

PLANT LIFE



H.P.T.

1949

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PLANT LIFE

VOLUME 5

[Nos. 1-4, Jan., Apr., Jul. & Oct.]

1949

EDITED BY

HAMILTON P. TRAUB

HAROLD N. MOLDENKE

THE AMERICAN PLANT LIFE SOCIETY

Box 2398, Stanford, California

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NOTE TO MEMBERS AND LIBRARIANS

The present volume is the fifth of the PLANT LIFE series. It is suggested that these five volumes be bound into one book for convenient reference. At the end of the present volume will be found a title leaf to be used for this purpose.

PLANT LIFE

VOLUME 5

[Nos. 1-3: Jan., Apr., & Jul.]

1949

GESNERIACEAE EDITION

EDITED BY

HAMILTON P. TRAUB

HAROLD N. MOLDENKE

THE AMERICAN PLANT LIFE SOCIETY

Box 2398, Stanford, California

PREFACE

Numbers 1-3 of PLANT LIFE, vol. 5, 1949, is devoted to the *Gesneriaceae*, a very interesting group that is gaining in public favor. In the present issue only a beginning is made toward the coverage of this important group. Other articles on this subject will appear in future issues of PLANT LIFE.

The cover design features *xAchimenes* cl. PURPLE KING, and illustrates the outstanding ornamental qualities that characterize the achimenes.

We are favored with most interesting articles by a number of *Gesneriaceae* enthusiasts. The Membership Secretary, E. Frederick Smith, makes his bow by contributing the stimulating article on "Experiences with *Achimenes*," under California growing conditions, and Wyndham Hayward, the Southeast Regional Vice-President, favors us with a similar article "The *Achimenes* Come Back," detailing their culture in Florida. The Moshers (Dr. Kenneth H. Mosher and his wife) contribute interesting articles on various *Gesneriaceae*—"Achimenes," "*Achimenes longituba*," "*Kohleria picta*" and "Hybrid *Naegelia*." These articles are a foretaste of what is to follow in future issues on these fine plants and related genera.

In future issues of PLANT LIFE, in addition to the annual HERBERTIA number devoted to the Amaryllids, other plant subjects will also be treated—caladiums, anthuriums, palms, oxalis, etc. Past issues have been devoted to the *Verbenaceae*, the *Bromeliaceae*, spring- and summer-flowering *Gladiolus*, the history of the Dutch Bulb Industry, 1940-1945, and the Aroid Lily (*Calla Lily*), *Zantedeschia*.

—Hamilton P. Traub
Harold N. Moldenke

September 30, 1949

CORRIGENDA

PLANT LIFE, VOL. 4 (1948) 1949

Page 10, center of page, under "Genus ZANTEDESCHIA Sprengel," 1st line, change "1926" to "1826."

Page 13, Horticultural Selections, under (a), note that Pearl of Stuttgart is indicated as a dwarf, very floriferous variety with pearl white flowers, in Cat., H. de Graaff & Sons, Pittsburgh, Pa., 1949, p. 74.

Page 24, under 6a, Range.—, change "Nyassaland" to "Nyasaland."

Page 28, 10th line, between "Roosevelt" and "*xZantedeschia*" insert a semi-colon (;).

12th line, between "Bailey" and "*Zantedeschia*," insert a semi-colon (;).

20th line, change "form" to "corm."

Page 30, 15th line from bottom, under "Notes," change "*Regionieri*" to "*Ragionieri*."

MONOGRAPH OF GESNERIACEAE NEEDED

In a letter dated Oct. 17, 1949, C. V. Morton, Dept. of Botany, Smithsonian Institution, writes—"I am sorry to say that there is no complete monograph of the *Gesneriaceae*. The Old World species (under the name *Cyrtandraceae*) were monographed by C. B. Clarke in De Candolle's *MONOGRAPHIAE PHANEROGAMARUM*. *Achimenes* and other New World genera have not been monographed since Hanstein published in several volumes of *LINNAEA* around 1865. This treatment is of course long out of date and hardly of great value at present in identification work."

We are grateful to Mr. Morton for this information. It is hoped that some one with the necessary training and time will give us a modern monograph of this plant family.

—*Editor*

EXPERIENCES WITH **ACHIMENES**

E. FREDERICK SMITH, *California*

A Professor of Psychology should sometime be urged to assign, to one of his eager Doctors-to-be, the following problem: Why does this peculiar breed of humans called gardeners permit certain groups of charming plants to disappear from circulation?

Somewhere in the thesis there is bound to be a reference to the great *Achimenes* mystery. Over one hundred years ago Old World gardeners and plant breeders were carefully selecting and hybridizing *Achimenes*, using material that originally came from America. And as European gardeners emigrated to this country they brought along their choicest specimens, to adorn the greenhouses of the great estates and conservatories in which they worked. This continued until the early part of this century, at which time the *Achimenes* suffered an eclipse. It seems entirely possible that the disappearance of the old-time gardeners might account for the decline of interest in *Achimenes*.

The recent revival of interest in *Achimenes* shows promise of healthy growth. But it goes without saying that there must be general acceptance—and demand—on the part of plant enthusiasts for new and exciting introductions. Growers will not bother to produce quantities of *Achimenes* tubercles for an apathetic market; plant breeders will like-

wise hesitate to risk their time and talent in the face of a lukewarm interest on the part of the plant-buying public.

This plant-buying public is not entirely to blame, however, since so little is ever written in popular gardening periodicals to acquaint one with the charm and loveliness of this fascinating group of plants. So, with the hope that new converts may be won over to the *Achimenes* cause, or at least that a start be made in that direction, this is being written.

I have been your Membership Secretary for four full years, and during that time I have resisted many an urge to do a little writing for publication. The press of routine matters, however, always seemed to preclude the accomplishment of that desire. And then the Editor sent a request for an article on *Achimenes* for PLANT LIFE, Volume 5. Just like that.

So a large piece of wrapping paper is placed over the stack of unanswered letters on my desk. This is done for two reasons: (a) the letters, if in plain sight, would have a distracting effect, and (b) a lot of dust might accumulate on them before this is completed.

It is but fair to warn you that this piece will be just about 100% non-scientific. I am writing this as a hard-working gardener who derives so much pleasure from the actual growing of plants in general that little time is left for the finer points of classification.

Another warning is in order. You do not grow just ONE single variety of *Achimenes*. Of course, if you are the kind of person who can stop after eating one salted peanut, you might possibly be content with a single variety of *Achimenes*. But my guess is that you will not be satisfied until you beg, borrow or swap as many as possible. As to the swapping part, it is not absolutely necessary that you possess horse-trading traits. But it certainly helps.

In order to make a start with *Achimenes* you must first purchase the bulbs, tubers, tubercles, rhizomes or roots. This may sound a little confusing, but it will depend on the particular bulb dealer with whom you place your order. One dealer may call them "tubers," another "roots," and maybe another will use as many as three of the terms in one single descriptive paragraph. But they all mean the same. When they arrive you are very apt to wonder if you were sent miniature pine cones by mistake, as that is what they really appear to be. The appearance, however, all depends on the variety. Some are short and fat (the "pinecone" type); others are long, thin and very fragile looking; many are intermediate: long-and-fat, short-and-thin. In fact, it is quite possible to identify many varieties by the size and shape of the tubercles, especially when color is also considered, since they range in color from white through pink to purple.

If in handling the tubers prior to planting you should accidentally break a few just consider yourself lucky. That may sound strange but you are working with a rather strange plant. If you plant one undamaged tuber you will have one stem; if you break the tuber in two you will have two stems—one for each section of tuber. Likewise, if you break it into four or more sections you will also have one stem for each portion. This can be carried too far, of course, for you must realize

that where you plant one single, undivided tuber you will have a vigorous growth response, since all of the stored-up energy is concentrated in one growing point. If segments are too small the newly-formed plant will need to build up a root system first, in order to manufacture food for further development. While it is doing this your one-tuber plant has raced on and will perhaps bloom several weeks ahead of the sectioned plants.



Fig. 1. *Achimenes mexicana*

The planting medium is a very important factor in successful *Achimenes* culture. In 1948 I used forest-run leafmold, throwing out only the larger sticks and stones—no screening whatever. This year I decided to treat them extra special and screened the leafmold through a half-inch-mesh screen, added about an equal amount of peatmoss and then some rotted cow manure. It sounds like a good mixture, and it looked fine. But the *Achimenes* didn't "think" so, and they showed their "dislike" for it almost from the start. Top growth was very slow in making an

appearance, and many of the less-vigorous varieties failed to show normal growth response after breaking through. Those grown in moss-lined wire baskets seemed to fare much better so one may conclude that drainage was not all that it should be in the pots and cans which were used for the most part. Even so, next year they are all going into containers with nothing but straight leafmold for the potting medium. They seem to require plenty of moisture but must have quick drainage, which are just the conditions leafmold provides. Unscreened, that is.

Plant-nutrient elements are quickly exhausted after the plants reach the bud stage, where leafmold alone is used, so it is necessary to feed them with a chemical fertilizer. Even with cow manure in the mixture it is beneficial to feed the plants regularly to keep them flowering well. A regular monthly feeding program is carried out, using liquid fertilizer. Fertilizer used in liquid form is much less apt to burn the foliage and roots, and is more quickly available.

Temperature is an important factor in the culture of *Achimenes*, especially in the early stages. They do best when the night temperature is about 60° F., or even a little higher. If forced to endure temperatures in the low fifties they practically stand still. They will make a feeble attempt to flower if you are lucky enough to get any size at all on them, but the flowers will be puny and just about completely off-type and off-color. These conclusions were reached after noting results following an experiment set up last spring. Identical lots were placed in a lath-house—subject to wind and weather—and in a heated greenhouse. The experiment needed to go no longer than two months, however, to prove conclusively that it is not worth the trouble to attempt to grow them under cool conditions. The plants in the lath-house were but a few inches in height, while the same varieties, in similar media, were growing vigorously in the warm house. Bailey's *ENCYCLOPEDIA* refers to them as "Greenhouse herbs" and the English and European gardeners term them "Stove plants"; both terms should cause one to hesitate about departing from standard practices. It is different with me, for I'm a confirmed experimenter and therefore have to find out the hard way.

Another test is indicated; one that might well be initiated by an experimentally-minded housewife: attempt to discover if *Achimenes* can be started in a kitchen window. It would seem entirely possible to do this successfully, especially where the home has thermostatically-controlled heat.

Once the plants are well started and ready to bloom they may be removed to the out-of-doors, in a situation protected from sun and wind. Flowering is somewhat slowed up but they will produce sufficient blooms to justify the care and space required. Results will of course depend on the region in which they are to be grown. In Southern California, Florida, Midwestern and Eastern States, and in the South generally, they should do nicely after the nights become warm. Conditions would be comparable to an un-heated greenhouse in this coastal part of California, where outside night temperatures average less than 54° F. during practically all of the summer months.

Achimenes are very "touchy" about strong light. After this year's collection was potted up in early April they were placed in a greenhouse with striped roof. Two-inch stripes of white, cold-water paint were applied about one-and-one-half inches apart on all roof glass surfaces. This afforded sufficient shading until early July, at which time severe burning of the leaves was apparent. The entire roof was sprayed with whitewash at this time, and all subsequent growth was normal following this total shading.



Fig. 2. *xAchimenes* cl. AMBROSIE VERSCHAFFELT

Significant results were obtained with one lot of surplus tubers that were placed in a warm house covered with Cel-O-Glass (galvanized wire fly-screen, impregnated with clear plastic). No attempt was made to shade the plants as they were strictly "on their own." They were newly-planted tubers, planted quite thickly in gallon cans—as many as 75 tubers to a can—and they made something of a record as to emergence. In fact, they grew so eagerly there was a temptation to move them to more "suitable" quarters. Lack of space, however, precluded such a

move and they remained right there. And there they still are (September 1st), growing and blooming at a great rate. Such unusual behavior rather forces one to conclude that there may be more to this material than meets the eye. Perhaps it screens out the infra-red rays, and possibly reduces the amount of ultra-violet rays. At any rate, the plants are growing lustily, with nary a sun-scald nor blister to mar their appearance.

Every African Violet fan should "take" to *Achimenes* like a duck takes to water. Assuming, of course, that a bona-fide fan is not passively content with merely buying a plant at a florist shop and then watching it grow. An honest-to-goodness fan finds a deeper and more exciting interest by growing new plants from leaves so they can be given away to friends, or swapped for new varieties. It is the same with *Achimenes*, only more so, since they have underground tubers that multiply at an incredible rate. For instance, in harvesting the crop in 1947 it was noted that one pot seemed to contain a staggering number of tubers. Since but two tubers had been planted the previous spring I undertook to count the total yield—but lost count after reaching 180. Not all varieties are this prolific, but even so, the national surplus would be something to really worry about if potatoes paid off like *Achimenes*.

If one is too impatient to wait for the harvest at the end of the growing season by all means use the leaf method of propagation to increase the population of choice varieties. Just take a pot, of suitable size to accommodate the desired number of leaves, and fill it with vermiculite. Then break off the older leaves from the lower end of the stems and insert them in the vermiculite. Keep them well watered and in about three weeks each leaf will have a well-developed root system and can be potted up. And in a very few more weeks they will be blooming and producing tubers. Just for the fun of it you might try planting half a leaf—the top half. You will be amazed to find that it will make a plant as quickly as an entire leaf.

If you prefer to make stem cuttings it will be necessary to first forget the standard rules for making cuttings. You do not cut below a node, to make a two- or three-node cutting; a single node is all that is necessary. But before you put into practice any of these easy methods for increasing your stock it would be well to estimate the amount of space available. They do take room—lots of it, if they are to be allowed to spread naturally.

A six-inch fern pot is an ideal size to use. This will accommodate up to a dozen tubers without crowding. Even half a dozen will make a good display by the time the secondary shoots have matured. The usual recommendation is to start the tubers in a flat of suitable soil, as is done with tuberous begonias, and transplant to pots after the shoots are about three inches high. This seems unnecessary—which is to say that I am too busy (lazy?) to follow this procedure; so mine are planted directly in the pots in which they are to grow for the entire season. When planting in hanging baskets the tubers are tucked into the moss as the layers of soil are being built up, so it would be impossible to pre-grow the plants for this usage.

Perhaps a more detailed description of my method of basket culture may be in order: Have ten-inch circles of one-inch lumber cut—preferably redwood or cypress. These can be made at any cabinet shop or lumber yard equipped with a band saw. Next procure the required amount of $\frac{1}{2}$ " hardware cloth to form the walls of the baskets. It will take a nine-inch strip of the hardware cloth, one inch longer than the circumference of the circular board bottom, to make one basket. Staple one edge of the wire to the board and crimp the ends of the wire together—remember the one inch extra for lap—and you have an ideal hanging basket, ten inches in diameter and approximately eight inches deep.



Fig. 3. *xAchimenes* cl. Mauve Queen

In planting the basket it is necessary to use sphagnum moss to keep the soil from sifting through the wire, so have a quantity of the moss soaking in a bucket of water. Squeeze this out a handful at a time and place it in a band about two inches high along the bottom and force it into the mesh of the wire. It should be at least a half inch thick so that it will remain in place while the soil is being added. Prepared soil is poured to form a cone in the center and then pushed into the moss; the final level being about half an inch below the top of the moss. Now for the tubers. If in plenteous supply I place them about two or three inches apart where soil meets moss, in a complete circle. Since new growth is

initiated at the end opposite to the point of attachment to the parent plant I place that end nearest the moss, or, if in a hurry—which is usual—they are placed parallel to the wire. The reason for this is that the new shoot should not encounter too much difficulty in pushing through the moss and wire to reach the outside.

The remainder of the basket is built up in the same manner—one layer at a time. On the final layer the soil is pushed out higher at the outside to form a saucer-like depression for holding water. First, however, a sprinkling of tubers is made over the upper surface and covered with a half inch of soil, which gives a globelike effect in the final picture. Figure 1, showing *Achimenes mexicana*, represents a basket prepared and grown in this manner.

In my present collection of 35 varieties (incl. species) there are perhaps a mere half-dozen which are not suitable for basket culture. Of these, it is entirely possible that they, too, would respond with a small amount of training. *Achimenes* clone Harry William, with its stiff, purplish stems, will grow to considerably more than two feet in height, and remain in an upright position with a minimum of staking. It can also be trained to grow prostrate, as was done last year in an 8" pot; the stems were bend down over the edge of the pot, and the ultimate spread was well over four feet. It was a truly remarkable sight when covered with a blanket of cerise-colored flowers. It might be mentioned in passing that this variety is the only one in the collection to produce stem tubers. All of the others produce their crop below soil level but this one forms large clusters of greenish, pine-cone-like tubers at the nodes. It also produces a generous quantity of tubers in the soil, which, added to the above-ground supply, adds up to a goodly yield.

There appears to be a difference of opinion as to the proper method of storing *Achimenes* tubers. Some are all for harvesting the dried tubers as soon as possible in the fall, storing them through the winter in dry sand, moss or vermiculite. This means double handling, since they will need to be handled again the next spring, at planting time. Others favor the practice of leaving the tubers right in the previous season's pots, allowing them to become completely dry and remain so through the winter. So, what with my chronic affliction (laziness), I heartily endorse the latter treatment. Come March and early April the containers are taken out of storage, tubers harvested and replanted into new pots and that's all there is to it. Important note: Storage temperatures should never go below 45° F.

Space will not permit a discussion of each variety individually so an attempt will be made to simplify descriptions by arranging in groups or pairs, those that possess similar plant forms, habits and flower patterns. In one group the three representatives are so nearly identical that it is sometimes necessary to look at the label to be certain as to the identity. These are *Achimenes* clones Royal Purple, Purple King (Cover Design) and Pulcherrima. Royal Purple is indeed a beautiful plant, in both foliage and flowers. The leaves are purple on the under surfaces and stems are purple. As presently growing, Royal Purple has the larger flowers—nearly two inches across—but this might be attributed to the

fact that it is being grown this year for the first time. A limited number of tubers was available and thus they were not crowded. The others were more or less crowded, which undoubtedly resulted in smaller flower size. The rich purple coloring is identical in all three, as is also the crimson-on-yellow markings at the base of petals.

Achimenes clones Ambrosie Verschaffelt (Figure 2) and Edmund Boissier are so similar that a casual glance will fail to convince one that there is a measurable difference. But certainly no collection is complete

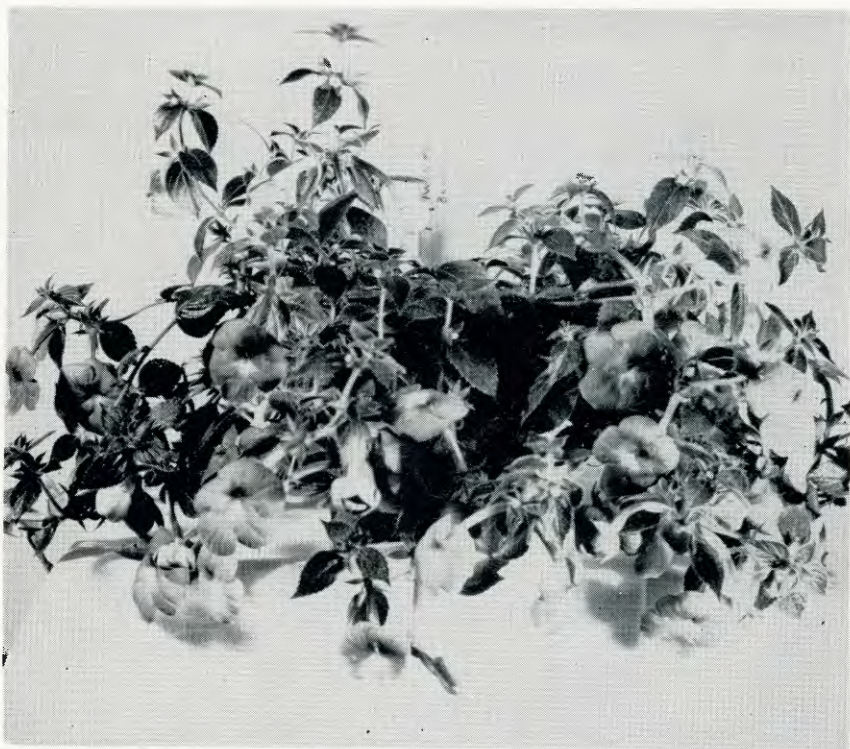


Fig. 4. *xAchimenes* cl. PERIWINKLE BLUE

without one or the other. The stunning venation pattern of these two causes them to stand out, and they are truly in a class apart. The ground color of the petals is a pale yellow, with lavender netting, heavy at the center with lines radiating out to the very edge of the corolla.

Achimenes mexicana (Figure 1), and clones Cattleya, Mauve Queen (Figure 3), Milky Way, Giant Pansy and Periwinkle Blue (Figure 4) might well be placed together in one group as regards flower form and growth pattern. Flowers are large across the face, with tubes usually

shorter than corolla width. All are well suited to basket culture; if grown in pots they cascade over the sides so heavily that pedestals are required to display them at their best.

Achimenes clone Mauve Queen (Figure 3) is the largest-flowering form in my collection. Individual flowers have measured three inches across the corolla. The soft, violet-blue flowers, with crimson-spotted, yellow eyes, makes it a "must-have" indeed. The clones Cattleya and Milky Way are quite alike in flower color, being a pale violet-blue, while the clone Giant Pansy might be called the flower of many blotches. There is a dark blue blotch above the mouth of the tube, with a light cream-colored one below; darker lines radiate out to the edges of the petals. There is no distinct ground color—merely a blending, or merging, of colors ranging from pale lilac to dark blue, but the over-all effect is most pleasing.

Achimenes mexicana is without doubt the most vigorous growing and most floriferous of all *Achimenes* I have grown to date. It is the first to show new top growth, the first to produce flowers (dark blue) and the one that can be depended on to continue abundant flowering throughout the entire season. It may not be the last in flower since some do not start to flower until September; these, of course, will continue to flower after the earlier ones begin to go dormant. Mention was made regarding eating one salted peanut—or growing ONE single variety of *Achimenes*—so it might be stated right here that if you are still timid about investing in ten or twenty or so varieties but are willing to risk a try at one, then by all means order *Achimenes mexicana*. If you fail to become infected by the *Achimenes* "bug" after growing it for one season you are practically hopeless, and you might as well settle on petunias as a substitute.

Achimenes clone Periwinkle Blue (Figure 4) is a delightful subject, in that it is one really "true-blue" among a host of near-blues. This may be a bold statement to make, considering the fact that reference has not been made to any color chart and that my record as a color-classifier is not all that it might be. Even so, it will take anything up to a spectrographic examination to convince me that there is something less than a speck of red in many of the so-called blues. Until that time, the clone Periwinkle Blue remains "true-blue" to me.

Achimenes clones Atropurpurea (Figure 5) and Grandiflora are much the same as regards color but there is a distinct difference in growth habit. The clone Atropurpurea (Figure 5) is upright growing, has rather coarse leaves and stems but produces a truly magnificent crop of bright purplish-red flowers. The catalog describes the color as "magenta," but that is incorrect since I do not get the customary reaction. If a certain color starts my eyelids to fluttering and causes me to quiver all over I know positively that it is magenta. So the color of these two is not magenta.

The clone Grandiflora has soft green leaves and purple stems. It might be more correct to say that the leaves are a purple-green; the under-surface is purple and the color bleeds through to create a pleasing combination of green-and-purple. As the stems elongate they tend to cascade over the edge of the pot.

Achimenes longiflora and the clones Dentonia, Andersoni, Galatea and Masterpiece all follow a similar pattern; tubes usually longer than corolla width and flowers in the blue range, varying from the light blue of Dentonia to the very dark blue of Masterpiece. The latter is of upright habit in growth, and is very late flowering. In fact, this is the first year for it to produce satisfactory flowers; the two previous years it had managed to display a few open flowers before going into dormancy but produced no sustained crop. It would seem that an experiment might



Fig. 5. *xAchimenes* cl. *Atropurpurea*

well be initiated to determine if this variety can be forced to break dormancy in the later winter, in order that earlier plantings be made, to cause the plant to mature by mid-summer. It is handsome in foliage and stems, the former being purple underneath and bronze above, with the stems a showy reddish-purple.

The clone Gauregnia Maxima (probably "Maxima" in the trade) and Dainty Queen (Figure 6) are bracketed together in my notes but in

all fairness to Dainty Queen it should be said that it deserves the spotlight of attention above the former. Gauregnia Maxima is perhaps more free-flowering, and does possess a certain charm over many others in the group, with its white, lavender-centered flowers. A fine lavender line through the center of each petal adds to its distinctiveness. But Dainty Queen has all of this, and more. Flowers are uniformly larger; venation around the mouth of the tube is suggestive of Ambroise Verschaffelt and a heavy, dark lavender line extends through the center of each petal. Both are excellent subjects for basket culture; at least they should be provided with pedestals if grown in fern pots.

The following defy comparison with other plants in this present collection of 36 varieties and species.

Achimenes tubiflora (Hook.) N. L. Britton (syn.—*Gloxinia tubiflora* Hook.) is covered by Dr. Mosher in another article and will not be described in the present article.

Near the top of the list of always-flowering *Achimenes* will be found the clone Venusta. And right inside the greenhouse, beside the entrance door, is a wire basket of this worthy, willing and winsome personality. Foliage color is a dark purple-green and the flowers are a very dark purple. Each flower has additional tiny florets at the mouth of the tube which gives it the distinction of being a "semi-double"; and this, of course, entitles it to placement in a special category. And to realize that this variety was introduced as a new hybrid one hundred and one years ago certainly does not detract from its interest.

Actual placement of flowers on the stems of *Achimenes* plants follows a fairly regular pattern. Usually they appear singly or in pairs from the leaf axils; occasionally there will be three—and very rarely there will be four—emanating from one axil. Flowering is also more or less progressive, opening at the bottom on the first-matured shoots and thence upwards as the shoots mature. One exception to this pattern is the clone Camille Borzoni. Here the flowering buds appear on long spurs arising from the leaf axils. Not just a few buds but literally dozens of them in a cluster. As many as six or more flowers open at a time in each cluster, each flower perfectly in line with its immediate mates yet each group of flowers facing in a different direction. The over-all effect is that of a many-faceted gem. And "Gem" is a worthy title for this little prize. Perhaps "Little Gem" would be more appropriate, since it is diminutive in stature and flower size. It seems to prefer a little support in order to reach the height of fifteen inches it apparently aimed for, but it will be interesting to force it to cascade over the edge of next year's pot. The leaves are rather large for so small a plant but this fact in no wise detracts from the appearance; the flowers practically hide the foliage so one scarcely notices the size of leaf. Flowers are about three-quarters of an inch across and of an unusual lilac tint with golden throat flecked with brown dots. It's new (to me) and has jumped to the top of the list.

Competition for placement at the "top of the list" must be a terrific ordeal for my ambitious plants, so to pacify them it is necessary to

provide for flexibility by setting up various categories. These have now grown to a near dozen—and if anyone ever suggests that a decision be made in favor of any one over the others I shall positively refuse to make a commitment. And so another champion is presented for approval: Master Ingram. This, quite obviously, is a product of English hybridization, since it seems to be the custom in England to call the young hopeful of the Ingram family “Master.” Regardless of the derivation of the name, the plant is outstandingly conspicuous on two counts. The leaves are sharply serrated; so much so that it can readily be identified at any growth stage by leaves alone. The second quality to qualify it for top billing (category 3) is the abundance of velvety, carmine-red flowers.



Fig. 6. *xAchimenes* cl. DAINTY QUEEN

And it is basket type, par excellence. This year the “basket” is a spin-dryer from an “Easy” washing machine. I didn’t know it at the time but when I found it, out on the back lawn, it seemed to be just the answer to my hunt for a suitable container: round and deep and chock full of nice round holes for the *Achimenes* to poke their little noses through. So I planted the thing to Master Ingram.

Two days later came Monday. Which is also wash day. So I dug up \$5.39 and bought my wife a new spin dryer for her “Easy.” And it wasn’t too easy to avoid her the rest of the week. How was I to know it was part of a washing machine? (Tip to husbands: Bee-ware! Go make yourself a hanging basket and keep hands off any gadget you find lying on the back lawn.)

Aside from the rather high cost, the basket has paid off in a wealth of plant growth and flowers, and present indications are that flowering

may continue well into October. Which should also mean there will be a skillion tubers, more or less, for planting baskets next year. But all of them will be un-“Easy” baskets from now on.

Pink is displayed by but one representative, Little Beauty. It certainly makes a vigorous attempt to court attention—and receives plenty, what with its shiny, purplish-green foliage, purple stems and lovely rose-pink flowers. Of upright habit; small in stature, with one-and-one-half-inch flowers.

The clone Vivid (= crimson lake in color?) is well named, with vivid, crimson-red flowers so suggestive of *Bougainvillea* clone Crimson Lake. At its best when allowed to cascade over the pot or through the meshes of a wire basket. This variety seems so much more sprightly than the clone Smoky Red, which has flowers of a dull, purple-red.

The clone Lavender Queen is truly a queen, with a spectacular display of large, Gloxinia-like flowers of dark lavender. Foliage is a soft, velvety-green and the plant is upright growing. One disappointment is in the length—or rather lack of it—of flowering period, as it produces one enormous set of flowers early in the season, but by mid-July is so barren of flowers that it is relegated to the “dormant” section in the lath-house.

The clone Margarita is a lovely, if temperamental, individual. Since it is the “white sheep” of this otherwise-dark-flowering group it may have acquired a prima donna complex; at any rate, it demands—and deserves—special treatment. Cascade treatment is indicated for attention-getting display.

A final grouping may be permissible for the inclusion of small-flowering forms. These are not considered at the bottom of the list by design; mere size of flower, as such, is indeed a faithless yardstick for calculating the virtues of many a flower. And so the clone Loveliness parades by, saucily saying “sure, I’m tiny; but see how multitudinous I am.” That’s a big word for a little flower but it is the truth. If one were to take the area of this pee-wee, violet-faced flower, multiply it by the number of flowers on the plant, and then compare it with the total area of many of the larger-flowering forms the result would be surprisingly in favor of Loveliness.

Achimenes pulchella is another midget-flowering species. Bright, orange-red little fellows that just seem to be smiling all the time. *Achimenes patens* var. *major* is also in this group, with color too close to magenta for my eye comfort.

Several more varieties remain to be described, but because of lack of distinguishing characteristics, or close resemblance to already-mentioned forms, it would be pointless to devote further attention to them here.

It is impossible to conclude this piece without expressing the hope that you have discovered, after reading this far, that *Achimenes* growing can be a lot of fun, and that you can derive real joy and satisfaction from their association.

THE **ACHIMENES** COME BACKWYNDHAM HAYWARD, *Florida*

At long last, the dainty and charming, unobtrusive yet gay and colorful *Achimenes*, a popular greenhouse and conservatory plant of the last century, is coming back to take its place again, at least in the half-shade, if not the sun.

For *Achimenes* cannot stand three things—drought, strong sunlight and cold. Possibly strong wind or draughts should be added to these don'ts for these lovely little plants which are grown from the most curious little tubercles, catkin-like affairs, resembling miniature pine cones in some species and almost wormlike in appearance in others.

The genus *Achimenes*, which has given rise to the modern hybrids, includes a few interesting species from more or less tropical America, as *A. longiflora*, *A. multiflora*, *A. tubiflora*, *A. hirsuta* and *A. grandiflora*, among others. The name comes from a Greek word meaning to suffer from cold, and this certainly describes the *Achimenes* plant, as several clones were slightly "scorched" by cold during the early stages of their growth last spring at Lakemont Gardens in Winter Park, Florida, when the thermometer unexpectedly went down to 40 degrees in late April. They quickly recovered in the warm days that followed.

In other words, *Achimenes* should have a warm, moist atmosphere, airy but part shade. They are members of the *Gesneriaceae*, that varied and ever more popular group of herbaceous and tuberous rooted plants including the ubiquitous *Saintpaulia*, which is riding high on the wave of current plant faddism at the present time. Actually with no disparagement intended toward the *Saintpaulia*, the *Achimenes* offers much greater interest and beauty in the variety of color shades, shapes and textures of bloom and foliage than the saintpaulias possibly could have. The achimenes also go dormant in winter, which makes their care in half of the year much more simple than that of saintpaulias.

Fundamental directions for the growing of achimenes would include the planting of four or five tubercles in late winter or early spring in a 5 or 6 inch pot. Actually a well grown plant from a single strong achimenes tubercle will well take care of a five-inch pot, but nevertheless a fuller and more shapely appearance is obtained by the planting of several tubercles. The soil should be a light, friable, leaf mold, sandy loam, clean of nematodes or other pests, in other words a soil such as might be dug up in the woods under an old oak tree, far from habitations. A little well-rotted cow manure may be added and some sand to make it porous if the humus content is too heavy.

There should be good drainage in the pot, a crock over the hole and a handful of granite or other non-calcareous gravel or rock or broken crocks, pieces of pot, etc., in the bottom. The writer puts a handful or large wad of fibre, as Spanish Moss (*Tillandsia usneoides*) in the bottom of his containers (gallon cans being sometimes used in commercial culti-

vation), then three or four inches of the prepared sifted potting mixture (which may include some slight amount of garden loam and a little sifted carex peat) on top of the drainage, and finally the tubercles are planted flat on this soil and covered with half to one inch more of soil, firmed well. The pots are placed in the shade for careful watering.

The matter of shade for *Achimenes* is strictly relative. They are cared for like gloxinias and saintpaulias. Strong sunlight must not strike the leaves while these are wet, or burning will result. Therefore watering should be done with a fine spray late in the afternoon after the sun is low.

When this is done, and the plants are maintained in sufficient warmth, there will be no damage to foliage from watering even under lath shade. The writer would say that house temperature of 68 degrees would be a satisfactory minimum for *achimenes*. They like it even warmer in Florida, where they are grown at Lakemont Gardens in a lath-house with 50 per cent shade, with perfect success. The flowers last longer and have better color when the plants are grown on a porch or under an oak tree giving plenty of light from the side, but almost complete shade above.

Hanging baskets as are used for gloxinias and tuberous rooted begonias are excellent for *achimenes*, and should be lined with a layer of damp sphagnum moss before placing the potting soil inside. The drainage in this kind of container is more perfect than in anything else. The plants also dry off quicker than in pots and watering must be regular and thorough. The *achimenes* will stand a few drying-out periods without too much harm, but continued neglect will result in unsightly, damaged plants and loss of propagating tubercles.

Achimenes range from the pure white Margarita, also known as Purity, which is just about an albino type. It is the only known pure white in the *A. longiflora* group, which is one of the leading classes of the *achimenes* and our own personal favorites. Others in this group are *Achimenes mexicana*, *A longiflora* var. *major*, sometimes called Magnificum, and the clones Denninii, Galatea, Cattleya, Pink Beauty, etc. These are early to midseason flowering types.

Then there is a still earlier flowering group featured by a purple variety variously called Purple King, Royal Purple, Pulcherrima, with slight variations of foliage and flower tints. This, and Galatea mentioned above, are probably the easiest and most colorful *achimenes* and the earliest to flower for showy summer bloom. Some of the other clones bloom late in summer, even into fall, as Little Beauty, a lovely salmon pink, *A. pulchella*, Loveliness, etc.

