Mrs. Perry,* a large evergreen golden yellow, and *June Boissier,* another evergreen, passed out of the picture completely, and will not be restored at Lakemont Gardens. They are apparently not suited for long survival in this subtropical climate except under the best garden conditions, and those are what few gardeners can give their daylilies all the time in Florida,—the best conditions.

As for the Carl Betscher originations, some fared well, as *The Gem, Modesty, J. R. Mann, J. A. Crawford,* etc., but most of them were found not too vigorous for this kind of unavoidable test. *Ophir* (Farr) bloomed poorly in the spring of 1947. So did *Hyperion* (F. P. Mead). *H. fulva rosea (Rosalind)* was weakened by its long neglect, but survived in a few plants which bloomed scantily in 1947.

A patch of several hundred choice hybrid seedlings planted in 1941, when uncovered from their crop of grass and weeds, had shrunk to small size, but a number of them bloomed in 1947 to give a good idea of the quality of this planting, to the pleasant gratification of the writer, but probably 25 or 30 per cent of the seedlings were lost in the years of thick grass. Whatever has survived ought to be tough enough for ordinary garden purposes. They really had to take it.

Of the writer's own originations, which he has left for last and minor reference, the majority, all Florida grown seedlings and propagated in the Sunshine State, survived in good shape. Some displayed remarkable vigor considering the conditions which they had to endure.

Among those which bloomed well in 1947 were *Flamente, Emperor Jones, Nubiana, Mrs. H. H Dewey, Othello, Marconi, Old Rose, Tahiti Belle, Rosita, Redman, Ginger, Cleo, Antares, Osceola, Sybil, Minnie,* etc. Their good showing is an encouragement to continue the effort to produce better things for Southern Gardens in the daylily line.

MY DAYLILY INTEREST

Mrs. W. E. MacArthur, *Florida*

The interest in daylilies began for me in my grandmother's garden a great many years ago, so it was natural for me to plant *Hemerocallis fulva* and *Hemerocallis flava* in my own garden.

My first attempt at hybridizing daylilies had a tragic ending, because two little girls invaded my garden at dawn one May morning gathering the fine precious seeds filling their baskets and covering them with azalea blossoms, hurrying out into the garden seeking to solve this ritual, they ran scattering the immature seed pods and my daylily crosses were delayed a whole year, this defeatism evolved itself into a volcanic eruption of thoughts on children, animals and Halictus reticulatus.

My next attempt was a cross between *Hemerocallis fulva* and Sovereign which resulted in a lovely semi-dwarf bicolor that has been named *Harriet Trcziyulny* for a deceased member of my Garden Club, as my daylilies come into bloom and are worthwhile in shape, size and color they are named for the members of my Garden Club. This new lily, all my own, inspired me to continue hybridizing *Hemerocallis.* I had used *Vulcan* as the darkest red until *Ruby Supreme* and *Theron* were acquired. Am anticipating many thrills when these seedlings come into bloom, my *Helen Carnell* is a cross between *Sir Michael Foster* and *Vulcan,* is a spectacular bicolor for me at least.

The peak of daylily bloom in Florida comes in May and June, of course there is a scattering bloom that is most welcome during the summer and fall months, Florida is never without some blooms from these prized perennials.

Mr. Wheeler's *Ruby Supreme* is a magnificent lily in color, shape and performance, however, it seems to produce infertile pollen, and the flowers fade under our blazing sun. It should be planted in semi-shade where it commands first attention. *Vulcan* holds its color in sunshine a little better, is an early bloomer, produces a fair percentage of seeds; both of these varieties are shy on proliferations.

Mr. Hayward's *Salmon Rose* is my best pink, some of my crosses show this strain decidedly, even a clearer pink but the shape of bloom is not so desirable. Mr. Sutton a local nurseryman has developed some outstanding new daylilies which are being recognized and sought after in Florida, one beautiful tall red bears the name of *Eleven Fifteen* because the lily closes at 11:15 P. M.

Dr. Traub's *Granada* is a wonderful lily, prolific bloomer on well branched scapes, holds its color, but does not increase fast enough to

meet demands. Dr. Stout's *Mikado* continues to be a very popular daylily, one of my crosses is almost an exact replica of this daylily, but I don't know what I used to make this cross; it's almost impossible for me to keep a correct record, to say nothing of handling the seedlings on a city lot.

There is nothing more attractive than a semi-circular bed, with a bird bath in the center, planted with a collection of daylilies in all the wonderful color combinations of gold, pale yellows, reds, purple and pinks that are available now, daylilies can be moved any time in Florida, however it seems wise to transplant soon after the blooming period to insure a good root growth during fall in readiness for spring bloom. The evergreen varieties are more satisfactory in Florida, although there are some choice varieties of the deciduous group that are very desirable.

Aurantiaca Major, Ajax, Sir Michael Foster, Sonny, Nebraska, Hyperion, Dauntless, Patricia, Princess are standbys for gold and pale yellows, while *Vulcan, Sachem, Theron, Ruby Supreme, Baronet, Cabellero, Granada, Hankow, Bertrand Farr, Red Bird, Port* and *Linda* serve as prized reds and bicolors for any garden, there are a great many beautiful new comers available now in the trade.

Daylilies and other flowers commercially grown are menaced by thrips, an infinitesimal insect that blights the fine texture of blooms, even so with the trials experienced, I like to go into the garden early in the morning and watch the lilies unfold, it restores the inner satisfaction of the unfailing, universal assurance of God's love and care for the whole system of created things.

NOTES ON DAYLILIES IN MARYLAND—1946 SEASON

J. S. Cooley, *Maryland*

Daylilies in this locality normally begin blooming about the first of May, and the usual order of blooming is *Gold Dust, Minor, Apricot, Middendorffii, Sovereign,* and *Flava.* In 1946 however the order of blooming was *Sovereign* and *Flava* followed by the other early bloomers such as *Gold Dust* and *Minor.* The flowers on *Sovereign* and *Mrs. J. R. Mann* were very abnormal, they were very narrow and slender, and never opened to their normal width. The dividing line is not always sharp between the normal and the abnormal blossoms, but it would seem to be best to reckon as the time of blooming the time when normal flowers and normal scapes appear. *Apricot* usually has its flowers borne on scapes about two and one half feet tall. This year the scapes were only about six inches tall which meant that the flowers were almost completely hidden by the foliage. *H. Middendorffii,* which usually is not floriferous in this region, was much more profuse in its blooming than is normally the case. It was in full bloom early in May while *Gold Dust,* which is usually much earlier, did not bloom until May 10.

The character of the blooming of these early varieties is probably largely dependent upon the growing conditions of the previous season.

If more were known about the effects that the different weather conditions produce, the cause of the abnormal flowering noted above would doubtless be better understood.

The earliest varieties are often somewhat disappointing because of the sporadic and sparse blooming, but in the years when they bloom well they more than compensate for the poor seasons by their profusion of beautiful yellow flowers.

The varieties in the slightly later group, which we designate as early midseason, have been much more dependable year after year than the earliest ones. *Flava*, a member of this early midseason group, when planted near blue and purple iris makes an unforgetable garden picture.

In the early mid-season group are *Chrome Orange, Queen of May* and *Flava*. *Queen of May* and *Queen Mary* bloom for us at the same time. *Queen Mary* is the finer flower and thrives splendidly here, but it is said to be lacking in winter hardiness for northern regions. *Chrome Orange* also serves to bridge the gap between the early and the mid-season varieties and has a very definite place in the garden.

The mid-season varieties were very beautiful this year, especially, those varieties having a suffusion of red over the ground color. *Dr. Stout* and *Wau-Bun* are examples of this type of flower. The quality of the red color of many of the red varieties also was finer this year than usual. The weather was very dry before the mid-season varieties began blooming, but about the time they began to bloom the drought was broken and there was adequate moisture throughout the blooming period. The temperature was lower than usual, but apparently it was sufficient for the daylily flowers to develop the exceptional richness of color.

The color of daylilies this year had its interesting and also its puzzling aspects. The question of the influence of weather conditions on the development of the various colors and on the intensity and richnes of color is a matter worthy of careful study. There is no doubt that the colors of the same varieties vary in quality in different localities. Among the important environmental factors that may affect the plant and its ability to develop one quality of color rather than another may be mentioned adequate soil moisture, excessive soil moisture, relative humidity of the air, soil and air temperature, and the interaction of a certain temperature in conjunction with dryness, and also with adequate and with too much moisture. It would be interesting if a number of growers would make observation on as many of these conditions as possible and report their findings.

The daylily is in general a warmth loving plant. Cool weather affects the development of certain colors in the flower much more than others. The red color develops very poorly in cool weather while the yellows are less affected. It often happens therefore that a variety having a heavy yellow undercolor will be a beautiful red one year and in another year it will have a decidedly brownish cast due to the unequal development of the red and yellow colors, different temperature conditions.

A word may be said here about the behavior of late varieties here where the weather may be unfavorable. Those late varieties blooming just after the midseason varieties are gone are good—such varieties as *Mrs. W. H. Wyman, Dorothy McDade, Aztec Gold, Berwyn, Hankow.* On the other hand those varieties having many of the multiflora characters such as *Autumn Prince* and *Boutonniere* have not proven very satisfactory as garden flowers in our grounds. There is urgent need of breeding work to produce some late varieties that will be first rate in spite of adverse weather conditions.

FLORIDA FIELD CULTURE OF HYBRID AMARYLLIS

J. D. Du Puis, M.D., *Florida*

The following observations may be of some interest to growers of hybrid *Amaryllis* in open field culture, in "the Land of Palms and Sunshine."

First let me state, that I have about three acres planted, in rows eighteen to twenty inches apart. The original bulbs were planted about fifteen to eighteen inches in the drill, and the greater number of the original bulbs have multiplied within the past eight years by offsets with a record of from one to twenty-five bulbs now in each hill of various sizes and ages. They are according to the Holy Scripture, fulfilling the law—"Multiply and Replenish the Earth."

The past two years, due to war and post war conditions, many varieties of grass and weeds have given the hybrid *Amaryllis* a tough race, for one was unable to employ labor that would work on a farm. However, within the past 12 months, with a crew of men ranging in age from 65 to 75 years, I have been able for the first time in several years to have the weeds and grasses removed, and to have the hybrid Amaryllis fertilized and cultivated. To their credit it should be stated that these elderly men are doing a better job than the generation that is more robust physically.

The *Amaryllis* have shown their appreciation for the care and regular fertilization, in other words—they are growing rapidly and looking exceptionally well.

The regular blooming period of *Amaryllis* is February through May in this area, however, with the various ages of the bulbs I have beautiful blooms every month of the year. Cross pollination in open field culture in the way that nature does it, has produced a multiple creation of many different and wonderful color patterns, some of which are individually rare and beautiful. To attempt a detailed description in a general way of the color patterns that have been developed in my garden is not possible in the allotted space, and the only way to really appreciate this color panorama in the regular blooming season is to visit my garden while they are in their full glory. For illustration, a few are pure white, and many rare individuals are nearly pure white.

It might be well stated, that a walk through my *Amaryllis* garden, when in full bloom, gives me new inspiration to carry on and patiently listen to the aches and pains of many patients whom I have tried to relieve and assist nature in curing for the past 49 years of my practice as a Physician and Surgeon.

In further reference to the acreage and the multiplicity of bulbs that have been produced as offsets of the original bulbs in the past several years it would take many acres of space now to transplant the young bulbs that have been produced by the mother plants. However, believe-it-or-not, some of the rarer individuals are practically non-producers of offsets, or do so only in a very small way.

Within the past month I have treated some of the rarer bulbs according to the cuttage methods recommended by experienced horticulturists in an effort to speed up the vegetable reproductive process. However, it will be some time to determine the effectiveness of splitting the bulbs into several parts perpendicularly in this program to create more bulbs of the particular kind or individual.

I have experienced a ready market for blooming size bulbs, with repeat orders by wholesalers and individual purchasers, and also for cut flowers at Easter and Mother's Day, when they are received locally by flower lovers, particularly by the many thousands of winter tourists.

PROBLEMS OF FLORIDA AMARYLLIS CULTURE

WYNDHAM HAYWARD, *Florida*

Growing Amaryllis commercially in Florida is not something to start on the spur of the moment overnight, as the veteran growers will advise the newcomer. It is a serious business, requiring careful, conscientious attention to various details and major factors, and with many angles to be considered beyond a mere bulb garden's problems.

First one must decide what market one wishes to grow the bulbs for—the class of trade to which one will try to sell the bulbs when mature. The fancy bulb trade is a more highly specialized line, requiring expensive parent stock and more careful attention to cultural details, as these bulbs are always the more delicate.

Some grow their *Amaryllis* under partial shade, as a lath house, others in the open ground. This last requires a better grade of soil, preferably like the Conway type soils in Orange County, Florida, or any comparable medium type of sandy loam, with a good humus content, enough to give the soil a dark color. Good drainage is essential, and every care must be taken to select a site which will not be flooded in the case of an occasional hurricane or heavy spring rain. Flat woods type land, unless carefully ditched is usually too sour and too wet, or liable to become so. Florida's heavy hammock soils are ideal for *Amaryllis* if sufficiently well provided with humus. In small plantings this humus can be added to the soil in the form of manure, muck, peat, compost,

rotted leaves, etc., providing sufficient basic material is also added, as ground limestone, to keep the soil reaction near neutral.

It takes three years to grow the bulbs to blooming size from seed under good field conditions. The first year the bulbs are grown in a special seedbed, sometimes in half shade, as a lathhouse. The plantings must be kept clean of weeds. Weeds rob the bulbs of moisture and fertilizer and crowd them in the planting so that they do not make their normal growth. Failure to weed a planting when necessary and continued neglect for a few weeks may retard a planting for a year in growth. Absolutely clean cultivation or a mulch is the best that can be done for the bulbs. A light dressing of fertilizer three or four times a year, between the rows, any good commercial vegetable fertilizer with adequate potash, is about all the attention that is required besides weeding.

Florida, with some 50 inches of rainfall annually, on the average, usually provides enough water for the commercial bulb plantings without irrigation, especially as the bulbs make most of their growth in the summer when the State has its "rainy season". However, there are occasional dry springs and falls, when growth may be seriously retarded by lack of rain, and hence if provision for irrigation can be made it will pay off in the end with larger crops of bigger bulbs in shorter time.

Insect pests under field conditions are few, the worst of them being an occasional caterpillar and the large "Lubber Grasshoppers", a pest native to Florida and difficult to control without continuous vigilance. The grasshoppers hatch in the spring from eggs laid the previous year. At first they are black and red, and about an inch long. They are attracted to anything of the *Amaryllis* nature like some impelling biological urge. A half grown Lubber Grasshooper can eat the leaves off a large *Amaryllis* bulb or devour a small *Amaryllis* bulb down to the roots (and frequently does) in an afternoon, with hardly any effect on the beast's appetite. And it can go on for days and days at the same capacity. In mid-summer the Lubber Grasshoppers mature into the adult form, yellow and green tones, and their *Amaryllis* eating capacity increases. At this stage they may be three or four inches long, and the damage they can do to a choice planting of the bulbs is appalling!

Strong sprays of such powerful insecticides as 5% DDT make them only slightly ill. Poisonous sprays, as arsenic, will control them, but it is difficult to keep the leaves uniformly covered with the poison. The best control is established by a daily patrol through the *Amaryllis* planting, preferably in the early morning, before the hoppers have begun to scatter. At night the young hoppers congregate on the upper parts of the leaves, and may be picked off by hand readily into a can of kerosene. After several weeks, their numbers will be decreased by this procedure, but it seems impossible ever to rid a planting of them entirely, as new ones are continuously flocking to the bulbs from outside, where they are a common pest of garden and field in peninsular Florida. Continued surveillance as described above, will maintain an adequate control of the hoppers in a commercial planting, but a few days neglect will cause a

rapid increase in the numbers of the pests invading the planting, and this will result in badly eaten foliage and damaged bulbs. A bulb with its leaves eaten all or partly away may miss most of its year's growth.

The seeds may be planted in flats of good garden soil, sweetened with wood ashes or ground limestone, the black, papery wafer-like things (seeds) being set thickly upright in slots in the ground or flat in little furrows. Not more than a quarter of an inch of soil should be placed over the seed. In a few days to several weeks, the seedlings will be sprouting. Freshly sown seed is better in germination, as the seeds lose viability fast after a few weeks.

Good drainage is necessary in the flats, and ground beds, three or four feet wide, may also be used in a lath house where watering facilities are available. The seed should be watered cautiously and carefully until well sprouted, and not over-watered at any stage of growth. Soggy, wet soil will cause rot and decay of the bulblets. A light dressing of commercial fertilizer may be mixed with the soil at planting, along with the sweetening material, if this last is necessary. Well rotted compost or rotted manure should be added if the soil is thin.

At one year, the bulbs should be one half to an inch in diameter with good culture. They are then large enough to be set out in the field, preferably when the soil is moist and cool, certainly not when the weather is hot and dry, unless irrigation is available.

Cold weather, such as is experienced in Central Florida, is not dangerous to the life of the bulbs, although freezing temperatures will cut down the leaves, which are tender, the bulbs or their necks may be frozen if exposed above ground. *Amaryllis* bulbs in pots are especially subject to damage in Florida if the temperatures go down to 20° F. or less, as happened on several nights in February and March 1947. Bulbs in pots on the writer's place at Winter Park went through temperatures down to 25 degrees or slightly less, lasting several hours. Some damage was noted in the case of most of the bulbs in pots, and blooming was retarded in date, and the quality of the flowers was severely affected.

Flowers of these bulbs which had been exposed to the cold weather in pots were distorted in some cases, the flower stems were weak, and several bulbs were killed outright, including a number of small hybrid *Amaryllis* in four inch pots. Bulbs in the open ground lost their leaves but were otherwise unharmed, as the cold was only sufficient to cause a light frozen crust to form on the surface of the ground where moist. Newly potted bulbs were more seriously injured than others, the frozen upper tissues of the bulbs eventually showing decay, which spread down into the basal portions so that the bud or growing point died. In a few such cases, after several weeks, small bulblets began to form on the outer ring of the basal tissue, although the core of the old bulb was dead.

Several dozen newly potted bulbs, imported from Holland, were given emergency shelter in a spare room of the writer's residence, where the temperatures went down to 35 and 40 degrees for several hours, and these bulbs, being mostly of naturally weaker greenhouse constitution, showed some of the same symptoms of cold damage, but to a lesser extent, when they finally came into flower.

AMARYLLIDS IN THE NORTHWEST

HARRY L. STINSON, *Washington*

One day in early spring when the poet Wadsworth was strolling along the shores of Lake Windermere, the sight of several hundred daffodils "dancing in the breeze" so thrilled him that he sat down and wrote one of our immortal sonnets to their golden beauty. I have often wondered what he would have written if he could have seen one of our present day daffodil farms in full bloom. A January issue of the Life Magazine shows a view of 6,000,000 bulbs blooming in one of Mr. Jan de Graaff's fields with the snow capped Mt. Hood towering in the distance—what a sight of waving golden blossoms. Not too many years ago I remember one of our leading Eastern bulb dealers making the statement that he was skeptical about the forcing quality of the western bulbs. Since that time the production of excellent quality bulbs has become an industry of major importance in several localities of Washington and Oregon. Annually over forty carloads of bulbs are shipped to the Eastern markets from the fertile fields of the Northwest. To this can be added the rapidly developing industry of growing Easter (Croft) Lily bulbs, which has been steadily increasing since the supply has been curtailed by war.

While the climate of the Northwest is ideal for the culture of those bulbs which require a long cool, moist growing season before the rigors of winter really set in, it is not too hospitable and leaves much to be desired by those who would grow the more tender and warmth loving amaryllids. Their natural habitat is usually a long and warm growing season which we cannot give them except by artificial means, and that experience has shown many of them do not like. Our growing season normally is about 120 days and the nights are so cool that we can grow only the short season crops on the west side of the Cascade Mountains. For several years I have unsuccessfully been trying to grow the beautiful *Hymenocallis (Ismene) calathina.* The bulbs bloom splendidly the first year but they are still green and immature when they are cut down by frost and have to be dug for storage. In fact they are so immature that many do not survive the period of dormancy. Another year I am going to start them in pots and transfer them later to the garden by burying the pots in the ground and then move them back under glass before the first killing frost. Possibly in this way I can enjoy their beauty year after year. Some of the other *Hymenocallis* do well under glass the year around.