There is a striking mid- to late-season lavender-rose clone called Vivid, which is growing in popularity in America and Holland at this time. It has other names in the trade, since nomenclature in *achimenes* like the camellias is badly confused. A few varieties can be readily identified, but most of them appear under several names when obtained from various sources.

America, Holland and India are the main growing centers of

achimenes at this time. Nurseries in India list the largest number of named varieties, and the tubercles can be imported by airmail with United States Department of Agriculture permits. The Holland firm of Messrs. C. G. Van Tubergen has one of the best lists of achimenes varieties in Europe. Before World War II such British firms as Sutton's and John Peed carried choice collections. In the United States there are several of the mail order bulb dealers offering achimenes among their choice bulbs and tubers for summer pot plant use.

The achimenes are hairy herbs growing a foot or more tall, with attractive foliage and bearing abundant flowers, sometimes enough fairly to hide the foliage, over a period of many weeks. Colors range from pure white to deep purple, with many shades of red, crimson, yellow-lavender, rose, purple, lavender, blue, etc. The red and lighter pastel shades are more unusual, especially in the large flowered types. Largest flowered varieties to the writer's best knowledge are found in the *A. longiflora* section such as Dainty Queen, a pure creamy white with light lavender spot at throat, which is sensational in a well grown pot. *A. longiflora major*, known as Magnificum, is even larger, up to three inches across the flower in the best specimens, but the flowers are not as abundant as in the smaller types.

After the plants have bloomed the watering should be decreased, and in a few weeks the plants will go to rest naturally. The tubercles can be dried off in their pots or containers and stored in a moderately cool atmosphere like a root cellar, dry but not too close, during the winter. Some of the nurseries have the tubercles ready to ship in late October. The tubercles may be removed from the soil carefully by sifting when thoroughly dried out in late fall, and stored in a fine grade of vermiculite, sifted dry peat or dry fine sand in boxes until early spring. Storage temperatures should not go below 50 or 55° F.

By starting several lots in the spring, a week or two apart, they can be had in a succession of bloom. The late blooming varieties should be started early so that they may be in bloom by late summer, August or September. These include primarily Maduna, *A. pulchella* and Loveliness, as now grown in this country.

Achimenes tubiflora is a striking plant, more like a *Gesneria* than an *Achimenes*, having bright green woolly foliage, long white blooms in an ascending spike, all in the same plane, and bearing tubers more like the gesnerias, potato-like, sometimes as big as an egg. This seems doubtfully to belong in the *Achimenes*.

Hybridizers have almost unlimited possibilities in the achimenes, but their work will need all the care and assiduous attention that the breeding of begonias and saintpaulias demands for success. Seeds are tiny, dust-like particles and can be grown like begonias and gloxinias. Hybridizing the achimenes will be a more delicate task than in the case of most plants. But the enormous variety of types and colors already available practically assures some kind of interesting results. There are too many purples, lavenders and mauves among the popular varieties. More than half are in this range. Yet there are some lovely blues, whites and a few good reds, but no large clear reds or rose varieties that the writer has

seen. *Achimenes pulchella* is a fiery red but tiny, less than half an inch in diameter.

Besides seed, the achimenes has all of the diversified propagating character of the gesneriads. A. A. Longmire of Carpinteria, Calif., has published a pamphlet on *Gesneriaceae* propagation which will be helpful to any beginner with the plants. Briefly, the achimenes tubercles can be cut into sections and will produce several to many plants from one tubercle. The writer uses a sharp safety razor blade for this, slicing the tubercle just as one would slice a piece of bologna in miniature. If the sections are not thinner than 1/16 of an inch, they seem to grow all right in sterile soil, thinly covered, kept moist, shaded and warm. Of course pieces like this do not produce such strong plants for flowering purposes the first season, but this is not important where propagation increase is the need.

Achimenes are also propagated from stem cuttings, tip cuttings, leaf cuttings, leaf sections, etc., rooted in clean white sand or mixed sifted peat and sand, with shade and careful watering. One might conceivably obtain 100 plants or many more from a single tubercle in a season.

[GESNERIACEAE AS A HOBBY—The Moshers,
continued from page 28.]

signs of growth in the early spring shake them carefully from the soil and repot as noted above.

When watering use care as for rex begonias. Do not wet the leaves with hard water as the deposit left upon evaporation will stain them.

A number of varieties have been developed by European specialists. The best now available in this country are Orange Delight, Monarch and Rose Queen which all have beautiful flowers and foliage.

If you are looking for a group of plants which give of their beauty over a very long period, be sure to try the Hybrid Naegelias.

CESNERIACEAE AS A HOBBY

THE MOSHERS¹, *Washington*

I. ACHIMENES

Writing of *Achimenes* as a hobby is a difficult subject because different people would find pleasure in widely different phases of any subject, consequently we will only indicate some of the phases of achimenes culture which have proved of special interest to us in the hope that others may find fields to explore on their own.

This group first attracted our attention just before the war when a friend gave us a pot of *Achimenes* clone Purple King in full bloom. Immediately they became a challenge to us. We resolved to obtain other clones and to find out more about them. During the war years achimenes tubers were difficult to obtain, but by searching through old gardens and plant collections, we obtained a number of the best varieties obtainable in this country.

Since the war we have continued to collect clones from all over the world. Achimenes tubers, unlike many other tubers, resent dry storage and can not be shipped long distances without serious loss. Many of our anticipated shipments were received with every tuber entirely lifeless. However, by trying again and again, we have built up a collection of the finest varieties in existence in the world today.

Elsewhere in this issue descriptions of varieties and cultural notes for the Achimenes are given in some detail. Like most garden flowers, many clones are relatively tolerant of a wide range of conditions. However, some clones are more demanding and offer a challenge to the hobbyist. Some of the rarer European clones in particular have not bloomed for us as yet. The flowering of these is a goal to be attained perhaps through the use of heat or special soil, etc.

Most of the clones now in existence were developed many years ago in Europe and England. There is a fertile field in the production of new ones, especially by hybridizing them, if possible, with the related plants such as the *Isolomas*, *Naegelias*, and other Gesneriads. The production of seed on the Achimenes offers a challenge to the grower. We have made hundreds of hand pollinations, but have never had any seed form on the hybrid clones. Perhaps a different method of handling the pollen must be discovered. Most of the flowers appear to be sterile of pollen, but this is not the case as the pollen falls from the anthers soon after the flower opens.

The Achimenes species are all native of tropical America and were grown, as were the hybrid clones, by European and English gardeners in warm or stove houses until about the time of the first World War. Then in order to save their choice plants, as fuel became limited, they tried them in cool and unheated houses. However, for seed production more heat or humidity may be required during certain stages of their development.

¹Dr. Kenneth H. Mosher and his wife, of Seattle, Washington.

The use of drugs such as colechicine, or other treatment of the plants may be required to induce seed formation.

Such problems as these lend themselves especially well to the hobbyist. A person planning to start with a few clones would do well to obtain a few tubers of some of the following which are among our own favorites. Then as they come into flower, the gardener can enlarge his collection according to his personal preferences.

Foolproof clones that will grow and flower under adverse conditions: Purple King, rich velvety purple; Edmund Boissier, white background with purple markings; and Madame Gehune, purple with white throat, large beautifully veined leaves.

Relatively foolproof varieties: Master Ingram, bright true red; Little Beauty, true pink, compact growth; Giant Pansy, large flat flower of blue, yellow and white on a hanging basket plant.

Beautiful foliage types: Maduna, lavender with white throat; Stormcloud, purple tubular flowers with a white throat, large velvety green leaves like a Tydaea.

Small flowered type: Loveliness, rich velvety red-purple; *A. pulchella*, small bright fiery red; Camille Brozzoni, lilac with a white throat.

Achimenes Tubiflora, a species with tall flowering stems bearing clusters of pure white tubular flowers with a delicious fragrance. We consider this one of the finest plants in the whole *Gesneriaceae*.

In writing of the *Achimenes* it is very difficult to leave out of the discussion the closely related groups such as the *Isolomas*, the Hybrid Tydaeas, *Naegelias*, *Kohlerias*, *Gesnerias*, etc. These all respond to the same treatment as the *Achimenes*, and in many cases will hybridize with them. Each has its own characters, but all are blended so subtly together that they are really just one big group horticulturally.

In choosing a plant hobby each person will be influenced by different considerations; some may be searching for a group of great beauty, others for something rare or difficult to grow, others something easy, etc. But whatever it may be the *Achimenes* group offers the gardener a satisfying experience.

II. ACHIMENES TUBIFLORA

This plant was introduced to England from Buenos Aires in the 1840's and named *Gloxinia tubiflora* Hook. (Bot. Mag. Lond. pl. 3971. 1843). The combination *Dolichodeira tubiflora* (Hook.) Hanst. (Linnaea 26:205. 1853-55) was later made. We know it now as *Achimenes tubiflora* (Hook.) N. L. Britton (Ann. N. Y. Acad. Sci. 7:185. 1893.) However, the characters of the plant and flowering habit are definitely not *Achimenes*-like. The flowers resemble those of a typical *Achimenes*, but no more than the flowers of many other genera which have been separated from *Achimenes* such as the Tydaeas, *Isolomas*, and *Naegelias*.

Achimenes tubiflora has long, tubular, pure white, fragrant flowers borne in clusters at the top of a tall flowering stalk often 18 to 36 inches high. The leaves are large, velvety green, opposite, oblong, and reticulated. The tubers are like potatoes, bearing no resemblance to the typical

Achimenes rhizome. In our opinion, the name *Dolichoderia tubiflora* would be much more appropriate for this plant than the one now accepted.

However, whether *Dolichoderia*, *Achimenes*, or *Gloxinia* this is a truly wonderful plant growing with the same care as tuberous begonias. Blooming in the summer, and suited for the outdoor garden in most localities, the fragrant flowers scent the whole neighborhood with a pleasant tropical fragrance. The flowers are also fine for cutting, if desired.

Achimenes tubiflora is a plant worthy of much wider cultivation.

III. KOHLERIA PICTA

Perhaps the name of no other garden flower is in such a state of confusion as is that of *Kohleria picta*. The mix-up of nomenclature here is more or less typical of that of many of the Gesneriads, and serves to bring home the necessity of an immediate and thorough revision of the whole *Gesneriaceae*.

Kohleria picta was first introduced from Mexico to England in 1843 by Theodore Hartweg and classified by Bentham as *Achimenes picta*. Under this very appropriate name it flourished in English gardens for many years. When discovered and examined by the Continental European botanists a few years later, it was first described by Regel in "Flora" in April 1848 as *Kohleria picta*. Later in the same year Decaisne in "Revue Horticole" founded the genus *Tydaea* on this plant, calling it *Tydaea picta*. Decaisne also founded the genus *Isoloma* at the same time, taking the name from Bentham, who had used it as the name for a section of the *Gesneraceae* in setting up the family and genus in his Genus Plantarium. A few years later *Tydaea* was included in *Isoloma*. Consequently the plant should become *Isoloma picta*; however, there already was a plant known as *Isoloma pictum*, and a new name was developed—*Isoloma bogotense*. Under this name the plant has struggled to maintain itself.

Based on the present rules of priority in nomenclature, *Kohleria picta* is the name that should be reaffirmed for this beautiful plant. The Continental European authorities have adopted this name, and we in this country should do the same.

Kohleria picta is a very satisfactory plant growing from a long, brown, furry, caterpillar-like rhizome. The plants should be handled exactly like *Achimenes* except that they need more room. We had good results with them in gallon cans and large pots. The plants grow one to two feet tall. The leaves are large, mottled brown, and covered with velvety hairs. The flowers are borne on peduncles from the leaf axils, often many open at once. They are tubular, orange-red and yellow, the lower lobes of the tube being red spotted on the yellow (from whence the name *picta*—spotted). They bloom over a long period of time.

A pot of this plant in full bloom is a sight never to be forgotten. Try it.

IV. HYBRID NAEGELIAS

Naegelias are Gesneriads closely related to the Achimenes and Isolomas. They have been developed chiefly in Europe over a period of about 100 years through extensive hybridization of the species such as *Naegelia zebrina* and *N. multiflora*; and by crossing them with *Achimenes* and *Isoloma* and related plants. This group of flowers includes some of the finest pot plants in existence. They are foliage plants rivalling and even surpassing the Rex Begonias and Fancy-leaf Caladiums, having large heart-shaped leaves of rich green, mottled and veined with rich chocolate brown. The leaves and stems are covered with velvety hairs which in some varieties appear green when viewed from certain angles, and red when viewed from others.

Late in the summer large clusters of beautiful tubular flowers develop from the axils of the upper leaves and the terminal bud. The flowers are somewhat Achimenes-like with the limb of the corolla less expanded, and more tubular, usually in shades of red, yellow and orange, often heavily spotted inside the tube. A number of flowers open at once and remain in good condition over a long period of time. By maintaining a uniform temperature after the plants come into bloom, they can be had in bloom at Thanksgiving or even Christmas. For the window garden or cool greenhouse they provide a wealth of color when flowers are hard to find.

The tubers or scaly rhizomes resemble some of the larger Achimenes tubers, but are more like small pine cones. Pot them up singly in 4 or 5 inch pots or quart cans immediately upon obtaining them, using a light rich compost containing leaf-mold, peat-moss, or vermiculite, but no manure. Place the potted tubers in a position where they will be free from frost until March or April, when they should be moved to a position where the temperature will be between 50 and 60 degrees at night. A light basement, garage, window garden or greenhouse bench should provide the satisfactory conditions needed to start them and maintain early growth. Water only sparingly until the growth appears above the soil, then top-dress with well rotted manure and keep moist while in full growth. Applications of weak manure water from time to time should be given until the flowers open. Normal summer temperatures will maintain full summer growth. Late in the summer move them to a spot where the temperatures will not fall much below 45 degrees in order to extend the flowering season. When the plants indicate by yellowing or withering leaves that they are through growth for the year, withhold water and when they are entirely dried off, remove the stems at the soil level and store the entire pot in a frost-free place in the garage, basement or under the greenhouse bench. Inspect the pots from time to time during the winter and sprinkle lightly if the soil appears too dry. Never store the rhizomes out of soil or vermiculite, and preferably do not disturb them in the pot until time for repotting in the spring. When the tubers show

PLANT LIFE, VOL. 5, NO. 4, OCT. 1949

HERBERTIA

1949

AUSTRALIAN EDITION

EDITED BY

HAMILTON P. TRAUB

HAROLD N. MOLDENKE

THE AMERICAN PLANT LIFE SOCIETY

Box 2398, Stanford, California

[CORRIGENDA: AMARYLLIDACEAE: TRIBE AMARYLLEAE,
by Traub & Moldenke. Continued from page 32.]

Page 154, under Description of subgenera and species, 2nd line, change "Specias" to "Species."

Page 164, under "Range.—," 2nd line, change "Maximowez" to "Maximowicz."

Page 165, 3rd line of text from top, change "Regal" to "Regel."

Page 169, under Description of subgenera and species, 7th line, change "*sanguinae*" to "*sanguinea*."

Page 177, 3rd line from top, change "segments" to "segmentis."

Page 183, 21st line from bottom, change "1939" to "1929."

8th line from bottom, change "1873-85" to "1783-85."

Page 184, 5th line from bottom, change "Wright" to "Wright Smith."

Under Stapf, O., change "pl. 9152" to "pl. 9162."

Page 185, under Perigone, change "flora" to "floral."

Page 186, 21st line from top, after "*Amaryllis elegans*" change "Lam." to "Sprengel."

Page 187, under "AMARYLLIS Herb.," "*belladonna* Herb.," add "61," and change "67" to "66"; also, under "*belladonna* Herb." add "*blanda*, 61," and "*pallida*, 61."

Page 193, first column, under "*Roezli*, 186" insert "*roseum*, 97."

NOTE.—Any additional corrigenda for this publication will be included in the following numbers of *Herbertia*.

PREFACE

PLANT LIFE, vol. 5, no. 4, the 1949 HERBERTIA number, is the 1ST AUSTRALIAN EDITION OF HERBERTIA. It is dedicated to Capt. Charles Osborne Fairbairn, an outstanding Australian amaryllid breeder, who specializes in *Narcissus*. In recognition of his achievements, the 1949 HERBERT MEDAL has been awarded to him. Capt. Fairbairn contributes an interesting autobiography to this issue of HERBERTIA.

Australian horticulture has suffered very great losses in 1949 in the deaths of four pioneers. It is with the deepest regret that we record the passing of Alister Clark, 1864–1949, William Jackson, 1865–1949, Charles Alfred Nethercote, 18??–1949, and C. E. Radcliff, 18??–1949. Brief In Memoriam notices are included in the present issue.

Thanks are due Mr. Fred M. Danks, Corresponding Fellow in Australia, who handled the details for the Australian papers appearing in this issue. Without his inspiring personality, this 1ST AUSTRALIAN EDITION could not have been achieved at this time.

Mr. Danks contributes an interesting note on "Horticulture in Australia." Other Australian articles include "Australian Amaryllids" by J. H. Willis, "Hybrid Amaryllis Breeding in South Australia" by E. Both and "Daylilies in Australia" by Fred M. Danks.

There is also a wealth of other interesting articles in this issue, in addition to the articles already mentioned. There are *Hemerocallis* articles by Elmer A. Claar (Ann. Report), Grafton W. Shults (daylily breeding), George Gilmer (distant shipping), Philip G. Corliss, M.D. (new daylilies); and descriptions of new daylilies. There are articles on hybrid *Amaryllis* by Mrs. W. D. Morton Jr., Cecil Houdyshel; and an article on a new pink *Amaryllis* by Mrs. Mary G. Henry. *Narcissus* articles are contributed by Grant E. Mittsch, Dr. J. S. Cooley, and W. R. Ballard. There are also articles on various amaryllids by Dr. Gouws, Messrs. Woefle, and Hinman, and Mrs. Coombs.

The 1950 HERBERTIA number is to be the HYBRID AMARYLLIS EDITION, and it is to be dedicated to Mrs. Mary G. Henry. Most of the articles for this issue have already been received, and it is scheduled for publication early in 1950.

—Hamilton P. Traub
Harold N. Moldenke

November 1, 1949

CORRIGENDA

HERBERTIA, VOL. 15 (1948) 1949

- Page 51, 3rd paragraph, 3rd line, change "42nd Ave." to "40th Place."
 Page 158, 13th line from bottom, for "*multiflora*" read "*hybrida*."
 Page 159, Fig. 209, change "*rosea*" to "*hybrida*."
 Page 165, after "Mr. Henry H. Nehrling, *Fla.*" insert "Mr. Theodore L. Mead, *Fla.*"

AMARYLLIDACEAE: TRIBE AMARYLLEAE, BY
TRAUB & MOLDENKE 1949

- Page 5, 21st line from bottom, change "*Cyrtanthus*" to "*Cyrtanthus*."
 Page 14, 2nd line, change "ganus" to "genus."
 Page 26, 1st line from top, change "lectrotype" to "lectotype."
 2nd paragraph, 5th line, for "Wright" read "Wright Smith."
 Page 29, 3rd line from bottom, for "Farm." read "Farn."
 15th line from bottom, delete "capitate obscurely."
 Page 30, 3rd line from top, change "13" to "16(19?)."
 4th & 5th lines, change "5-flowered" to "8-flowered."
 Page 33, 13th line from bottom, change "Linean" to "Linnean."
 Page 44, 19th line from top, change "Specias" to "Species."
 Page 47, 5th line from top, change "includes" to "include."
 6th line from top, change "it" to "them."
 12th line from top, change "Planarum" to "Plantarum."
 20th line from top, change "Wright" to "Wright Smith."
 Page 55, 1st column, 3rd paragraph, 2nd line, change "El." to "Ed."
 Page 66, 3rd paragraph, 8th and 9th lines, delete "capitate" and change "obscurely trilobed to rounded" to "trilobed to capitate."
 Page 74, 16th line from top, change "conclusion" to "conclusions."
 Page 75, 2nd paragraph, 13th line, change "Wright" to "Wright Smith."
 Page 85, Table 6, change "*A. abvena*" to "*A. advena*."
 Page 90, 17th line from bottom, change "*Amaryllis flavus*" to "*Amaryllis Solisii*."
 Page 94, 2nd line from bottom, change "*pumila*" to "*Barlowii*."
 Page 113, 11th line from bottom, change "2.5-3 cm." to "2.5-3 dm."
 Page 115, 3rd line from bottom, delete "Syn."
 7th line from bottom, change "16" to "359."
 Page 124, 2nd line from bottom, for "1937" read "1837."
 Page 128, 10th line from bottom, change "253" to "353."
 Page 129, 3rd and 4th lines from top, transfer "*H[ippeastrum] Tweediana* Herb., Amaryll. 425 [Index]. 1837." to the synonymy of *Amaryllis elegans* Sprengel, on page 109.
 Page 133, 6th line from top, change "*taeniophylla*" to "*taeniophylla*."
 Page 139, after "*Amaryllis ciliaris* Linn., Sp.," insert "Pl."

[CORRIGENDA: AMARYLLIDACEAE: TRIBE AMARYLLEAE,
by Traub & Moldenke. Continued on page 30.]

DEDICATED TO
CAPT. CHARLES OSBORNE FAIRBAIN



Herbert Medalist—Charles Osborne Fairbairn

Plate 1

CHARLES OSBORNE FAIRBAIRN, O.B.E., A.F.C.¹

An autobiographical sketch

I was born in Victoria, Aust., 1893, into a family now having over 110 years of pastoral experience in Australia, and was educated at Geelong Grammar School and Cambridge University, from where I joined the Royal Flying Corps at the beginning of the first world war. I was wounded in action and awarded the Air Force Cross. Returning to Australia after the cessation of hostilities, I took over the management of "Banongill" upon my father's retirement. This engaged my full attention until the outbreak of the second World War, shortly after which I was appointed to command the R.A.A.F. air crew training establishment at Ballarat, Vic., receiving my discharge in October 1944 with the rank of Group Captain, and was appointed an Officer of the British Empire.

In addition to managing this property the family love of horticulture persisted. When the local Postmaster suggested organizing a daffodil show, as this district is very well suited for their cultivation, I readily agreed. The exhibit that we staged was a very sorry sight beside the exhibits of those renowned growers Leonard Buckland and West and Fell. However, it roused my Scottish pigheadedness and I became determined to grow blooms that could hold their own with the best. Thus started 27 years of intensive culture of Daffodils. I procured some up to date bulbs from Mr. Leonard Buckland and continued to import the best that I could get from England, Ireland, Holland, New Zealand and Tasmania, besides many local ones. At the same time I started to raise my own seedlings. As I was already a breeder of thoroughbred horses, sheep, cattle and dogs I realized the benefit of keeping ample and accurate records and of course already had a working knowledge of the Mendelian principles of heredity.

My early efforts were chiefly directed towards improving the color of the red and yellow varieties and later towards their resistance to burning by the sun. At no time would I tolerate any that were not strong stemmed and of good habit in the garden. Later my efforts were directed towards all varieties of daffodil but now the pink, and red and white, varieties are getting most attention and again my objective is to improve the color, garden habit, and resistance to sun.

Though I am not very interested in exhibiting, I do so occasionally to see how my introductions compare with those of other hybridists.

It has given me great satisfaction to win the principal Seedling awards both in Victoria and Tasmania, the only two states in which I have competed. But it gives me still more satisfaction to hear growers say how well this or that variety of my raising does in the garden. It has also given me great satisfaction to see the Skipton Show, so humbly started, rise to one where the average standard of bloom is second to none in the state.

¹The 1949 William Herbert Medal was awarded to Mr. Charles Osborne Fairbairn for his outstanding achievements in Narcissus breeding.—*Editor*.

Another activity that is occupying some of my time now is experimenting with imported bulbs from England to see which is the best way to get them acclimatized. Some of the results have been surprising but the early impression is that different varieties need very different handling.

My other recreations are Golf, Tennis, and Horse Racing including the breeding of horses.

NARCISSUS LEGACY OF CLARK, RADCLIFF, NETHERCOTE AND JACKSON

HAROLD ALSTON AND J. R. BYFIELD

The year 1949 has been marked by the passing of four of the most noted raisers of narcissi in the Commonwealth. The deaths of Messrs. Alister Clark, C. E. Radcliff, C. A. Nethercote and Wm. Jackson are mourned by all lovers of the Daffodil and have left a blank in the list of pioneer hybridists which it will be difficult to fill. All four played an important part in establishing the cult of the *Narcissus* in the Antipodes and have left a wonderful legacy of fine flowers for the younger generation to carry on with.

—Harold Alston

IN MEMORIAM—ALISTER CLARK, 1864-1949

Mr. Alister Clark, B.A.F.R.H.S., was the doyen of the cult in Victoria. His death, which occurred at his home, "Glenara," Bulla, Victoria, on January 20, 1949, removed from Australian Horticulture one of its greatest and best beloved personalities. Born at "Glenara," Bulla, where he lived all his life, he was within a few days of attaining his 85th birthday. Though born in Victoria, he spent a portion of his school days in Tasmania, New South Wales and Great Britain, and graduated Bachelor of Arts at Cambridge University. A personal friend of Mr. Andrew Kingsmill, he became interested in the Daffodil and through him he and his brother-in-law, Sir Heaton Rhodes of "Otahuna," New Zealand, became members of a syndicate, which included Miss Helen Willmott and Mr. J. T. Bennet Poe, to acquire the stocks of the earliest productions of the Rev. G. H. Engleheart. This was in 1897 and among the bulbs secured were: White Queen, Albatross, Noble, Lemon Queen, Solfaterre, Amber, Valeria, Astrardente, Zenith, Bianca and Diana. In the following year, Mr. Geo. S. Titheridge on his return to England disposed of his large collection of bulbs and Mr. Clark and the late Mr. Leonard Buckland of Camperdown, Victoria, secured the bulk of his collection. This was the beginning of half a century of sustained and enthusiastic cross-pollination and the production of new varieties from seed. Among his first and most notable productions were: Felucca, Nulli Secundus, Colonel Bogey, Sunshade, Footlight, Daydream, Firebell, Isolde, Lady Northcote and Betty McMullen. Using *N. triandrus* var. *albus* and *N. jonquilla*, he produced many charming hybrids. His *Triandrus* hybrid,

“Nightlight,” is probably one of the whitest flowers in cultivation. About 1914, however, an epidemic of eel-worm played havoc with stocks at “Glenara” and for some years Mr. Clark had only healthy seedlings of his own raising with which to work, and in this respect his work was remarkably successful. Always fond of flowers of the Leedsii type, he produced many attractive flowers, many of which had buff edges to the corona. About 35 years ago, however, his production of a daffodil with

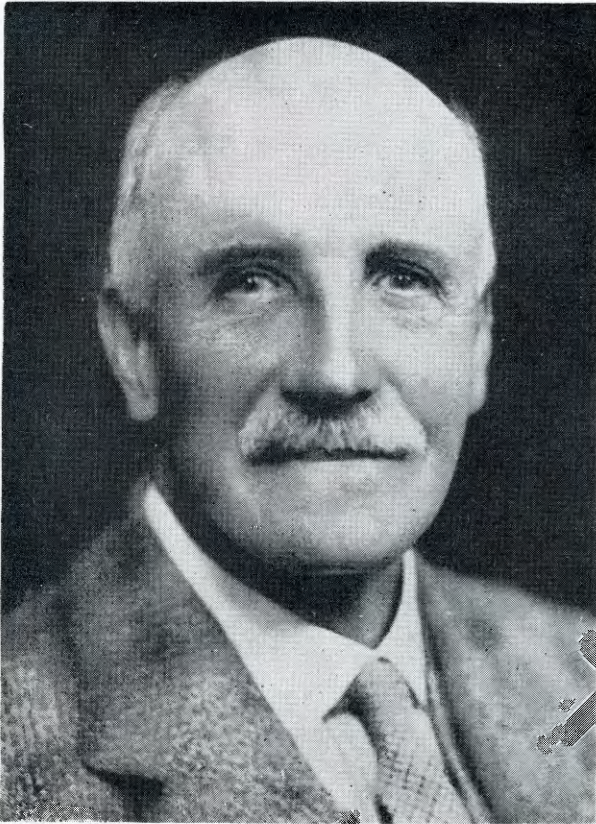


Fig. 7. Alister Clark, 1864-1949

pink corona opened up new vistas on the production of flowers with pink or pink-edged crowns. Notable pink varieties raised by him include: Mabel Taylor, Promisso, First Blush, Madge Buckland, Better Half, Mrs. Alister Clark, and Hugh Dettman, and there are still many more as yet un-named. For many years he, together with the late Messrs. L. Buckland and D. V. West, were keen competitors in the larger classes at the Royal Horticultural Society's and other shows, and in addition his non-competitive displays of seedlings of his own raising created intense in-

terest and stimulated other growers in the raising of seedlings. His award of the Peter Barr Memorial Cup was a well-merited tribute to his work as he may truly be said to have placed Daffodil culture in Victoria on a sound and stable basis and has enriched the gardens of the Commonwealth with many charming flowers. In addition to his work with the Daffodil, he had of recent years interested himself in the production of Nerines with considerable success, and the award of the Dean Hole Memorial Medal for his work with the rose indicates his wide interest in horticulture. In the production of his daffodils all records and pedigrees were kept with meticulous accuracy, and the hybridizing and cultivation were the personal work of Mr. Clark. Such thoroughness brought its own reward and is evidenced by the number of fine flowers which have been raised at "Glenara." Visitors to "Glenara" received many tokens of his generosity and to those who were privileged to enjoy his friendship and the more intimate association of his home life, and to participate in the work of selecting his seedlings, he was a delightful companion and generous host. To daffodil growers his passing has left a blank which will be hard to fill as his unassuming nature and sincerity endeared him to all who came in contact with him. To his horticultural friends he will remain an enduring memory of a delightful personality. They farewell him as a very great gentleman and a generous and devoted friend.

—*Harold Alston*

IN MEMORIAM—WILLIAM JACKSON, 1865-1949

The death of Mr. Wm. Jackson on May 22, 1949, in his 83rd year, deprives Tasmania of one of its most esteemed daffodil specialists.

Born in England in 1865, he was educated at Shrewsbury and at Caius College Cambridge, where he studied medicine. Mr. Jackson married in England and arrived in Tasmania in 1898, taking up residence in Dover, then known as Esperance. Mr. and Mrs. Jackson remained in the district for the whole of their lives. They raised a family of three sons and two daughters, all of whom survive their parents.

In all branches of athletics the name of Jackson became a household word in Southern Tasmania. Himself a fine all-round athlete in his youth, Mr. Jackson was a keen supporter and patron of cricket, football, tennis, rifle shooting and yachting. He was many years Warden of Esperance Municipality, Coroner for his district and a special Magistrate.

An acknowledged authority on all branches of horticulture, Mr. Jackson was keenly interested in the raising of daffodil seedlings, commencing serious work about 1924. His efforts met with early success as in the 1928 show one of his seedlings was awarded Champion Bloom honors. In this year the C. E. Webster Challenge Cup competition was inaugurated and is awarded annually to the twelve best seedlings raised in Tasmania. Mr. Jackson scored four wins and was runner-up eight times in this section. During the past twenty years Mr. Jackson has raised many fine seedlings which have won highest awards in strong competition. In the Ajax, Barrii, Leedsii and Incomp. classes he was always

strongly represented and on four occasions won the champion award with blooms of his own raising.

Mr. Jackson's methods as a hybridist were based on accurate recordings of every detail as regards parentage, date of sowing, germination and blooming. In many instances the measurements of the first blooms were recorded. Invariably Mr. Jackson could name the parentage of a flower without reference to pedigree lists.

Of a bright and cheerful disposition, always prominent in all philanthropic movements, together with a genial personality and keen sense of humor, Mr. Jackson was assured of an enthusiastic welcome from all classes of the community. Tasmanians especially feel very keenly the loss they have sustained by his passing.

Many amateur gardeners throughout the State have benefited by Mr. Jackson's generous distribution of his daffodils. He was never known to sell a bulb from his gardens; on the contrary, one had only to display interest in growing daffodils to be promptly offered additions or a collection to start the novice on his way to the show benches.

Mr. Jackson's name will be perpetuated by the gracious action of his family who have donated perpetual Challenge Cups to the leading shows and societies for annual competition.

It is also pleasing to record that one of Mr. Jackson's sons, William, will continue the work to which his father so successfully devoted his skill and enthusiasm.

—*J. R. Byfield, President,
Hobart Horticultural Society.*

IN MEMORIAM—CHARLES ALFRED NETHERCOTE, 18??-1949

Charles Alfred Nethercote, who died at his home in Victoria on April 30, 1949, was a member of the Royal Horticultural Society of Victoria for fifty-eight years, the past thirty-six of which he was the Society's Treasurer. He was appointed to the Committee on the Amateur side in 1896, and was later made a Life Member for his services.

A contemporary of the late Messrs. Geo. S. Titheridge, Henry Boyce, Walter J. Smith, Alister Clark and Leonard Buckland, he started growing daffodils in 1890 and from that time on was a regular importer of bulbs from Great Britain. In conjunction with his life-long friend the late Mr. Scott Morrison, who had a property at Wandin on Mt. Dandenong, he established a large collection of all the representative types amounting in latter years to an area of approximately twenty-two acres. He was a great friend of the late Mr. Leonard Buckland of Camperdown and stimulated by his success in raising daffodils from seed he commenced hybridizing and produced many fine types, his first and best known success being his Jonquil hybrid, Gertrude Nethercote. Other varieties raised by him were: Tanjil, Clunes, Abcal, Bunnies and several cyclamineus hybrids.

He had an encyclopedic knowledge of varieties both old and new and their origin, and was considered the finest judge of the flower in

the State. In addition to raising many flowers of exhibition type he was keenly interested in species and miniature types and used *Narcissus triandrus*, *N. calathinus* and *N. cyclamineus* freely. He was of a most unassuming nature, of the highest integrity and most generous—many beginners receiving parcels of bulbs suitable for laying the foundation of a good collection. He was in his 83rd year and is survived by a son and daughter, his wife having predeceased him some years ago.

—*Harold Alston*

IN MEMORIAM—C. E. RADCLIFF, 18??-1949

I.

The untimely passing of Mr. C. E. Radcliff, District Surveyor of Hobart, Tasmania, removes from our midst one of the most prominent raisers of seedling daffodils in recent years. He was the first Australian grower to be awarded the Peter Barr Memorial Gold Cup by the National Daffodil Society of England. The award was made in 1946 for his outstanding work in the production of pink cupped seedlings. Several of Mr. Radcliff's pink daffodils have been distributed in England and the United States. One noted seedling—Rosario—being catalogued in Ireland at £10; another notable flower, Moina, a pink crowned Leedsii, was the first Australian raised daffodil to gain the Award of Merit from the Royal Horticultural Society, London. A number of valuable cups are competed for annually at the Hobart Horticultural Society's shows and it would be of interest to quote a few of the late Mr. Radcliff's successes.

In 1928 the Wm. Jackson Cup was presented for the best new seedling Daffodil raised in Tasmania. During the past twenty-one years Mr. Radcliff was awarded this cup on ten occasions.

In 1929 the late Mr. C. E. Webster, then President of the Society, presented a perpetual cup for twelve Tasmanian raised seedlings. In this competition Mr. Radcliff secured the honors on eight occasions, was placed second six times and third three times.

The definite improvement in the quality of the pink toned seedlings induced Mr. T. D. Raphael to present a special cup to be awarded annually to the best pink crowned daffodil and in the ten years of this contest Mr. Radcliff scored eight victories, the above-mentioned Rosario being successful four times.