California is not so far away but what many of our friends and neighbors sojourn within its borders. While there they see the exotic Painted Lady, *Brunsvigia rosea* (Lamarck) Hannibal (syn.—*Callicore rosea* Link; *Amaryllis belladonna* Ait., non Linn.) and bring back a few bulbs of it for their gardens, only to be disappointed for it seldom blooms under our natural conditions. "Why does my *Amaryllis* not bloom?" is one of the most frequently asked questions that we have to answer among our gardening friends. Usually they have a situation to which they can move it where it will be more sheltered and protected

against frost, and they are happy again for it blooms. Unfortunately some of our chain stores of the dime variety have been offering these bulbs for sale pictured as hybrids of the true *Amaryllis belladonna* Linn. [(non Ait.), syn. *Hippeastrum* Herb.] This sort of misrepresentation is unfortunate, but can be corrected in time by education of the public through the garden clubs.

Very infrequently a clump of crinums is to be seen in one of our more extensively planted gardens. *Crinum Powellii* and its parent *Crinum bulbispermum* (syn. *C. longifolium*) have proven to be perfectly hardy here at Seattle and could be more generally planted as it gives us lilium-like flowers later in the season when such flowers are rather scarce. Its other parent *C. Moorei* is not quite so robust and will not survive our winters very long without some protection. Several other crinums I grow under the shelter of a cool greenhouse and they reward me each year with their gorgeous blossoms.

Probably I have been negligent of my trust for I have not been pushing the *Hemerocallis* program as diligently as I should have. The West lags far behind the East in the introduction of the newer hybrids, however they are beginning to be seen in ever increasing numbers. The old types are found in nearly every garden and no doubt these new hybrids will win favor by their gorgeous colors and counterbalance the fact of their ephemeral qualities. They bloom at a time when there is a scarcity of color in the garden and will help to fill the gap between the perennials and the colorful annuals.

In my rather limited expanse of glass I have several other members of the *Amaryliaceae* growing, such as, *Vallota, Sprekelia, Clivia, Amarcrinum, Nerine,* and *Lycoris* which did not take too kindly to living under glass so I moved it outside against a south wall. It may bloom. During the war when fuel was at a premium I lost quite a few of my amaryllids due to cold and dampness.

Sooner or later around this household the conversation always turns to the alstroemerias and bromareas. Year by year they are gaining favor in the eyes of the gardening public. Their ease of culture and wide range of colors makes them a favorite of every one who grows them. *Alstroemeria pelegrina alba,* according to the reports from Mr. Hinman, of Geneva, Illinois is increasingly demanded by the florists of Chicago. The *A. chilensis* are lagging behind slightly as they are a little more difficult for florist's use, but as they learn of their excellent keeping qualities I have no doubt but that they will be more acceptable to the trade. Last year we shipped the cut flowers by air-express and air-freight to Mr. Hinman and learned many things about their behavior in transit. This season I sent a small package to Mr. Foster, and after a delay in transit he kept them about a week. If and when we can get better and more reliable airplane connection at terminals I believe it will be possible to ship them to any place in the United States, After considerable experimenting with *A. violacea* and losing several hundred tubers I have been rewarded with the most wonderful display of violet or lavender you could possibly desire this side of the rainbow. *A. nemorosa* has proven to be evergreen and almost everblooming. It sets seeds

very readily when grown adjacent to *A. psittacina,* (syn. *A. pulchella* of the trade, which it is not). *A. Ligtu,* Feuillet has proven so far to be as hardy as the *A. chilensis* hybrids and was a gorgeous sight this year with its pink blossoms with white on the two upper petals. In growth, it

Fig. 185. *Hymenocallis* caribaea. Photo by W. M. James.

differs considerably from *A. chilensis* and all doubt is removed but that it is really the one which Father Feuillet found and described. Mr. Foster informs me that his *A. caryophyllaea* is finding Florida to be a very hospitable home and is increasing rapidly. He has hopes of offering it to the trade within a couple years. My few plants are doing as well as could be expected under their growing conditions. I hope to see bloom this fall. Dr. Bullock was extremely kind to bring specimens of the alstroemerias indigenous to his vicinity in Chile when he came to the

make dozens in a few years. The foliage is rich green and 6 to 12 inches long, linear, up to a quarter of an inch broad.

It is reliably reported as native to Central America and the West Indies. In parts of the South it has naturalized itself, and may be found blooming in long-abandoned plantation and country gardens. It is perhaps the most vigorous and free blooming of all the Zephyranthes.

Next I would place *Zephyranthes rosea* and *citrina*, two of the most beautiful of small flowered bulbs in all the plant world. *Z. rosea* is reported from the Cuban mountains, and has tiny linear, bright green leaves, glossy and beautiful, and charming rose-pink flowers about an inch to an inch and a half across in late summer, and sporadically before. When a patch of this bulb blooms in unison, as they do when well established, it is a sensational effect, indeed, one of the big moments in floriculture. The actual bulbs are up to ¾ of an inch in diameter, mostly smaller. It does well in pots, but is not as hardy as *Z. grandiflora,* which can stand lower temperatures. They are tropical bulbs and should never be exposed to freezing in the ground.

Gorgeous *Z. citrina*, is the best yellow type commonly in cultivation in the United States. And I don't mean commonly, as it is quite rare in fact, but found now and again in choice collections. The bulbs have narrow, bright green leaves up to a foot long, and make bulbs up to an inch in diameter. It is said to be a native of British Guiana. The flowers are light golden yellow, and an inch or more in diameter, borne mostly in late summer on 6 to 8 inch stems.

Maybe I should like *Z. atamasco* best of all, as it is the type species of the genus, the one most widely dispersed in nature in the United States, (from Virginia to Florida and Mississippi) and made famous nearly 150 years ago by Redouté, Josephine's famous flower painter, in his Liliacées (Plate 31, which I am happy to possess.) But *Z. Atamasco* is not native down into Central Florida, and while bulbs of this beautiful native wild flower have survived with me for a decade, a few of them blooming famously every spring, they flower only once or twice and lose their foliage all summer long while the other *Zephyranthes* are in handsome appearance. They bloom first of all the genus with me in Central Florida, some of my flowers being four inches across, undoubtedly the largest of the genus, despite the name of *Z. grandiflora*. The bloom is simply huge for the size of the bulb in the case of a strain I obtained from the countryside near Tallahassee, Fla., and named *Z. atamasco* var. *major*. A pan of these would be the sensation of any British or American flower show in the spring. The bulbs are scarcely half an inch in diameter.

Z. atamasco is temperamental with me in pots. Even in the ground I have lost hundreds of bulbs obtained from as far north as the Carolinas, after a few years. The Tallahassee stock survives in healthy condition, in a light sandy loam in my lath house. It puts up flat green leaves something like *Z. grandiflora* in winter and blooms in March or April, or even before. Then the leaves vanish until the next winter. The pure white flowers of my Tallahassee strain are twice as large as

Redoute's specimen, which is painted apparently life size. They are pure white inside, four inches across on stalks 6 to 10 in. tall, with pink tinting on the outside as they fade.

Z. atamasco sets seed readily, but the seedlings are slow and difficult to raise because of their deciduous character. *Z. rosea* sets seed occasionally, and scantily, while *Z. citrina* sets seed readily and abundantly.

Z. candida and its variety *major* are almost too well known to mention. They are not happy in Florida unless given constant care, and I have never seen them naturalize successfully for any number of years, but understand that they do this readily in other parts of the South. The foliage is bright green and roundish, with flower stems up to 1 ft., and flowers pure white or pinkish-tinted on the outside. It is said to seed well at some places, but does not do this in Florida. It is the flower which caused the naming of the Estuary at Buenos Aires as Rio de la Plata (river of silver) because of masses of the flowers on the shore seen by the early explorers, so tradition has the story. The bulbs are half hardy, but should be protected from frost. The range up to ¾ to 1 inch in diameter. The flowers have pointed petals forming a white star 2 inches or more across.

My favored white species is the new *Z. insularum* found by Dr. H. H. Hume in Key West, and named accordingly, but probably not native there. It blooms freely in early summer, with showy porcelain-white flowers which are pinkish without and blunt tipped. *Z. tubispatha* is an old species from the West Indies, similar as to foliage, but with sharply pointed petals and pure white on the outside of the expanded flower. *Z. tubispatha* is more delicately constitutional, and more disinclined to give fine shows or bloom. *Z. insularum* will not seed with me, and *Z. tubispatha* rarely sets seed.

Z. Treatiae and *Z. Simpsoni* are distinct native Florida species, having roundish foliage, which is glaucous in Treatiae, white flowers like the common type of *Z. atamasco* in the case of *Z. Treatiae,* and long trumpets with an extended green base and very slight flare at the top in *Z. Simpsoni.* They grow well in sandy soil with me, but are sparse bloomers, seed fairly well, but grow slowly and with difficulty in flats. Good drainage seems to be one of the main factors for *Zephyranthes* in cultivation, even though some kinds are found in more or less swampy spots in nature. *(Z. atamasco* and *Z. Treatiae).*

Most of these *Zephyranthes* like a loose, friable, fertile soil, in the garden or in pots, pans or boxes. They like considerable humus or well rotted cow manure in the soil, (25 per cent) if sandy loam is used. Good drainage is essential, as in cultivation they will soon rot off their roots and waste away if subjected to standing water or soggy ground.

Seedlings may be grown in a flat or pan of the same soil, out of the reach of heavy drip or rain, and kept weeded and clear of slugs or grasshoppers which are their greatest pests in Florida. Otherwise they have no known enemies except an occasional caterpillar.

One of the greatest opportunities for botanists and horticulturists

exists in the Latin American countries in the collection of new species of *Zephyranthes, Cooperias* and *Habranthus,* not to speak of small-flowered types of *Amaryllis* and other similar subjects. Scattered through Mexico, Peru, Argentina, Chile, Brazil and other countries South of the Border are many species reported in the literature, perhaps once known to horticulture, but now lost or never in cultivation at all. There is *Z. andicola* with violet flowers in Chile; *Z. coerulea* in Argentina, *Z. longipes* in Uruguay, *Z. Lindleyana* and *Z. verecunda* in Mexico, and many others. Probably there are new species still to be discovered.

The genus is becoming more popular. Garden lovers are turning to their culture gradually, and cherishing these choice beauties as they deserve. In a few years they will be better known. They are fascinating in their way as the *Crocus* or Tulip species and similar small bulb favorites.

Of the Texas species of *Zephranthes,* I have recently flowered *Z. longiflora* for the second time from bulbs received from Miss Willie May Kell of Wichita Falls, who stated they were collected in the Davis mountains. It is a lovely lemon-yellow thing, with fine, chive-like leaves a foot long and more, very slender. There are other yellows in Texas, *Z. pulchella,* and one or two more uncertain as to identity. Texas also boasts the beautiful night-flowering *Cooperia pedunculata, C. Drummondii, C. Smallii* and *C. Traubii.* The first named *Cooperia* is one of my favorites, and makes large bulbs up to 2½ inches in diameter, but usually an inch and a half to two. The flowers are flat and spreading on a 10 inch or more peduncle. The leaves are flat and grayish green to blue, and tend to die off in the summer. The leaves of *C. Drummondii* are more roundish and the flower, which has a long, slender tube, is half the size of *C. pedunculata.* Both are more or less fleeting. They open in the early evening, and are more or less wilted by the next mid-morning.