Space will not permit more than a brief mention of a few of Mr. Radcliff's noted seedlings.

Bonnington, a bicolor ajax of wonderful type, carriage and form, has received more championship awards for "best bloom" than any of his seedlings. Robert Montgomery, a fine yellow 1-A, has been consistently prominent—Pink O'Dawn was probably the first Australian seedling to be classed as a "pink trumpet" variety. Dawnglow was bred from this one and was a distinct improvement on the parent as regards color. Moina, referred to above, was produced the same year.

Keeping closely to a set line of breeding, Mr. Radcliff continued each year to produce something more interesting and with marked improve-

ment, particularly with regard to true pink coloring of the cup or crown. Rosario first saw the light in 1938 and created a sensation amongst the daffodil fraternity. The following year Roselands was staged for the first time, and was acclaimed as the best pink trumpet to date. This flower came from a different parentage than those previously noted.



Fig. 8. C. E. Radcliff, 18....-1949

Mr. Radcliff's next surprise bloom was staged in 1944 under the name of Kuranja. This seedling pink won the grand champion award on its first appearance. One of its parents is Dawnglow, the product of Pink O'Dawn.

Mr. Radcliff's success in raising a large number of high-quality blooms in all the classified sections was remarkable, and in proof of this, his seedlings have gained the highest awards in all sections of the various daffodil shows held annually throughout the State.

Mr. Radcliff's death was unexpectedly sudden as he appeared to be making a satisfactory recovery from a recent illness. His passing comes as a great shock to all who enjoyed his genial friendship and advice and the Hobart Horticultural Society's committee has suffered a dual loss of its two leading daffodil hybridists, the late Wm. Jackson having passed away less than twelve months ago.

In recent years Mr. Radcliff became interested in the culture of bearded Iris and his rapidly increasing collection contained many of the new introductions from England and the United States. He was also the first to introduce the new strains of "Pacific Giant" Delphiniums to Tasmania and had been working on crossings of the two strains, with the same keenness which brought him so much recognition in the daffodil world.

Naturally we must, as time passes, lose these great personalities, still (as in the case of the writer of this abridgement) when an intimate association, extending over a period of some thirty-odd years, is suddenly closed by death, the loss of such a true friend and sportsman strikes deeply.

Our sincerest sympathy is extended to the relatives and friends of Mr. C. E. Radcliff.

—*J. R. Byfield, President,*
Hobart Horticultural Society

II.

Mr. C. E. Radcliff, who died at his home at Sandy Bay, Hobart, Tasmania, on March 13, 1949, was the most notable of the younger generation of Daffodil hybridists. So successful was he that in 1946 he was awarded the Peter Barr Memorial Cup by the Royal Horticultural Society of England for his work in the production of varieties with pink coloration. At the time of his death he had over two hundred and thirty selected varieties showing pink in the coronas. Noteworthy varieties raised by Mr. Radcliff include: Pink of Dawn, a bicolor trumpet with a crown of blush pink; Rosario, a Leedsii with deep rosy frilled cup, and Kuranja, which at the Hobart show in 1944 was awarded the Champion prize for the best bloom of the show and the finest pink staged to that date. Mr. Radcliff did not, however, confine his attention to the raising of pinks, and many other fine varieties stand to his credit, among which are his splendid yellow trumpet, Robert Montgomery; his bi-color trumpets, Bonnington and Dawn Glow; his fine Leedsii, Nautilus; his incomparable, Moina; and his Barrii, Portia. He worked unceasingly in popularizing Daffodil growing in the State of Tasmania and distributed his bulbs freely to societies in different parts of the island. He was in constant touch with growers overseas, and at the time of his death had probably the finest collection of modern daffodils in the Commonwealth. He was very thorough in all his operations and so successful was he that at the annual Tasmanian shows he placed reliance on productions of his own raising rather than imported varieties.

An outstanding personality, those who met him could not but be impressed by his character and his sound judgment. His loss to the cult in Tasmania was a very serious one but he has so imbued other growers in the island with his enthusiasm and has left such a legacy of fine things that the future of the *Narcissus* in Tasmania is safely established on a firm basis. His daughter Miss Ruth Radcliff is carrying on the good work.

—*Harold Alston*

HORTICULTURE IN AUSTRALIA

FRED M. DANKS, *Australia*

The development of *Narcissus* breeding in Australia has been detailed in part in 1946 HERBERTIA, and further information is furnished by Harold Alston and J. R. Byfield in the present issue of HERBERTIA.

Mr. G. K. Cowlshaw has written on Hybrid Brunsvigias (also called Hybrid Cape Belladonna Lilies), and other amaryllids in Australia in 1935 HERBERTIA. In gardens one will find quite unusual shades of Hybrid Brunsvigias, and the name of Bailey is associated with the white one—it undoubtedly came originally from some Sydney garden. They grow so freely, even when discarded on the rubbish heap, that they have little value. White *Brunsvigia* hybrids are still uncommon, but every tone in pink is to be found for the searching. Very few hybrids have been named, but the late Mr. Clark had many, and Mr. Aylett of Mangoplah, N. S. W., sent some overseas that were welcomed in their new homes.

The true *Amaryllis* (formerly erroneously known as *Hippeastrums*) were freely grown along the eastern coast line even back in the last century, and would flower year after year among the grass in the open without any attention. The *Amaryllis* hybrids were possibly ahead of anything that others had at that time, but the records are obscure so that it is not possible to duly credit the early workers. Fortunately Mr. E. Both has given part of his attention to Hybrid *Amaryllis* for some years and his interesting article appears elsewhere in this issue of HERBERTIA.

The history of the other amaryllids in Australia—*Nerine*, *Lycoris*, *Crinum*, *Zephyranthes*, *Hymenocallis*, etc.—has still to be written, and this should be the objective of the 2ND AUSTRALIAN EDITION of HERBERTIA to appear later.

As to climate, Tasmania more nearly approaches the English conditions, and with convenient traveling distances between scenic attractions that rival any on the mainland. It is a tourists' joy. The Harbor of Hobart, with 60 feet of water beside the oversea berths, is an asset apart from its expansive beauty; and the graceful curve of the floating bridge is a novelty that in no way spoils it. Water power from high inland lakes provides industry with current and in every way this smallest of the States is especially favored. These same lakes too give feed to introduced fish that enables them to outgrow less favored relatives. The 20-pounders among the rainbow trout are sought by fishermen from all over the world.

All along this southern coast line, both of the mainland and the "tight little isle" there are changes in climate that are so characteristic. Anything from "Monsoonal Mugginess" or the raging desert gales, as from a furnace, to the fresh blows straight from the Antarctic wastes, can come at all seasons. In the winter dull days are dreary but just beyond the ranges to the north, the sunshine is warm though the nights are cold. There are a few weeks when growth is slow, but once the earliest spring appears there are many delightfully fine days to enjoy.

Most ornamental plants will grow here. Many can be made to bloom in the winter. For the propagation of cuttings little glass is used. Frosts are not heavy and some areas are entirely free from them. South Australia gets more heat and milder winter weather. Perth, with an average winter minimum of over 40° F., can grow nearly anything at any time. Hill country near at hand gives the cooler conditions in the summer.

The East Coast, lapped by Pacific waters, is productive along its whole 2500 miles, quickly reaching to the tropic climes. Even within the State of New South Wales, the sugar cane is grown with bananas and other tropical fruits, and Queensland with its coastal rains in yards per day grows still more. Inland conditions everywhere become dryer, for the coastal range from the South Australian border to the tip of Cape York is never far from the sea. Irrigation has done much and will help still more.

Horticulturally the possibilities have rarely been exploited, but when you can enjoy daffodils on the cool mountain slopes of Tamborine just south of Brisbane within sight of the ocean growing under banana plants, it is clear that there are many unrealized possibilities.

Having mentioned some of our climatic variations, some records might be of interest. Queensland and New South Wales have more humid conditions in the summer but along the southern coast line, the worst days give temperatures into the hundreds that have to be felt to be appreciated. These come with a raging gale right from desert areas and a blistering sun. The highest ever recorded was 114° F. in the shade in Melbourne—Mildura gets 124°—and that was accompanied by two other days in the one week above 110. In over 80 years of recording, nothing above 108° had been registered and this unusual reading was to a large extent due to the ghastly forest fires that destroyed everything before them. Readings at 100° average five per season and there are some 15 days in the 90's which are nearly as trying, but mostly they come as single "trials" and by shutting the brick houses the indoor temperatures are kept to normal. Actually the average summer day is ideal—about 75° with a cloudless sky and a fresh breeze. Winters are mild though sometimes dull.

Returning members of the armed forces in the last war have no doubt taken back much information on the type of country this is but for the benefit of those who have not had this personal contact, it may be of interest to state that the two main cities have each over a million inhabitants. Melbourne is laid out on square lines with wide streets and

I. REGIONAL ACTIVITY AND EXHIBITIONS

DAYLILY REPORT, 1948

ELMER A. CLAAR, *Chairman, Hemerocallis Committee*

On June 22, 1948, I visited the Farr Nursery Company at Weiser Park, Pa., to see Dr. A. B. Stout's daylilies. (The Farr Nursery Company markets the Doctor's daylily introductions.) I am growing all of Dr. Stout's introduced varieties so I was particularly interested in his seedlings. As in the past, we are assured of some very fine things in the future from the Doctor. However, in order to avoid causing him and the Farr Nursery Company any undue correspondence, I hasten to say that these seedlings will not be available for a number of years. I was assured by Mr. Seyler, the daylily enthusiast of the Farr Company, that there are a considerable number of new doubles of varying types coming on. These were not in bloom but I saw some very fine improvements in bloom in the intermediate types.

The most outstanding of all the intermediate daylilies, in my opinion, was an eyed variety, very much like Mrs. David Hall, but which blooms considerably later than Mrs. David Hall. In fact, had it not been for the time of the year, I would have thought it was Mrs. David Hall. Both of these plants have much more substance, a clearer color, and a much more contrasting eye than Mikado.

I also saw a plant very similar to George Yeld, which I have no doubt will be introduced in due time, and another one which is the largest intermediate yellow I have seen up to this time.

Of the named varieties, Baronet was most impressive. This plant is a good large red, comparable to the best reds in any blooming season.

In discussing daylilies with Mr. Seyler, he indicated that he is very fond of Autumn Prince and Afterglow and that Afterglow is particularly popular. It is, I believe, one of the very best pastel types of daylilies. Mr. Seyler also is very fond of Firebrand and Georgia. The latter is more peach-colored than Bertrand H. Farr. We discussed many of the other lovely things that the Doctor has introduced, but all of these have been written about many times.

I spent the summer in Europe and while there went to the Kew Gardens (the Royal Botanical Gardens) in England. I contacted the main gardener, who told me that they did not have any daylilies. I saw the list of the varieties grown at Wisley but I had grown or am growing all of them, and with time so precious, I did not go there.

I took a trip to Mr. Amos Perry's, in southeast England, and spent a day at his place. Mr. Perry was head of Perry's Hardy Plant Farm, which is known throughout the world. This fine old gentleman (he says he is seventy-eight but he does not look it) is one of the world's foremost plant explorers and horticulturists. As a member of the Alpine Club he has brought back and introduced some of the world's finest alpiners and

perennials. His labors associated with water plants have carried him many times (I believe he said five) to the swamps of Lapland, hundreds of miles inside the Arctic Circle. However, he has been interested in all hardy plants and is one of the pioneer hybridizers of daylilies, and one of the first to sing their praises. His exhibits at most of the horticultural shows in England and on the Continent have been enthusiastically commented on. He staged the first water garden exhibit in England in 1902. The awards he has received have been too numerous to mention. His publications have been many and varied.

A year or so ago Mr. Perry retired and his two sons, Gerald and Reginald, are carrying on the business. He went to Weeley Heath, near Clacton-on-the-Sea, in Essex, purchased a small plot which he could care for himself (about an acre, I should judge) and continues enthusiastically hybridizing daylilies and collecting rare plants. Most of his acreage was planted in daylilies.

When in 1937 I wrote to Mr. George Yeld, the man who first hybridized daylilies, asking that he send me his 1937 *hemerocallis* catalog, I received the following reply:

"I am sorry I cannot send you my 1937 *hemerocallis* catalog. I do not issue one. I am an amateur.

I would suggest you should apply to Mr. Amos Perry, V.M.H., Hardy Plant Farm, Enfield, Middlesex, England. Mr. Perry is the ablest and most widely known cultivator of *hemerocallis* in this country."

Mr. Perry told me he first became interested in daylilies when he met Mr. George Yeld in 1890. Mr. Yeld became interested in daylilies in 1877 and made the first known crosses of this flower, and showed Apricot, his first named hybrid, in 1892.

Mr. Perry said he introduced his first seedling in 1900 and called it Amos Perry. He said further that he made the first cross of *Hemerocallis fulva* and named it Margaret Perry, about 1920, which flower still is extensively listed in American catalogs. Almost every year thereafter he introduced a number of varieties:

1923—Circe; E. A. Bowles; Yellow Hammer.

1924—Eldorado; Erika; George Yeld (selected from Mr. Perry's seedlings by Mr. Yeld to be named after himself); Gladys Perry; Iris Perry; Lady Fermor Hesketh.

1925—Gold Imperial; Gold Standard; Emperor; Mrs. Perry; Thelma Perry; Viscountess Byng.

1926—Elizabeth Pyke; June Boissier.

1928—Byng of Vimy; Dawn; Hiawatha; Moonstone; Reggie Perry; Revenge, H.M.S.; Rose Queen; Minnie Nightingale.

When we remember that Mr. Burbank named Calypso in 1917, that Mr. Farr named Ophir in 1924, that Hyperion was introduced by Mr. Mead in 1928, that Mr. Betscher introduced his first seedling, Lemona, in the same year, that Dr. Stout named his first introductions in 1929, that Hans Sass did so in 1930, and that Mrs. Nesmith did likewise in 1933, it can be seen that Mr. Perry was truly a pioneer in this field. He, of

course, introduced many other daylilies in the years following. Most of his daylilies are listed in American and European catalogs.

Mr. Perry evidently has not been hybridizing for intermediate bloomers as there were very few daylilies in bloom at the time I was at Weeley Heath, and I would estimate that he now has a half acre of daylily seedlings.

The Perry Hardy Plant Farm lists a number of new daylily introductions in its 1948 catalog. I ordered the following pink and red varieties, and they sent me some seedlings:

Edith Shewring, Helen Lindsay Smith, Marie Ballard, Pat, Balherine, Rugby, Betty Stewart, Conspicua, Gladiator, Katherine Clark, and Kathleen Hardy-Smith.

While talking with Mr. Perry, he told me, "My Richard Thornby is one of my greatest treasures, worth waiting 55 years for. On opening, the medium-sized flowers are a delightful shade of rich orange; at midday (2 to 3 o'clock) they start to assume a snow-white shade, spotted and splashed orange, with a deep orange reverse and base." Mr. Perry said it is a remarkable flower and that he has marked it seven X's. Evidently, Mr. Perry does not object to a flower fading if, when it does, the result is beautiful. Unfortunately, Richard Thornby was not in bloom when I visited there.

Mr. Perry carried the torch for daylilies as one of the first hybridizers. He sang the praises of daylilies when few others knew about them. More especially, he listed them in his catalogs, which were internationally distributed, and he surely must have spent large sums of his own money as a pioneer prophet of our favorite summer perennial when folks paid but a dollar or two for a new introduction. Hail to Mr. Perry and all honor to him! Spending a day with him was an honor, a privilege, and tremendously inspirational.

While in England, I also was at Bournemouth-on-the-Sea and saw a number of fulvous daylilies in the gardens of the Hotel Royal Bath.

In Switzerland, between the Furka Pass and the Brunig Pass, we came to the small village of Meiringen, some miles on the other side of the Rhone Glacier. This village is nestled in a valley, with high mountains all around it. Here again, at the hotel, I saw a number of large beds of fulvous daylilies.

I also saw some fulvous daylilies at the Hotel Villa d'Este at Lake Como.

At the town of Voss, on the Bergen Railway, in Norway, the Hotel Fletcher had many, many daylilies in its gardens—all fulvous. This also was true on the trip from Voss to Fossli, where at Granvin there were a large number of fulvous daylilies in the hotel garden.

On August 15 I was at Gothenburg, Sweden, where I went to the Gothenburg Botanical Gardens, the Tradgardsforiningen. These gardens are beautiful, very much like the English gardens. One unusual effect was a plot of grass which had over 100 specimen plants from five to ten feet apart, and at least ten feet in diameter. In this plot were huge clumps of daylilies Flava, Mrs. Perry, George Yeld, Citrina, Baroni,



1949 Amaryllis Queen of New Orleans

Plate 2 (See opposite page for additional legend.)

Double Fulva, Gold Imperial, Golden Dust, Radiant, and Ochroleuca, and some others without markers. Each had a separate bed.

By being abroad during the summer months, I missed the principal blooming season in my own garden, and especially that of some 82 new daylilies that I acquired in 1947, and which I was very desirous of seeing in bloom. In 1948 I acquired an additional 46 plants, all of which I shall be anxiously looking forward to seeing in 1949.

NEW ORLEANS AMARYLLIS SHOW, 1949

MRS. W. D. MORTON, JR., *Pres. Garden Circle, New Orleans*

The first official New Orleans Amaryllis Show, sponsored by the New Orleans Garden Circle, was held on April 2-3, 1949. The Show was beautifully staged on the entire lower floor of the Jewish Community Center.

Amaryllis of various colors were displayed against a background of black and silver. Flower arrangements were entered from all of the local Garden Clubs. The spacious halls and one-half of the lower floor reception rooms were used for individual displays, and ribbons and sweepstakes were awarded in all classes.

The New Orleans Amaryllis Show was a feature of the New Orleans Spring Fiesta, and the hostesses were Fiesta ladies in antebellum costumes. One half of the lower floor, with a stage of spring setting of dogwood, palms, and other potted plants, love birds and canaries, provided an appropriate setting where Miss Rosemary Wingrave, daughter of Judge and Mrs. John J. Wingrave, was crowned the 1949 Amaryllis Queen of New Orleans (Plate 2).

The registry disclosed that there were visitors from every State of the Union, and three foreign countries. Six competent judges had charge of the awards.

Plans are now being made for the 1950 New Orleans Amaryllis Show which promises to surpass the successful 1949 Show.

AUTUMN AMARYLLIS SHOW, POMONA, CALIF., 1948

CECIL HOUDYSHEL, *California*

THE AUTUMN AMARYLLIS SHOW, Pomona, Calif., Sept. 23, 1948, was held in conjunction with the flower shows at the LOS ANGELES COUNTY FAIR.

Plate 2. (See opposite page.) The Queen of the New Orleans Amaryllis Show, 1949, Miss Rosemary Wingrave, center, is crowned by Safety Commissioner Bernard J. M'Closkey at ceremonies at the Jewish Community Center. Others from left are Miss Alice Toso, Mrs. Z. B. Crawford, Mrs. John J. Wingrave, mother of the queen, Miss Lillah V. Schmidt, Miss Annette Ruckstuhl, Mrs. George Ronstrom, Miss Clementine Doskey and Mrs. Mark Sackett. The show was sponsored by the Garden Circle of New Orleans. Photo by *The New Orleans Times-Picayune*.

Mrs. Leonard Swets, Riverside, received 7 first and 5 second awards; Las Positas Nursery, Stanta Barbara, received 5 first, 1 second, and 1 third awards; Oakhurst Gardens, Arcadia, and W. R. Rice, Downey, received one first award each; Howard & Smith, Montebello, received 1 first and 3 second awards; Mrs. Kenneth B. Anderson, La Canada, received 1 first award; Mrs. Leonard Slosson, Los Angeles, received 2 second and 3 third awards; and Cecil Houdyshel, La Verne, received 7 first, 13 second and 3 third awards.

[HORTICULTURE IN AUSTRALIA—Fred M. Danks, continued
from page 44.]

fine open areas of park lands near the city. Sydney in a restricted narrow space is set on one of the remarkable harbors of the world, with ample accommodation for shipping and the settings for beautiful waterside homes. Other capital cities drop away in numbers and the country towns are small. Newcastle, with its steel works producing the products cheapest, is a fine town even though similar industries now have spread to Port Kembla, further south, and to Whyalla in South Australia.

Horticulturally the demand for plants and cut flowers is helping to establish an industry that is capable of still further expansion. In keeping with other lands, the growing realization of all that can be accomplished by selective breeding opens up new possibilities. With climate and soils to help there is hardly a limit as to what can be accomplished in the future. In this development of horticulture in Australia, we welcome the cooperation of American horticulturists. Australia has fine native plant seeds and also fine selected strains and clones of introduced plant subjects to give in return.

[AMARYLLID NOTES—Hamilton P. Traub, continued from page 82.]

Ipheion Lorentzii (Herter) Traub, **comb. nov.** Syn.—*Beauverdia Lorentzii* Herter, in Boissiera, VII, 509, fig. 54. 1943.

Ipheion hirtellum (Kunth) Traub, **comb. nov.** Syn.—*Triteleia hirtella* Kunth, Enum. Pl. 4: 465. 1843.

Ipheion Felipponei (Beauverd) Traub, **comb. nov.** Syn.—*Nothoscordum Felipponei* Beauverd, in Bull. Soc. Bot. Geneve, ser. 2. VIII, 267, c. fig. 1922.

Ipheion Sellowianum (Kunth) Traub, **comb. nov.** Syn.—*Triteleia Sellowianum* Kunth, Enum. Pl. IV, 466. 1843.

Ipheion subsessile (Beauverd) Traub, **comb. nov.** Syn.—*Nothoscordum subsessile* Beauverd, in Bull. Herb. Boiss. ser. 2, VIII, 997, c. fig. 1908.

Ipheion lloydiiiflorum (Beauverd) Traub, **comb. nov.** Syn.—*Nothoscordum lloydiiiflorum* Beauverd, in Bull. Herb. Boiss. ser. 2, VIII, 999, c. fig. 1908.

Ipheion vittatum (Gris.) Traub, **comb. nov.** Syn.—*Milla vittata* Gris., in Goett. Obh. 24: 318. 1879.

Ipheion Tweedieanum (Gris.) Traub, **comb. nov.** Syn.—*Milla Tweedieana* Gris., in Goett. Abh. 24: 318. 1879.

2. SPECIOLOGY

[EVOLUTION, DESCRIPTION, CLASSIFICATION AND
PHYLOGENY]AUSTRALIAN AMARYLLIDS¹

J. H. WILLIS, *B.Sc.*
National Herbarium, South Yarra

By comparison with similar areas in other parts of the world, Australia's representation of the Daffodil and Garlic Family is scanty. Only 80 species are at present recognized for the Commonwealth (cf. about 230 in South Africa) and, upon further critical revision, some of these may prove to be no more than varieties. Nevertheless, there is an astonishing diversity of stature, form and beauty among the four score kinds—from the large-flowered, intensely fragrant *Crinum*s of our eastern tropics to the almost odorless woolly and bizarre Kangaroo-paws of the far South-west from the tiny Golden Star of cool damp southern heaths and meadows to the gigantic Spear Lilies of north-east New South Wales and Queensland forests.

Bentham's classification (in *Flora Australiensis VI*, p. 417, 1873) has been followed by all Australian botanists, except that his tribe *Hæmodoreæ* is now given family rank and the curious *Campynema* is transferred from *Iridaceæ* to the amaryllids (near *Hypoxis*). *J. Hutchinson* (*Families of Flowering Plants—Monocotyledons*, 1944) raises the tribes *Agaveæ* and *Hypoxideæ* to the status of distinct families and places the *Conostyleæ* in *Hæmodoraceæ*, thereby narrowing the old family *Amaryllidaceæ* (as it occurs in the Commonwealth) to two tribes of bulbous plants with umbellate inflorescences. This new concept has not yet been adopted by systematists in Australia and, for the present, I prefer to deal with *Amaryllidaceæ* in its older, wider sense.

Let us now indicate the size and geographical range of our twelve genera:

1. *CRINUM* (11 Aust. spp.—*C. flaccidum* on Murray near Ned's Corner, Vic.)

This genus, of more than 120 species, is widespread in tropical and sub-tropical countries, the large white or rosy flowers borne on tall fleshy scapes and often sweetly perfumed. Australian species are found variously from the Flinders Range (S. Aust.) and lagoons along the Lower Murray and Darling water systems to Port Jackson, thence up the East

¹EDITORIAL NOTE.—Mr. Willis follows the older classification of BENTHAM & HOOKER (1883) with some modification which is not officially recognized in HERBERTIA. His viewpoint is presented as a customary courtesy. The more modern classification of HUTCHINSON (1934) was adopted for HERBERTIA in 1934.

Australian coast to Cape York, the Gulf country, Arnhem Land, and the Victoria River watershed (N. Terr.) with an outlier in the Kimberleys (W. Aust.)

2. *EURYCLES* (2 Aust. spp.)

Extends from Moreton Bay to Cape York and on through the East Indies to Malaya. The flowers are remarkably like those of a white narcissus.

3. *CALOSTEMMA* (4 spp. Aust. only—*C. purpureum* at Lake Hattah, Vic.)

Also jonquil-like, these purple, blotched, yellow or whitish-flowered bulbs range from Spencer's Gulf (S. Aust.), through the Murray-Darling region to the Darling Downs (Q'land), Rockhampton and the Gulf of Carpentaria.

4. *DORYANTHES* (2 spp. Aust. only)

The bulky "Spear Lilies" are not as fleshy as their close American relatives of the genus *Agave*; they occur between Port Jackson and the Burdekin River (Q'land), the spikes of large waxy-red flowers sometimes attaining 16 feet in height.

5. *CAMPYNEMA* (1 sp.—endemic in Tasmania)

A little mountain plant with green perianth and bright red anthers.

6. *HYPOXIS* (6 Aust. spp. *H. hygrometrica*, *glabella* and *pusilla* in Vic.)

A large widely distributed genus of about 90 species, half of which occur in South Africa. Certain species are to be found all around Australia and Tasmania, except in the arid inland regions; in early spring their golden starry flowers are dotted over acres of wet grassy land.

7. *CURCULIGO* (2 Aust. spp.)

A widespread group of which both Australian species occur also in tropical Asia. Leaves are aspidistra-like, the yellow flower clusters often nodding.

- | | |
|-------------------------|--------------------------------|
| 8. <i>TRIBONANTHES</i> | (5 spp. endemic in West Aust.) |
| 9. <i>CONOSTYLIS</i> | (37 spp. " " " ") |
| 10. <i>BLANCOA</i> | (1 sp. " " " ") |
| 11. <i>MACROPIDIA</i> | (1 sp. " " " ") |
| 12. <i>ANIGOZANTHOS</i> | (8 spp. " " " ") |

The last five genera, constituting the tribe *Conostyleæ* and embracing 52 of the 80 Australian amaryllids, are confined to the southwest of

Western Australia between Shark Bay and Israelite Bay; they favor the great sand-heath areas near the coast, where their flamboyancy adds materially to the landscape effect in many places. All are brightly hued flowers with a curious woolly vestiture.

The only genera reaching Tasmania are *Hypoxis* and *Campynema*, the latter endemic, while in New Zealand there is but one amaryllid (*Hypoxis pusilla*).

Apart from their æsthetic and decorative value, Australian amaryllids have few uses. North Queensland aborigines roasted and ate the roots of *Curculigo ensifolia*, while those of Mitchell Downs are said to have eaten the bulbs of *Hypoxis hygrometrica*. Bulbs of the "Darling Lily" (*Crinum flacidum*) yield a passable arrowroot and were once used successfully at Wilcannia (N.S.W.) as a substitute for flour. *Doryanthes* leaves have a strong fibre and like the New Zealand Flax should prove commercially useful.

KEY TO THE GENERA OF AUSTRALIAN AMARYLLIDACEÆ.
(adapted from those of Bentham and Hutchinson)

- 1a. Inflorescence umbellate, subtended by an involucre of one or several spathe-like bracts (*Euamaryllideæ*)
- 2a. Corona absent; no scales or teeth between the stamens *CRINUM*
- 2b. Corona present, formed by the expanded filaments which are often connate at the base.
- 3a. Ovary 3-locular; ovules 6; leaves ovate, petiolate, with distant primary veins *EURYCLÆS*
- 3b. Ovary 1-locular; ovules 2-3; leaves narrow, with close venation *CALOSTEMMA*
- 1b. Inflorescence neither umbellate nor subtended by spathe-like bracts
- 4a. Large plants with inflorescences exceeding 6 feet in height; flowers large and fleshy, leaves radical, 4-6 feet long (*Agaveæ*) *DORYANTHES*
- 4b. Small plants with inflorescences seldom 4 feet high; flowers not fleshy; leaves under 18 inches long and usually scattered
- 5a. Flowers entirely glabrous or with a few simple hairs; embryo immersed in the endosperm (*Hypoxideæ*)
- 6a. Flowers solitary or few, with segments divided to the ovary; fruit capsular,
- 7a. Styles free; anthers opening outwards *CAMPYNEMA*
- 7b. Styles connate; anthers opening inwards *HYPOXIS*
- 6b. Flowers sessile in a dense spike, usually tubular; fruit fleshy and indehiscent *CURCULIGO*
- 5b. Flowers very woolly, commonly with branched hairs; embryo not wholly enclosed by the endosperm (*Conostyleæ*)
- 8a. Ovary superior; anthers with terminal appendages; perianth deeply divided, rotate *TRIBONANTHES*
- 8b. Ovary inferior; anthers without appendages; perianth usually remaining tubular
- 9a. Perianth regularly split into lobes
- 10a. Flowers in dense heads, tube short *CONOSTYLIS*
- 10b. Flowers in 1-sided racemes, tube comparatively long *BLANCOA*
- 9b. Perianth much more deeply split on lower side
- 11a. Tomentum black; ovules 1 per loculus *MACROPIDIA*
- 11b. Tomentum variously colored; never black; ovules 2-4 per loculus *ANIGOZANTHOS*

KARYOLOGY OF SOME SOUTH AFRICAN AMARYLLIDACEAE¹

JOZEF BENJAMIN GOUWS, *D. Sc., Pret.*
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I. INTRODUCTION

The present paper is the result of a 4-year study undertaken at the University of Pretoria. The object was to determine, as far as possible, from cytological data the phylogenetic relationship of the South African genera of the *Amaryllideae* (sensu Pax & Hoffmann). With this object in view 25 native species of random selection representing 12 genera of the *Amaryllidaceae* were collected and investigated.

It was soon found that the meiotic division occurs while the inflorescence is still enclosed in the bulb. This meant the destruction of a bulb for each inflorescence to be investigated. As the number of bulbs available did not allow this costly process, attention was restricted to the somatic figures.

Herbarium specimens of all the investigated species were prepared and now lie deposited in the HERBARIUM OF THE UNIVERSITY OF PRETORIA (UPR). A list of these species is given below, indicating the 2n chromosome number and the locality from which they were obtained.

My sincere thanks are due to Prof. Dr. M. G. Mes and to Dr. H. G. Schweickerdt, senior lecturer, of the Dept. of Botany, for their encouragement, guidance and facilities provided for carrying out this work; and further to the staff of the NATIONAL HERBARIUM, PRETORIA, for the identification of specimens and the loan of literature. The encouraging and constructive suggestions of Prof. Quintanilha, Director of the Cotton Research Institute, Lourengo Marques, are sincerely appreciated.

II. MATERIALS AND METHODS

In preparing the slides it was found that the squash method yielded the best results in the shortest time. The root-tips were fixed in a solution of 3 alcohol to 1 acetic acid for 24 hours, after which they were colored in acetic orecein (prepared according to the formula of Darlington and la Cour (1)² for 4 hours.

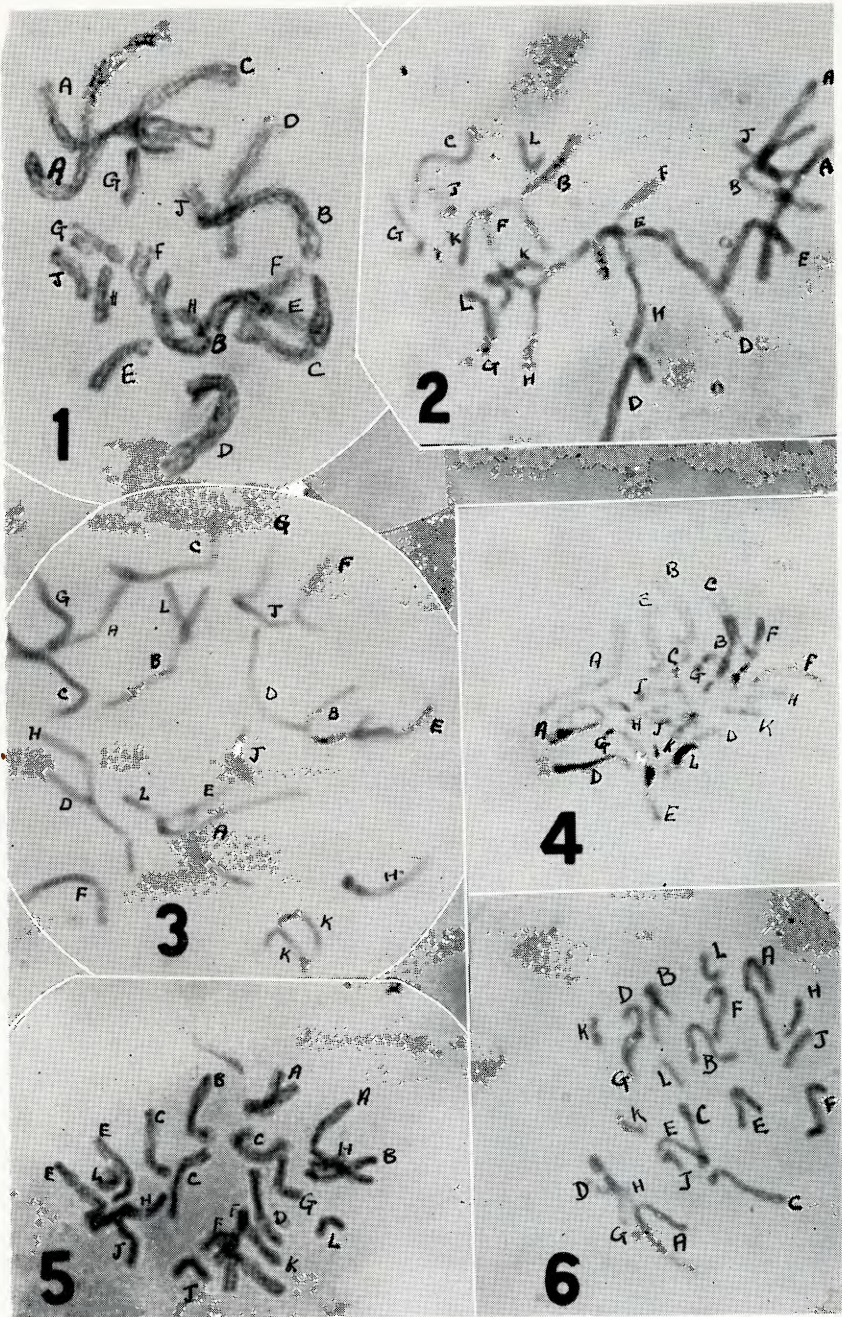
The slides were made permanent according to the schedule of McClintock (2). The usual method of combining coverslip and object glass was not practiced here as it is impossible to replace the coverslip in its original position. This means that one layer of cells is often superposed on the other. The two were, therefore, always mounted separately in Canada Balsam.

Of the slides prepared in this way many are 3 years old and seem to be permanent.

The photographs were taken through a "panphot" kindly loaned by

¹Submitted to the faculty of Science of the University of Pretoria in partial fulfillment of the requirements for the degree of Doctor of Science.

²Italic numbers in parentheses refer to Literature Cited at the end of the article.



Amaryllid chromosomes—1, *Haemanthus magnificus*; 2, *Clivia miniata*; 3, *C. caulescens*; 4, *Nerine laticoma*; 5, *N. duparquetiana*; 6, *N. sarniensis*, diploid. (See text for magnification.)

the DIVISION OF BOTANY AND PLANT PATHOLOGY, PRETORIA.

The drawings were made at table level by means of a Reichert microscope fitted with a 18a+ oil immersion lens, 25× ocular and a Zeiss camera lucida.

Figure 6 has been drawn from the means obtained from the measurements, for each species, of 2 well-developed metaphase figures. For the purpose of measurement the complexes were drawn as described above. Subsequently a few 10 μ divisions of a Leitz Object Mikrometer scale were projected under the same conditions. With the help of a pair of dividers the absolute length of each chromosome was obtained.

The measurements so obtained have not been analyzed biometrically. This will be done when more data are available.

III. PRESENTATION OF RESULTS

Where possible the chromosomes were arbitrarily divided into long, medium and short. The first letters of the Latin longum (l), medium (m) and brevis (b) were used in the formulae to express this condition. In addition the letters V, L and f were used to indicate the position of the kinetic constriction. V for a median constriction or one nearly so; L for sub-median; and f for sub-terminal to terminal, i.e., when the proximal arm is $\frac{1}{3}$ or less of the length of the distal arm.

1. Genus HAEMANTHUS

The specimens collected near Bloemfontein presented many difficulties in identification. *H. hirsutus* and *H. nelsoni* are distinguished by the fact that the former has white flowers and hairy leaves, while the latter has pink flowers and less hairy leaves. The plants collected near Bloemfontein have pink flowers but the leaves are quite as hairy as those of *H. hirsutus*. At Wakkerstroom, where typical specimens of *H. hirsutus* were collected, one pink-flowered individual was found. On the basis of these characters apparently no clear line of distinction between the two species in question is possible. This fact seems to suggest that *H. nelsoni* and *H. hirsutus* are conspecific, a point worthy of further investigation.

Very little cytological information could be found in the available literature concerning the *Amaryllidaceae* of Southern Africa. On account of war conditions some of the publications were inaccessible, especially the papers published in Japan.

1. *Haemanthus magnificus* Herb. Plate 3, fig. 1. $2n = 18$. Herbarium material: Gouws 186, 249 and 257 in UPR.

Material was collected from 3 widely separated areas. Numerically no difference was found in the genome. Although there is a very close similarity between the chromosomes of the different sets of plants, a small degree of variation was noticed, but whether this is due to some fault in the method or to intra-specific variation could not be determined.

Genome formula: 1:lL; 3:lF; 4:bf; 1:bV.

The 4 long chromosomes are readily identified optically. A, by its long proximal arm; B, by its extremely short proximal arm; while the

ratio of proximal to distal arm in the case of chromosomes C & D is about the same. They can, however, be identified by the fact that C is appreciably longer than D. As regards the E, F, G & H chromosomes, identification is extremely difficult. There is a certain degree of variation, but insufficient to make their optical identification certain. Chromosome J is the only bV type and thus quite distinct.

2. *Haemanthus nelsoni* Bkr. (?). Figure 9, 807. $2n = 16$. Herbarium material: Gouws 260 and 263 in UPR.

Genome formula: 1:lL; 2:lf; 2:mf; 2:bV; 1:bf.

Chromosome A is the only lL type and thus readily recognizable. Chromosome B has the shortest proximal arm of the long chromosomes. Its correspondence with chromosome B of *H. magnificus* is evident. Most probably these are homologous. Chromosome C is longer than B in both the proximal and distal arms. The 2 medium chromosomes D & E can be identified by the fact that they are much shorter than the previous two and by E having a clearly shorter proximal arm than D. Chromosomes F & H (bV type) can be identified by the fact that F is a much larger V than H. Chromosome G is the only bf type and can therefore be readily identified.

Evidently the genus *Haemanthus* has so far received very little attention from cytologists. Apparently the only publication on this genus is that of Sato (3), quoted by Darlington and Janaki Ammal (4). On basis of this article both *H. albiflorus* and *H. coccineus* possess 16 chromosomes. In a garden plant of *H. albiflorus* the same author found $16 + 2f$. Of the species here investigated, *H. nelsoni* and *H. hirsutus* each have 16, while *H. magnificus* has 18 somatic chromosomes. There is, therefore an intra-generic variation in the chromosome number. In spite of the fact that only a few species have been investigated cytologically, it does seem that the 18 chromosome species is derivative. The larger number of short chromosomes in the latter species seems to indicate this presumption.

A double structure in the chromatids of this genus is very obvious (see Plate 3, fig. 1). Darlington (5) is of the opinion that each chromatid has a single chromonema. Where more than one was observed, he ascribes it to "bubbles of differential refractivity," caused by fixatives containing acetic acid. Investigators have, however, shown that the double structure can be observed after fixation in fluids containing ammonia, hydrochloric acid, nitric acid, but no acetic acid. Nebel & Ruttle (6) even claim 8 threads for each chromosome during metaphase.

The same double structure was observed in the chromatids of *Brunsvigia cooperi*.

2. Genus CLIVIA

3. *Clivia miniata* Regel. Plate 3, fig. 2. $2n = 22$. Herbarium material: Gouws 321 in UPR.

Genome formula: 2:lL; 2:mf; 3:mL; 1:mV; 1:bV; 2:bL.

A & B, the 2:1L chromosomes, can be distinguished by the fact that A has a longer proximal arm than B. C & D, the 2:mf chromosomes, are too similar for optical identification. Chromosome E, mV type, is readily recognized by its extremely sub-median kinetic constriction. Chromosomes F, G & H, mL type, may well be identified by the fact that H is distinctly shorter than the other two and by the fact that F has a shorter proximal arm than G. Chromosome J is the only bV type and thus readily identified. Chromosomes K & L, bL type, are readily distinguished by the fact that K has a small trabant on the proximal arm.

4. *Clivia caulescens* R. A. Dyer. Plate 3, fig. 3. $2n = 22$. Herbarium material: Gouws 109 in UPR.

Genome formula: 2:1L; 4:mL; 4:bL; 1:bV.

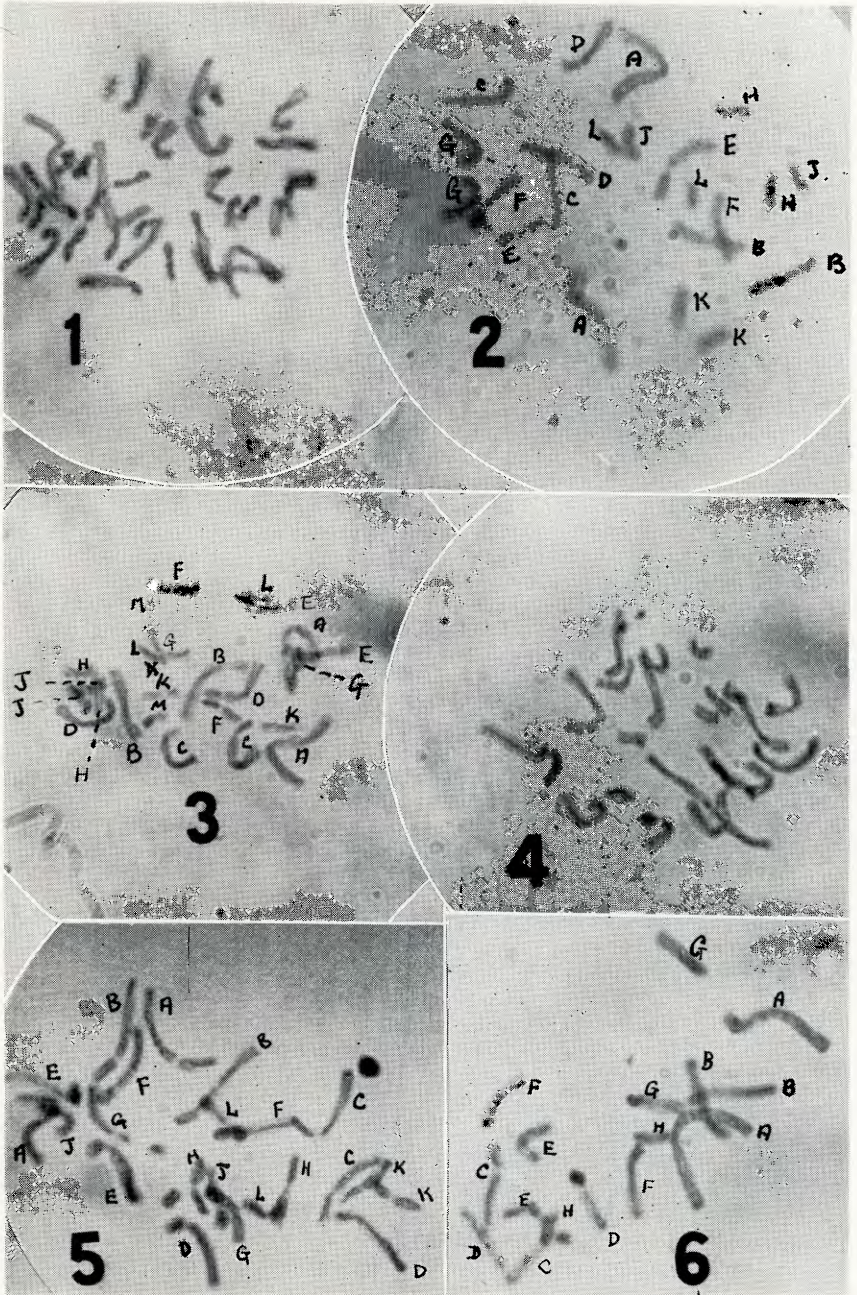
The A & B chromosomes, 1L type, are too similar for optical identification. Chromosomes C, D, E & F, mL type, show a certain degree of variation, but so slight that optical identification is dubious. Chromosomes G, J & L, bL type, can be identified by the fact that G is appreciably shorter than the other two and by the fact that L has a decidedly shorter proximal arm than J. K, the other bL chromosome, is rendered distinct by the spherical trabant on the proximal arm. Chromosome H, being the only bV type, is distinct.

In the past, two species of the genus *Clivia* were investigated cytologically, viz. *C. nobilis* & *C. miniata*. Van Camp (7), according to Inariyama (8), found that in *C. miniata* $n = 9$, while Thornton (9), according to Inariyama (8), reported that $n = 11$ for the same species. Inariyama (8) found that both *C. nobilis* and *C. miniata* have $n = 11$. Flory & Yarnell (10) give in their list *C. miniata* as $n = 9$ or 11. Wittlake (11) reports that *C. cyrtanthiflora*, a cross between *C. miniata* and *C. nobilis*, has $n = 9$.

The species that were investigated here, *C. miniata* and *C. caulescens*, both have $2n = 22$. So far this corresponds with the reports of Thornton and Inariyama.

If the number reported by van Camp, $n = 9$, is correct, it would mean that 11 is not the basic chromosome number of the species, but probably arose through polysomy or fragmentation. Since $n = 11$ has now been reported for 3 species of the genus and is also typical for a large number of species of the *Amaryllidaceae*, the number 9 cannot, without further proof, be accepted to indicate the genome of this genus.

In connection with the finding of Wittlake she herself makes the following remarks: "The interesting fact about these chromosomes is that they lie well within the range of *C. miniata* which varies from 18 to 22 somatic chromosomes according to the articles in the 1937 HERBERTIA by W. S. Flory and S. H. Yarnell. . . . So far the chromosome count itself has not answered the question regarding the failure with its seeds in the study of *C. cyrtanthiflora*." It may be that an early abnormal division resulted in at least one daughter cell with a complete set of genes, and a complex of 18 chromosomes, not consisting of 9 homologous pairs. One could expect that a plant under such conditions would be sterile to a high



Amaryllid chromosomes—1, *Nerine sarniensis* (triploid); 2, *N. frithii*; 3, *N. filifolia*; 4, *N. masonorum*; 5, *Coburgia rosea*; 6, *Anoiganthus breviflorus*. (See text for magnification.)

degree.

Fig. 24 of Inariyama shows a high degree of correspondence with my Plate 3, fig. 2. His 2 pairs of long chromosomes correspond with my A and B chromosomes. His description of the shorter chromosomes, however, differs from my finding. His classification is based only on the position of the kinetic constriction, on basis of which he recognizes the following types: 2 with about median constriction; 1 with extremely sub-terminal kinetochore; and one with a terminal kinetochore.

The study of a large number of metaphase and anaphase figures revealed no figure with a terminal kinetochore. Often, however, it happens that the constrictions are not all clear as is also reported by Bahtia (12), but in anaphase chromosomes the position of the centromere can be determined with a fair degree of accuracy by the bend in the chromosome. Consequently anaphase figures were used to check the observations on metaphase figures.

Inariyama did not define his conception of either sub-median or sub-terminal. It is thus possible that some constrictions were regarded by him as sub-terminal, while they are regarded here as sub-median. From his fig. 24 it would appear, however, that he found more chromosomes with sub-terminal centromeres than is the case in the present paper. It should, however, be borne in mind that in both cases the material investigated has probably been in cultivation for many generations, which might be responsible for structural changes in the chromosomes.

The trabant, which is clearly visible on chromosome K in both species, is not mentioned by the previous author.

In connection with the recently described species, *C. caulescens*, this is probably the first time it has been investigated cytologically.

The chromosomes of this species show a high degree of correspondence with those of *C. miniata*. The main differences are in the E and J chromosomes. In *C. caulescens* no chromosome was observed to correspond with the E chromosome of *C. miniata*, the latter possessing a sub-median kinetic constriction. Chromosome J of *C. miniata* is very similar to the H chromosome of *C. caulescens*. If the positions of chromosomes H and J of *C. miniata* are changed about, the correspondence of the two complexes becomes even greater. It may well be that chromosome J of *C. miniata* is homologous with chromosome H of *C. caulescens*. The 2 SAT chromosomes also appear to be homologous.

3. Genus NERINE

5. *Nerine laticoma* (Ker.) Dur. and Schinz. Plate 3, fig. 4. $2n = 22$. Herbarium material: Gouws 77 in UPR.

Genome formula: 1:IV; 6:mf; 3:bV; 1:bL.

Chromosome A is rendered distinct by its IV shape. The medium chromosomes, B, C, D, E, F and G, are all of the mf type, thus very difficult to identify. Still, B can be identified by having the longest distal arm of the group. C, D and E are about the same length. The proximal arm of C seems slightly shorter than those of the other two. Chromosome F has a shorter distal arm than the previous three, while G, about the

same length as F, has a slightly longer proximal arm. Of the three bV chromosomes, L is rendered distinct by its being the shortest of the three, while H and J resemble each other too closely for optical identification. K is the only bL type and thus distinct.

6. *Nerine duparquetiana* Bkr. Plate 3, fig. 5. $2n = 22$. Herbarium material: Gouws 157 in UPR.

Genome formula: 1:IV; 3:mf; 3:mL; 2:bL; 2:bV.

Chromosome A, the only IV type, is quite distinct. Of the mf chromosomes, B, C and G, the former two are about the same length and shape while G can be recognized by its being much shorter than the previous two. Likewise of the D, E and F chromosomes, mL type, F can be identified by its being much shorter than the other two, while these, D and E, are very nearly similar. Of the bL type there seems to be two, H and K. Chromosome H being distinctly longer than K. Chromosomes J and L are also distinguished by the fact that J is longer than K.

7. *Nerine sarniensis* Herb. Plate 3, fig. 6, and Plate 4, fig. 1. $2n = 22$ (33). Herbarium material: Gouws 86 in UPR.

Genome formula: 1:IV; 4:mf; 2:mL; 3:bV; 1:bf.

Chromosome A, the only IV type, is distinct. The mf chromosomes, B, C, D and E, are very difficult to identify. Their proximal arms are about the same length, while their distal arms form practically a graded series. The two mL chromosomes, F & G, are rendered distinct by the secondary constriction which divides the proximal arm of G into two approximately equal halves. Of the bV chromosomes, H is the longest, while the other two, K and L, are indistinguishable. Chromosome J, the only bf type, can be readily identified.

8. *Nerine falcata* Bkr. Figure 9-(922). $2n = 22$. Herbarium material: Gouws 193, 292, 293, 312 and 314 in UPR.

Genome formula: 1:IV; 2:mL; 3:mf; 1:mV; 2:bf; 2:bV.

A, the IV chromosome, is distinct. The two mL chromosomes, B and G, are easily identified by the fact that B is much longer than G. Of the three mf chromosomes C and D are practically identical while F seems to have a slightly shorter distal arm. Chromosome E, being the only mV type, is distinct. Of the bf chromosomes J has a decidedly shorter proximal arm than H. The bV chromosomes, K and L, are too similar for optical identification.

9. *Nerine frithii* L. Bolus. Plate 4, fig. 2. $2n = 22$. Herbarium material: Gouws 204 in UPR.

Genome formula: 1:IV; 3:lF; 1:mf; 2:mL; 4:bV.

The IV form of chromosome A renders it distinct. The three lF chromosomes, B, C and D, are very difficult to identify on account of the fact that the proximal arms are about the same length, while the distal arms form almost a graded series. Chromosome E is the only mf type and has an akinetic constriction in the distal arm. Chromosomes F and G are easily identified by the fact that F has the longest proximal arm of the

medium chromosomes, while G has a much shorter proximal arm. Of the four bV chromosomes H and L are the longest and shortest respectively, while J and K appear to be identical.

10. *Nerine filifolia* Bkr. Plate 4, fig. 3. $2n = 24$. Herbarium material: Gouws 216, 217 and 218.

Genome formula: 1:IV; 5:mL; 4:bV; 2:bL.

Chromosome A is the only IV type. Of the mL chromosomes E can be identified by the secondary constriction in the distal arm; B is the longest; F is the shortest; while C and D are practically similar. Of the bV chromosomes, G can be distinguished by the fact that it is the longest, while the other three differ too slightly for optical identification. The bL chromosomes, J and M, can be distinguished by the fact that J is appreciably longer than M.

11. *Nerine masonorum* L. Bolus. Plate 4, fig. 4. $2n = 24$. Herbarium material: Gouws 222, 223 and 224.

Genome formula: 1:IL; 4:mf; 2:mL; 2:bL; 3:bV.

A, the only IL chromosome, is distinct. Of the mf chromosomes, B has the longest proximal arm and is thus distinct. C, D and E have about the same length of proximal arm, while the distal arms form practically a graded series. Identification is thus extremely difficult and even doubtful. F and G, the two mL chromosomes, are distinct on account of the fact that G has an akinetic constriction in the distal arm. H and J, the bL chromosomes, are too similar for optical identification. The bV chromosomes, K, L and M, also resemble each other too closely for optical identification.

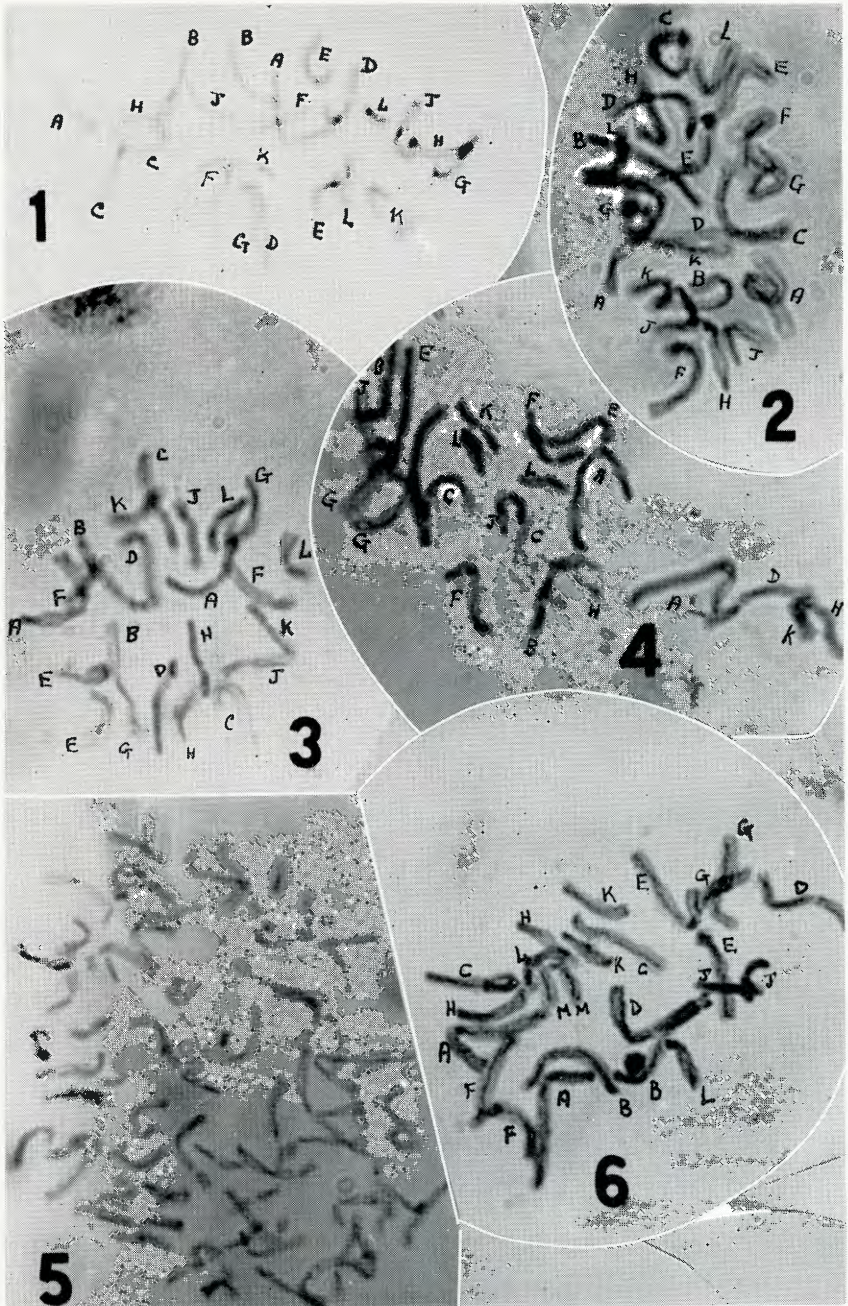
Apparently *N. laticoma*, *N. duparquetiana*, *N. frithii* and *N. masonorum* have been investigated cytologically for the first time.

For *N. sarniensis* Heitz (13) found 22 (24) somatic chromosomes; Inariyama (8) reported 33; while James and Addicot (14) counted 22 somatic chromosomes. In the present study quite a number of plants, all found growing wild, were investigated. Except for one triploid (see plate 4, fig. 1), all plants were found to have 22 somatic chromosomes.

The counts of James and Addicot (14) for *N. falcata* and *N. filifolia* were corroborated here.

There is a great degree of similarity between the karyotypes of the different species. Chromosome A seems to be mostly V shaped, *N. masonorum* being the only exception in this respect. The medium and short chromosomes also exhibit marked similarities both in regard to their number and morphology.

In the two species with $2n = 24$, the addition seems to have occurred in the short chromosomes. As Darlington (5) has shown, the short chromosomes are more subject to variation than the long ones. The 5 pairs of short chromosomes in these two species (*N. filifolia* and *N. masonorum*) seem to corroborate this statement.



Amaryllid chromosomes—1, *Crinum forbesianum*; 2, *Crinum* sp.; 3, *C. crispum*; 4, *C. buphanoides*; 5, *C. bulbispermum*; 6, *Cryptostephanus vansonii*. (See text for magnification.)

4. Genus COBURGIA Herb. 1819*

12. **Coburgia rosea** (Lamarck) Gouws, **comb. nov.*** [syn.—*Amaryllis rosea* Lamarck, Encyc. Méth. Bot. 1:122. 1783; *Amaryllis belladonna* L'Hérit., Sert. Angl. 11–13. 1788, non Linn.; *Amaryllis belladonna* Ait., Hort. Kew. 1:417. 1789, non Linn.; *Coburgia belladonna* Herb., Bot. Mag. Lond. 47: pl. 2113, p. 4. 1819; *Amaryllis belladonna* Herb., Append. Bot. Reg. 31, 1821, non Linn.; *Callicore rosea* (Lamarck) Link, Handb. 1:193. 1829; *Amaryllis belladonna* Baker, Amaryll. 95. 1888; Fl. Capensis 6:203. 1896, non Linn.; *Brunsvigia rosea* (Lamarck) Hannibal, in HERBERTIA 9(1942):101-102, 146. 1943.]

For discussions of the nomenclature of this plant the reader is referred to the authorities quoted (15, 16, 17, 18, 19, 20a, 20b) at the end of this article.

Plate 4, fig. 5. $2n = 22$. Herbarium material: Gouws 182 in UPR. Genome formula: 3:lL; 2:mf; 2:mL; 1:mV; 2:bL; 1:bV.

A, B and C, the three lL chromosomes, are readily identified by the fact that A has the longest proximal arm; B the shortest proximal arm; and C the shortest distal arm of the three. D and E, the mf chromosomes, are too similar for optical identification. F and G, the mL chromosomes, are readily identified by the fact that G has a secondary constriction in the proximal arm. Chromosome H is the only mV type, thus distinct. J and L, the bL chromosomes, are too similar to be distinguished. K is the only bV chromosome, therefore quite distinct.

According to Baker (20b) the genus is monotypic. Cytological reference to this species is made by Flory and Yarnell (10), according to whom *Coburgia rosea* Gouws (syn.—*Amaryllis belladonna* Herb., non Linn.) has $2n = 20$ as reported by Fernandes (21). Fernandes (22) again gives *Coburgia rosea* Gouws as $2n = 20$. Inariyama (8), however, found that *Coburgia rosea* Gouws has $2n = 22$. In the present investigation both metaphase and anaphase figures have shown that *Coburgia rosea* Gouws has $2n = 22$. As regards the morphology of the chromosomes there are, however, a few important differences with the findings of Inariyama. In the first place, no long chromosome with extremely sub-terminal to terminal kinetochore could be found in this investigation.

*EDITORIAL NOTE.—The determination of generic limits is in the field of biological research, and rules of nomenclature (which are merely tools) are only obligatory in so far as the use of the first validly published names are concerned. This safeguard is necessary in order to keep research entirely free from dictation. Dr. Gouws is therefore entitled to maintain *Coburgia rosea* (Lamarck) Gouws as the type of the nomenclatural genus *Coburgia* Herb. 1819. He does this however entirely on his own responsibility and this does not change the editorial policy in HERBERTIA of recognizing *Brunsvigia rosea* (Lamarck) Hannibal as the closest approximation of the biological facts when the *Amaryllidaceae* as a whole are taken into consideration as pointed out by Traub & Moldenke, page 65, AMARYLLIDACEAE: TRIBE AMARYLLEAE. 1949. This viewpoint is also accepted in Bailey's MANUAL OF CULTIVATED PLANTS. 1949. (See also GENTES HERBARUM, Vol. 8, fasc. 1. May, 1949.). The readers should note that fortunately the controversy has been entirely resolved on the rules level because the INTERNATIONAL RULES OF BOTANICAL NOMENCLATURE are impartially observed in both cases. The difference of opinion is on the research level (biological) as it should be. Both sides of all research matters are presented in HERBERTIA so that workers can form their own opinions.

The three longest pairs of chromosomes have clearly submedian constrictions. Chromosome E, which has the shortest proximal arm, clearly has a sub-terminal constriction.

Sato (3), as quoted by Darlington and Ammal (4) also found 22 somatic chromosomes for *Coburgia rosea* Gouws.

5. Genus BRUNSVIGIA

Apparently this is the first time a species of this genus has been investigated cytologically. No literature referring to its chromosomes could be traced.

13. *Brunsvigia cooperi* Bkr. Figure 9—(871). $2n = 22$. Herbarium material: Gouws 290 in UPR.

Genome formula: 1 :lL; 3 :mf; 4 :mL; 2 :bV; 1 :bL.

Chromosome A, being the only lL type, is quite distinct. The seven medium chromosomes, however, give much difficulty with their identification. B, C and D are here regarded as mf chromosomes, while E, F, G and H are mL type. The line between the two groups, however, had to be drawn arbitrarily as there is a gradual transition between the two groups. The three mf chromosomes are readily identified by the fact that the proximal arm of C is the longest, while that of B is intermediate in length and that of D is the shortest. Of the four mL chromosomes, E and F are so similar that identification is dubious. G and H with their shorter distal arms, however, can be identified by the fact that G has a longer proximal arm than H. J and K, the two bV chromosomes, are almost identical. L, the only bL chromosome, is distinct.

6. Genus VALLOTA

14. *Vallota speciosa* (Linn. f.) Dur. Schinz. Figure 9—(734). $2n = 16$. Herbarium material: Gouws 255 in UPR.

Genome formula: 3 :lV; 1 :lL; 1 :bL; 2 :bV; 1 :bf.

Chromosomes A, B and D, the lV chromosomes, can be identified by the fact that A is longer than B, which in turn is longer than D. Chromosome C is the only lL type, thus quite distinct. The short chromosomes are distinctly shorter than the long ones, thus forming two clearly defined groups. E is the only bL type, thus quite distinct. Of the two bV chromosomes, F is longer than H, while G is the only f type in the complex.

According to Baker (20) the genus *Vallota* is monotypic, but he also makes the following interesting remarks: "Var. *magnifica*, Hort., is a form with large (4 in. long) bright scarlet flowers, with a white eye. Introduced by Mason 1774. There is a white flowered form. *V. elata* Roem. is a form with smaller cherry-red flowers and shorter anthers."

On the same page he also refers to Nos. 5949—2 of Burchell.

It would appear from this citation that Baker had a limited number of samples at his disposal, perhaps too few to enable a good circumscription of the genus. There seems to be a probability that he regarded the genus as monotypic merely on account of a want of a sufficient number

of samples. His remarks concerning a white flowered form, and *V. elata* Roem., with smaller cherry-red flowers, create the impression that the genus may not be monotypic. A revision of the genus in the field seems desirable. The plants here investigated agree very closely with the samples in the NATIONAL HERBARIUM, PRETORIA, and thus seem to represent typical *V. speciosa* (*V. purpurea*).

Baker's other remark, concerning a large bright scarlet flowered form with a white eye, may be significant. For many years this genus has been cultivated in gardens and is, like *Coburgia* Herb. 1819, occasionally confused with the American genus *Amaryllis* Linn. 1753, non Herb., nec Baker. Bulbs, under the name of *Vallota speciosa*, were received from George, one of the localities cited by Baker. These on flowering proved to be an introduced species of the American genus *Amaryllis* Linn.

According to Darlington and Ammal (4) *V. speciosa* has $2n = 16$. Thornton (9) is quoted as the author who investigated this species.

The most obvious characteristic of the chromosomes of this species is the large percentage possessing sub-median to almost median kinetic constrictions. In this respect they differ from those of all the other plants here investigated.

7. Genus ANOIGANTHUS

Only one species of this genus was obtained and no literature could be traced on the cytology of the genus. Presumably this is the first cytological investigation on the genus.

15. *Anoiganthus breviflorus* Herb. Plate 4, fig. 6. $2n = 16$. Herbarium material: Gouws 294 in UPR.

Genome formula: 1:IV; 2:mL; 3:bf; 1:bL; 1:bV.

Chromosome A, being the only IV type, is distinct. The two mL chromosomes, B and C, resemble each other too closely for optical identification. D, E and H, the three bf chromosomes, are readily recognized by the fact that the proximal arm of D is slightly longer than that of E, while no constriction could be observed in the case of H. The assumption is that it has a terminal centromere. Chromosome F, the only bL type, has an akinetic constriction in the distal arm. It is thus readily recognized. Chromosome G is the only bV type, thus also distinct.

8. Genus CRINUM

16. *Crinum forbesianum* Herb. Plate 5, fig. 1; Figure 10-(688). $2n = 22$. Herbarium material: Gouws 145 in UPR.

Genome formula: 1:IL; 5:mL; 1:mf; 3:bV; 1:bl.

Chromosome A, IL type, is rendered distinct by its long proximal arm. Of the mL chromosomes B has the longest distal arm, that of C is intermediate, while those of D and E are too similar for optical identification. Chromosome F has an akinetic constriction in its distal arm; it is thus quite distinct. Chromosome G is the only mf type, thus also dis-

tinct. The three bV chromosomes are rendered distinct by the fact that H is longer than J, which in turn is longer than K. Chromosome L is the only bL chromosome.

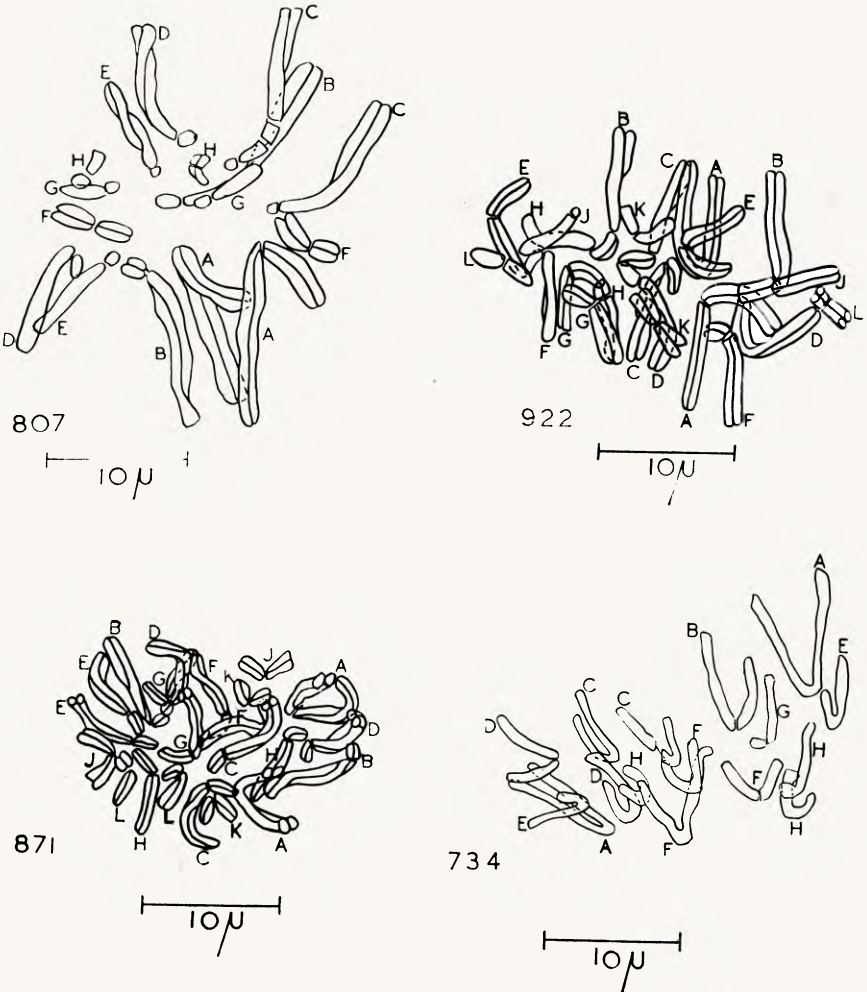


Fig. 9. Amaryllid chromosomes—(807), *Haemanthus nelsoni*; (922), *Nerine falcata*; (871), *Brunsvigia cooperi*; (734), *Vallota speciosa*.