One of the choicest of these small bulbs of the *Amaryllidaceae* is *Cooperia Smallii,* which bloomed for me last week (late June 1947) after five years of idleness in this regard. It is a showy little sulphur-yellow flower from down in the lower Rio Grande Valley, in Texas, the only yellow-flowered species of *Cooperia* known, and a recent botanic discovery, comparatively. It was named for the late Dr. John K. Small, long the New York Botanical Garden authority on the flora of the Southeast. Possibly my bulb, which survived in the ground in my lath shed during the war years under bad neglect, but did not bloom as I remember since 1942, is among the few bulbs of this lovely species in cultivation in the world today. It has never been offered in the trade. I am nursing the bulb in its new pot with care to set seed, and hope to grow more *C. Smallii* bulbs from that.

In what other branch of the field of ornamental horticulture can one have the thrill so easily as with these dainty bulbs, of knowing that the bulb you possess is one of the rare but choice beauties of the plant world, and that perhaps no other person on the entire earth has one of the

same species as you in bloom or even in cultivation. However, that is no situation to appeal to the miserly instinct, which possesses some plant fanciers, as there is no meaner stripe in any soul than the queer quirk of mind of some horticulturists and persons who call themselves garden lovers, and who guard a new plant or bulb jealously like Midas his gold, withholding it from all private and commercial distribution until they have built up a stock of it or used it to their own full satisfaction in breeding experiments, before turning it loose to an awaiting gardening public. The riches and beauties of the world of plants belong to all, to all those who appreciate them, and no one has the right to "corner" some little item for his own pet, peevish pride and avarice. Especially when the new plant or bulb is purely the bounty of Dame Nature.

Texas, to return to our muttons, has also the pretty little copper-colored *Habranthus Andersoni* var. *texanus*, formerly called *Z. texana*. It is a tiny thing, widely found over the Lone Star State, and at one time thought to be the same as a parallel species *H. Andersoni* in Argentina, and possibly introduced from there. But its widespread existence in nature in Texas seems to preclude this possibility. It has slender gray-green foliage, and flowers an inch long on stems to 6 or 8 inches tall.

H. Andersoni var. *texanus* does not thrive in Florida soil. Probably it wants more lime or clay than we have in the Peninsular State. The flower is light golden yellow inside and copper tinted without. It seeds readily.

In South America there are at least two little known Cooperias, one in Brazil *Cooperia brasiliensis* recently discovered by M. B. Foster and the other *C. albicans* in Peru. Neither are in popular cultivation so far as known. There are a number of interesting *Habranthus* species, as defined by J. R. Sealy of Kew in the RHS Journal, Vol. XLII, Part 5, 1937, of which *H. robustus* and *H. brachyandrus* and *H. cardinalis, (Z. bifolia)* are best known in the United States. *H. robustus* should be grown by the dozens in every Southern garden, for its showy white and orchid-pink trumpets which are on stems up to one foot tall. The foliage is a light gray green and the bulbs black, up to 1 and ¾ inches diameter. In the case of *H. brachyandrus* the pink is a purple rose and deeper color pervades the flower. It is less free flowering with me, but Frank Vasku of Winter Park, who also grows many of these things, finds differently in his location. He grows them in ground beds while I have them in pots and flats.

Some few of the *Amaryllis (Hippeastrums)* species are small enough to group with the bulbs previously mentioned, especially those in Chile, as *A. advena* and *A. miniata*. There are other small-flowered types, which deserve careful study and introduction into cultivation. Very few of these are known to bulb fanciers today.

Sealy in 1937 listed more than 35 species of *Zephyranthes;* some five species of *Pyrolirion,* a genus of related bulbs from Peru and Bolivia unknown to cultivation in the United States with rare exceptions; at least 10 species of *Habranthus,* and many species of *Amaryllis,*

25 or more from Chile, which may be of the intriguing small-flowered type. There is room for plenty of plant exploring here to introduce new bulbs for American gardens.

Amaryllis advena is an attractive red-flowered miniature type of *Amaryllis* from Chile, and yet suited to gardens in the lower South and Southwest. It is reported hardy well up toward the northern states in protected locations. It makes its leaves in winter, and blooms in mid to late summer, with good umbels (five or six flowers or more) on slender stems up to a foot and a half tall. The leaves are concave and glossy rich green. There is a pink type from Chile which may be *A. roseus,* also found in Texas and Florida gardens, apparently perfectly acclimatized. This is a vigorous gem well worth trying in suitable areas.

Habranthus cardinalis, described as the old *A. bifolia* by Dr. H. H. Hume, is perhaps the most colorful of the genus, with salmon-red blooms, varying in shade, found native in the Dominican Republic. It has slightly nodding, graceful flowers, of a most delectable tint, and grows well also in the coral soil of the Bahamas, but wastes away in a few years in Florida, possibly because of lack of lime in our Central Florida earth. It is just too, too divine, as the debutantes say, and truly makes the garden lover humble with its sheer beauty.

The writer would like to hear from bulb fans near and far who have species of these small bulbs different from any described in this article. There are probably some new or different ones in American gardens somewhere. The writer cannot close without a mention of the remarkable series of hybrids between *Cooperia* and *Zephyranthes* species introduced in India many years ago by Sydney Percy-Lancaster, who created the numerous hybrids which were introduced into the United States 10 years ago by the American Amaryllis Society and distributed thereafter to various bulb growers. These bulbs seed readily, and the writer has a number of descendants of the Percy-Lancaster *Cooperanthes* blooming every summer in his lath house. Mr. Percy-Lancaster followed his father's purpose of creating vari-colored *Cooperia* type flowers which would open in the afternoon like the *Zephyranthes.* He described them in Herbertia, Vol. 3, (1936).

ZEPHYRANTHES ROSEA AND HYBRID AMARYLLIS

FRANK VASKU, *Florida*

Last fall we received an inquiry from a large western wholesale bulb company about *Zephyranthes rosea.* Could we supply several thousand bulbs and could they be handled dry and sold over the counter same as *Amaryllis* bulbs? In Florida we leave them in the ground the year around and dig them only when too crowded or for sale, so the thought was new to the writer. I replied that I saw no reason why they could not be so handled. Since they ordinarily bloom in August through September it seemed best to give them three months of rest to

recuperate so they could stand that treatment. Accordingly they were dug in January and dried.

As there was no place ready nor time to plant them, the bulbs left over were put into a shed. The last week in May they were planted. The first week in June they were up and striving mightily to make up for lost time. It would appear therefore that they may be handled the same as other bulbs that are being sold over the counter in the stores. Since these little bulbs can take much punishment it would seem that they would make good subjects for rock gardens, edgings, window boxes and pots. They probably would not survive a freeze, however.

It is well not to be dogmatic. The above was written June 17. Two days later there were bulbs of *Z. rosea* blooming in the undug portion of the bed. Why they should be about two months earlier this year than other years, the writer does not know. Neither can he explain why after blooming thousands of *Zephyranthes grandiflora* through the years with never a single seed pod he should find one this year.

Has anyone ever found out why *Amaryllis* lose their roots and decline? If so, there may be preventive measures also, but that knowledge has not reached all *Amaryllis* growers as yet. Every year we lose many valuable bulbs. While absolutely rootless, these bulbs often put out leaves and even flower, but each year grow smaller, and if left to themselves, ultimately die. I found such a flowering one this spring. When through blooming the bulb was taken up, cleaned, rootoned and set into a pot of prepared soil. In two weeks it had started new roots and is doing well at this time.

This led to an experiment. To some soil of compost and rotten cow manure was added some superphosphate and bonemeal. Into this soil eleven rootless bulbs, scraped clean with the trowel of all dead tissue, were set and watered. Three days later most of them had started new roots.

Then the experiment was carried into the field. The rootless bulbs were lifted, scraped and put back in the same place from which they had been taken. Examined ten days later, one sixth of them had started roots. It would seem, therefore, that for whatever reason the bulb loses its roots, the dead tissue acts as an insulator for the bulb and tends to prevent its sending out new roots. It would seem further that when certain elements are brought into contact with the bulb's live tissue, its root forming ability is stimulated to put out new roots. The field trials should have been carried still further and rootone or superphosphate and bonemeal should have been tried as in the case of those eleven mentioned above but lack of time prevented this.

The writer realizes that these tests are inconclusive. We should try to find the cause if possible and adopt preventive measures if such can be found. In the absence of knowing the cause or causes, any knowledge of measures that help restore the vitality of the bulbs would be welcome.

STERNBERGIA, A REAL GARDEN GEM

J. S. Cooley, *Maryland*

A very interesting plant belonging to the *Amarilidaceae* is *Sternbergia.* When visiting my old home "Rockville" in the Shenandoah Valley of Virginia some years ago the *Sternbergia* plants were in full bloom and quite beautiful. This planting has persisted there since my grandparents or maybe great grandparents planted it years ago. There is a tradition (Moncure, R. C., Nat. Hort. Mag. 21:106, 108. 1942) that *Sternbergia* bulbs were planted about the Governor's Place in Williamsburg and from there were distributed to the Colonial gardens. Some friends of the governor may have seen this striking and beautiful flower at the Palace and requested plants. After there was sufficient increase the recipient gave it to his friends and they in turn to theirs. In those days there was considerable exchanging of plants, that being a safeguard against losing the stock of some rare or highly prized plant. A plant that has persisted so well might easily have passed from one flower lover to another until it was quite widely distributed. This flower was apparently planted and used more extensively in Colonial gardens than at present. However it is adequately able to compete with the best of the present day flowers.

This genus has its origin in the Mediterranean region of Asia Minor and Europe. There are about a dozen known species. The genus is named for Casper Sternberg, a botanist and writer of Prague, Bohemia. The usual growth habit of the group is for the plants to send up strap-shaped leaves at the time of blooming in early fall. The leaves remain green all winter and die down in the latter part of May—before the *Narcissus* leaves die down. There however, is a species, *S. Fischeriana,* native to the Caucasus, that blooms in the spring. Although the species *S. colchiflora* blooms in the fall, its leaves do not appear until spring.