17. *Crinum Sp.* (Probably *C. Sp. nov.*). Plate 5, fig. 2. $2n = 22$. Herbarium material: Gouws 159 in UPR.

Genome formula: 1:lL; 5:mL; 1:mf; 1:bL; 3:bV.

Chromosome A is readily recognized by its 1L form. The five mL chromosomes, B, C, D, F and G, show a fair degree of variation. B and C correspond too closely for optical identification. D has a shorter proximal arm and slightly longer distal arm than the previous two. F has a shorter proximal arm than the afore-mentioned three, while the proximal arm of G is about the same length as that of D. It can, however, be identified by its much shorter distal arm. Chromosome E is the only mf type. Chromosome H, the only bL type, is quite distinct. The three bV chromosomes, J, K and L, are too similar for optical identification.

18. *Crinum crispum* Phillips. Plate 5, fig. 3. $2n = 22$. Herbarium material: Gouws 322 in UPR.

Genome formula: 1:1V; 3:mL; 4:mf; 2:bL; 1:bV.

Chromosome A is the only IV type. Of the three mL chromosomes, B is distinguished by the fact that it has the longest distal arm of the complex. C and D differ too slightly for optical identification. E, F, G and H, the mf chromosomes, are recognized as a group by the fact that they have the shortest proximal arms of the complex. The proximal arms form more or less a graded series while there is also little variation in the distal arms. Optical identification is thus unreliable. The two bL chromosomes can be distinguished by the fact that L is shorter than J. Chromosome K, being the only bV type, is also distinct.

19. *Crinum buphanoides* Bkr. Plate 5, fig. 4. $2n = 22$. Herbarium material: Gouws 138 in UPR.

Genome formula: 1:1L; 4:mL; 2:mf; 2:bL; 2:bV.

Chromosome A, the only 1L type, is distinct. Of the mL chromosomes, B has the longest proximal arms; F has an akinetic constriction in the distal arm; while C and D (just shorter than B) resemble each other rather closely. E and G, the mf chromosomes, also resemble each other so closely that optical identification is doubtful. The two bL chromosomes can be identified by the fact that H is appreciably longer than J. K and L, the two bV chromosomes, are too similar for optical identification.

20. *Crinum bulbispermum* (Burm.) M-R. and Schw. (?). Plate 5, fig. 5. $2n = 72$. Herbarium material: Gouws 130, 133, 134, 135 and 147 in UPR.

The analysis of this complex is very difficult on account of the high number of chromosomes. From a large number of preparations only two figures were obtained from which the number could be obtained with certainty—the first (Plate 5, fig. 5) in full metaphase, while the second was an anaphase. Both showed that the plant has 72 somatic chromosomes. For the analysis of such a large complex one metaphase figure is insufficient. An attempt was made to arrange the chromosomes into groups as far as this is optically possible. There are, however, some chromosomes that form graded series. The extremes of these series are clearly different, but the limits of each group could not be determined with certainty.

In the following formula the figures imply groups: 1:1L; 4:mL; 2:mf; 3:bL; 4:bV.

The 4 chromosomes of group A are readily recognized by their 1L form. Groups B, C, D and F are all mL type. The two in group B have the longest distal arms of the medium chromosomes. The next 16 chromosomes show a degree of variation, but so slight that the limits of the different groups could not be determined with any degree of certainty.

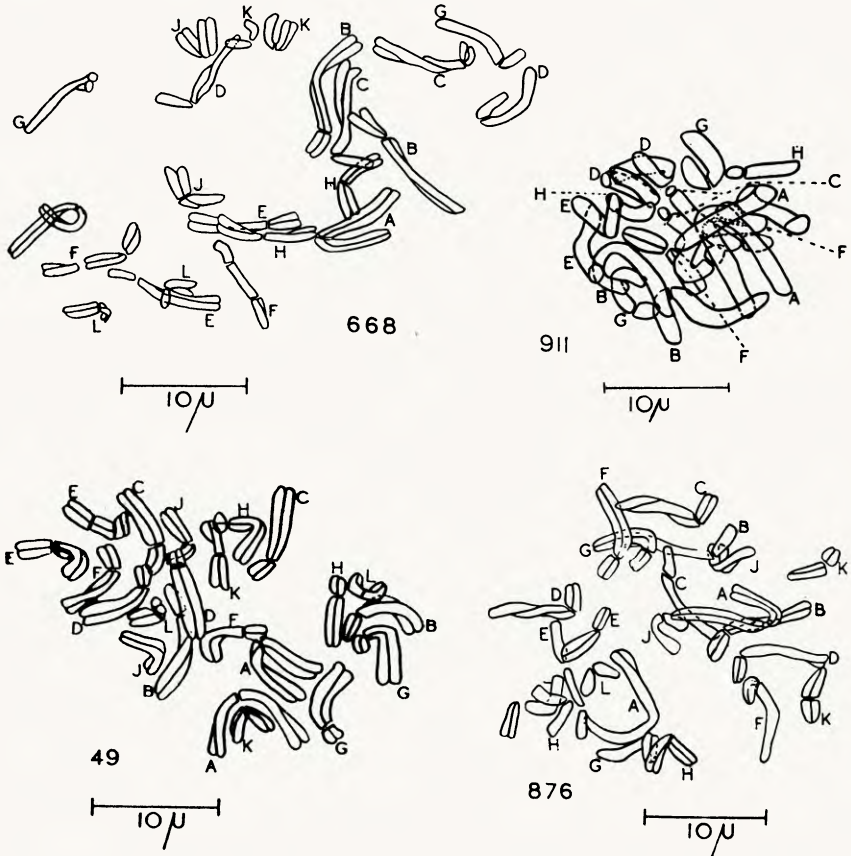
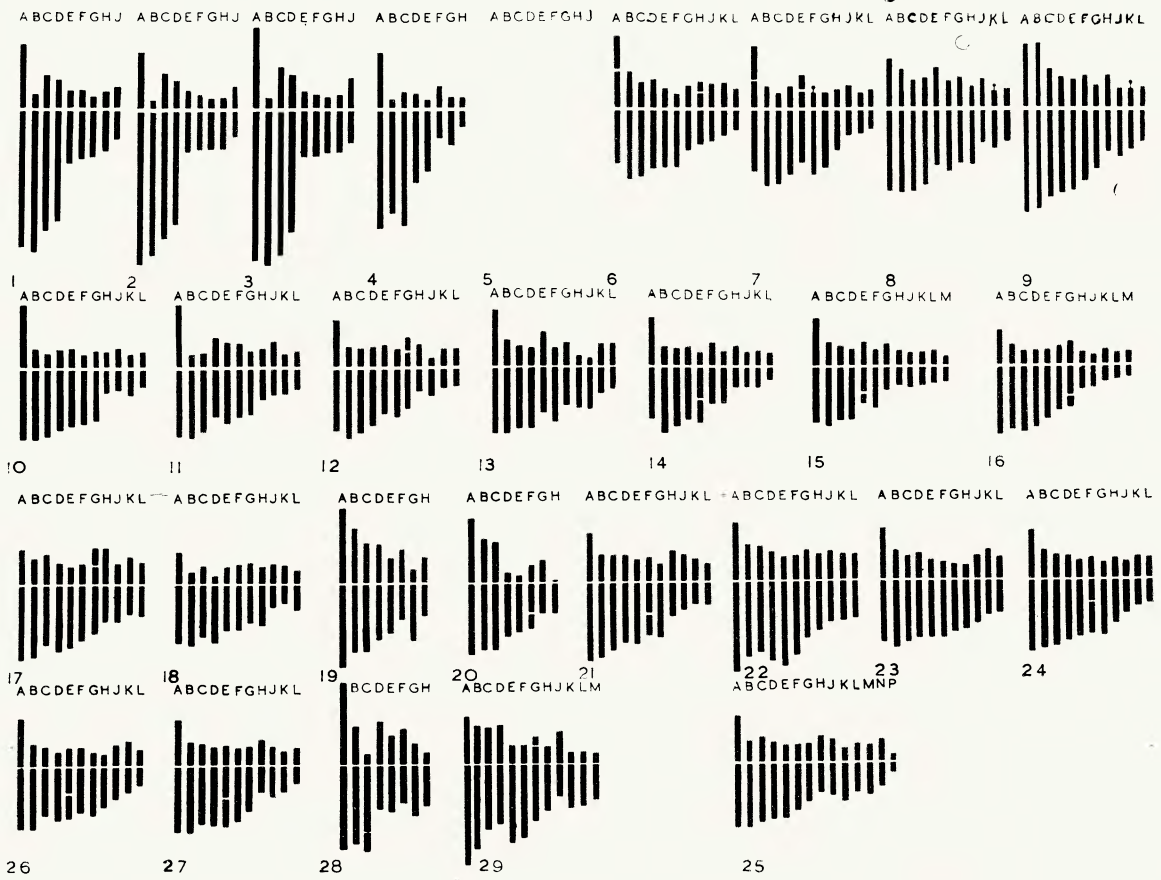


Fig. 10. Amaryllid chromosomes—(668), *Crinum forbesianum*; (911), *Cyrtanthus tuckii* var. *transvaalensis*; (49), *Ammocharis coranica*; (876), *Cybistetes longifolia*.

It seems the most likely limit divides them into two groups of 8 each. Those of group D having slightly longer proximal arms than those of E. The D chromosomes are here regarded as mL type while the E chromosomes are regarded as mf type. It must, however, be borne in mind that the constrictions lie very close to the margin between L and f. Of the F chromosomes (mf type) there also seem to be 8. Their distal arms are



Comparison of amaryllid chromosome complements.
 Plate 6 (See opposite page for species legend.)

distinctly shorter than those of the E type, with about the same length of proximal arm. In group G (mL type) there are four with distinctly shorter distal arms than those in group F. Of the bV chromosomes there are four groups: H, J, N and P, with 6, 8, 8 and 4 chromosomes in each group respectively. Those in group H seem to be slightly longer than those in group J, which in turn are slightly longer than those in group N, while the four in group P are almost fragmentary. K, L and M, the bL groups, have 2 chromosomes in each group. The K chromosomes have the shortest proximal arms, while the L chromosomes have the shortest distal arms. The distal arms of chromosomes M seem to be in between those of K and L.

It is obvious that this grouping can only be regarded as tentative. Statistical analysis of a large number of figures will probably change it considerably.

In fertility the plants seem to behave as functional diploids.

The specimens that were identified as *Crinum bulbispermum* were all collected in areas in the Northern Transvaal with a fairly high precipitation. In the adjoining arid areas, however, only *C. forbesianum* is met with.

The areas cited by Baker (20), being mostly arid, do not correspond in climate to those mentioned above.

Another striking point is the fact that the polyploid in this case occupies the areas with the most favorable conditions for growth (high precipitation and temperature), while the diploids occur over wide and less favorable arid areas.

Hagerup (23 and 24) found that the polyploid usually occupies the larger area under more trying conditions. Baldwin (25) came to the same conclusion after a study of *Sedum ternatum*. Hagerup (24), however, pointed out that vivipary increases with ploidy up to a certain maximum. This may also be true of its distribution.

Inariyama (8) reported $22 + 2f$ chromosomes for *C. capense (longifolium)* of India. It is to be doubted whether this species is conspecific with the South African *C. bulbispermum (longifolium)*. It must also be borne in mind that the limits of the South African species of this genus are as yet very poorly defined and it may be that the plants here investigated do not represent typical *C. bulbispermum (longifolium)* as reported by Baker to have been collected at Cape Town, Cathcart, Colesberg, Hopetown, etc.

This is probably the first time polyploidy has been observed within the genus *Crinum*.

Plate 6 (See opposite page). Comparison of amaryllid chromosome complements: 1, 2 & 3, *Haemanthus magnificus*; 4, *H. nelsoni*; 6, *Boöphone disticha*; 7, *B. guttata*; 8, *Clivia miniata*; 9, *C. caulescens*; 10, *Nerine laticoma*; 11, *N. duparquetiana*; 12, *N. sarniensis*; 13, *N. falcata*; 14, *N. frithii*; 15, *N. filifolia*; 16, *N. masonorum*; 17, *Coburgia rosea*; 18, *Brunsvigia Cooperi*; 19, *Vallota speciosa*; 20, *Anoiganthus breviflorus*; 21, *Crinum forbesianum*; 22, *C. Sp. n.*; 23, *C. crispum*; 24, *C. buphanoides*; 25, *C. bulbispermum*; 26, *Ammocharis coranica*; 27, *Cybitetes longifolia*; 28, *Cyrtanthus tuckii* var. *transvaalensis*; 29, *Cryptostephanus vansoni*.

The plants obtained from Potchefstroom and Bloemfontein have chromosomes morphologically rather different from those of *C. forbesianum*, under which category the plants just mentioned have been classified up to the present. Yet these differences seem to plead for the creation of a new species. From a discussion of this point with Miss I. C. Verdoorn of the NATIONAL HERBARIUM, PRETORIA, it appeared that she had already arrived at the same conclusion after an organographic study of plants collected in approximately the same areas.

9 and 10. Genera AMMOCHARIS and CYBISTETES

21. *Ammocharis coranica* (Ker-Gawl.) Herb. Figure 10-(49). $2n = 22$. Herbarium material: Gouws 1 and 7 in UPR.

Genome formula: 1:1L; 3:mL; 4:mf; 1:bL; 2:bV.

Chromosome A is readily recognized by its 1L form. The mL chromosomes B, C and F can be identified by the fact that B has the longest proximal and distal arms, while the distal arm of F is only slightly shorter than that of C. Of the four mf chromosomes, D and G are practically identical; E has the shortest proximal arm of the group; while the akinetic constriction in the distal arm of C renders it distinct. J, the bL chromosome, is distinct. K and L, the two bV chromosomes, can be distinguished by the fact that K is a distinctly larger V than L.

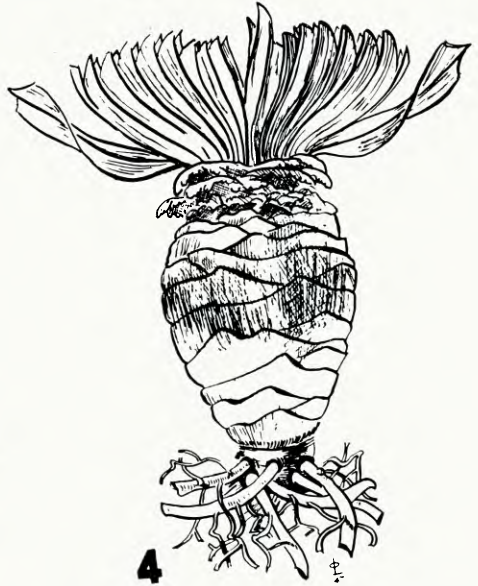
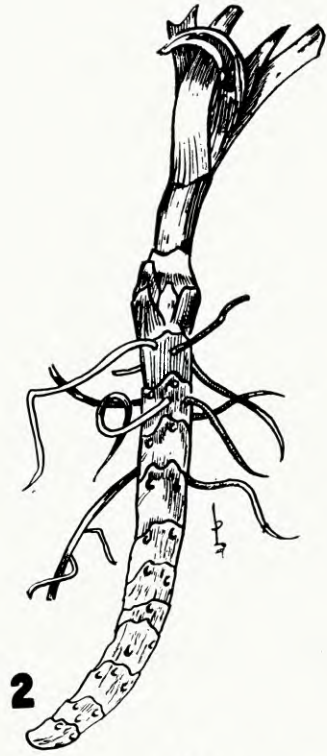
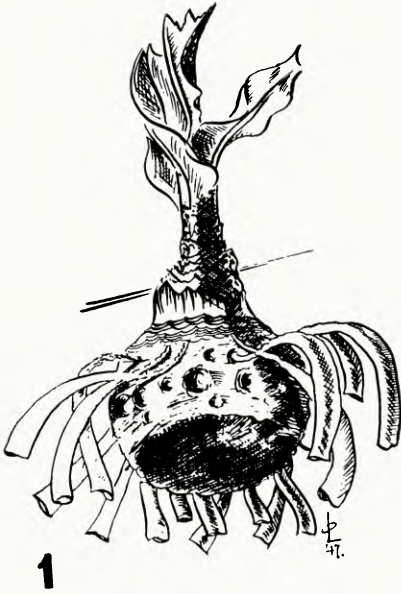
22. *Cybistetes longifolia* (Linn.) M-R. and Schw. Figure 10-(876). $2n = 22$. Herbarium material: Gouws 28 in UPR.

Genome formula: 1:1L; 4:mL; 2:mf; 2:bV; 2:bL.

Chromosome A, being the only 1L type, is readily recognized. The medium chromosomes show a gradation very much like that in *Ammocharis coranica*. B, C, E and G are here regarded as mL chromosomes, while D and F are mf chromosomes. B can be identified with a fair degree of certainty by the fact that its distal arm equals that of A. Chromosome E has an akinetic constriction in the distal arm, while G is rendered distinct by the fact that it has the shortest distal arm of the medium chromosomes. Of the bV chromosomes H is distinctly longer than L. The two bL chromosomes can be distinguished on account of the proximal arm of K being shorter than that of J.

The genus *Ammocharis* was revised by Milne-Redhead and Schweickhardt (26), so that there is no difficulty in the identification of these plants. On the difference of its fruit with the other species of *Ammocharis*, the plant formerly known as *A. falcata* (Jacq.) Herb. alias *A. longifolia* (Linn.) Roem., was transferred to the newly created genus *Cybistetes* M-R. & Schw. On page 191 of their publication they make the following remark: "It is probable, therefore, that *Cybistetes* is more closely related to *Ammocharis* than to any other genus."

The number and morphology of the chromosomes of the two plants in question were investigated and the results obtained corroborate this remark completely. Plate 6 shows the striking similarity between the two complexes. It is, however, impossible to decide from purely cytological data whether the two species belong to the same or different genera.



Rootstocks—1, *Haemanthus magnificus*; 2, *Clivia caulescens*; 3, *Hypoxis* sp.; 4, *Boöphone disticha*.

11. Genus CYRTANTHUS

23. *Cyrtanthus tuckii* Bkr. var. *transvaalensis* Verdoorn. Figure 10-(911). $2n = 16$. Herbarium material: Gouws 287 and 289 in UPR.

Genome formula: 1 :lV; 1 :lL; 1 :lf; 2 :mV; 2 :mL; 1 :bf.

Chromosomes A, B and C, being lV, lL and lf chromosomes respectively, are readily recognized. Chromosome C is further distinguished by the akinetic constriction in the distal arm. The mV chromosomes, D and F, are readily distinguished by the fact that D is longer than F. E and G, the mL chromosomes can be identified by the proximal arm of E being longer than that of G. Chromosome H is the only bf type, hence distinct.

Darlington and Ammal (4) give the somatic chromosome number of *Cyrtanthus obliquus* as 22. Randolph Taylor (27), however, reports $2n = 16$ for *C. parviflorus* Bkr. This is also the number found in the present investigation for *C. tuckii* var. *transvaalensis*. His interesting remark that the complex is ". . . difficult to analyze because of the length and tangled character of the elements" was found to be true also for the chromosomes of the species here described. His fig. 32 shows a great degree of resemblance with Figure 10-(911) of the present paper. The most important differences are in the long chromosomes: Where Taylor observed two pairs of V's and two pairs of chromosomes with secondary constrictions, only one pair of long V's and one pair with secondary constrictions were observed in the present investigation.

12. Genus CRYPTOSTEPHANUS

24. *Cryptostephanus vansonii* Verdoorn. Plate 5, fig. 6. $2n = 24$. Herbarium material: Gouws 311 in UPR.

Genome formula: 2 :lL; 3 :mL; 2 :mf; 1 :bL; 1 :bV; 3 :bf.

The lL chromosomes are rendered distinct by A being longer than B. Of the mL chromosomes G is recognized by the akinetic constriction in its proximal arm, while C and D resemble each other too closely for optical identification. Similarly E and F, the mf chromosomes, cannot be distinguished optically. H and J, the bL and bV chromosomes respectively are distinct. K, L and M, the bf chromosomes, show a certain degree of variation, but insufficient for optical identification.

Although this genus does not belong to the *Amaryllideae* it has been included here because of its close resemblance in habit to that of the genus *Clivia*. As nos. 8, 9 and 29 of Plate 6 (*Clivia miniata*, *C. caulescens* and *Cryptostephanus vansonii* resp.) show, there are numerical and morphological differences. Still there is a marked degree of resemblance too. This will be referred to later.

Apparently this is the first time the genus has been investigated cytologically.

IV. DISCUSSION

The method for the construction of Plate 6 has previously been discussed. It is only necessary to repeat that the classification of Pax and

Hoffmann in Engler and Prantl (28) has been followed since this at present still is the most complete system.

In the classifications of Rendle (29), Hitchcock (30), Thonner (31) and Phillips (32) the underlying principles are similar.

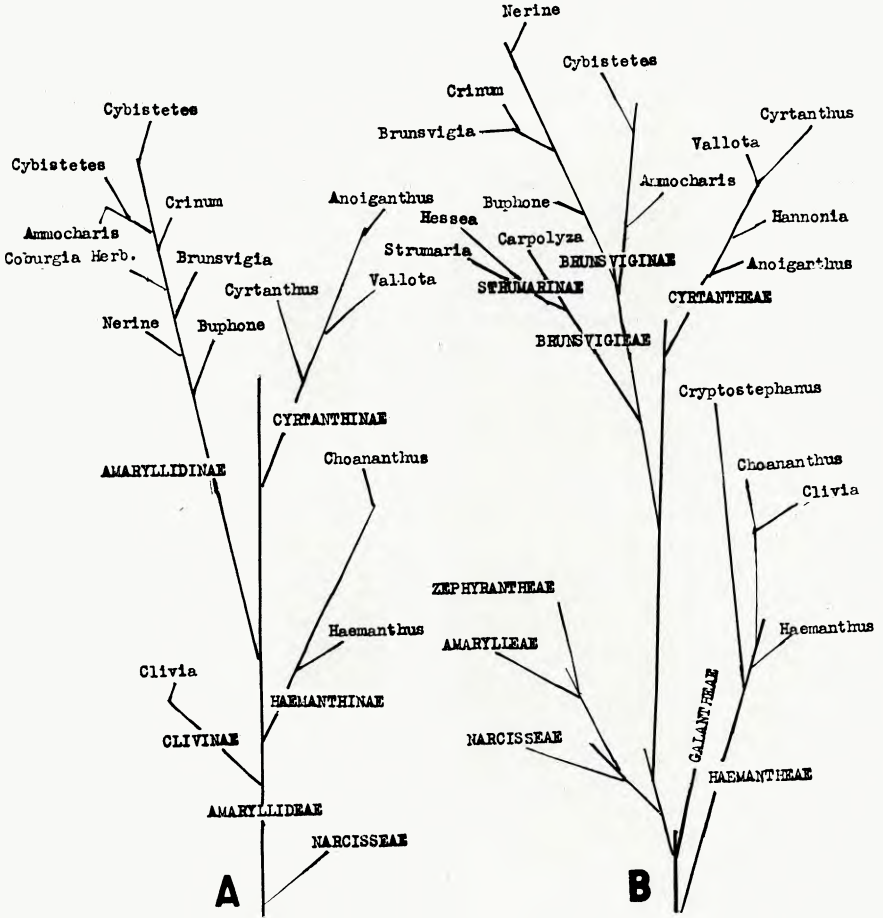


Fig. 11. Probable phylogeny of amaryllid groups,—A, according to Gouws (present work); and B, according to Traub (unpublished manuscript: AMARYLLIDACEAE, as of 1949).

On comparing the probable phylogeny as presented in the classifications of Engler and Prantl (28) and Hutchinson (33) it appears that:
1. The main branch, i.e., the tribe *Amaryllideae* of Pax and Hoffmann, is unnamed by Hutchinson.

2. The sub-tribes *Amaryllidinae*, *Crininae* and *Haemanthinae* of Pax and Hoffmann are raised to the ranks of tribes by Hutchinson viz. *Amaryllideae*, *Crineae* and *Haemantheae*.

3. *Vallota* has been transferred by Hutchinson to the *Crineae*.

4. *Anoiganthus* is omitted by Hutchinson. (One realizes, however, that his system does not claim to be complete in every detail).

5. The *Amaryllideae* and *Crineae*, in Hutchinson's classification, overlap to a small degree.

This overlapping suggests a very close affinity between a branch of the *Crineae* (being composed of the genera *Crinum*, *Coburgia* and *Am-mocharis*) and the *Amaryllideae*, a point to be referred to later.

In a publication on the genus *Choananthus* Milne-Redhead (34) describes the subterranean organ of this genus as being a root-stock. In the same account the author points out that two types of subterranean organs are met with in the tropical representatives of the genus *Haemanthus*: the first type consisting of a group of species possessing a rhizome from the apex of which a bulb arises which in turn is composed of the expanded bases of the petioles surrounded by a few sheathing scales; the second type consisting of a group of species where bulblike organs are absent.

Milne-Redhead, furthermore, was able to correlate a terminal scape with the subterranean organ of the second type. In addition hereto he mentions differences in the nature of the perianth.

According to Hugo de Vries (35), a rootstock is a horizontal or vertical subterranean stem which decays from the base upwards.

This definition being accepted, the subterranean organs of plants such as *Haemanthus magnificus* and *Clivia caulescens* (Plate 7, figs. 1 and 2) may also be considered rootstocks. In the case of *Haemanthus hirsutus* the organ in question is decidedly a bulb, whereas this is not clearly so in the case of *H. magnificus*. The resemblance between the subterranean organs of the latter species with those of the genus *Hypoxis* e.g. *H. cooperi* as described by Pole Evans (36), (see Plate 7, fig. 3) is striking. In both cases there is below the roots an older portion of the succulent stem, devoid of tunics, which progressively decays from the base upwards. There are indeed a number of tunics above the roots of *Haemanthus magnificus* by which the organ probably is regarded as a bulb. Above the roots of *Hypoxis*, on the other hand, the remains of the partially decayed old leaf sheaths are present in the form of fibres called bristles by Pole Evans (36). On removing these fibres, the leaf sheaths of the subsequent year's growth become evident. There is, therefore, no fundamental difference between the subterranean organs of the two plants. It is also clear that in the species of one and the same genus (*Haemanthus*) two distinct types of subterranean organs are met with. To use a character which is unstable even in one and the same genus, for the identification of sub-families, savors of the artificial.

In the case of *Clivia caulescens* (Plate 7, fig. 2) the bulb is even less evident. Yet *Clivia* and *Haemanthus* are grouped together with *Boöphone* (with a definite bulb, see Plate 7, fig. 4) under the *Haemanthinae*. This in spite of the fact that on page 391 Pax and Hoffmann (28) state: "The

typical *Amaryllidaceae* are characterized by well-developed bulbs; only in a few genera, as *Haemanthus*, *Clivia* and especially *Ixiolirion*, is there deviation therefrom, in that among them are found transitional forms with subterranean rhizome or leafy peduncle.”

Of the three species of the genus *Haemanthus* here investigated, *H. magnificus* possesses 18 chromosomes, a phyllotaxis other than $\frac{1}{2}$, leaf-bases simulating an aerial stem, and a subterranean rhizome. In contradistinction hereto both *H. nelsoni* and *H. hirsutus* possess 16 chromosomes, a phyllotaxis of $\frac{1}{2}$, prostrate leaves adpressed to the soil thus not simulating an aerial stem, and furthermore with distinctly bulbous subterranean organs.

The characters enumerated by Milne-Redhead (34) may possibly be correlated with those just mentioned, but such a presumption would call for a detailed investigation of all the representatives of the genus, which lies beyond the limits of the present cytological study.

The cytology of *Haemanthus*, *Boöphone* and *Clivia* (see Plate 6, nos. 1-4; 6 and 7; and 8 and 9 resp.) reveals that the three genera are not so closely related as to allow a grouping within the same sub-tribe.

The genomes of *Clivia* and *Boöphone* bear a greater resemblance to those of the *Amaryllidinae* or *Crininae* than to those of *Haemanthus*. It seems desirable, therefore, that both *Clivia* and *Boöphone* be removed from the *Haemanthinae*.

On comparing the genomes of *Clivia* and *Cryptostephanus*, one is struck by a fair degree of resemblance in their morphology, in spite of the numerical difference. A close relationship is also evident in the organography of the two genera (see description by Verdoorn (37)).

It is therefore suggested that a new sub-tribe be created to accommodate the genus *Clivia* and that it should be placed near the base of the phylogenetic tree of the *Amaryllideae* to indicate its relationship with *Cryptostephanus* of the *Narcisseae*. Such a sub-tribe could be called the *Clivinae*.

Careful consideration of Pax and Hoffmann's grouping of the genera exhibiting coronal structures in the flower leads one to suspect that such a grouping is not necessarily one indicative of a natural generic relationship; the genera exhibiting coronal structures thus need not be monophyletic, but may indeed be polyphyletic in origin.

The genus *Boöphone* will be referred to later.

Under the *Amaryllidinae* and *Crininae* there are certain genera which could be grouped more satisfactorily under a separate sub-tribe. The genera concerned are: *Vallota*, *Anoiganthus* and *Cyrtanthus*. In these the somatic chromosome number is 16 and the genome most probably 8. Although the genome of the genus *Haemanthus* is probably also 8, this genus, however, cannot be grouped with the previous three genera, as both the morphology of the chromosomes and the organography of the plants argue against such a step.

Cytologically, apparently no objection can be raised against the remaining genera of the *Amaryllidinae* and *Crininae* (*Coburgia* Herb. (1819), *Brunsvigia*, *Nerine*, *Crinum*, *Ammocharis* and *Cybistetes*) being

grouped under the same sub-tribe, as is also suggested by the overlapping of the *Crineae* and *Amaryllideae* in the classification of Hutchinson.

Assuming that the allocation of genera by Pax and Hoffmann for the *Amaryllideae* is acceptable, it is suggested that:

1. A new sub-tribe be created to accommodate the genus *Clivia*. As an alternative, *Clivia* and *Cryptostephanus* could be grouped in one and the same sub-tribe.

2. *Boöphone* to be transferred from the *Haemanthinae* to the *Amaryllidinae*.

3. *Vallota*, *Anoiganthus* and *Cyrtanthus* to be grouped under the *Cyrtanthinae*.

4. *Crinum*, *Ammocharis* and *Cybistetes* also to be placed under the *Amaryllidinae*, as is also suggested by the overlapping in the classification of Hutchinson (33). The phylogenetic tree would then appear as in Figure 11-A. It is interesting to note that Traub (38) arrived at much the same conclusions. The only difference being that, as with Hutchinson, Traub's tribal concept coincides with the sub-tribes of Pax and Hoffmann. His classification of the *Cyrtantheae* and *Brunsvigieae* (*Amaryllideae*) shows a decided advance on the previous systems.

A comparison with the phylogenetic tree in Figure 11-B [compiled from Traub's classification of the *Amaryllidaceae* (19, 38, 39)] clearly shows how close the agreement is with the present suggestions.

Traub's classification of the *Cyrtantheae* and *Brunsvigieae* is in complete harmony with the cytological evidence for the South African genera. Thus far his classification must be regarded as a step forward. By creating a separate tribe *Cliveae*, to accommodate the genus *Clivia*, and perhaps also the genus *Cryptostephanus*, Traub's classification would become a still more natural one.

V. SUMMARY

1. Separate mounting of cover- and objectglass has a decided advantage over a recombination of the two.

2. The following is a list of the investigated species with their somatic chromosome number. The species numbers refer to the numbers in Plate 6. *Boöphone guttata* and *B. disticha* were investigated by Pienaar (unpublished).

Those starred (*) were investigated for the first time.

Name	2n	Area
HAEMANTHUS		
*1, 2, and 3. <i>magnificus</i> Herb.	18	(1) Wakkerstroom, Tvl.; (2) Letaba, Tvl.; (3) Pretoria, Tvl.
*4. <i>nelsoni</i> Bkr. (?)	16	Bloemfontein, O.F.S.
*5. <i>hirsutus</i> Bkr.	16	Wakkerstroom, Tvl.
BOÖPHONE		
6. <i>disticha</i> (Linn. fil.) Herb.	22	Pretoria, Tvl.
7. <i>guttata</i> (Linn.) Herb.	2?	Stellenbosch, C. Prov.

CLIVIA		
8.	<i>miniata</i> Regel	22 (Cultivated)
*9.	<i>caulescens</i> R. A. Dyer	22 Houtbos, Tvl.
NERINE		
*10.	<i>laticoma</i> (Ker.) Dur. and Schinz ..	22 Bloemfontein, O.F.S.
*11.	<i>duparquetiana</i> Bkr.	22 Zoutpansberg, Tvl.
12.	<i>sarniense</i> Herb. (33)	22 Stellenbosch, C. Prov.
13.	<i>falcata</i> Bkr.	22 Rustenburg, Tvl.
*14.	<i>frithii</i> L. Bolus	22 Potchefstroom, Tvl.
15.	<i>filifolia</i> Bkr.	24 (Cultivated), C. Prov.
*16.	<i>masonorum</i> L. Bolus	24 (Cultivated), C. Prov.
COBURGIA Herb. 1819.		
17.	<i>rosea</i> (Lamarck) Gouws	22 Stellenbosch, C. Prov.
BRUNSVIGIA		
*18.	<i>cooperi</i> Bkr.	22 Wakkerstroom, Tvl.
VALLOTA		
19.	<i>speciosa</i> (Linn. f.) Dur. Schinz ...	16 Kirstenbosch, C. Prov.
ANOIGANTHUS		
*20.	<i>breviflorus</i> Herb.	16 Wakkerstroom, Tvl.
CRINUM		
*21.	<i>forbesianum</i> Herb.	22 Bandolierkop, Tvl.
*22.	Sp. n.	22 Bloemfontein, O.F.S.
*23.	<i>crispum</i> Phillips	22 Pretoria, Tvl.
*24.	<i>buphanoides</i> Bkr.	22 P. P. Rust, Tvl.
*25.	<i>bulbispermum</i> (Burm.) M-R. and Schw.	72 Duiwelskloof, Tvl.
AMMOCHARIS		
*26.	<i>coranica</i> (Ker-Gawl.) Herb.	22 Hamanskraal, Tvl.
CYBISTETES		
*27.	<i>longifolia</i> (Linn.) M-R. & Schw. ...	22 Stellenbosch, C. Prov.
CYRTANTHUS		
*28.	<i>tuckii</i> Bkr. var. <i>transvaalensis</i> Verdoorn	16 Wakkerstroom, Tvl.
CRYPTOSTEPHANUS		
*29.	<i>vansonii</i> Verdoorn	24 S. Rhod.