The usual species of the colonial gardens as well as the one grown at the present time is *Sternbergia lutea.* It is widely distributed in the Mediterranean region, extending to Persia. Its flower scapes are short at first but those of the later flowers may be as long as 5 or 6 inches. The waxy flower, which is somewhat smaller than that of the spring crocus, is a beautiful clear golden daffodil yellow—A very fine color quality. The flower although small and short is very appealing. When taking flowers to a nearby military hospital it was interesting to note how many patients when given a choice of an arrangement of *Picardy* glads or one of *Sternbergia* would choose the little *Sternbergia* in preference to the large and showy glads. For an intimate flower arrangement they are long lived and very satisfactory. Also the effect in the intimate garden is splendid. The plant however is small and must of necessity be used where large plants do not compete. The intimate garden or the rock garden is a good place for it.

The species, *Sternbergia macrantha,* native to Asia Minor, Syria,

Palestine and western Persia, blooms later than *S. lutea,* and has bright canary yellow flowers. It should be an excellent addition.

If one wants the ground of the *Sternbergia* bed covered all summer with green it is sometimes difficult to find a plant to meet this need during the months of June, July and part of August while the *Sternbergia* tops are dead. Perhaps one should be satisfied without a green plant in the *Sternbergia* bed for a part of the summer in payment for the autumn show.

There are many qualities to commend *Sternbergia lutea* as a garden flower. It has been perfectly hardy in this latitude during my 10 years experience with it. Furthermore, mice which destroy bulbs such as crocus *Iris reticulata, Chionodoxa, Brodiaea uniflora* and tulips, do not touch this bulb. Increase is fairly rapid. A few plants will soon multiply enough to enable one to have the mass necessary for the best garden effect.

Several common names have been applied to this flower. In some of the English publications it is called "Winter Daffodil," in others it is called "Yellow Star Flower." The common name often used is "Fall Crocus," but since it is not a *Crocus* that name is likely to lead to confusion. It seems unfortunate that we do not have an appropriate and easy common name to apply to this beautiful group of plants. It may be that some one can suggest a good common name.

The culture is not exacting. Dig the bulbs when dormant after the tops die down in June, and transplant at once or at least by August. Plant 3 to 6 inches deep. Best results will be obtained by planting in a rich loamy soil somewhat on the heavy side. They will thrive however in a wide variety of soils. The plant is said to be hardy as far north as Philadelphia and it has been reported as growing in sheltered locations in New Jersey and New York. This plant has thrived well and has been very satisfactory here in Maryland. It seems strange that so few gardeners use it. It may be that the reason is that few gardeners know its merits.

ALLIUM NOTES

WILLIAM LANIER HUNT, *North Carolina*

These *Allium* notes from a traveling gardener's note book are offered to the members in connection with the search for the most outstanding alliums. It is the writer's experience that one may belittle an undesirable species of *Allium* only to run into a most excellent species immediately after. In a genus with over 600 species, it is natural that a judicious selection is desirable from the standpoint of the ornamental garden.

R. H. S. GARDENS, WISLEY, 1945

Allium Macleanii?; this is the finest *Allium* that I have ever seen anywhere; color has amazing carrying quality; 3 ft. scapes; heads of bright blue-violet resemble *Agapanthus* flowers and may well be a substi-

tute for those who cannot cultivate agapanthuses. Against the Administration Bldg.; in bloom late May; no foliage with blossoms; seed heads carried their color till August! [Seeds received from Wisley, Jan. 1946, planted June, and coming up in June 1946.]

KEW GARDENS, 1945

Allium ampeloprasum var. *violaceum,* 2-inch, wavy wands, topped by purple-violet heads; graceful. In bloom July.

Allium Beesianum; a form with highly developed pappus that prevents their being very effective. Rock Garden; in bloom July 30th.

Allium carinatum, from Europe; very handsome, red-purple type, striking and worth while, showy; 12-15 inches tall. Mr. Scot in Rock Garden thinks it would be good in combination with *A. flavum.* [Mr. Scot is now with Ingwersen, 1946.]

Allium cernuum, from North America; the English have a wonderful form such as I have seen in the North Carolina mountains; illustrated in "Amateur Gardening", Sept. 11, 1945, p. 14, entitled "A Pretty Allium". Best *Allium* photo I have seen in English publications. In bloom June 11th.

Allium coeruleum, from Siberia; this must be an extra-flowering type; seed heads May 22; 3 ft. scapes; leaves dead, of course.

Allium flavum, from Europe. Same floppy old thing. In bloom, June 11th.

Allium cyaneum; grass-like foliage; many tiny blue flowers; Rock Garden July 30th.

Allium karataviense, from Turkestan; seed heads, May 22nd. Fine type here. [Editorial note: this needs an alkaline soil. Bulbs planted in pots rotted away in ordinary acid Maryland soil.]

Allium Margaritaceum; neat, floriferous, 10-inch scapes; in bloom, May 22nd; lavender.

Allium obliquum, from Siberia; greenish-yellow heads, 2½ to 3 inch scapes, May 22nd.

Allium ramosum; very fine, 18-inch scapes; flowers white with maroon marks; May 22nd; very floriferous. Is this a synonym?

Allium schoenoprasum ver. *sibiricum;* large form of chives that is *not as floppy* as the type; June 11th; flowers deep violet.

Allium senescens var. *atro-violaceum;* pink-lavender; June 11th.

Allium senescens var. *glaucum;* almost pink; June 11th.

Allium sphaerocephalon L., from Europe and the orient; good shade of lavender; lies on the ground and flower heads turn up.

GARDIN BOTANIQUE DE L'ETAT, BRUSSELS, 1945.

Allium tuberosum, from Malabar; a good white, 12-inch *Allium:* check for synonomy with *Nothoscordum fragrans;* in bloom Sept. 2nd; garden effect is certainly the same.

Allium yunnanense; a tiny pink rock garden species; flowers have a pink stripe; July 30th.

Nothoscordum fragrans, "Amerique septentrionale"; beautiful bed of white alliums in effect. N. B. These bulbs evidently stay out of doors with no protection in winter.

AMARYLLIDS IN LOUISIANA

Mrs. Herbert V. Kelley, *Louisiana*

Gardening in central Louisiana is subject to vagaries of weather over and above what one would expect from a perusal of the statistics covering mean temperatures. The average winter temperature is 56 degrees but a 30 degree drop in the course of a winter afternoon is not an unusual occurrence. Moreover, while the opening of December may be accompanied by harsh mid-winter weather, the early days of January may be balmy and spring-like. This latter period of equable temperatures is generally followed by what we of the deep south regard as extreme cold, sometimes as low as 30 degrees. Added to this are lengthy spring and fall droughts which coincide with the blooming periods of the spring and fall blooming species of the amaryllids.

Another important factor in outdoor bulb gardening is the abundant rainfall, some 65 inches for the area. The mercury hovers around the nineties for most of the long summer, which may be reckoned to extend from late May to late October. Since the rainfall is copious during this period it works a hardship on those amaryllids which become dormant in the summer and those which are in leaf are sometimes scalded by the alternating showers and hot summer sun.

Baton Rouge, in central Louisiana, is the beginning of the highlands and the soil varies from heavy clay to clay loam. Such a soil lends itself readily to the usual methods of soil improvement while retaining its beneficent moisture- and nutrient-retentive characteristics. While this type of soil is perhaps not regarded as the ideal medium for bulbs, it has been my experience that with little effort it can be made productive of spectacular success. It is slow to warm up in the spring yet highly retentive of the intense summer heat and it is to this factor that I attribute my failures with some of the amaryllids I have tried.

Notwithstanding these apparent obstacles to successful outdoor bulb culture, many of the amaryllids are grown successfully. Several do so well that they are thought by some to be natives of the section. The large pink *Zephyranthes grandiflora* which begins to bloom in late April and the white *Z. candida* which begins in early August, both of which are known locally as Rain Lilies because of their repeated bursts of bloom after each summer rain, are to be seen in most gardens. *Amaryllis Johnsonii,* here called the St. Joseph Lily, is plentiful and considering that it never sets seed and all multiplication is asexual it must have been brought here long ago to have become so widespread in central and south Louisiana. *Crinum americanum* and *Hymenocallis occidentalis* are indigenous to the area. The latter, known as the White Spider Lily, lines

the ditches and covers the low meadows with its spidery white bloom in early spring. These are in bloom at the same time as the native iris and grow in like situations. A summer blooming *Hymenocallis* though not a native is widely grown. This is the *Hymenocallis* of which Elizabeth Lawrence writes in her article in the 1943 Herbertia. Blooming in late June and thru August, its large white clustered blossoms lend sparkle to the summer garden. *Narcissus Tazetta,* Jonquils and many Crinums abound in old gardens and cemeteries where they have persisted for generations and their varietal identity has, in many cases, been lost. *Lycoris radiata,* the Red Spider Lily, does well. It multiplies rapidly forming clones that cover wide areas and sending up its showy blooms during September.

L. aurea appearing simultaneously, or slightly earlier, is distressingly parsimonious with its bloom, though it will ,when given due attention, yield gold that fully repays such care. I have in mind a small clone growing in a shady, fern-covered nook. The camera, (Plate 312) attempting to reproduce all of the beauties of the surroundings, was unable to do full justice to the warm golden shadows that lie in the heart of this glorious flower. The degree of shade given these bulbs affects their blooming time; by planting some in full sun and some in shade their blooming period may be extended considerably, those in shade blooming first.

Besides these old favorites, I have succeeded with species and varieties which are not grown generally in this area. Some years ago I tried hybrid *Amaryllis* as pot plants. Finding that they did poorly I tried them in the garden where they have thrived and yielded satisfaction immeasurably beyond the care demanded by them. I have grown hybrid *Amaryllis* both in New Orleans and Baton Rouge and have hybridized extensively in the latter place. My hundreds of seedlings are now progressively yielding bloom that are a constant source of delight. These usually come into bloom from the end of March to the first week of April. No winter protection is given these bulbs and the culture they receive is only that which is accorded other garden plants. Discovering that these succeeded in the open, I sought to know other members of this interesting family.