3. The chromosome numbers seem to prove the partial inadequacy of the system of classification of Pax and Hoffmann. It is suggested that the genera *Boöphone*, *Crinum*, *Ammocharis* and *Cybistetes* be accommodated in the sub-tribe *Amaryllidinae*; and that two new sub-tribes should be created, one to accommodate the genus *Clivia* and the second for the genera *Vallota*, *Anoiganthus* and *Cyrtanthus*.

4. The plant, tentatively identified as *Crinum bulbispermum* from the Duiwelskloof area Northern Transvaal, is a polyploid with 72 somatic chromosomes. Its distribution, occurring in areas with a high precipitation only, merits specific rank.

5. The *Amaryllidoideae* cannot be distinguished from the other sub-families of the *Amaryllidaceae* by the possession of either a bulb or a rhizome. Rhizomes occur in different genera of the *Amaryllideae*, viz.—some species of *Haemanthus*, *Clivia* and *Choananthus*.

6. *Ammocharis* Herb. and *Cybistetes* M-R. and Schw. are very closely related genera.

7. A provisional phylogenetic tree of the *Amaryllideae* is suggested, based on the results of this study. This differs fundamentally in certain points from the phylogeny of this tribe as set forth by Pax in Engler and Prantl (28).

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32. Phillips, E. P.—The Genera of South African Flowering Plants (1926).
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35. de Vries, Hugo—Plantenkunde II.
36. Pole Evans, I. B.—in Flow. Pl. S. Afr. 5, 172 (1925).
37. Verdoorn, I. C.—in Flow. Pl. S. Afr. 23, 885 (1943).
38. Traub, H. P.—in Herbertia 5, 110 (1938).
39. Traub, H. P.—Amaryllidaceae (unpublished manuscript as of 1949).

ALLIUM TRICOCCUM NOTES

THOMAS K. BARRIE, *Pennsylvania*

I have read with great interest the report of Dr. Traub in 1947 HERBERTIA (pages 69-70), and since my interest in this species goes back for some years, I have been watching these plants again during the summer of 1948 in an attempt to answer Dr. Traub's question on page 70.

Two groups of *Allium tricoccum* were studied,—(A) plants growing in their native habitat, and (B) plants under cultivation in my garden. I thought that perhaps the moving of the plants sent to Dr. Traub might have retarded their growth, and also the development of the seeds. However, my analysis for 1948, as shown in Table 1, is about the same as that which he reported. The seeds for 1948 may be a fraction larger. I used a transparent rule held behind the seeds, and a magnifying glass to obtain the measurements.

TABLE 1. *Allium tricoccum*, 1948

Umbel number	Capsule number	Number of capsules with			Diameter of seeds	
		1 seed	2 seeds	3 seeds	range, mm.	average, mm.
GROUP A. GROWING IN NATIVE HABITAT						
1	1-19	8	11	0	2.5-3.5	3.33
2	1-13	2	11	0	1.75-4.0	3.46
GROUP B. CULTIVATED IN GARDEN						
1	1-13	1	9	3	3.0-3.5	3.45
	14-17		seeds not developed			
2	1-14	5	6	3	3.0-3.5	3.39
	15-19		seeds not developed			

I have studied several umbels at other points in the County, and in all cases only one or two seeds developed per capsule. *Allium tricoccum* generally grows in clumps. I wonder if this crowding may be the cause of failure of some seed to develop. I plan to separate the bulbs and plant them singly and see what happens.

AMARYLLID NOTES

HAMILTON P. TRAUB, *Maryland*

Amaryllis incarnata Hort. ex Heydt, in Moellers Deutsch. Gaert.-Zeit. 47:304. 1932; Traub and Moldenke, Tribe Amaryll. 1949, p. 137. = *Lycoris incarnata* Comes ex Sprenger.

Crinum bulbispermum (Burm.) M-R. and Schwkt., var. **farinianum** (Baker) Traub, **comb. nov.** Syn—*Crinum longifolium* var. *farinianum* Baker, Gard. Chron. Ser. 2, 16:883. 1887; Amaryll. 94. 1888.

xClivia cl. PRINCE ALBERT, Ch. de Bosschere, L'illus. Horticole 3: 217, pl. LXII. 1896.

Reported as a cross between *xClivia* cl. MADAME DONNER and *xC.* cl. CHEVALIER HEYNDERYCX. The umbel is many-flowered; the tepalsegs are quite wide; the perigone color is a brilliant scarlet red with prominent yellowish-whitish star in center. Can anyone inform the readers as to what has become of these and other outstanding *Clivia* hybrids?

Zephyranthes chloroleuca Jacques, Ann. Flore et Pomone (Jour. des Jard.) 2:28-29, pl. facing p. 28. 1833. Only a side view is shown, and the description is incomplete. This plant is apparently *Habranthus Andersoni* Herb.—the flower shape and color are similar to this species, and the stigma is indicated as trifold.

Zephyranthes grandiflora Lindl.; Jacques, Ann. Flore et Pomone (Jour. des Jard.) 2:93-94, pl. facing p. 93. 1833. This plate is correctly named.

Crinum minor Jacques, syn. *Amaryllis latifolia* Jacques, Ann. Flore et Pomone (Jour. des Jard.), 59-60. 1833.

Descr.—The bulb is shaped like a large walnut slightly elongated; the leaves are 3-3.5 dm. long, 2.5-3 cm. broad, sheathing at the base, glabrous, apple-green; the scape is produced at the side of the bulb, is nearly round, pale green, about 1.7-2 dm. tall; the spathe is 2-valved, the valves about equal in size; the umbel is 4-5-flowered; the tepaltube of the perigone is about 7.6 cm. long, greenish; the perigone-limb (6 tepalsegs) is about 5 cm. long, of a beautiful white, the tepalsegs slightly undulating, and somewhat recurved at the tips. It flowers in March and April (under culture at Naples).

Notes.—This worker, who signs himself "Jacques," has done a great disservice to science by proposing plant names without adequate descriptions. In this case it will be difficult, if not impossible, to identify this plant. He received it as *Amaryllis latifolia*, which means that it is broad-leaved, but he indicates the breadth of the leaves as 12-15 lines (= 2.5-3 cm.) which hardly measures up to the name.

Amaryllis Jacobaea Karsch, Phan.-Flora Westphalen, p. 814. 1853. = *Sprekelia formosissima* (L.) Herb.

[AMARYLLID NOTES—Hamilton P. Traub, continued on page 50.]

A PINK AMARYLLIS

MARY G. HENRY, *Pennsylvania*

A pink *Amaryllis* bloomed in the window of a well known Philadelphia florist in 1944. My daughter Josephine saw it on February 2nd and commented on it. At this season, however, red and occasionally pink *Amaryllis* are seen in florist shops, so I gave but a passing thought to the occurrence and promptly forgot it altogether.

Six days later, on February 8th, I happened to pass the same window when surely the term "rooted to the spot" applied to me.

The pink *Amaryllis* were still there, some half a dozen stalks in a vase. The flowers were a totally different pink from anything I had ever seen in an *Amaryllis*. The pink was a true pink of an exceedingly attractive and luscious shade. There was no tinge of magenta nor any hint of peach to mar the purity of the color.

The errands for which I went to town were forgotten. I acquired two stalks of the *Amaryllis*. There were two flowers on one stalk and three on the other. The well shaped flowers were large but not as large as the florists' hybrids commonly seen, and according to Ridgway the color was close to "Eosine Pink." I guessed the source whence these flowers came, as I knew that one of the officers of the Academy of Natural Sciences had recently been collecting birds in South America. Later on I learned that the bulbs had been collected in Bolivia by a local bird collector. The Philadelphia ornithologist who brought them to the United States does not know if this species has as yet been identified.

My two precious stalks of this *Amaryllis* were kept in their box for five days until February 13th. I used the pollen on several *Amaryllids* then in bloom in my tiny greenhouse, keeping the stalks sprinkled in their narrow box. Suddenly an idea came to me. I placed the two stalks in a vase—there was but one flower remaining apiece—and pollinated each with the other's pollen. This was on February 13th. Slowly one of the pods swelled. As the days passed, the cut end of the stem seemed to melt away. With trepidation I saw the rot creep higher and higher towards the enlarging pod. It was a race.

The seed pod won but the stem had literally rotted away. Just two months after pollination the fat pod split open, exposing the ripe seeds!

The seeds were sown April 18th. Many of them were soft and flabby and soon disintegrated, but roots emerged from a few on April 25th. Two of the tiny bulbs lived to put out leaves on May 18th. One of these grew apace but the other dwindled away.

In February 1948, just about four years after pollination, my one bulb of the precious pink *Amaryllis* sent up a sturdy stalk from which expanded three enchantingly lovely flowers! (Plate 8.)

What a thrill they gave me, and how precious and beautiful they seemed after the long but exciting wait. According to Traub & Moldenke this plant is *Amaryllis belladonna* var. *Haywardii*.

EDITORIAL NOTE.—The cover design, by Miss Josephine Henry, for 1950 Plant Life, including *Herbertia*, will feature *Amaryllis belladonna* var. *Haywardii* in color.

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*]

Habranthus teretifolius (C. H. Wright) Traub & Moldenke, in *Tribe Amaryll.* 145. 1949.

Syn.—*Hippeastrum teretifolium* C. H. Wright, in *Gard. Chron.* 28(2):142. 1900; et *Bull. Misc. Inf. Kew*, 144. 1901; *Hippeastrum teretiflorum* (sphalm.), *Index Kewensis*, suppl. 2.

Description.—Bulb pyriform, brown; leaves terete, acute, 3.6 dm. long, 4 mm. in diam., slightly glaucous, synanthous; scape robust, 2.3 dm. tall, 6 mm. in diam., wine-colored below, green above; spathe 3.8 cm. long, bifid to the middle, wine-tinted; umbel 2-flowered; pedicels 4.5 cm. long, green; perigone pale-rose, tepalsegs oblanceolate, 5 cm. long, 12 mm. broad; stamens and style as in the other species; ovary oblong, 6 mm. long.

Range.—Uruguay; Montevideo.

Notes.—Description based by Wright on Cantera #285, and on plants that flowered at Kew in July, 1899. According to Wright (1901), it is "Close to *Hippeastrum roseum* Baker [= *Amaryllis Barlowii* Traub and Moldenke], from which it differs in its terete leaves and 2-flowered umbel, and pale-rose flowers."

Amaryllis Hassleriana Chodat et Lendner, *Bull. L'Herb. Boiss.*, Ser. II, 1:422. 1901; Traub & Moldenke, *Tribe Amaryll.* 137. 1949.

"[Description.—] Bulb rounded, about 2 cm. long, tunics brown, neck about 3 cm. long and 8 mm. thick; leaves contemporary with the flowers, linear, longer than the scape, narrowed toward the base which is 1.5 mm. broad; scape 8–10 cm. tall, filiform; spathe tubular for $\frac{2}{3}$ of its length, deeply bifid at the apex, rose-colored, equaling or shorter than the pedicel and ovary to which it is joined; pedicel slender; tepaltube very short, obsolete; tepalsegs about 3.2–4 mm. long, stigma trifid.

"Related to *A. minima* (*A. parvula* Seub.) from which it differs in its broader leaves, its longer pedicels (1.2–2.2 cm. long), and three times larger perigone.

"Found in swampy places in the vicinity of Lake Ypacaray, December, [no.] 1711; flowers whitish, Paraguari, in pastures, January, [no.] 4726, Balansa."

Amaryllis caerulea Grisebach, *Goett. Abh. wiss. ges.* 24:320. 1879.

"[Descr.—] Belonging to [subg.] *Habranthus*, bulb extended into



THE PINK BELLADONNA LILY, *Amaryllis belladonna* Linn., var. *Haywardii*. From kodachrome by Miss Josephine deNancrede Henry.

Plate 8

an elongate vaginoid neck; scape precocious [= not contemporaneous with flowers?], about 2.2 dm. tall, umbel 1-flowered; the pedicel subequaling the bifid spathe; perigone 'pale blue,' 2.5 cm. long; the perigone-limb with slightly unequal divisions, simulating a slender-clavate tepal-tube beneath, dilated above the middle into elliptic-oblong mucornate tepalsegs; the three longer stamens subequaling the pistil, the three shorter slightly surpassing the throat of the perigone, stigma trifid. Compare with *H. pedunculatus* Herb. [Amaryll.] (pl. 26, fig. 3, shown as bluish in color), which is distinct in its 2-flowered umbel, and in having a perigone twice as long.

"Leaves not known; bulb 2.5 cm. in diam., neck 2.5–6.4 cm. long; spathe 2.5 cm. long; lower portion of perigone about 1.6 cm. long, the upper dilated portion 9 mm. long. Found in sandy places near Concepcion, Uruguay, blooming after the first rains in the beginning of March."

USDA DAYLILIES

Editorial Note.—Sixteen daylily clones have recently been distributed to nurserymen for propagation, and the U. S. Department of Agriculture does not have any stock on hand for further dissemination. Those interested may obtain them a little later when the nurserymen have had time to increase their stock sufficiently to offer them to the public. These sixteen clones are named and briefly described below:

MARY HENRY. Plant very vigorous and floriferous; 3½ feet tall; flowers of great delicacy, and sun-resistant, 4¾ to 5¼ inches across; petaline segments Barium Yellow (RHS 50–3), 1½ inches broad; sepaline segments Straw Yellow (RHS 60–4), 1 inch broad. Midseason. Fragrant. [Clone #31; see fig. 12.]

STEPHEN FOSTER. (See Figure 13.) Plant 3 feet tall; notable for entirely sun-resistant flowers of heavy substance, 4 inches or more across; orange throat; sepsegs ¾ inch, and petsegs 1 inch broad; segs iridescent, blood red (RHS 8–22) in the full sun, but in the shade the color is modified by the orange ground color, giving a deeper shade near Chianti. [Clone #152.]

EMILY DICKINSON. [Clone #76.] Plant very vigorous and floriferous; 3⅔ feet tall; notable for the delicacy of the sun-resistant flowers, 4¾ to 5 inches across; segs a glistening straw yellow (RHS 60–4) self; sepsegs 1 inch and petsegs 1¾ inches broad; very delightfully fragrant; early midseason.

CLARINDA. Plant almost 3 feet tall; notable for long flowers, 5½ inches across; petsegs near Empire yellow (RHS 60–3) self, with narrow whitish stripe in center of segs; sepsegs 1 inch broad, same color, but no stripe in center; moderately fragrant; midseason to late midseason. [Clone #79.]

KRISHNA. Plant vigorous, 4 feet tall; flowers to 4¾ inches across; petsegs 1¼ inches broad, velvety, near oxblood red (RHS 008–23) over orange-yellow ground color, and very narrow orange stripe through center of segs; sepsegs ⅞ inch broad, same color but stripe is only a faint line; very slightly fragrant; midseason to late midseason. [Clone #98.]

[To be continued in 1950 *Herbertia*]

REGISTRATION OF NEW AMARYLLID CLONES

Registrars: Prof. J. B. S. Norton and Mr. W. R. Ballard

This information is published to avoid duplication of names, and to provide a space for recording brief descriptions of new Amaryllid clones. Names should be as short a possible—one word is sufficient. It is suggested that in no case should more than two words be used. *The descriptions must be prepared in the form as shown in the entries below, and*



Fig. 12. *xHemerocallis* cl. MARY HENRY

must be typewritten and double-spaced. The descriptive terms used should be in harmony with those given in the "Descriptive Catalog of Hemerocallis Clones, 1892-1948" by Norton, Stuntz and Ballard.

There is close liaison between the AMERICAN PLANT LIFE SOCIETY and the HEMEROCALLIS SOCIETY regarding the registration of new *Hemerocallis* clones, and such new names can be sent to the registrars of either

society and will automatically be included in the records of both organizations. See also postscript note on page 134.

Correspondence regarding new amaryllid clones, including *Hemerocallis*, to appear in HERBERTIA should be addressed to Prof. J. B. S. Norton, 4922 40th Place, Hyattsville, Maryland, enclosing self-addressed, stamped envelope, if reply is expected.

For obvious reasons, there is a limit to the number of descriptions included from any one member in any one issue. Not more than five brief descriptions of clones under each generic heading will be published from any one member in any one issue of HERBERTIA. Descriptions of clones in excess of five brief descriptions, up to a total of 25, will be entered if the space required for each is limited to one line. In this case use should be made of the standard abbreviations already mentioned.

HYBRID AMARYLLIS CLONES

Introduced by Mrs. C. H. Armstrong, Joy, Illinois.

ALFRED. Leopoldii type A, 8½ inches across face of flower; pure white.

EVALENA. Leopoldii type A, 9½ inches across face of flower; deep velvety red; white throat; fragrant.

LILLIAN. Leopoldii type B, 7 inches across face of flower; pink.

JAYGEE. Leopoldii type B, 7 inches across face of flower; light red, with dark red markings in throat.

HYBRID DAYLILY (xHEMEROCALLIS) 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*; (6) *Des Moines Park Board, Des Moines, Iowa*; (7) *Div. Ornamental Hort., Univ. of Calif., at Los Angeles*. [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.

The following registrations have been made for members of THE AMERICAN PLANT LIFE SOCIETY. Names that have been published in the CATALOG OF HEMEROCALLIS CLONES (DCH) are listed by name only.

Introduced by E. A. Claar, Chicago, Ill.—The Doctor, EmRe; 36"; ORMI; de. (2705).

Introduced by C. W. Culpepper, Arlington, Va.—Abcada, M; 36"; LY. (2696); Darkten, EM; 42"; DR. (2697).

Introduced by R. F. Hawkins, Laporte City, Iowa.—In DCH, —Romeo, Vinore.

Introduced by Wyndham Hayward, Winter Park, Fla.—In DCH,—De Soto, Mephisto, Molten Fire, Montezuma, Rameses.

Introduced by H. M. Hill, Lafontaine, Kan.—Bright, MLa; 45"; R7M; ext. (2698); Apricot Dream, MLa; 45"; O7L; ext.; de. (2699); Cibola, M; 36"; O7L. (2700); Villanelle, M; 45"; R9L; ext.; de. (2701).

Introduced by Dr. E. J. Kraus, Corvallis, Ore.—Brownstone, MLa; 36"; ROD2. (2702); Evelyn Claar, EM; 30"; RL1. (2703).

Introduced by Mrs. T. J. Nesmith, Lowell, Mass.—Ivory Chalice, M; 40"; Y4L; de.; fr. (2704); In DCH,—Amber Lustre, Bonny Ruffles,

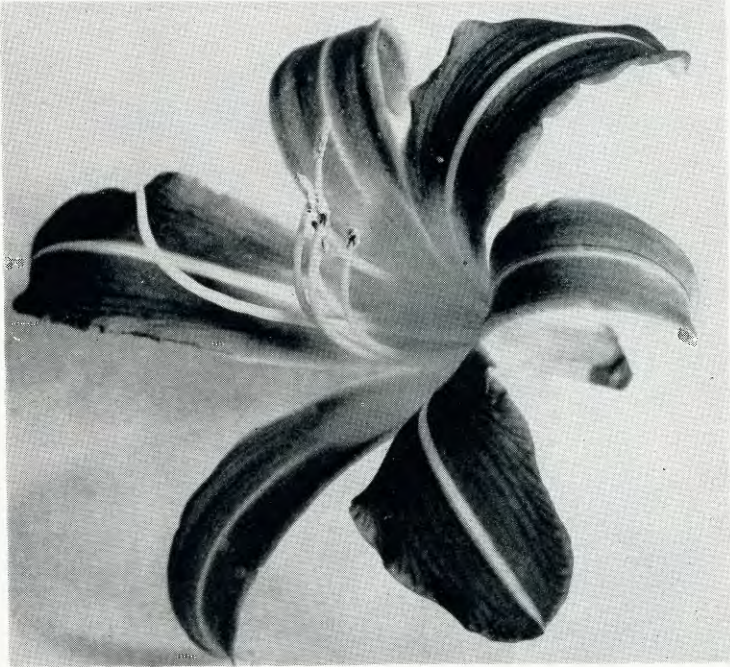


Fig. 13. *xHemerocallis* cl. STEPHEN FOSTER

Canyon Purple, Carved Ivory, Dancing Fire, Gay Heart, Guiding Light, Kentucky Cardinal, Lipstick, Pink Lotus, Pink Petticoats, Pink Prelude, Pimento, Pirate Treasure, Sorrento, Tallyho, Twilight Tryst, Wood Nymph.

Introduced by Mrs. A. R. Parry, Signal Mountain, Tenn.—Parry-Claar clones in DCH,—Chameleon, Jean Lafitte, Plum Mist, Royal Crown.

Parry-McDade clones in DCH,—Cherokee, Chickamauga, Danny Boy, Hiawassee, Lovebird, Merryman, Nickajack, Sheila, Sonata, Spanish Cavalier, Whippoorwill.

Parry-Wood clone in DCH,—Neon.

Introduced by Sass Bros., Omaha, Nebr.—Evening Glory, EM; 40"; Y7L; de. (2706).

Introduced by S. E. Saxton, Saratoga Springs, N. Y.—Alnilam, EM; 20"; RDOYM3. (2707); Alnitah, EM; 20"; RMYM3. (2708); Arab Chief, M; 45"; YM2. (2748); Campfire, MLa; 30"; ORD1. (2709); Corduroy, M; 30"; RD2. (2710); Mintika, EM; 20"; RD2. (2711); Panda, MLa; 38"; RVDYM3. (2712).

Introduced by Mrs. Bright Taylor, Ocala, Fla.—Brocade, MRe; 42"; ROL2-H; ext.; ev. (2713); Brule'e, E; 36"; YOL2-S; ext.; ev. (2714); Citation, MRe; 36"; ORM2-H; ev. (2715); Cockade, MRe; 36"; OYL1; dbl.; ev. (2716); Constellation, MLa; 42"; OYL2-3; ext.; ev. (2717); Dark Victory, EMRe; 34"; VRD1; ext.; ev. (2718); Duna, EM; 34"; RM1; ev. (2719); Fern Irving, ERe; 48"; ARMIext.; ev. (2720); Guinevere, MLa; 40"; ORM1; ev. (2721); H. Harold Hume, ERe; 36"; RD1; ext.; ev. (2722); Lodestar, EMRe; 42"; ROL2; ev. (2723); Nantahala, ERe; 36"; YOL2-H; ext.; ev. (2724); Penelope, MLaRe; 40"; RL1; ev. (2725); Pocahontas, ERe; 19"; RM1; semi-ev. (2726); Spice, MRe; 36"; ROD2; ev. (2727); Spring Dawn, EM; 42"; RL1; ev. (2728); Sugar Cane, MRe; 40"; OL1; ext.; ev. (2729); Sunset Sky, ERe; 32"; RM2; ev. (2730).

Introduced by R. M. Wheeler, Winter Park, Fla.—Albion, ERe; 38"; YL1; ev. (2731); Arla, EMRe; 40"; YL1; ev. (2732); Bacchus, EERe; 36"; VRM1; ev. (2733); Merceuse, EE; 36"; VRYL3. (2734); Brassy Sun, ERe; 38"; OYM1. (2735); Cameo, ERe; 40"; RL1. (2736); Diadem, E; 36"; ORLYM3; ev. (2737); Grey Pearl, M-La; 40"; VRL2-H. (2738); Lotus, EMRe; 60"; YL1; ev. (2739); Mirage, ERe; 36"; ROM2; ev. (2740); Niobe, ERe; 38"; VMR2-H; ev. (2741); Platinum Blonde, MRe; 50"; YL1. (2742); Sequin, ERe; 36"; YLR13-H-Rev.; ev. (2743); Show Girl, E-MRe; 40"; VR1. (2744); Tiara, EM; 44"; YOLROL3-R-Rev.; ev. (2745); Tomaka, M; 36"; VRD2-H. (2746); Tyrol, ERe; 36"; RMOYM3; ev. (2747); In DCH.—Ming Toy, Muscat, Olympus, Psyche, Raven, Vega.

CORRIGENDA:

DESCRIPTIVE CATALOG OF HEMEROCALLIS CLONES, 1893-1948

(Publ. June 30, 1949)

It should be pointed out that the fundamental principle followed in the CATALOG OF HEMEROCALLIS CLONES (DCH), and one recognized in plant nomenclature everywhere, is that *the correct name of a plant is the first one printed with a description in a dated publication*; others for the same plant published later are synonyms (invalid). If a name already in use (homonym) is bestowed, the plant is without a name, and a new name must be chosen in place of the *later homonym*. A name registered with a registering organization is recognized by it, but of course is not binding on others, if there is a conflict with the fundamental rules.

The date to appear in the parentheses after names first published in the DCH, and also in 1948 HERBERTIA, vol. 15, is "1949." All dates following "Myb. 2" should be "1948."

[CORRIGENDA: DESCRIPTIVE CATALOG OF HEMEROCALLIS CLONES, Continued on page 133.]

3. GENETICS AND BREEDING

HYBRID AMARYLLIS BREEDING IN SOUTH AUSTRALIA

E. BOTH, *South Australia*

After reading the many very interesting articles in *HERBERTIA*, I felt rather reluctant to attempt an article for the readers of this classic of all amaryllid publications, on our experiences with that super glorious



Fig. 14. Mr. E. Both, South Australia, hybridizing *Gladiolus*

flower of all flowers, the *Amaryllis Hybrids*. However, through the insistence of our mutual friend Mr. Fred Danks of Melbourne, Victoria, I have been forced to reconsider my previous resolutions, and so here it is:

If my memory serves me correctly, it was in 1928 that I first became

acquainted with the *Amaryllis Hybrids*. Well do I recollect being enthralled with the sheer beauty of my first 12 *Amaryllis* which were destined to eventually produce our present existing strain. There were two red and whites with the red predominating, and the other ten were a mixture of tricolors and bicolors, mostly a mixture of light to deeper tone reds with white and green midribs with various tonings in the throats. These were planted in 10" pots under glass and became so engrossed with their sheer beauty that I quite overlooked the most important factor to cross-pollinate these the first season. Readers will, however, appreciate that I had ample time in between this flowering and the following season's flowering to set a schedule of various crosses, that, in my estimation could produce other colors, The time soon arrived, and in this instance there was no such miscalculation as in the past season as eventually there were approximately 500 seedlings planted up in beds under glass, each cross correctly labelled and faithfully recorded. Two years later I had the pleasure of seeing the first results of my crossing with *Amaryllis*. In the majority of instances my calculations were sadly upset as I was yet to find out that the red was the predominating color. Even at the present stage, although the various colors may now be inbred for at least 6 to 7 generations, unless one is mighty careful, the red will persist in popping up when least expected.

However, it was not until in the third year that the slightly weaker plants flowered, and in amongst these found the decided breaks in color that I had previously anticipated when crossing. Two were very outstanding breaks in color, No. 3 and No. 4, pink. No. 3 pink showed a blending of salmon, orange, and a touch of rose. No. 4, pink had a similar mixture with rose predominating. Other crosses again produced deeper toned reds, the heavy white midrib was gradually receding, and a deeper tone was also developing in the centers. At this stage I had better mention the basic principle on which I work to increase or decrease the intensity of color, size, and improvement of shape.

These do not vary to any marked degree over and above that which is recognized by other hybridizers of flowers or as far as that goes breeders of blood stock. Just in case any readers are not conversant with these principles they are as follows:

To intensify color. You take the pollen from the deeper toned color and cross it onto the stigma of a lighter toned color.

To lighten or decrease the depth of color. The pollen of the lighter tone is crossed onto the stigma of the deeper tone—actually the above cross in reverse.

Selfing Colors. If a flower $\frac{3}{4}$ red and $\frac{1}{4}$ white were crossed onto a flower which only had $\frac{1}{2}$ red and $\frac{1}{2}$ white, the corresponding offspring would show a bigger percentage of red and a corresponding decrease in white. After several such crossings a self would eventuate.

To increase the size of any one bloom, or any individual tepalseg, you select the pollen from one with larger tepalseg and cross it onto a slightly smaller bloom. If the two blooms are approximately the same size we would strongly advise any potential hybridist to cross these both ways, because in the latter instances marked increase in size is often found in these crosses.

In crossing for shape immediate results on improvements of all tepalsegs cannot be expected. It is certainly far better to cross for the improvement of each set of tepalsegs, that is to say, the two top inner, the two bottom outer or inner bottom or top outer tepalseg each at a time. Although it may be possible to increase the size of the two inner top tepalsegs and decrease the size of the bottom inner tepalseg in one cross, it is far better to select blooms with a view of just increasing the size of the two top inner tepalsegs. Once this has been achieved it would be quite an easy matter to select seedlings from this cross where the desired improvement showed on these tepalsegs and then to cross the pollen from those having the slightly smaller inner bottom tepalseg onto the slightly



Fig. 15. The Both Family and Friend,—From left, Helen Both, Ann Both, Mrs. Lange, a great friend of the Boths, Bob Both, Marlene Both, Mrs. E. Both, and Elizabeth Both.

larger one with a view of decreasing the length of this tepalseg and retaining the increase in size elsewhere.

Another very important factor that one must not overlook is to make a close study of the grandparents as well as the great grandparents before one can be reasonably assured of what to expect in the offsprings.

Working on these theories, and bearing well in mind that red was the predominant color, every bit of my knowledge on cross-pollination was used to further break up the then existing colors and endeavor to merge the colors that had appeared in the markings with a view of creating new colors.

The two pinks previously mentioned played an important part in eventually producing many very beautiful and rare colors. This was achieved in crossing No. 3 and No. 4 pink both ways, back to their par-

ents and also on to seedlings that showed a slight variation either on the edges of the tepalsegs or deep in the throat. Other seedlings where the midrib had receded these were crossed with a view of selfing that particular color. Where a slight variation occurred in the throat marking or the midrib showed a variation of color these were crossed with a view of extending the color out of the throat and to extend onto the tepalsegs. Quite a number of named varieties of gladioli in cream and yellow are green in the bud stage. Although experts frown upon green in an *Amaryllis* hybrid. I set about to self a green with the hopes of eventually producing a cream or the much desired and elusive yellow. Our second lot of crossings mostly followed this routine quite naturally and all were faithfully recorded and every seed planted in such a manner that in our estimation would hasten results. Two years later I had the pleasure of seeing further improvements—many hopes dashed to the ground but quite a few that were very promising. Amongst these No. 251 was undoubtedly the most outstanding—the color on the outer edges of the tepalsegs was a rosy carmine and the center a pure white. This particular variety was the start of our rose shades and also played an important part in our marginata—varieties with a white center and edges of tepalsegs of various colors. In others a rosy lavender, a deep rose red and whites with but slight markings appeared. The latter after several crossings eventually produced our first white. The rose reds were then crossed with various seedlings where a slight blue edge had appeared on each tepalseg and also onto ones where a blue toning appeared in the depth of the throat. After 3 or 4 crosses we were fortunate in securing our first cerise and later petunia and purple appeared. In our last batch of seedlings traced back to these crosses we had the pleasure of flowering one of the most beautiful *Amaryllis* hybrids. This particular flower was all but a “Vieux Rose” self, the only markings being a margin of white on the tips of each tepalseg. Another seedling out of the same cross was a pure magenta with a pure green throat very definitely marked. A very beautiful seedling and one which I value to a very marked degree for breeding purposes. The No. 3 and 4 crosses gave us some very outstanding pinks and these in turn in later generations gave us our copper reds, rose, buff, salmon, orange. As soon as the buffs appeared we immediately crossed these into a green with a brown throat marking and were very pleased with the results in securing our first deep cream with a brown blotch. Later we crossed our white self into this cream and produced some very beautiful creamy whites with very delicate brown tigring. These in turn are now being used to intensify the brown tigring with a view of producing either a brown self or who knows that elusive golden yellow. The receding white midrib crossings onto the increased midrib were now reaching a stage where the red self was not far distant. When these eventually did appear the pink self soon followed. The deeper throat markings similarly handled deepened our very dark reds from wine, dark blood red, maroon to almost a deep black red equal in depth of color to that wonderful old time *Gladiolus* “Moorish King.”

Another outstanding seedling is number 127. The variation in color of the various seedlings from this particular numbered seedling is re-

markable. Smoky colored gladioli have without a doubt been my weakness and I have often visualized that in some future date it would be possible to produce a similar coloring in *Amaryllis* hybrids. One of 127's



Fig. 16. *xAmaryllis* cl. Both #11,086

seedlings has given me great hopes that this should materialize at not too far distant a date.

Markings, margins and delicate tigrening on a pure white background have also interested us immensely. The pure white center with a red edge or margin on the edges of the tepalseg are beyond description and I hope in the not very far distant future to produce these with

frilled edges. Although during the past season we handled practically all colors we have as yet to produce the blue and yellow. Whether this is possible is problematical. I feel confident that the golden yellow self is just a matter of time [*Amaryllis aglaiae* is butter yellow.—Editor], but the actual problem is the blue—to self those with slight bluish markings in the throat and also upon the edges of the tepalsegs, with the red color predominant, is an extremely doubtful procedure.

In the production of the double *Amaryllis* hybrids we have not been so fortunate as we were not lucky enough to fluke that eluding freak double pollen imperative for evolving that elusive yet beautiful double *Amaryllis*. The pollen to which I refer does not come from the center of the flower but is attached to one of the tepalsegs. Strange as it may seem, three seasons ago the freak pollen bearers appeared amongst our gladioli and also in our *Amaryllis* hybrids. So far we have not been fortunate enough to see the results of the *Amaryllis* crosses but in the gladioli we secured quite a number of semi-double glads still producing the freak double pollen bearers. Now that the double *Amaryllis* is within our reach we are paying special attention to those numbered seedlings with slightly frilled and intense crimped edges. The twisted and twirled tepalsegs as well as the orchid shaped are all doing overtime because a double without fringe, twisted or twirled tepalsegs would be sadly lacking if without these essential features.

Have often admired the beautiful reproductions produced in *HERBERTIA* each year. The tendency for the two top inner tepalsegs to be the smaller and the outer tepalsegs larger appears to be the most desired. I quite appreciate that the following remarks are likely to be criticized by a number of leading experts. Although in direct contradiction to the opinion of others that which appeals to me most as the perfect shape would be the flower with 6 equal sized tepalsegs. The width would be such that they overlap considerably and only on the very tips would there be any break in a perfect circular outline. A really beautiful shape is the flower where the two bottom outer tepalsegs are slightly smaller, the two top inner tepalsegs slightly larger, the top outer tepalseg extending over the full width of the flower and the bottom inner tepalseg in proportion to the two bottom lower tepalsegs—shape similar to a shell with crimped edges. Even though this shape is extremely beautiful, the 6 equal sized tepalsegs are without a doubt the desired shape. Shape has played an important factor in our crossings during the past 6 to 7 years, but in reality these crossings have been infinitesimal in comparison with the number of crosses made solely and purely for the creation of newer colors.

As a slight indication we handled anything from ten to twenty thousand seedlings prior to the war each year, and for the duration of the war, this was but slightly reduced.

Size undoubtedly plays a big part in the winning of grand champions at Australia's leading Gladioli Classics. We have naturally been thrilled with the success of rank amateurs winning with our Gladioli releases each year and producing spikes on the showbench equal and at times even bigger and better than the results we achieved in our testing plots.

In one instance Tunia's Wizard—our 1947 release—was staged with the bottom floret a fraction over 11" across. With the *Amaryllis* hybrids we have endeavored to improve color and shape. The sizes of our blooms are not considerable as most vary from 8" to 10" across, although one or two badly shaped 12" florets have appeared.