Amaryllis belladonna Linn., non Ait. (syn.—*A. equestris* Ait.) grows and multiples in the garden but as a pot plant it is a more dependable bloomer. Its red-orange flowers with greenish white throat are in bloom in February indoors but not until late April in the garden. When established, the striking scarlet blooms of *Sprekelia formosissima* also appear at this time. Most crinums found in this section have long, trumpet-shaped blooms which hang their heads. There were no good whites. Hoping to secure a good white, I first sent for *Crinum Powellii album* and *C. bulbispermum album* (syn. *C. longifolium album.*) I was delighted to find that the flowers of *C. Powellii album* were not only a beautiful clear white but tulip-shaped, a flower form which was then scarce among the crinums grown locally. *C. bulbispermum* turned out to be a purer white than the one found locally and I was grateful for its aid in identifying the older *Crinum. C. scabrum* is the next in bloom

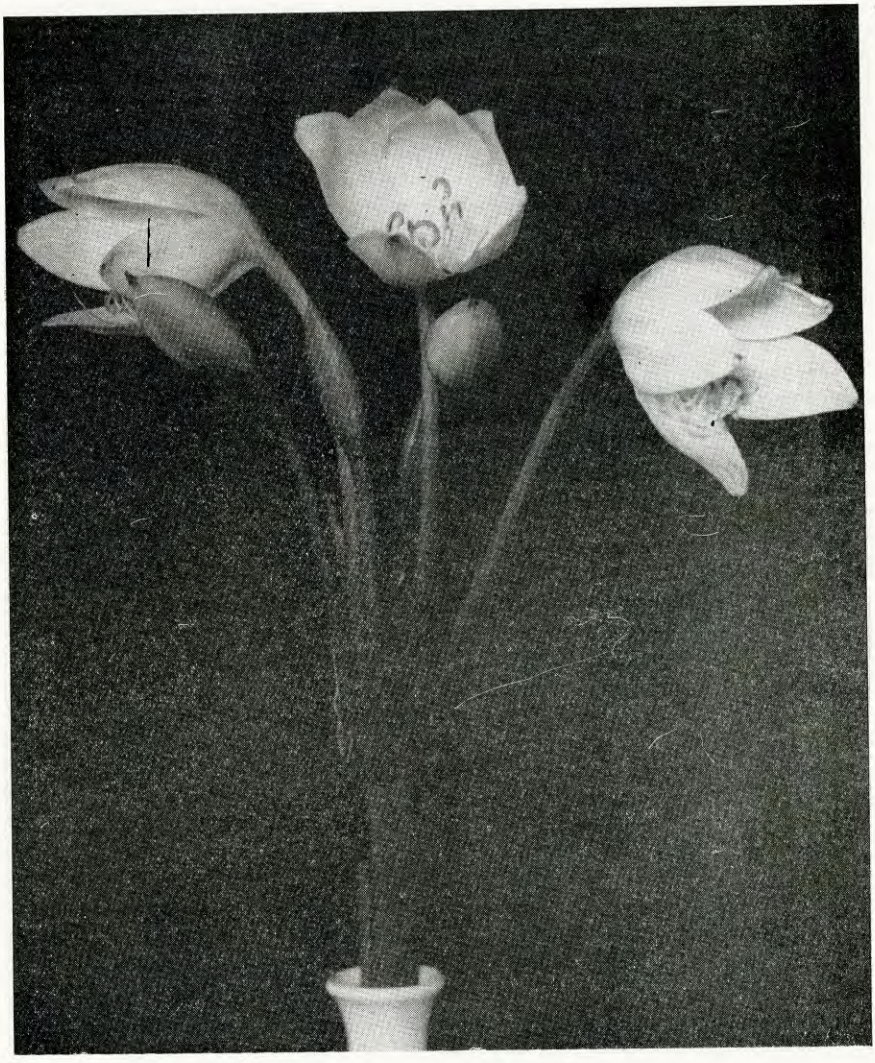
Lycoris aurea
Photo by Herbert V. Kelley

Plate 312

and its wide white petals striped with clear deep red are of good form with heads held horizontally. This is one of the best of the Milk-and-Wine types having a spring and fall blooming period. Although it sets seeds which germinate readily it is slow to mature and multiply. Among the pink crinums, *J. C. Harvey* and *H. J. Elwes* have made nice clumps but have not bloomed. *C. Cecil Houdyshel,* while only planted last year, already has its second bloom stalk, the first appearing on May 25th. An unknown pink crinum is called *Ivy Powell,* a friend and neighbor, since the original bulbs were brought from her family plantation. It has a lovely shell pink flower and blooms four or five times a season. Its flowers are held erect, the broad segments flaring open and recurving. It resembles a lilium rather than a crinum. *Ellen Bosanquet* has handsome rose-red flowers; although it is said to be the deepest red crinum, I have in my garden an unidentified crinum with much darker red flowers. This interesting unknown has a three foot crown of leaves surmounting twelve to fourteen inch neck. The long and narrow segments are flushed with the color of the reverse of the petals which are a deep wine-red approximating the color Hollyhock (53 L 11- Maerz & Paul). The tube is also this rich color and the heavy clusters of flowers produce a striking picture. *C. fimbriatulum* comes into bloom in mid-August and its white salverform flowers have a pale pink stripe. Opening at dusk, it perfumes the night air and four to six blooms open in pairs on each succeeding evening. The first frosts usually find this crinum still in bloom. Its wide segments outspread to form a six-pointed star and give it the name of Star Lily. A crinum brought from Mexico (Plate 313) and tentatively identified as a *Mooreii* hybrid is doing exceptionally well. It is a creamy-white with black tips on petals and sepals. On opening in the evening the anthers are gray and crescent shaped and darken to black during the first day, straightening as they mature. It remains open two days and is very fragrant. Its leaves are quite short, a good characteristic as most crinums take considerable space in the flower border. In an exchange of bulbs with Mr. L. S. Hannibal, I was so fortunate as to obtain a bulb of *C. Frank Leach* which flourishes but has not as yet bloomed, having been planted just last fall.

Agapanthus have usually been considered pot plants in this section but I have *A. orientalis alba* and *A. longispathus* in the open. While they are on the south side of the house, they are not protected and have come through two winters unharmed. *A. longispathus* has bloomed with the coming of each spring around the end of May.

Zephyranthes atamasco, the lovely white wild Easter Lily of the East Coast is a shy bloomer with me. *Z. citrina* is a good clear yellow and blooms generously. I have a yellow *Zephyranthes* from an old plantation garden which duplicates the color but differs in size, having shorter leaves and smaller flowers. I would hesitate to identify it as being the same species notwithstanding that they exhibit the same fertility and appear identical in many other respects. *Z. Ajax* is a paler yellow, somewhat larger than *Z. citrina.* It blooms here in June and the white selections of this hybrid are a pleasing variation for no other white is then in bloom. *Z. candida,* Mr. E. L. Brasol's cross between *Z.*



Unidentified *Crinum;* probably a cultivated hybrid.
Photo by Herbert V. Kelley

Plate 313

Ajax and *Z. candida,* is a lovely straw yellow displaying the form of *Z. candida* but blooming at the same time as *Z. Ajax. Z. aurea and Z. treatiae* have not yet bloomed for me. *Z. rosea* and *Z. insularum* were planted this past winter and I am eagerly looking forward to their blooming.

Cooperia pedunculata does exceptionally well here and sets seeds generously which germinate within five days if harvested and sowed immediately after the necessary minimum of drying. Its lovely white flowers which open in the evening and remain open throughout the following day fade to pink under the sunshine. They surprise one by literally leaping up after the early spring rains. Their first bloom has appeared as early as the last week in March.

The most astonishing characteristic of the *Habranthus* is the wide disparity in size and color among the various species. *H. Andersonii* with yellow flowers washed red on the outside is very tiny. *H. robustus,* on the other hand, is as large as *Zephyranthes grandiflora;* its handsome pink and white flowers are the first of the *Habranthus* to appear in early June. *H. brachyandrus* is the giant of the three with which I am familiar. Its orchid-pink flowers shading to magenta at the base are as large as one of the smaller *Amaryllis.* If the flowers flared open and were not so tubular, they would be much more attractive.

The only *Alstroemeria* grown in this section is *A. pulchella* Linn. *(A. psittacina,* Lehm.) which is commonly known as the Parrot Lily. I have tried without success to grow *A. lutea,* the Chilensis hybrids and the white *A. pelegrina.* Considering how easily *A. pulchella* grows, I was perplexed by my failure until I heard Mr. William Lanier Hunt last fall in New Orleans explain that the soil in which alstroemerias are grown should not go above 65 degrees in summer. The coloration of these species is what attracted me as the red, green and maroon spotted, flowers of *A. pulchella* are bizarre rather than beautiful. However, I am determined to make another effort to grow these more desirable forms in the shade and cooler spots of my garden.

Mid-June finds the beautiful *Crinodonna Howardii* (syn. *Amercrinum Howardii*) in full bloom. It is truly the belle of the summer garden with the pearly pink of its blooms held high above the foliage. Here it blooms monthly from June until late November.

Allium tuberosum does well for me, forming nice clumps which bloom profusely in mid-summer. Its small cluster of clear white flowers are attractive in the garden as they are carried well above the foliage on stems which do not need staking. They also make fine cut flowers and I keep them cut for fear of having them become the nuisance that *Nothoscodum inodorum* is in this area.

On learning that *Lycoris radiata,* which is still called the "Guernsey Lily" in this section, was not a Nerine, I tried to secure bulbs of the true Guernsey Lily. Being unable to do this, *Nerine Bowdenii* and *N. filifolia* were tried. Neither survived its first winter which was an exceptionally wet one. I hope to try these nerines again, being hopeful that better drainage is what they need.

Lycoris squamigera, L. incarnata, and a white form of *L. radiata,* have been tried. While all have survived and multiplied, I have had no bloom from any of them. I made the mistake of moving them when they failed to bloom hoping to find a location more to their liking. Since it appears that they resent this, I have let them remain in one place. I made the same mistake with *Brunsvigia rosea.* Fortunately two bulbs escaped my mistaken kindness and have multiplied and bloomed in September the past two years. The flowers are white with a light pink tint on the outer ends of the segments. Another bulb, *Brunsvigia rosea minor,* bloomed a week after planting and seemed to duplicate the above, the scape being shorter which may have been the result of recent planting.

A mere list of the amaryllids which I have tried cannot adequately convey the enjoyment that I have derived from their nurture and the charm which they lend to my garden. The success that I have had, while perhaps not unusual, has served to intensify my enthusiasm for this branch of gardening and to determine me to seek more and more of this pleasure.