Sports are apparently quite prevalent amongst gladioli but for us as



Fig. 17. *xAmaryllis* cl. Both #333, pure white.

regards color have as yet to appear amongst our *Amaryllis* hybrids. One very interesting feature did occur with us approximately 2 years ago: one bulb developed with 2 side shoots, the original plant had a self green leaf on one side and a variegated set of leaves on the other side. The small side shoot on the green side was also green, on the other side the side shoot was the same as the variegated leaves. This season we intend cutting this bulb in halves and will endeavor to propagate the variegated section.

Propagation. We would like to take this opportunity in CONGRATULATING AND OFFERING OUR SINCERE THANKS to the various growers who were good enough to elaborate on their very interesting experiences in the propagation of named varieties of *Amaryllis* hybrids. Strange as it may seem, although our experiences were rather crude in comparison they were remarkably similar. A thin square prong digging fork was used in the lifting of some of our selected numbered seedlings and through a mishap the fork cut one of these in halves. Being a variety of great value for breeding purposes, I planted the two halves, trusting that life would still exist in one of the halves. I was greatly surprised to notice that two small bulbs formed on each half and later developed into four full sized bulbs. To me this was a revelation and quite naturally I set about trying various methods with a view of quickly propagating any selected seedling. A pure white was used in our first experiment. This was cut perpendicularly from top to bottom into 8 equal pieces, but through an excess of moisture we lost the lot. Another bulb that I used in my second experiment was an outstanding fiery scarlet self, No. 43. This particular bulb was cut up the same way as the white one but under dryer conditions, and eventually produced just on 50 small bulbs. I tried out quite a number of methods, but the one that appears to be the safest and at the same time, gives the most satisfactory results, is to select a bulb with only the root growth in the ground. The top $\frac{1}{2}$ portion of the bulb is cut off, or in other words, the bulb is cut horizontally in halves. The top section is naturally discarded as useless, but the bottom half is then cut perpendicularly into approximately 20 pieces. Do not cut right through the basal plate and endeavor not to disturb the old root growth. As the small bulbs develop and show signs of developing a small root growth of their own, these bulblets are cut off with a very sharp knife, the wound is allowed to heal in the shade, and is then planted in a propagating frame. Several weeks later found a further batch of bulbs forming, and they in turn were treated the same way as their predecessors. After taking off four such crops the last fourteen were allowed to develop on the plant and in 12 months were $1\frac{1}{2}$ " across. The small bulbs were transplanted, flowered two years later. We however, found it necessary to do this in the beginning of September (spring) just prior to the time when our bulbs come out of their dormant stage and start into their new season's growth.

Growing Conditions. Perhaps at this juncture it may be of some interest, to the readers of this article, to read about the exact treatment we give our entire crop. We will start just prior to the dormant stage. During June, we find it necessary to send our plants under glass dormant, the leaves are cut back, to within 6" of the neck of the bulb and when the sap recedes this is then cut back again hard into the neck of the bulb. The soil is slightly moist and is cultivated. Two weeks later we dust the whole planting with lime mixed with black leaf 40 known in Australia as Nico Dust. The idea of the black leaf 40 is to kill any mealey bug or aphid that may have attacked the plant and the lime to kill any slugs or snails that may have found their way into the glasshouses.

Towards the end of July the lime is cultivated into the ground and

a slight watering given. As soon as possible the ground is again cultivated and the plants allowed to stand until they show signs of again coming into active growth. A dressing of dried blood meal is then given at the rate of 160 lbs. to each 5,000 plants. The area can be easily calculated as our plants are grown in rows 6" apart and 6" in between each plant in the rows, thus giving each plant 6" square to develop. Before watering in we consider it imperative to cultivate the dusting of blood meal into the top soil so that each plant has a reasonable chance of receiving the same amount of benefit. Watering at this stage is on the heavy side and it is naturally increased during the flowering period. When the seed has been harvested the flower stems are all cut off, and the



Fig. 18. *xAmaryllis* cl. Both #6, orange red self, deeper throat, 10½-inch diameter.

ground again hoed. During December we again give a slight blood meal dressing approximately half the quantity of the previous one. The plants are watered on an average of once a fortnight and are thus kept going right up to the next season's dormant stage. We are great believers in this December blood meal dressing,—the leaves appear to grow out of all proportions, and at times are up to 4'-6" long, and in cases 4" and even wider. It is remarkable just how these 4'-6" leafed plants produce the tall flower stems the following season. Our tallest measuring 4'-3" from ground level to the top of flower head.

To date we have not finalized on any definite method of commer-

cially propagating in any outstanding seedling with a view of eventually naming these and placing them on the market. All our stock offered for sale are grown from seed. We were rather surprised to notice the poor germination reported by some growers after a period of approximately 3 months after harvesting. Should we have a surplus of special crosses at the end of any season these are kept until the beginning of the next season and planted with the next season's crop. Two years ago we had rather a heavy carry over and took particular notice just how the previous season's seed germinated. In quite a number of instances there was a better germination than from the fresh seed, although we must admit that the germination was poor in the very delicate pink crosses. When harvesting our crops of seed we earmark any valuable crosses. As soon as sufficiently dry these are planted singularly in thumb pots (1½" diam.); approximately 3 months later they are then transplanted into 2½" pots where they remain until they become rootbound, when they are again transferred to a 4" pot and allowed to develop into approximately an 1¼" bulb. Specially prepared beds are then awaiting these bulbs. Approximately 15 months later the first then begin to flower but are at their best the following season. Our reason for going to this extra amount of trouble is that if the very small plants are planted direct into the beds quite a number of the weaker plants do not bloom, whereas in this instance very few do not flower before the 3rd or 4th year when the picked seedlings are transplanted into fresh beds and the remainder commercialized. In preparing a bed for planting we remove approximately 18" of soil, in each 6' there is a bore sunk down to the marl and filled with cinders. The cinders also cover the bottom 6" of the bed. On top of this we put 12" of specially prepared soil. This is composed of equal parts of leaf mould, garden loam, Mount Gambier Volcanic Soil, which in appearance is very similar to black peat, and one part of either shell-grit or lime mortar and sand. The component parts are thoroughly mixed before being transferred to the glasshouse. The seed of the ordinary selected crosses are planted up in beds with the seeds just touching in the rows and the rows 1" apart. Approximately 3 months later these are transferred out in the open into beds 180' long by 14'-6" wide. These are in reality glasshouses with sides only and when the plants are 2 years old are covered with a glass roof, so that the plants are protected when they come into bloom.

As each crop is lifted out of these glasshouses the glass roof is transferred to the adjoining plots, which are also with the exact same size with posts also identically spaced. We also have six 50-ft. glasshouses where the extra selected crosses are tested. These are under glass continually. All the extra selected marked seedlings eventually find their way to our display house. This glasshouse is approximately 106' long by 25' wide. The roof is a huge leanto and the beds inside are raised in such a manner that they follow the slant of the roof. Perhaps more explicitly explained when I use the terms we so often hear, that when the bulbs are dormant, it resembles a stadium. Only the very best and most outstanding colors, shapes and sizes find their way into this glasshouse, and it is from these that we make our selected and extra selected crosses.

Quite a number of times when we find an improvement in our other

glasshouses amongst the seedling patches we pick these flowers and place them in bottles so that the stem is approximately $\frac{1}{2}$ " away from the water level. Whatever space there may be between the stem and the neck of the bottle, we pack with dry wadding. These flowers apparently develop normally, and in most instances will even set seed if pollinated, and the pollen is then naturally used with a view of further improving that particular color. Should slugs or snails find their way into this house and damage any stems, they are also picked and transferred to bottles until the seed is harvested.

In Australia there is no recognized *Amaryllis* society but we do claim that in South Australia, even without a society, we have a wonderful bunch of *Amaryllis* hybrid enthusiasts and admirers. Many hundreds and perhaps I would not be exaggerating in saying that many thousands call each year to admire the blooms in our display glasshouse.

There are many hundreds of enthusiasts who grow the *Amaryllis* hybrids, both under glass and also in the open in South Australia. But I would feel somewhat amiss if I did not at least mention about 10 who have gone past the stage of being enthusiasts, and are in reality *Amaryllis* hybrids fiends. Heading this list would undoubtedly be Bruce Hudd, the man who has made so many criminals squirm with his uncanny knack of being able to trace fingerprints. He is the fingerprints expert in our State's C.I.B. and is undoubtedly an outstanding specialist in this particular department. Huddy's experiences on *Amaryllis* hybrids goes back many years and he has often related just how these were grown 30 years ago. He was rather surprised to see us blooming our extra selected seedlings in 18 months, and often moans the time he wasted trying to get flowering results in 4 to 5 years. He has taken a very keen interest in each new color that has appeared. He is a strong believer in a perfect evenly balanced round flower and often looks with contempt at some of the seedlings which were specially crossed to produce twirled narrow tepalsegs. I had gone to some considerable trouble to produce a flower similar to the red *Sprekelia* in the various shades, and as each of these eventuated it would be amusing to see the look of disgust on his face as he viewed the so-called mongrels and yet those eyes would sparkle with pride as he would view any improvement in a perfect circular bloom.

Charlie Gilbert, also one of the old brigade, and still a great lover and grower of our beautiful flower, grew considerable quantities in practically pure sand and it was remarkable the wonderful results he achieved under these poor conditions. Charlie is also still one of our annual visitors. Bob Paterson finds a great pleasure in his retired life in growing Cyclamen during the winter and to finish up his display in his beautiful glass house with *Amaryllis* hybrids. Strange as it may seem, the same two flowers are grown and admired by Hugh Price, Reg. Leahy, Alb. Lindsey, Len Bevan and Vic Stephens. Whereas with Tom Jolly and Perce Sampson they believe in intermingling their *Amaryllis* hybrids with Delphinium. The writer, whilst also being a great admirer of Delphinium, has a very great sneaking regard for Cyclamen. I feel quite confident in making a claim that although we have no society, no better feeling could exist than that amongst this wonderful group of *Amaryllis* hybrid enthusiasts in South Australia.

In conclusion I would like to take this opportunity in offering my best "Amaryllis Hybridia" Greetings to all lovers of this kind of all flowers, and do sincerely trust that their 1949-50 display will be their best yet.

To fellow hybridists may your success be treblefold, and may that evasive yellow and blue *Amaryllis* hybrid be a reality in the near future.
*Box 1091-J, G. P. O.,
 Adelaide, South Australia*

HEMEROCALLIS BREEDING—THE HURST BAND SYSTEM

GRAFTON W. SHULTS, *Maryland*

Detailed by Lewis A. Hurst in *HERBERTIA* 1947 is the answer to the backyard Daylily Hybridizer's prayer.

How would you like to grow, in a plot 6' x 60', 8,400 seedlings instead of 1,440? You say—"It can't be done!"

That's what *I* thought. Even when I saw the plan in operation last summer with thousands of lilies blooming in one-third of an acre in their original seed-bed and no weeds because the twelve inch centers from band to band shaded them out; I still said—"I don't believe it!"

The idea fascinated me and I went back later in the season just to see the plants, because the peak bloom was past.

Then this fall (1948) when I plotted the bands on paper and estimated my potential yield, I again said "No, it can't be,—let me read that thing again!" It's too simple, and that's why you just can't accept it until you work it out as I did.

In the spring of 1948 I rented a garage on a nearby lot 100' x 150' with permission to fence and garden. I planned a series of 6' x 60' raised beds with 12" walkways lengthwise through the center. I had sufficient seedlings from the conventional seed box to set 1,440 plants on 5" centers. I thought I had something—1,440 selected crosses from eight different HEM-BUGS!

This fall (1948) I used another of the 6' x 60' spaces, dividing into 8 individual 6' squares with a 20" walkway separating each (all soil having been removed from the 20" x 6' walkway, and stone-and-ash-fill substituted).

Each of the eight 6' x 6' plots accommodates six 2" x 6' Hurst Bands on 12" centers. Each Hurst Band accepts one level (chef's) tablespoonful, or approximately 175 seeds.

Therefore 8 plots x 6 Hurst Bands x 175 seeds per band = 5,250 potential seedlings, representing thirteen hybridizers—all in the same sized area which produced 1,440 on 5" centers the previous season.

Remember, you will enjoy earlier blooms, too, induced by the simulated pot-bound root condition assisted, of course, with good old 5-10-5.

All the above, plus no transplanting (except the "Selects" as they bloom)—and a minimum of weeding is your gift from Lewis and America Hurst. A delightful contribution to the HEMEROCALLIS devotee.

4. AMARYLLID CULTURE

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

DAYLILIES IN AUSTRALIA

FRED M. DANKS, *Corresponding Fellow,*
Victoria, Australia

It may seem strange that after some years of experience with day-lilies in Australia there is little to tell of results, but until a comparison with named clones can be made, the seedlings we have cannot be rated at all. Good friends have recently provided the named American clones for comparison but minor mistakes in handling have delayed satisfactory flowers so far.

The first lot received were put in pots so that they could be handled with care and sheltered from undue heat. A few bloomed poorly, and then in the transfer to permanent positions—delayed a little through pressure of other tasks—a further set-back was experienced. A second batch was put right into the permanent position in beds, but they arrived a little late so it is a matter of awaiting this year's (1949-1950) flowers to see them at their best.

This does raise the question as to the best time to ship plants, but the ease with which they survived a protracted journey when sent in the fall season is a factor we cannot lightly pass over. It seems that any sizable piece (ramet) will stand three months out of the ground and still have the life within to start again even in strange surroundings to meet severe heat so soon. Small ramets, under the conditions of the experiments, will give leaf growth but they fail to make any roots and eventually die. Such small ramets could apparently be sent by air mail and grow satisfactorily. Surface mails suffer delays that seem hard to account for since the three weeks of ocean travel is the main part of the journey but to date there is usually a three months' period before delivery with quarantine and other inspections added.

Among an expanding collection of seedlings, there are many that attract, but from day to day these may vary somewhat in color and shape due to the climate. We get extremes with high temperature alternating with cold "snaps." They undoubtedly have a place in our garden displays for they survive long dry times and flower freely with a minimum of care.

At this writing (August, 1949) it can be said that soon now flowers will show and later reports will tell of the successes. It will also give the opportunity for us to compare our seedlings with American named clones. At present commercial possibilities are limited for gardeners look upon *Hemerocallis* with doubts, and are not educated to distinguish between hybrids and the older types. In due time this discernment may come. I will see to it that the more important nurserymen get propagation stock as soon as possible.

I have always sown seeds in the spring fearing the loss of the types

that died down in winter if sown in autumn. However, it is possible to put them in immediately on gathering and some could be hurried along to give flowers the first spring.

It will be many a day before we have all of the named clones that you enjoy, and a long time before the public is educated to demand them. We have so much to enjoy and can grow most flowers so that competition is keen and fashion often rigid. Perhaps *Hemerocallis* will eventually make a place for themselves in Australian gardens.

DISTANT SHIPPING OF DAYLILIES

GEORGE GILMER, *Virginia*

In August 1947 and August 1948 I shipped daylilies to Mr. Fred M. Danks in Australia. There were twelve roots in one shipment and twenty in another. They were shipped by ordinary parcel post. There were between two and three months from date of shipment to date of arrival. All of the plants survived shipment across the Equator.

The plants were carefully dug, thoroughly washed, and dried in the sun until there was no appearance of moisture on the outside of the roots. The tops were cut back to one or two inches of the point where the roots came out. One year the short roots were cut back to two or three inches. The other year they were left normal length. No difference was reported. Each individual root was wrapped in paper. They were then tightly wrapped with no provision for ventilation.

I selected August for shipment because the plants were fairly mature at that time and they should arrive early enough in Australia to have a fair growing season.

I prefer to ship and receive plants packed damp if the distance is short, but if the weather is hot and humid I have had some losses from damp shipments where they were only going part of the way across the United States. If they are packed for a long or hot trip, unless they are dry, they have a tendency to rot and become soft.

NEW DAYLILIES

PHILIP G. CORLISS, *M.D., Somerton, Arizona*

None but Superman himself could "snatch a peek" in one season of all the new Daylilies our hybridizers are producing for our future garden pleasure. I was fortunate during the summer of 1948 to visit some of our prominent growers in the northern tier, and I hope my report will be of interest to you.

First I visited the Milliken Gardens in Arcadia, California. The famous Iris exhibition garden is directly across Highway #66 (where you get your kicks) from the Santa Anita race track. Mr. Milliken took us, however, to the larger field where his *Hemerocallis* were blooming. Here was his 1948 introduction, GARNET ROBE, which I have elsewhere described as the best new daylily I saw in 1948. Mr. Milliken says in his catalog, "We do not have nor have we seen, any other *Hemerocallis* in the dark tones to challenge it"—and that is a masterpiece of understatement.

ment! There are brighter reds, and darker ones, but none like GARNET ROBE!

Two other fine reds were offered by Mr. Milliken this year. Both were more brick red. POMPEIAN RED is 2½ feet tall, has a light throat, and is more on the orange side than RED ROCK CANYON, which is four feet tall, also with a light throat. TAMARA and PARTY GOWN are fine bicolors. The dark color in the petal of PARTY GOWN does not extend far towards the throat. COLONIAL DAME and RUFFLED PINAFORE are excellent apricots. CATHEDRAL TOWERS has a very large brown eye marking on the petals. All of Mr. Milliken's flowers have medium-large to large flowers of heavy substance. Two months later I visited the Milliken Gardens again and saw some fine seedlings. Mr. Milliken was quite noncommittal about them, so I feel he has some even finer ones under cover and coming up.

I felt particularly fortunate in being able to visit with Dr. Stout both at the New York Botanical Gardens and at his suburban home with his charming wife. Dr. Stout is reticent about his unnamed seedlings, but he kindly showed me one of his new doubles. He says there is no Kwanso blood in these doubles. Alas, he told me it will be perhaps ten years before he will be satisfied with these doubles and designate some for introduction. I think most *Hemerocallis* fans understand the arrangement by which all of the Stout hybrids are introduced by the Farr Nursery at never more than three dollars. This arrangement necessitates delay while a large stock is grown. Every daylily that Dr. Stout introduces has been thoroughly tested, and is the best of its type. I recommend a visit to the Farr Nursery for a view of Dr. Stout's wonderful new daylilies. In deference to his wishes, I am not even going to tell you about some of the new things that are almost ready for release. But they are there, and they will be ready for our gardens one of these days, and when they are, remember that I told you!

During June and July I was able to visit the Fairmount Gardens nearly every day for five weeks. I saw all of Mrs. Nesmith's 1948 introductions except the three late ones—EBONY BOY (dwarf red-purple), FAIRY LUSTRE (yellow) and MME. RECAMIER (pink). My favorite was WINDSOR TAN, a bicolor of tan and buff. The flowers are large and full, about the size of BOLD COURTIER, but not so tall. BALTIMORE BELLE and PYGMALION are fine pastels. BURNT ORANGE and GAY ROMNNY are brilliant and striking, and THUNDERHEAD is the new dark one.

Two of the most striking flowers in the garden were seedlings of Geddes Douglas, which Mrs. Nesmith will introduce this year or next. One is a very large true red with a green throat. The size and intensity of the color make it outstanding. The other is a large pink. It is much larger than ROSALIND, and heavier in substance, and has been named PINK RADIANCE. I was able to study and photograph the following 1948 introductions of Mrs. Nesmith:

PINK PETTICOATS has a medium-large flower of rosy pink. The petals and sepals are extremely recurved and both are creped. There are prominent darker veins in the petals, and a heavy cream midrib. The small throat is the same shade as the midrib, with a green center.

GAY HEART is a large (6½") star-shaped pink flower with flaring and somewhat recurved petals and sepals. The petals are crinkled and have a bright yellow midrib. The sepals have a yellow center stripe running into a throat of the same color. The flower is over four feet tall.

AMBER LUSTRE is an outstanding new flower in the apricot shade. The sepals are recurved. The petals are very wide and have a creped cream border and midrib. The flower is unusually large and flaring. It has a darker halo. The cinnamon overlay looks as though it had been painted on in narrow stripes, and the center is a brilliant gold. Four feet tall.

CANYON PURPLE is larger than most of the purple flowers (6"). It is a full and open flower with a green throat. The tips of the sepals have a slight twist, and both sepals and petals are slightly fluted.

TWILIGHT TRYST is a fine new member of the evening bloomer class. It is light yellow with a dark narrow halo on the petals. The flower has heavy substance, is tall, large, well-branched, and slightly ruffled.

BONNY RUFFLES is another evening bloomer. It is a yellow self, with very ruffled petals and sepals.

PINK PRELUDE marks what Mrs. Nesmith believes is her greatest advance toward the true pink. It is a self except for a lighter midrib on the petals. The flower is not very tall (two and a half feet) but is remarkably beautiful, with a fullness that is not coarse, and a delicate creping.

Other fine Nesmith introductions for 1949 are: TALLYHO (vermillion), DANCING FIRE (red, with yellow cup), SORRENTO (large wine red), WOOD NYMPH (dark wine, green throat, lily shape), KENTUCKY CARDINAL (rich red, yellow touches), GUIDING LIGHT (nice yellow), PINK LOTUS (large coral-pink, star-shaped), CARVED IVORY (extremely light self) and PIRATE TREASURE (recurving orange with darker veins). Doesn't Mrs. Nesmith get the most wonderful names? Mrs. Nesmith is particularly interested in the melon shades, and has many fine seedlings which she is watching. When they are introduced, they will have to meet her rigid requirements for growth and branching.

The new creations of our other hybridists I have not yet seen. I have been in correspondence with Prof. Saxton, Wyndham Hayward, Dr. Traub, Mr. R. W. Wheeler and Mrs. Bright Taylor. I have seen pictures of the 1949 Saxton and Wheeler introductions, and several of them are thriving in my own Arizona garden now. What else they, and the many other fine hybridizers whom I do not yet know, have in store for us, I cannot say, but I am certain they have many fine new things. Aren't we lucky?

EUSTEPHIEAE AND EUCHARDIDEAE

LEN WOELFLE, *Ohio*

Almost everyone, young or old, rich or poor, is familiar to some degree with the *Narcissus*: The never-failing showiness of the Paper White during the long drab winter months when our gardens are particularly lacking in blossoms; the fragrant Jonquil, a perennial standby; the classic beauty of the Trumpet Daffodils, glowing golden "King Alfred," the madonna-like pure whiteness of "Beersheeba," and the striking apricot-pink of "Mrs. Backhouse." All these add more than a little to the satisfaction we obtain from our gardens.

But how many of us know the stately splendor of *Ismene calathina*, the tall, graceful *Elisena*, the beautiful foliage and many flowered umbels of the deliciously scented *Hymenocallis*? How many of us are aware that a group of relatives of the *Narcissus*, containing approximately a dozen genera and in the neighborhood of a hundred species, almost encircle the globe in a belt some three thousand miles wide, matching in stateliness the finest lilies and containing all the hues of the rainbow? All are pre-eminently beautiful and almost all of such simple needs that any of us can grow them successfully, if only we know their simple requirements and supply them.

The genus *Pancratium*, from the Mediterranean and the Canary Islands, give us three species, *canariense* and *maritimum*, which are pure white, and *illyricum*, which has a creamy or yellowish cast. These may be grown in pots, or in the garden, where they bloom during the summer. The long, glaucous foliage of *maritimum*, however, is persistent, and this species is best if kept in slow growth in pots over winter in a light, cool basement or greenhouse. It may also be dried off and stored in sand, soil or other material like the other species, but is perhaps the better for being kept in growth.

The genus *Hymenocallis* has a much greater range than *Pancratium* and is found in Senegambia in Africa, the islands of the Caribbean, Northeastern South America, Florida and the Carolinas, Texas and Mexico.

Hymenocallis Harrisiana has two or three dainty pure white blossoms on a round scape about twelve inches high. It does well in the garden or may be grown in pots. It should have complete rest in winter and may be stored dry if kept warm, in a temperature 55 to 70 degrees. It comes from Mexico and is supposedly hardy to Philadelphia.

Hymenocallis occidentalis, a native species, is deciduous, and nearly hardy like *Harrisiana*. It has many small-cupped pure white blooms in summer. This is best if potted over winter, watered only sparingly to preserve the root system.

Hymenocallis macrostephana, "large crowned *Hymenocallis*," is a supposed cross of *H. speciosa* and *Ismene calathina*. It is evergreen and bears up to ten large white cupped blooms, 2" wide and about as deep. It is perhaps best grown in pots, but the writer has stored one bulb of this completely dry in peat moss the past winter, without any apparent damage to the bulb.

Hymenocallis rotata is another native species, suitable for garden growing. Five to eight blooms in summer. This may be stored dry in sand, soil or peat over winter, but better if potted in fall. It may also be grown in pots.

Hymenocallis senegambica has only been grown by the writer in pots, but indications are that it may be grown in the garden, as its behavior in pots is not unlike *Rotata*. It has long, very narrow, dark green foliage and six to eight pure white blooms in late summer. I think this one is exceptionally good. It is the only species from Africa.

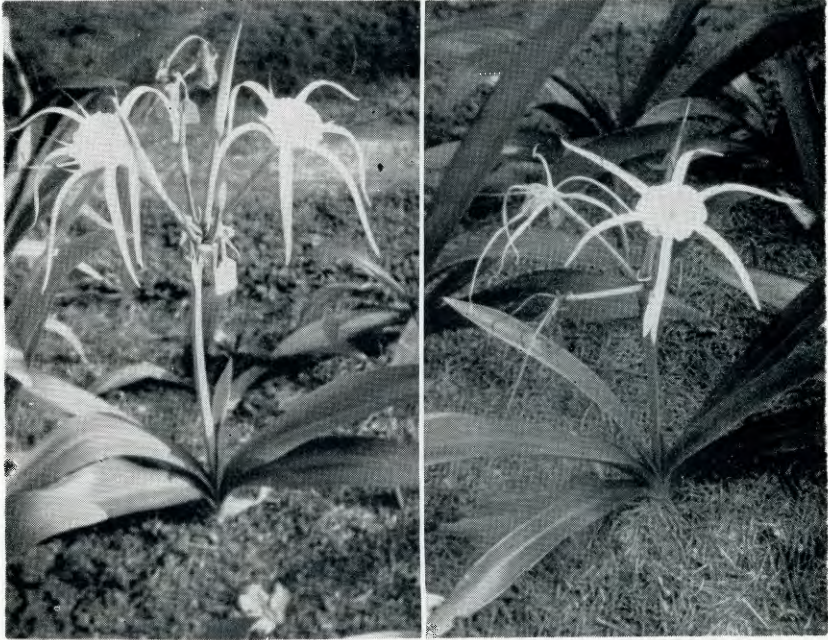


Fig. 19. Left, *Hymenocallis rotata*, and right, *Hymenocallis tenuiflora*. Photos by Len Woelfle.

Hymenocallis speciosa is a large plant, with somewhat oval leaves and up to twenty very fragrant blooms, pure white, with a cup about $1\frac{1}{2}$ " wide and as deep. This is evergreen and blooms in late winter in pots. It is from the West Indies and is considered the most showy in bloom.

Hymenocallis tenuiflora from South America is very similar to *Rotata* in growth and habits. Treat as *rotata*.

The writer also has three unidentified species or varieties of these plants, one similar to *speciosa*, one similar to *rotata* and the other entirely different from any he has ever seen. I hope with future experience to place these.

xHymenocallis cl. *Daphne*. I have not yet had the pleasure of blooming this one. It is a hybrid of *Ismene calathina* and *Hymenocallis speciosa* originated by Van Tubergen of Holland in attempting to duplicate *H. macrostephana*. It is a beautiful evergreen plant, with foliage more like *Ismene calathina*, and according to the originators carries many large, pure white blooms. It should be kept on the dry side during winter to promote spring flowering.

The genus *Ismene* is native to Peru and consists of about four species known to date. All bloom in spring if planted in the garden toward the end of May. All are very stately plants and require identical treatment. For best results they should be dug the early part of October or after the first light frosts and stored warm and dry over winter, 55 to 70 degrees. They may also be grown in pots, started into growth about March and are said to bloom in May. I have never tried this, and I think I should prefer to grow them in the garden, giving them treatment as above. In any event since they grow so vigorously I believe they would be better if planted out of pots into the garden in May or June to renew their bulbs.

Ismene Amancaes, the sacred Amancaes of the Peruvians, has deep golden yellow flowers in June. This is very rare in cultivation, but available. It is one of the parents of the hybrid Sulphur Queen. It has narrow yellowish foliage.

Ismene calathina (see Fig. 208 in 1948 HERBERTIA), the giant Peruvian Daffodil, has beautiful white cups about three inches long and almost as wide, the pure white lobes fringed or torn like shredded tissue. Green keels and bears from two to five blooms soon after planting in the garden. It is very easy to grow and bloom and a good multiplier. The other parent of the hybrid Sulphur Queen. It has large rich green foliage.

Ismene Macleana is a fairly rare species with flowers like *Calathina*, but slightly smaller. The foliage is like that of *Amancaes*. Although this has smaller bulbs than *Calathina* it is a very vigorous plant and a prolific multiplier. The scape is about 18" tall like *Calathina*, but the smaller blooms are more adaptable for arrangements.

xIsmene cl. *Festalis* is an elegant pure white hybrid of *Ismene calathina* and *Elisena longipetala*. This is more graceful than *Calathina* and scapes may go to 36".

xIsmene cl. *Olympia* is a supposed cross of *I. calathina* and *I. cl. Sulphur Queen*. This is our largest *Ismene*. Cream to pale yellow.

xIsmene cl. *Sulphur Queen*. This hybrid between *I. calathina* and *I. Amancaes*, I consider one of the most beautiful plants I have ever seen in bloom. The scape is slightly shorter than *calathina*, but the foliage is somewhat broader and has a yellowish color like *Amancaes*. The cup is about as large as *calathina*, but has rounded lobes only slightly recurved. It has green stripes in the cup like *calathina*, but opens a fairly deep yellow and gradually pales through primrose and cream to almost white in bright sunlight. This should be a "must" in every garden.

Southern readers will note a particular lack of cultural information in the foregoing article for their locale. However, *Pancratium*, except perhaps *canariensis*; *Hymenocallis* except *Macrostephana*, *speciosa*, *Sene-gambica*, and the Hybrid *Daphne*; and *Ismenes* except perhaps *Aman-*

caes, should be hardy where the frost does not penetrate more than an inch or two below the surface and will not reach the bulbs. Since I do not yet have the surplus bulbs to experiment with here, I cannot give the degree of hardiness with authority. To be safe they could handle all as tender bulbs until hardiness is proven.

Cincinnati is approximately on the 39th latitude. Our minimum recorded winter temperature is minus 17 degrees. Temperatures of zero or a few degrees below are not unusual. If these plants will stand the severity of our inland winters and bloom, we may some day see a new race of beautiful hybrids in this group, suitable for growth all over the United States. We know many species will endure some frost, but just



Fig. 20. Left, *Hymenocallis macrostephana*, and right, *Pancratium maritimum*. Photos by Len Woelfle.

how much, we don't know. Perhaps as they become more widely grown, this information will become apparent. In any event, those interested growers who have surplus bulbs which they are willing to chance losing, might do future generations of Americans a favor by making some of their bulbs martyrs to the cause.

All the plants listed in this article and many other rarer, related species are available from scattered growers in this country and at least one importer.

After growing these plants for a number of years, I cannot recommend them too highly to anyone interested in grand flowers with an exotic fragrance. The *Ismene* group is particularly easy. They will grow in any soil that will support the Gladiolus and require only five minutes or so spring and fall to plant them and dig them. They may be thrown into a paper bag over winter and if kept warm they will pay better dividends than any group of plants I know. They seem to be free of disease and as most of them bloom in the spring even the thrips do not get them.

They thrive in full sunlight and will stand partial shade, and as a specimen plant in the border, the foliage after the blooms are gone will stand with the finest the border has to offer. If you want something different, something grand, that will cause a stir of excitement in your garden try them. Given decent treatment they will give you life-long enjoyment. And in a few years you will be able to pass along a few of the bulbs to your friends. I could not think of a finer gift to a gardener than a collection of *Ismenes*.

For those garden enthusiasts who like to experiment with hybridizing, I believe this is the most fertile field today. Many of the species are fertile at least to their own pollen and further experimentation might develop some interesting variations. The process is slow, but the technique is simple. You won't get hundreds of seeds from one cross and much could be done with little space. Mature plants require, generally, about a square foot of space. I plant mine a foot apart in the garden and they seem to have ample room.

For you who have never grown any of these plants, try them. I assure you you'll be delighted, and if you are a serious gardener, you'll be forever thankful that you have taken that step. You'll never tire of them.

For you oldsters at the game who are familiar with this group, I know you are contented with them, but I would suggest trying some of the newer or different species available today. Dig up your old suppliers and see what they have to offer. It's a safe bet you've overlooked something good.

GROWING ALSTROEMERIAS FOR THE MARKET

BRUCE HINMAN, *Illinois*

Some five years ago we began growing *Alstroemerias*, chiefly from seeds and roots sent us by Harry Stinson. Since that time we have experimented with most of the *Alstroemeria* species and varieties which are available in this country. This article, however, describes mainly our experience with the two varieties of *A. pelegrina*, and particularly our efforts to sell these flowers to florists for use in corsages and wedding bouquets.

During our first two *Alstroemeria* seasons we sold our few surplus flowers to consumers for table decoration. I had read Harry Stinson's article in the 1942 *HERBERTIA*, and I had seen the picture of Mrs. and Miss Stinson wearing *Alstroemeria* corsages, but at that time I just wasn't corsage-minded. But shortly after our third season opened, one of our flower customers took some of our white *pelegrinas* to her florist and asked him to make them into a corsage. She was well pleased with the result, and so was the florist. He became the first of our present list of trade customers, numbering now about 25 florists.

Our operations are not on a large scale, and possibly never will be. We have only a small greenhouse, with perhaps 350 square feet of bed space. However, this area can produce a considerable number of corsage flowers, since we cut the individual blooms only, leaving all the buds to come along later.

The first year that we sold *Alstroemeria pelegrina* to florists in this way, we had only half a dozen customers. Last year we increased this number to ten, and this season—just over on July 1st—we finished with 25. During the same three years we have gradually increased our *A. pelegrina* production until there is very little space left for further expansion.

We had to go out after most of our customers, for florists in general are not in a hurry to try something new in the way of flowers. This characteristic was well demonstrated this season when, for an experiment, we tried to sell some surplus flowers through a prominent Chicago wholesaler. Out of ten medium-sized boxes of pelegrinas, not a single box was sold during a full market day, although many florists saw the flowers displayed. On the second morning I telephoned the wholesaler to give away the ten boxes as samples to ten clients who might be good prospects. He did this, but no one of these trial prospects came back for more, or seemed more than mildly interested.

I had had a similar experience with the Chicago wholesale market during the first year of our attempt to put *A. pelegrina* on sale as a corsage flower. This second trial only proved more conclusively that, for us at least, other ways of getting new *Alstroemeria* customers were better.

Our best way so far has been to take the flowers personally to our prospect, when this is practicable. Our earliest customers were sold this way. In almost all cases we have given away a trial lot of 3 dozen flowers as a starter. If the florist is at all interested in something new for his trade, it is not really hard to get him to try a flower as attractive as either of the two pelegrina varieties, especially if they are free.