SEMI-HARDY CRINUMS

L. S. Hannibal, *California*

Dean Herbert, who passed away a century ago, holds the undisputed lead as a *Crinum* collector and breeder. The world now knows little of the crosses that he effected and the writer doubts if any of his specimens still exist. Still his work was not in vain for he showed that the species of the genus *Crinum* were among the easiest of the Amaryllids to hybridize, and others have readily effected new crosses of their own. Some of these latter hybrids, being fairly hardy, have come into general use, and others being more tender have failed to survive unless grown in subtropical areas. Just how many *Crinum* hybrids exist is anyone's guess, but of the semi-hardy only a score or so can tolerate climatic conditions bordering the north edge of the Citrus belt. In other words there are only a few good Crinums that the writer deems worthy of listing as outdoor or cold greenhouse plants. Time may turn up a few more, but not many.

For a number of years *Crinum Ellen Bosanquet* has been considered one of the most colorful hybrids. The bulb needs some protection from the cold damp in the winter and not too much summer sun, but the delicate rose-purple shading and aromatic fragrance of the flowers warrant all the care that the plants require. In 1939 the writer ran across another example of Mr. Bosanquet's creations; this was *Crinum Louis Bosanquet,* which is equal to if not more attractive than, *Ellen Bosanquet.* This lesser known plant has viable pollen and has given rise to some interesting seedlings, none of which the writer has grown, but have been crossed with Mr. Houdyshel's *Crinum* hybrids such as *Gordon Wayne.*

However, the finest of the recent Crinums similar to the *Bosanquet* hybrids came through the success that Dr. Traub has had in crossing *Crinum scabrum* (seed parent) and *Ellen Bosanquet* (pollen parent). Out of a number of interesting F-1 seedlings, one of particular merit appeared, which was deeper and richer in texture than the rose-purple pollen parent, *Ellen Bosanquet.* This splendid hybrid which Dr. Traub has named *Elizabeth Traub,* in memory of his mother, the late Mrs. Elizabeth Graf Traub, will be available shortly to *Crinum* collectors. Mr. Houdyshel showed the writer quite a clump that was in bloom and it is an admirable addition to the bulb garden. The writer is pleased to have this opportunity of mentioning this clone in connection with the other semi-hardy *Crinums* considered in this article. [Editorial note.—The *Crinum Elizabeth Traub* is more vigorous, and has longer leaves than *Ellen Bosanquet.* In a recent letter (8-21-1847), Mr. Houdyshel writes,—"Examination this A. M. showed 13 florets in the . . . umbel of Elizabeth Traub . . . there were no *Ellen Bosanquet* with that number. The color of *Elizabeth Traub* was much darker and richer . . . ".]

As far as known Mr. Bosanquet did not reveal the *Crinum* species that he used in making his crosses. Several hybrids, the best in fact, did not flower until after his death in 1930. Thus there has been some speculation whether *Crinum Moorei* or a *Moorei* hybrid was involved. From the standpoint of hardiness the evidence indicates such, since few other *Crinum* species contribute this factor which is so all important in this area. However others have expressed views otherwise. The proof will probably lie in a critical examination of seedling throwbacks that some Texas and Florida growers have been able to effect.

The well known *Powellii* hybrids *(Crinum bulbispermum* x *C. Moorei)* represent the hardiest of old time hybrids. The first of the crosses came from Sir W. Bowman's garden near London in 1887. The cross has been repeated a number of times, notably in Holland, and several of these plants have much in their favor as far as outstanding quality is concerned. Unlike many Amaryllids both *C. Moorei* and *C. bulbispermum* (The latter is also known as *C. capensis* and *C. longifolium)* are variable within the species. Quite a bit of individual variation exists in color, width of segment, and flowering date. In fact the writer has one clone of *C. bulbispermum* that came from Mr. Hayward some years ago that may throw white flowers at one time and light pink the next, or more often the two colors may appear in the same umbel.

Obviously with so much variation within the species it follows that considerable variation occurs in the various *Crinum* X *Powellii* clones that have been developed. In the course of the last ten years the writer has picked up a score of forms, several of outstanding quality. One came from the Ivy Powell estate near Baton Rouge, where it has been grown for years (We have reason to wonder if there was some connection between the Powell family and Sir Bowman), another came from Australia, and still others came from local sources. Even *Crinum Cecil Houdyshel* is considered a *Powellii* cross, although it is not exactly

typical of the usual *C. Moorei* x *bulbispermum* hybrids. All in all the *Powellii* types are hardy to cold and drought, and they multiply rapidly, so it is not surprising to find many forms scattered about.

Other *Crinum* crosses on *Crinum Moorei* are not uncommon. The writer introduced *Crinum Frank Leach* as a *Moorei* type. Subsequent breeding experiments have caused us to conclude that the plant is a tetraploid hybrid, an amphlidiploid to be exact, since so many of its seedlings revert to a *Moorei* plant of lesser stature with shorter scape. At one time too we thought the plant a local find, but the clone is scattered about the south to some extent, even to Key West.

Luther Burbank made a number of *Crinum* crosses, two of which are occasionally found in circulation. One of the white forms, commonly found about Riverside, Calif., produces viable seed, and the writer has grown and flowered a number of these. It is apparent that this hybrid of Burbank's was a *Crinum Moorei* X *C. erubescens* cross since several of the seedlings are very characteristic of the well known *C. erubescens* species, whereas others are the *Moorei* type. In the writer's experience the seedlings were not easy to bring to maturity, but once established neither central California's summer drought nor winter rains seem to bother the plants. They thrive in spite of all neglect, but we have still to see an offset.

Crinum erubescens itself is an attractive plant. The white flowers with their delicate pale pink keels are exceedingly graceful. In winter hardiness this species stands up as well as *C. Moorei,* but obviously not as well as the tough old *C. bulbispermum.* The latter is reported to exist in protected outdoor locations as far north as Washington, D. C.

"Walking stick" Crinums may be a new term to many, but it is a common nick-name applied to any long scaped *Crinum* in Australia. The climate of New South Wales is particularly mild and a wide selection of Amaryllids have been grown there for a century or more. For fifty years or more extensive breeding has taken place in all lines of horticulture due to the prestige offered in taking the coveted Baptist award, which is issued annually by the Royal Horticultural Society of N. S. W. for the best flowers of the year. Occasionally an Amaryllid has taken the prize as *Nerines, Amaryllis, Clivia, Brunsvigia multiflora,* or *Crinum* hybrids are often entered. To qualify three bloom or umbels must be presented, and many a "walking stick" has been severely criticized due to the scape being out of proportion to the size of the umbel or plant. Those plants that have been accepted are usually well balanced in form and have excellent quality. In many cases they receive names, like the "Amaryllis Baptisti."

Crinum George Harwood is the only named Australian clone that the writer has seen to date, but it is definitely an outstanding hybrid. It is one of H. B. Bradley's productions that was first observed flowering shortly after his death in 1918. *Crinum* hybrids *George Harwood, Cummins,* and *H. B. Bradley* were all seedlings from the same cross on one of his hybrid "Walking sticks;"—a bulb that is now lost. However there seems to be considerable similarity between this lost clone and

Crinum Ellen Bosanquet, as the plants have a number of similarities. The hybrid *George Harwood* is a bicolor, white and deep rose, and although the flowers are shaped like *Ellen Bosanquet,* the wider perianths give the blossoms of *George Harwood* more of a chalice shape. This form in combination with the coloring and exquisite fragrance has produced a prize that has no equal in this country.

The Bradley hybrids, at least the three clones named above, may hold the record for length of their leaves. Those of *George Harwood* are some six feet long. The species *Crinum Kirkii* may throw four or five foot leaves, and undoubtedly other species do likewise, but six feet seems a bit out of the ordinary, yet it is not unattractive.

Actinomorphic Crinums. Thus far we have confined our discussions to the *Crinum* subgenus *Codonocrinum,* a group that has funnel form flowers borne on a curved tube. The subgenera *Stenaster* and *Platyaster* are distinct in that the segments are ray-shaped and borne on an upright tube. The Species *Crinum americanum* found in the Florida swamps is typical of this ray-form (See Bailey's Cyclopedia of Horticulture, Page 893). Plants of the ray-formed flowers are mostly tropical or sub tropical, although some of the Asiatic forms do grow in southern Japan.

On the whole though it is a rare discovery to find one that will grow outdoors in Southern California, let alone central California. The writer has tried *Crinum asiaticum, C. americanum* and *C. caribaeum.* Only the last has ever flowered, and this was in an unheated greenhouse. Thus it was with some surprise to find that a recently contributed plant defied our climate and really thrived here. This bulb, belonging to the gigantum group, (The name is misleading as the "Gigantum" crinums are all small plants) was collected by the Reverend Lyman Morse in the upper Congo in 1895. He reports it as growing in abundance in an almost inaccessible area along the banks of the Lukunga river. Like most of the "Actinomorphic" flowered Crinums this species requires considerable moisture for growth, but it makes an exception to the usual requirements of an acid soil that is so typical for bog plants. That, plus a fair degree of hardiness and a tendency to multiply rapidly by stolens, makes it a plant that will eventually be in general distribution. The wide, marble white, strangely reflexed petals will capture the heart of any *Crinum* fancier. We believe that it is a new species, but a better understanding as to species differentiation in the "Gigantum" group is desirable before passing final judgment.

Excluding the hybrid *Crinum Edmund Sturtavent,* the writer knows of no hardy, or semi hardy Crinums involving *Stenaster* or *Platyaster* blood. *C. Edmund Sturtavent* is somewhat an exception in more than one way. The *C. Moorei* parentage introduces hardiness and the *C. asiaticum,* size. Likewise it crosses a zygomorphic flower with an actinomorphic to give a sterile zygomorphic seedling (Herbertia Vol. 11, Page 258). Altogether it is a type of cross that one is not likely to find often nor do easily.

Crinum Breeding. *Crinum* breeding involves no special requirements other than suitable climatic conditions, which means warmth and proper humidity. Most of the Crinums are nocturnal in that the blossoms open in the evenings, and the pollen is most potent then when fresh. Thus evening pollinations are the logical procedure. However there is one serious difficulty. If one is in an area where cold nights occur chances of many crosses taking are quickly eliminated. Many *Crinum* pollens become inactive at some critical temperature, which may be below 70° F. for some and 65° F. for others. Warm nights are most conducive to successful takes.

A special inducement to better pollinations can also be effected by breaking off a petal in the morning and treating the exposed break to a lanolin—phenoxyacetic acid wash, the same as is used to induce fruit setting on other crops. Pollination some eight hours later according to our New Zealand friends is far more likely to take.

The crosses that can be tried are endless, but if one wishes to show progress the selfing or crossing of existing hybrid stock, providing that it sets viable seeds, presents the quickest opportunity of something new. The F-2 seedlings from the Burbank hybrids, or *Ellen Bosanquet,* or Bradley's "Walking sticks" are a splendid example of this. Oftentimes though one may run into seedlings that are throwbacks to one of the original grand parental species. The writer has in mind a score or so of perfect *"Mooreis"* that appeared out of the blue from one of the Houdyshel hybrids. Then again albino plants, or ones that multiply by numerous offsets often appear. The albinos die due to lack of chlorophyll, and the "Horse Teeth" or splitters never get to be of flowering size.

The formation of species throwbacks from a viable hybrid is not uncommon, as geneticists have reported many instances of such in the literature. However practically all cases cited deal with plants not belonging to the Amaryllidaceae. Dr. Edgar Anderson was the first to note that multiple characteristic linkages appeared in Daffodil hybrids at Oregon Bulb Farms, and attributes the cause to a strong tendency for the plants to try to retain their original, or part of their original chromosomes as a species entity. (In other words the chromosome groupings that entered a hybrid try to breed out in their same relationship as they entered.) The same occurs in *Brunsvigia multiflora, Clivia, Nerine, Cooperanthes,* and undoubtedly a number of other Amaryllids. At first it seems unusual that so many Amaryllidaceae hybrids should behave thus, but on the other hand it can be a common cytological behavior that marks the *Amaryllidaceae* apart from the *Liliaceae, Bomareaceae,* or *Iridaceae* families.

As a consequent specie throwbacks amongst the *Crinum* hybrids can be expected, and the quantities will vary from practically none to 100% depending on the hybrid clone used. If such occurs the only way to circumvent it is to look for breaks and to carry on to another generation using such plants. Perhaps some day *Crinum* hybrids will be as diversified as the Tall Bearded Iris, but it will take involved breeding,

many thousand-fold more complex than Dean Herbert envisioned when he attempted to solve the riddle of hybridism on the basis of his *Crinum* crosses.

HYMENOCALLIS CARIBAEA

W. M. JAMES, *California*

The specimen of *Hymenocallis caribaea* illustrated (Figures 185 and 186) was produced from a bulb collected in Jamaica by Mr. A. C. Splinter. This bulb was dug in July 1945 and all foliage cut off before being packed. It was received in Santa Barbara in November of the same year and was planted in Mr. Splinter's glass house. Although the bulb did not bloom until July 1946, which is a little later than normal, the flower was of good size and quality considering that this species of *Hymenocallis* is evergreen, does not take any prolonged rest period and was out of the ground and in transit for about four months. This umbel

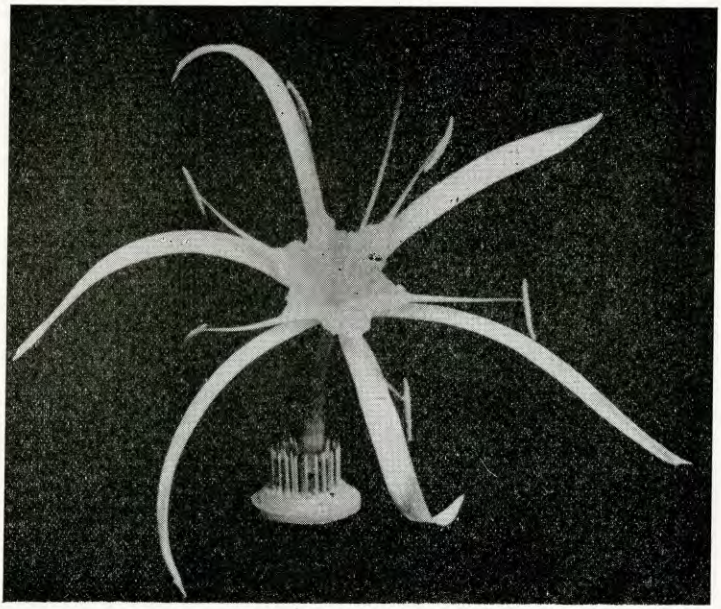


Fig. 186. *Hymenocallis caribaea;* single flower about half natural size. Photo by W. M. James. [Fig. 185 on page 170.]

had twelve blossoms. Mr. Splinter says that in Jamaica there are up to thirty blossoms in one umbel and the stems are up to three feet long. The leaves are pointed, narrowed at the base, three to four inches wide in the broadest place, are two to three feet long and resemble *Eucharis* foliage more than the leaves of other *Hymenocallis*. This is a beautiful flower with a delightful fragrance, but it can not be grown out of doors to any advantage in Santa Barbara.

5. THE AMERICAN PLANT LIFE SOCIETY

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[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.*]

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[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.]

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Prof. Ira S. Nelson, in charge of Daylily Trial Garden, Dept. of Horticulture, Southwestern Louisiana Institute, Lafayette, La.

Prof. L. H. MacDaniels, in charge of Daylily Trial Garden, Dept. of Agriculture, Cornell University, Ithaca, N. Y.

Mr. H. T. Blackhurst, in charge of Daylily Trial Garden, Division of Horticulture, Texas Agric. Expt. Station, College Station, Texas.

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, Div. 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.

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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 and Vol. 14, 1947. 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—

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The American Plant Life Society,
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(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. *Vol. 1, (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., and Ladislaus Cutak. 105 pages.

Vol. 2, (Nos. 1-3.) VERBENACEAE EDITION. Illustrated treatment of

the Verbena Family by Dr. and Mrs. Moldenke, the outstanding authorities on this plant family. 100 pages.

Vol. 3, (Nos. 1-3.) GENERAL EDITION. Containing an illustrated article on winter and spring flowering *Gladiolus,* and articles on the Dutch Bulb Industry, 1939-1945. 42 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.

Volume 4 (1937). FIRST BRITISH EDITION. DEDICATED TO WILLIAM HERBERT. Containing the biography of William Herbert; the reprint of Herbert's essay, on Crosses and Hybrid Intermixtures in Vegetables; Dr. Darlington's essay, The Early Hybridizers and the Origins of Genetics, and many important articles on description; cytology, genetics and breeding; physiology of reproduction, and amaryllid culture; with two portraits, forty-four other plates and three figures; a total of 280 pages.

Volume 5 (1938). FIRST NETHERLANDS EDITION. DEDICATED TO ERNST H. KRELAGE. Containing the autobiography of Ernst H. Krelage; the history of amaryllid culture in Holland by Ernst H. Krelage, Dr. Uphof's important article in which the name *Hippeastrum* is rejected; a revision of the tribes of the Amaryllidaceae; and the species of Amaryllis; outstanding articles on forcing amaryllids by Dr. Grainger and Prof. Dr. van Slogteren; and many other articles on description, cytology, genetics and breeding; physiology of reproduction, and amaryllid culture; with 33 plates and 2 figures; a total of 218 pages.

Volume 6 (1939). DEDICATED TO THE UNION OF SOUTH AFRICA, and containing articles on South African amaryllids, including the history of botanical exploration for amaryllids in South Africa, the distribution of South African amaryllids in relation to rainfall, and a review of the genus *Agapanthus* by Frances M. Leighton, a review of the Genus *Cyrtanthus,* with many excellent line drawings, by Dr. R. A. Dyer; other

articles—*Zephyranthes* of the West Indies by Dr. Hume; the Tribe *Gilliesieae* by Dr. Hutchinson; rating of daylilies for garden value by Mr. Kelso; daffodil articles by Jan de Graaff, and many other items on description, cytology, breeding, propagation, and amaryllid culture; with 44 plates and 10 figures; a total of 258 pages.

Volume 7 (1940). Dedicated to Latin America, and featuring articles on Latin American amaryllids; biographies of Drs. Philippi and Holmberg; report by Dr. Goodspeed on the amaryllids collected by the Univ. of Calif., Second Andean Expedition; reports on the flowering of the "Blue Amaryllis," *A. procera;* and many other important articles on the description, propagation, breeding, culture, harvesting and storage of amaryllids. Of special interest are the important articles on the description, breeding and culture of daylilies by noted authorities. With 45 illustrations—30 plates and 15 figures—and a total of 242 pages.

Volume 8 (1941). First Daylily Edition. The first extensive symposium on the daylily, containing biographies of George Yeld, Amos Perry, Hans Sass, and Paul Cook, and important articles on daylily evaluation, breeding, propagation and culture. Also important articles on *Narcissus* and other amaryllids. Thirty-eight illustrations—27 plates and 11 figures—and a total of 185 pages.

Volume 9 (1942). First Alstroemerid Edition. Dedicated to Harry L. Stinson, the outstanding authority on this plant group, who contributes a summary of his work on Alstroemerid taxonomy, breeding, propagation and culture. This volume contains the autobiography of Prof. Dr. Abilio Fernandes, the Check-List of Amaryllids by Major Pam, and a review of the species of *Crinum* by Dr. Uphof, and also many important articles on daylilies, *Narcissus, Cyrtanthus,* hybrid *Amaryllis, Ixiolirion* and other amaryllids. Thirty-five illustrations—17 plates and 18 figures—and a total of 243 pages.

Volume 10 (1943). 10th Anniversary Edition. Dedicated to Elizabeth Lawrence, the outstanding authority on the use of amaryllids in the garden, who contributes a summary of her work in this field. This volume contains the review of *Agapanthus* and *Tulbaghia,* by Dr. Uphof; an article on *Brunsvigia rosea* and hybrids by Mr. Hannibal; a symposium on *Narcissus* breeding by Messrs. Powell, Reinelt, Berry and Reynolds; a review of amaryllid chromosomes by Dr. Flory; articles on hybrid amaryllis, daylilies, and many other important articles on amaryllids. Forty-one illustrations—12 plates and 29 text figures—and a total of 205 pages.

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 Ligtu.* 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, an article on his breeding activities; 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 A. and R. Fernandes; 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 other amaryllids— *Hemerocallis,* hybrid *Amaryllis, Habranthus, Crinums, Lapagerias, Agapanthus, Hymenocallis,* etc. Thirty-nine illustrations—186 pages.

Volume 14 (1947). 2nd Hemerocallis Edition. Dedicated to Ralph W. Wheeler, the noted Daylily breeder. This volume contains an autobiography of Mr. Wheeler and an article on his breeding activities; and many important articles on *Hemerocallis* description, evaluation, breeding, etc., from various parts of the country. There are also important articles on other amaryllids—Hybrid *Amaryllis,* amaryllids in the Holy Land and Mexico, starch in *Alstroemeria,* the *Galantheae,* Double *Narcissus, Zephyranthes, Sternbergia, Allium,* etc. Twenty-eight illustrations —206 pages.

[PUBLICATIONS—Continued on page 204.]

6. THE BUYERS' GUIDE

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[PUBLICATIONS—Continued from page 198.]

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