This year we added the method of sending trial lots to well known florists in several large cities, chiefly between us (Northern Illinois) and the east coast. These shipments went by air parcel post, special delivery, and in most cases were delivered within 24 hours after mailing. They went to such places as Cincinnati, Toledo, St. Louis, Minneapolis, Boston, and others. We got several new customers by this method, although in some other cases we didn't get any reply at all. However, I feel reasonably sure that some of the florists who made no response may still become *Alstroemeria*-conscious after another experience or two. Furthermore, we did get enough customers in distant cities to give our packing method a good preliminary test.

Concerning the packing, we cut these single flowers on 1½-inch stems and put them at once in the refrigerator at 40 to 45 degrees F. The storage vessel is a shallow pan provided with a wire tray of ½-inch mesh. The flower stems dip in water through the wire meshes. After 12 hours or more of this hardening process, the pelegrinas can be packed. We don't yet know the best method, but to date the most successful way has been to pack in cartons 3½ inches deep, with enough partitions to insure against shifting of the box contents. A 2-inch layer of shredded waxed paper (orchid straw) is put in each partitioned space. The short flower stems are inserted vertically in this paper, with rather close spacing. We then mist the flowers heavily with water, and cover them with a half-inch layer of the same shredded paper. The flowers themselves are very light and the paper is very light. Unless someone is extraordinarily careless in

handling the package, the flowers get to their address in good shape, usually in 24 hours or less. At the other end, the florist puts them at once in the icebox in some sort of storage tray such as I have described.

When the flowers are handled in this way, they will stay usable a week in the florist's icebox, although they are at their best if used somewhat sooner. We have had some remarkable experiences reported in which the ultimate consumer has worn an *Alstroemeria* corsage three or more times at intervals of a day or two. In such cases, of course, the wearer needs to give the corsage a little extra care, keeping it in her icebox between times in a closed cellophane bag, plentifully sprinkled with water. But it can be done, and nothing seems to endear a corsage more to a woman than its capacity to outlive more than just one wearing.

We sell these pelegrinas at from \$1.50 to \$2.00 per dozen individual flowers, depending upon whether the sale is local or involves shipping, with the attendant expense of air postage and special delivery. At these prices the flowers are able to complete on favorable terms with most of the florists' present-day standbys, and their novelty is much in their favor. However, to sell them to the consumer sometimes requires a little extra interest on the part of the retail florist, and some florists just don't want to take the trouble.

Both pelegrina varieties behave admirably when used for personal wear, but the white kind is perhaps a 5 to 1 favorite over the type variety because of the greater adaptability of its coloring. It can be used with more different costumes. However, with the right person and the right dress, no orchid is more handsome than a well-made corsage of *A. pelegrina* (type).

Another circumstance which makes *A. pelegrina alba* the more useful is its great suitability for wedding bouquets. It is a fine wedding flower, as one of our local florists would surely tell you. During the last three years she has used it in more than fifty weddings.

We have run into a number of cultural difficulties, but perhaps those had better wait for some later discussion. Corsage and wedding flowers must be more nearly perfect than those used in ordinary bouquets, and we have had some trouble in holding the quality up to standard. *Alstroemeria pelegrina* grows well in a cool greenhouse, and is highly productive, but there seem to be some definite upper limits for temperature and humidity if the best flowers are to be had. We haven't got all this worked out yet, but we think it can be managed eventually.

EDITORIAL NOTE.—Mr. Bruce Hinman (Address: Geneva, Ill.) would like to correspond with persons who could direct him to new sources of *Alstroemeria* material.

Mr. Hinman also writes that he has offered in the florists' trade *A. violacea*, *A. chilensis*, *A. tricolor*, *A. psittacina*, and others, but that these were not as favorably received as *A. pelegrina alba*.

COWPEAS—A COVER CROP FOR NARCISSUS PLANTINGS

J. S. COOLEY, *Maryland*

In earlier issues of *HERBERTIA* the writer has discussed the use of cowpeas as a cover crop for narcissus plantings. In Figure 21 the effect on chickweed if cowpeas or no cowpeas are grown is shown. The narcissus bed shown in the upper part of the picture (above the middle stake) had



Fig. 21. Cowpeas cover crop for *Narcissus*—Upper bed, not cover-cropped to cowpeas, with abundant chickweed; lower bed, cover-cropped to cowpeas in previous season, shows no chickweed. Note that later variety in upper bed shows few blossoms as yet.

no cowpeas for cover crop and when cool fall weather came there appeared a thick stand of young chickweed seedling. In the bed shown in the lower part of the picture cowpeas were sowed as soon as the narcissus bulbs were planted, which was early in July. The thick growth of cowpeas, which lasted till the frost killed the vines in October, prevented

germination and growth of chickweed. The remains of the cowpea vines show in the picture.

The cowpeas not only made unnecessary the laborious task of cleaning out the chickweed, but also helped to enrich the soil by the addition of humus from the decaying leaves, stems and roots. The soil was so mellow where the cowpeas grew that it scarcely needed any cultivation until time to sow cowpeas again. In this region narcissus bulbs start root growth before the time when cowpeas vines are killed by frost. It is possible, therefore, that the cowpeas take up plant food that might be used by the narcissus in the early fall. Cowpea vines and roots, however, disintegrate very readily and their constituents are probably available as food for the narcissus bulbs by the time it is needed. Also in practice we have not been able to note that cowpeas have any harmful effect on flower or bulb production.

NOTES ON THE 1949 DAFFODIL SEASON

GRANT E. MITSCH, *Chairman,*
Narcissus Committee, Canby, Oregon

Last year was unprecedented in its lateness, and 1949 came on the scene with promise of excelling its predecessor in tardiness; however, it relented at the last moment and surprised us by ending the Daffodil season at about the usual date. This shortened the blooming period by several weeks and precluded our getting accomplished some of the things we might have otherwise done. Since these notes are written to meet the deadline for publication and are assembled from a faulty memory, they must be sketchy and rather disconnected; but one (the writer at least) never gets to record even in a normal blooming season what he would like to have for reference later.

The winter and spring of 1949 will be remembered as being one of the coldest and driest experienced by residents of Oregon. Here in the Willamette Valley, considerably lower temperatures have been recorded than the ten degree minimum of this year but other cold periods have been of shorter duration. The ground was never entirely free of frost for about seven weeks starting from the first of the year. Some Daffodils were up on January 1st and seed were sprouted at that date but growth was at a standstill from then until past the middle of February. At a time when we ordinarily expect cloudy weather, rain and fog, we had more days of sunshine and more days with snow falling than ever before witnessed here. Precipitation was far below normal and consequently most Daffodils were shorter stemmed than usual.

The weather had moderated only a few days until the blooms of that delightful miniature trumpet species, *N. minimus*, opened on February 25th. This was followed in two weeks by a hybrid from *N. cyclamineus* x cl. Magnificence which preceded February Gold about a week. On March 17th we left for California to view Frank Reinelt's planting which, in common with ours, was much later than normal. Here the

flowers were at the height of their bloom. If Mr. Reinelt had done nothing with Begonias and Delphiniums, I am sure he would soon gain renown as a flower breeder through his work with Daffodils. Unlike many hybridists, he is paying less attention to beauty of form and color than to substance of the flower and vigor of the plant. He is not neglecting the former but giving more attention to attaining the most difficult goals



Fig. 22. Left, *xNarcissus* cl. COTTERTON; right *xNarcissus* seedling (cl. CUSH-
ENDALL x CANTABILE). Photos by Grant E. Mitsch.

first, and numbers of his seedlings testify to the correctness of his methods. Aside from this general plan, he is attempting to develop varieties particularly suited to California climatic conditions. We saw numbers of outstanding things from Polindra crosses, and more recently he has been using Trousseau, Galway and his own seedlings as parents. One seedling of his in particular, Loma Prieta, seems to have the faculty of im-

parting substance to its offspring. Our visit to Mr. Remelt's place was a highlight in the 1949 Daffodil season.

On reaching home a week later we found numerous early flowers opening, most of them being seedlings. Rains coming while we were absent and more light showers the next few days helped the blooms considerably but there was not enough moisture for the best development of the flow-



Fig. 23. *Narcissus* cl. FOGGY DEW. Photo by Grant E. Mitsch.

ers, particularly those planted on light soil. Clearing skies and higher temperatures brought the blooms out with such rapidity that it was impossible to keep pace with them. From the time they got well started, there was no rain, little wind and not much cloudy weather until the very late poets and small crowned leedsiiis were in bloom. There were few hot days but many with warm bright sunshine in which the white flowers

reveled, Kanchenjunga giving huge blooms of finer quality than I had seen before. Cantatrice was nearly perfect as usual, and Coolin was lavish with very large, finely formed, very white blooms. Truth was exceptionally good. Possibly our favorite of all the whites is Ludlow, which has very broadly overlapping perianths of much substance which become very pure white as they age. The huge snowy white Zero is striking as it is one of the first of the big whites to bloom. The immense tall stemmed blooms of Broughshane come a little later than most of the whites and usually get caught by inclement weather but we were permitted to enjoy them more this year. Pearl Harbor remains one of our favorites as a garden flower. Incidentally, we had a number of magnificent huge white seedlings this year from Pearl Harbor x Kanchenjunga. Cotterton (Fig. 22) is a delightful finely finished rather small flower and among other whites looking good this past season were Evening, Carnmoney, Rostov, and Moray. Ludlow has already been mentioned as a great favorite of ours, but going to another section with flowers of entirely different form, we think Chinese White (see HERBERTIA 1947, Plate 290) one of the most lovely of all Daffodils. It does hang its head when first open but it is an exquisitely lovely immaculate flower. Foggy Dew (Fig. 23) and Glen-shane are of somewhat similar character with somewhat more substance but less purity than Chinese White. Then there are Tinsel, Sylvia O'Neill and Moina with colored rims on their chalice. Some of the smaller flowers of the same type are no less lovely, and the enchanting beauty of the green eyed blooms of Cushendall, Frigid, and Polar Sea must be seen to be appreciated. We had three or four most dainty and lovely small green eyed seedlings from Cushendall x Cantabile (Fig. 22). They are so cool and ethereal in appearance as to be almost unreal. For cutting they are unmatched but in a warm room they are as with other Daffodils, all too short lived! If one tires of the larger flowers by the time the season ends, these fairy flowers will renew one's enthusiasm.

Daffodils with pink coloring are among the most intriguing and at the same time among the most unpredictable. Breeding pinks is one of the most fascinating phases of narcissus hybridizing but one fraught with many disappointments and surprises. We are quite amazed to see some varieties which are usually possessed with strong coloring come pale and washed out this year whereas others exhibited more intensity of pinkness than normal. The rather old, and most familiar of the pinks, Mrs. R. O. Backhouse, showed rather more coloring than normal whereas Wild Rose was very faded and not its usual self this year. Heretofore, for depth and clarity of coloring it about topped the list. Even the richly colored Mabel Taylor was hardly as striking as usual although it still drew perhaps more attention than any other of the pinks. Interim, with its wide band of rosy salmon pink, is one of the larger and better formed of this class but was deficient in coloring this year, as were also Lisbreen, Ischia, Rose of Tralee, and several others. On the other hand, Lough Maree displayed much more coloring than before. It is quite a good sized flower and a vigorous grower although not quite so fine in form as one would desire in an exhibition flower. For good size, nice form, and luscious coloring Dawnglow and Rosario excelled all others this year. Per-

haps next to them was a seedling of quite different form having a ruffled very frilly trumpet crown with nice soft pink coloring throughout. It had bloomed twice before but its three blooms this year were better than previously. Some of those which were better last year were not as fine this time as this one which came from Shirley Wyness x Pink a Dell. Among the first Mabel Taylor seedlings blooming this year were some with good color but very poor form. Of course they may improve when grown from larger bulbs and doubtless there should be much better ones when they bloom in larger numbers another year. We hope that before

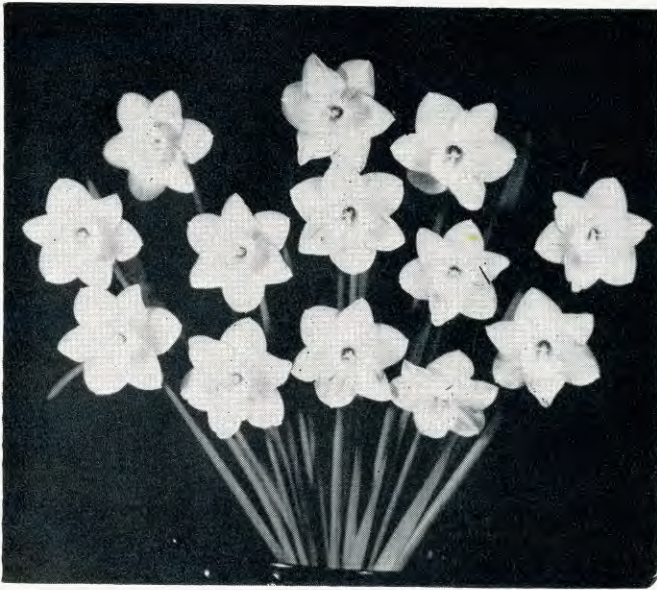


Fig. 24. *xNarcissus* el. BINKIE. Photo by Grant E. Mitsch.

too long there may be a pink Daffodil combining the best qualities of the pinks that we now have coupled with an ability to retain this coloring under various soil, weather and climatic conditions.

Some of the red and orange cupped Daffodils are quite as fickle as the pinks while others can be depended upon to give good color and good performance generally. Even these will surprise one occasionally as did Porthilly, which appeared with virtually no coloring two years ago. Even in this season which was rather unfavorable to red cups, Porthilly had quite rich orange crowns. Although not a very large flower, Narvik has been unsurpassed for quality and coloring. Krakatoa is the most striking at its best but is rather variable in performance. Although it fades somewhat more quickly in the sun than some other varieties, Indian Summer has very rich deep coloring in both crown and perianth, the

latter being an intense golden yellow. Sun Chariot of similar coloring is larger and of quite different form, having longer petals and a more flaring crown. Royal Ransom consistently gives good blooms of excellent form and unique coloring, the perianth being rich buff and fading lighter. Unfortunately it is not too vigorous in growth here. One would not want all their flowers to be of formal exhibition form but the very rounded flat overlapping perianths of such varieties as Hugh Poate, Garland, Chungking, Dunkeld and Tamino have an especial appeal to one who likes perfection in form. The first named is the largest and strongest growing of the lot but has least coloring in the crown. Diolite with its smooth finish and fine form has long been a favorite, and Red Riband with its very distinctly orange banded crown was very fine this year.

Fermoy and Kilworth are two of the best whites with red crowns. The former is very large and of good form, the orange red of the crown shading to gold at its base. Kopriva strikes a new note by giving us color earlier in the season. In Tuskar Light we have a very large flower with a distinct orange banded cup, a very striking flower. Most of the red and white flowers belong to the barrii section. Of these, Limerick is about the best, it having held its color well even this year with the dry warm sunny weather. Bravura, Matapan, Otranto, Paprika, and Teboura are all worth while and Crete gives some of the finest blooms of all but is not quite as highly colored. Although not a red cupped variety, Blarney might be considered here. It is a most lovely thing with its yellow rimmed salmon orange crown. Apparently it does not thrive in all sections.

Yellow is generally thought of in connection with trumpet Daffodils yet most of the best yellows are not of trumpet proportions. Our first choice would go to Galway although some years Golden Torch is fully as good. Balmoral is unexcelled for perfection of form and smoothness of texture but it is not quite equal in length of stem and substance to the other two. Perhaps the largest and one of the most striking yellows is Shanghai. Of the trumpets, Kingscourt was perhaps the best last season. Camberwell King was not as good the past two seasons but has in the past given us blooms equal to any we have grown of any yellow variety. Frontier and Moonstruck looked good, the latter in particular being a very large sulphur toned flower. Among our seedlings from Content have been numbers of those greenish toned flowers, several of very good quality. Content has proven very valuable for breeding and was quite marvelous itself this year. Its huge graceful blooms opened with a luminous cool sulphury coloring that soon faded to its accustomed "lemonade" hue. Binkie (Fig. 24) was superb, being a most satisfying cut flower and should in time become a splendid commercial variety.

Good bicolor trumpets are still not plentiful. Spitzbergen gave superb large perfectly formed flowers of pale coloring. Trouseau and Trostan were good again as usual. It is difficult to surpass Sincerity for quality although one could wish it were a bit larger and considerably taller. We were much pleased with the very early flower, Foresight, this year. Although short on first opening, it lasted a long time and continued to grow in height.

We are still unwilling to discard Bodilly and Polindra in favor of any of the new bicolor incomparabilis although Statute, Tramore, and several others look good. Bodilly is always good but we had never had such fine blooms before as from some bulbs planted in a display bed two years ago. Coverack Perfection was outstanding this year and we had quite the largest blooms of Gold Crown that we have grown. This one seems to have possibilities for breeding if we may judge by a few of its seedlings bloomed this spring. Rubra provided us with beautiful cut blooms as well as supplying material for hybridizing. A number of its seedlings from Sylvia O'Neill pollen were of entrancing beauty. Rubra is among the most prolific seeding of all Daffodils, apparently being receptive to the pollen of most other varieties and making a larger number of seed per pod than anything we have used other than some of the poets.

Silver Chimes came through the winter and bloomed in spite of the cold and its reputed tenderness. Of the jonquil hybrids Trevithian was again the finest and Cantabile the most attractive of the poets. Although the season was unfavorable for many varieties, yet we had quite a lavish display of beautiful blooms, again proving that the Daffodil is capable of performing under adverse circumstances.

NARCISSUS IN A MARYLAND GARDEN

W. R. BALLARD, *Maryland*

The season of 1948 was rather favorable for narcissus in my garden. No attempt was made to keep an accurate record of dates of bloom but from breeding notes, it appears that the following varieties were in bloom on March 30: Ada Finch, Stresa, Beersheba, February Gold, Fortune, Unsurpassable, Magnificence, Carlton, Miriope, Gertrude Millar, and Carmencita. Other varieties were undoubtedly in bloom on this date but no record was made of this fact.

By the 5th of April several other varieties had blossomed. These include Roxane, Central Park, Lovenest, Giant Perfection, Tunis, John Evelyn, Johanna, Francisca Drake, Ace of Diamonds, Forerunner, Lady Hillingdon, Suda, Firetail, Damson, General Pershing, Golden Goblet, Honey Boy, Lanarth, Dawson City, Tredore, Shererasade, Trevithian and Sonja.

By the 12th of April additional varieties in bloom included Salemba, Mayflower, Cheerio, Beryl, Whiteley Gem, Apotheose, Golden Perfection, Mildred Haven, Porthilly, Lucinius, Irmelin, Alcida, White Wedgewood, Great Warley, and Shot Silk.

The last notation recorded was made on April 26th when Silver Chimes and Bulbocodium were listed. Other varieties in the parade since the middle of the month had been Moonshine, Mystic, Mrs. R. O. Backhouse, Green Mantle, Cheyenne, Agnes Harvey, Thalia, Silver Salver and Tagore.

There were undoubtedly many other varieties in bloom at various periods, but these were the ones used in crossing, and it is to be assumed that these appeared at the time to have had certain characteristics which

were thought to have value from a breeding standpoint. Without having made careful descriptive notes at the time they were in bloom, it is not easy to recall outstanding performances. Much depends upon the culture given as to how the different varieties develop.

Since my soil is rather heavy clay and none too fertile, it has been necessary to improve the conditions. To improve the entire area to the extent required seemed too great an undertaking so a compromise was arrived at. This was done by simply digging out pockets a foot deep where the bulbs were to be planted and this was filled with a soil consisting largely of leaf mold. The portion below the bulbs was liberally fertilized with pulverized sheep manure to which a small quantity of a 5-10-5 fertilizer had been added. This may not be the orthodox way to do, but it seems to have worked. Not only have the flowers developed satisfactorily but the bulbs have increased so rapidly that the clumps have had to be dug up and separated every four or five years.

The following varieties are a few of those which performed well for me. Considering their size, vigor and permanence, *Unsurpassable* and *Magnificence* seem to have the lead among the early yellow trumpets. *Apotheose* has been remarkable for substance of flower, but it has not bloomed as freely as could be desired. As far as color, substance, and carriage are concerned, *General Pershing*, a *Jonquil* hybrid, is a prize. However, in the two years it has been in my garden, it has had only one flower. So far it shows little inclination to multiply. If it presently shows a tendency to overcome these shortcomings, it is easy to see that a large clump in bloom would surely be outstanding. The flower stem is strong, holding the flower up-tilted, and usually has been about two feet high. *Fortune* is the only representative of this strain in my garden, but it has consistently performed well.

Of the white trumpets, *Ada Finch* has been the tallest, the flower is large, and it has been generally satisfactory. *Roxane* has done well but the stems are only medium in height. *Stresa* is another large flowered white which has done well. *Gertie Millar* and *Daisy Shaffer* are two of the *Giant Leedsii* whites which have been quite fine. *Lovenest* and *Mrs. R. O. Backhouse* have been in the garden for several years. They both flower profusely and the bulbs have made good increase. *Mystic*, a pink *Leedsii*, is a weak doer and last year was the first time it has had strength enough to bloom. *Beersheba* is quite distinct in form, a pure white in color, and it has a distinct record of good performance.

The medium and small flowered types may not be as showy as the large trumpet varieties, but they are in some respects more intriguing in the garden. Some of those which have added interest and charm to my garden are *John Evelyn*, *Tunis*, *Sonja*, *Gallipoli*, *Mayflower*, *Actaea*, *Silver Chimes*, *Shot Silk*, *Green Mantle*, *Triandrus alba* and the *Bulbocodium*.

The double varieties have not had too great an appeal although *Daphne* and *Cheerfulness* are attractive. It is true that some of the more recent introductions are improvements over some of the older varieties. *Holland's Glory*, *Royal Sovereign* and *Texas* bloomed in my garden last year and they are rather pleasing.

It is not always easy to provide congenial growing conditions for *Narcissus* species, but they add much to the interest of the group when they can be made happy. Unfortunately it seems to be very difficult to find available stocks in this country of the many charming sorts described in the literature. It would be interesting to try some of the fall blooming sorts, if bulbs could be procured.

In relating the season's experiences with narcissus, no attempt has been made to evaluate critically the parade of varieties, but more especially to record the sometimes clear but often vague impressions of the floral display as it passed in review.

NARCISSUS NOTES, 1948

J. S. COOLEY, *Maryland*

The narcissus at my place began blooming in 1948 on March 20, which was a week or more earlier than usual. As is generally the case, the differential in time of blooming of the early group of varieties was rather slight—there being only a day or two from the time of blooming of the earliest to that of the next earliest variety. Usually *N. minor* is the first to bloom here but this year it was preceded by Henry Irving. The order of blooming was Henry Irving, *N. minor*, February Gold, Obvallaris, Forerunner, Golden Harvest and Alasnam.

The weather was such this year that one had a chance to observe some of the conditions making for red color in narcissus. Just as blooming started (March 21) there was a heavy rain followed by cool weather, and on March 26 the temperature was low enough for the ground to freeze. The weather continued on the cool side throughout the blooming period, which lasted well into May. Frequent rains gave adequate moisture. The color of those varieties having some orange in the cup was very beautiful. Fortune, which bloomed here during the cool moist period, was very pleasing. On the other hand a friend of mine living a little farther south grew his Fortune where it bloomed about a week earlier than mine. Its color was poor, having little orange in the cup. The weather had been dry and warm (some days as high as 85) prior to blooming of his plants. The evidence this year as well as in previous years indicates that adequate moisture and coolness are conducive to the formation of the beautiful reddish orange color of the cups of narcissus. In this locality the weather is often warm and the soil more or less dry by the time the red-cupped varieties come into bloom. There is often so little red in the cup that one might think the variety he purchased for a red-cup variety is mislabeled and does not correspond to the description. Red Cross for instance is often of very poor color. Some other varieties having red in the cup such as Dunkeld and Ace of Diamonds may fade badly in a hot period. The weather limitations on growing narcissus in this locality probably help to make one appreciate still more the beauty of those varieties making no claim for redness in the cup. The color of a plain yellow, such as Dawson City, is finer than that of an orange-cup variety where the orange does not develop, as is sometimes the case with

Red Cross. Fortune, for instance, some years gives one the impression of being a much overrated variety. With these climatic limitations on the growing of certain varieties of narcissus, it would seem that the breeders would do well to put more emphasis upon finish, substance and "doability" rather than upon some red frilling to the cup that may often be absent or nearly absent.

In 1946 and 1947 a condition obtained that enabled us to get some information on the passing out of certain varieties between the yearly growth periods. It is a matter of common observation that many of the plants of certain varieties often fail to show up the next spring. This may be very disconcerting, especially if the plants had been recently acquired at some expense and planted with great hope and anticipation. In 1946 I acquired about 25 plants of Daisy Schaeffer. They were planted out in October. The next spring there was a good but not perfect stand of fine plants having beautiful blooms. The bulbs were not dug that summer but were left undisturbed in the soil with the expectation of having fine increase by next year, but none of them showed up in 1948. Because the flowers were so fine and attractive in 1947 twenty additional plants were acquired and planted in October 1947 in a bed adjacent to those planted in 1946. Those planted in 1947 gave a good stand in the spring of 1948 and produced fine flowers. Those bulbs of the 1946 planting that remained in the soil in the summer of 1947 failed to appear in the spring of 1948. When a clump of narcissus passes out it is usually blamed on some unfavorable winter condition such as excessive wetness or low temperature or the one bad condition in conjunction with the other. The condition reported above with Daisy Schaeffer indicates that some condition in summer of 1946 rather than a winter condition in 1947-48 was the important factor in the passing out of that variety. In the summer of 1948, in order to prevent the Daisy Schaeffer bulbs from rotting during the summer, they were dug in July soon after the tops died. At the time of digging some of the bulbs were rotten and most of them showed signs of rot starting. These bulbs had been planted in fertile, well-drained soil where narcissus had not been grown before. Furthermore, bulbs of other varieties planted adjacent to the Daisy Schaeffer showed no evidence of rotting or of basal rot when dug at this time in July. This as well as other experience indicates that if one lives in a region of moist summers he would do well to discriminate against those varieties that often pass out from one year to the next. Certain varieties of the white trumpet and Leedsii classes are most likely to pass out. Among them are Daisy Schaeffer, Roxanne, White Emperor, Silvanite, Mme. Van Waveren, Mrs. Kreilage. Among the yellows are Pacific Spur, Golden Spur, Henry Irving, Diotima, Carlton, Orange Queen, Abelard. It may be advisable therefore to dig every year as soon as the tops die those varieties that often pass out or that are important in one's breeding program. Some disinfectant treatment such as dusting as soon as dug with Arasan or Spergon (McClellan, W. D. *Phytopathology* 38:17. 1948) may also be advisable to help prevent rot during the summer. An effective method consists of shaking the bulbs in a paper bag with some of the Arasan dust. (The necessary precautions should be exercised in handling these

poisonous compounds.)

After giving as near optimum storage conditions as possible the bulbs should be planted in October or at the time when conditions are favorable for root activity to start at once. Such a procedure would prevent the inactive bulbs from being subjected to conditions that are conducive to rotting.

The cool moist weather in April, May and early June 1948 should have been very favorable for the development of strong bulbs and a good crop of flowers next year. Last year and the year before, weather was unfavorable for the development of flower buds; consequently those plants that were in some unfavorable situation because of competition with other plants or overcrowding gave very few and poor flowers, while those plants that had adequate room in a fertile soil bloomed freely.

SOUTH AFRICAN AMARYLLIDS AS HOUSE PLANTS

[Continued from 1948 HERBERTIA]

SARAH V. COOMBS, *New York*

I. BRUNSVIGIAS

Brunsvigia rosea (Lamarek) Hannibal (syn.—*Amaryllis belladonna* Ait., non Linn.; *Coburgia rosea* (Lamarek) Gouws). Commonly known as the Cape Belladonna Lily, and as Maartlelie (March Lily) in South Africa. Though this lovely flower is now to be known as *Brunsvigia*, it may still be called Cape Belladonna. The ways of botany are sometimes hard for an outsider to understand, yet they must be followed for scientific accuracy. It will come easily to call this flower a *Brunsvigia*, especially as the name makes many of its hybrids no longer bi-generic, with many crosses now within the genus. The story of this flower is a puzzling one. It is with great diffidence and modesty that I embark on it.

The Cape Belladonna is not found on Table Mountain only in South Africa but it is definitely a plant of the South African winter rainfall area of the extreme southwest Cape, while crinum and other brunsvigias with which it has been crossed are found in the eastern and northeastern section of summer rainfall. So far as the subject seems to be recorded, crossing of the Cape Belladonna does not take place naturally with nerines or haemanthus, other amaryllids, though they live in the winter rainfall section and bloom at the same time, in some cases.

Brunsvigia rosea blooms in California fairly early in September and October yet in the way of many South African plants it is adjustable, making it useful as a house plant. This is especially true as they bloom at home in February, March and April. Different times of blooming are noted particularly in the hybrids. Different times of starting bulbs, different times of watering, have much to do with time of blooming.

The wild species may be pink in color or white with a streak of yellow at the base of the segments. The deeper tint of the pink shows in those growing in partial shade. The stamens are white, tinted pink when young; the style is white at base, pink above, with small purple stigmas.

This flower is nearly hardy in the New York area and may grow and bloom if planted in a sheltered spot with good drainage, deeply set and covered with a mulch in winter. In the New York Botanical Garden, it is planted against a greenhouse and blooms in late summer. The hardiest of all is the variety *purpurea major*.

There are different forms or species known as var. *major* (early flowering), *minor*, *bicolor*. The origin of these bulbs is obscure and no mention of similar specimens has been found in European literature, though they resemble the ones grown in Mediterranean gardens. Hannibal says that "*major*" is apparently an intermediate between the type and *spectabilis bicolor* Sprenger, while "*minor*" is a small form of *B. rosea*. In southern California, where the climate suits them, they grow almost like weeds; the ones best known there are the pink forms. The variety or hybrid introduced much later and known as *xBrunsvigia multiflora alba* is most valued, perhaps because more beautiful and certainly rarer. The white forms are greatly prized by the bride, who carries them up the church aisle. These may be hybrids of the group produced by Bidwell of Australia between *Brunsvigia rosea* and *B. grandiflora* Lindl and known as *B. multiflora*, *B. multiflora alba* and *B. multiflora rosea*. Of the "Belladonna Lily" proper, there are many forms of which "*rubra*" is the brightest of the *multiflora* type. The parentage is uncertain but the type is good. They are known to have sometimes 30-40 blooms on a stalk and to remain in bloom for a long time. A fine named variety of the *multiflora* type, Haythor, raised by Bradley of Australia, said to be a seedling of *B. rosea* and *multiflora alba*, is a lovely pure white with a small orange-yellow eye. It has ruffled petals with a crinkled edge and increases quickly. Hannibal thinks that one parent was a Bidwell *multiflora* hybrid (*B. grandiflora* x *B. rosea*) and the other may have been *Parkeri* (*B. grandiflora* x *B. rosea*). Cowlshaw thinks it is a good form of *B. Josephinae* crossed with *B. multiflora alba*. Other good hybrids of the multifloras are Harbord, a fine white, and Orvieto, a deep pink. *B. multiflora* Ait. is considered by Baker, in *Amaryllideae*, a synonym of *B. gigantea*. *B. Parkeri alba* is especially fine.

A cross between *B. rosea* and *B. Josephinae* (*B. gigantea*?) produced the variety *Parkeri*. It has a very tall spike, many, sometimes 16-20 flowers per umbel. The color is a pale rose. The name is used for another crossing by a different producer.

The species has one botanical variety, *Brunsvigia blanda*, though Baker gives *A. pallida* Red., which is included also in the Royal Botanical Hand List. Var. *blanda* has appeared and disappeared, coming back perhaps as different forms or natural hybrids. It is distinguished from the so-called Cape Belladonna by longer, wider, more substantial leaves, with a pseudo-stem and late-blooming tubular flowers. The flowers are white and turn to very pale pink, later to clear pink. Allied forms, now *B. rosea* var. *rubra* (syn. *A. rubra major* of J. E. Elwes) and the variety *purpurea major*, are only partly deciduous and have a pronounced pseudo-leaf. This last is free-flowering, with many flowering umbels and hardy, with full protection. It has several stalks. The flowers of *rubra* are the brightest pink or crimson with a yellow base while those of *pur-*



xBrunsvigia Parkeri cl. ZWANENBURG

[Reproduced from HERBERTIA 2: plate on p. 113. 1935; original photo C. G. van Tubergen Ltd.]. See page 134.



xCrinodonna Corsii cl. FRED HOWARD (syn.—*xAmarcrinum Howardii*).

purea major are carmine, also with a yellow base. These two hybrids are large robust plants.

The variety known as *purpurea major* has been much used in Dutch nurseries. This is known in French gardens as *rosea-perfecta*. It is a good bloomer. Australian breeders have done much work on this group. Breeders there have grown many hybrids between *B. rosea* and *B. Josephinae*, as others have done, but they have had a splendid start on the growing and produced much that is interesting. The work continues in several countries with various hybrids, with fine results. The variety *purpurea major*, crossed with *Parkeri* and *rubra major*, has given a number of varieties. Many of these bulbs produce strong stems and large, lily-like flowers, colored a pink or deep rose-carmine. Among these are the Van Tubergen varieties, Barberton, Jagersfontein, Lydenburg, Pretoria and Windhoek. These growers have great hopes of a cross made between a *B. rosea* and the orange colored *B. gigantea*. It needs great patience to work with these flowers, as Brunsvigias are in no hurry to bloom. They will be worth waiting for.

The hybrids known as Brunsdonnas cover crosses between *B. Josephinae* as seed-parent and *B. rosea* as pollen parent. A splendid hybrid of this crossing has violet-pink flowers and is known as *xBrundsdonna Tubergeni*. The hybrids Haythor, Harbord and Orvieto are usually called Brunsdonnas. This name is used for other hybrids and will have to be settled as to its rightful naming. It may be necessary to furnish another name, if there is controversy. Bailey uses the name for both crosses. There is a splendid lot of material and well qualified growers.

A chance seedling found in an old California garden has been named Frank Leach. It represents one of the better Cape Belladonnas. The flowers open white but turn a warm pink.

Cultivation of Cape Belladonna and Hybrids. Soil conditions are not critical. Any good loam suitable for roses is excellent. Sand is desirable when added to loam but there should not be too porous a condition, though drainage is important. Though the bulbs resent frequent transplanting and some of them are said gloomily not to do well in a pot, they sometimes like to spend their first phase in making extra bulbs instead of blooming and these should be separated and given a chance with extra richness, to bloom by themselves. When later, they are crowded with roots, the trouble seems to be over and they will bloom till they almost burst the pot or tub. In outdoor planting, they are set rather deeply, to avoid possible freezing and too hot sun in summer. For indoors planting, only $\frac{2}{3}$ of the bulb should be covered. *Parkeri* and its allies need a rather lighter soil and a warmer location. If outdoors, a rather shallow planting may be suitable with a ground cover to protect the bulb from too much sun. Some shade is suitable.

These bulbs need a good ripening. While resting indoors, pots may be laid on their sides with a cover of salt hay or other material. It is the experience of this writer that to set the pots on their sides under a bush during the summer, where occasional rains keep from too dry conditions, seems to produce better results, for this is more like their native conditions. When growth is wanted, watering may be started, lightly at first.

later more abundantly, kept up until signs of resting show by the drying of the leaves, when watering is gradually withheld.

Different soils have little or no effect on color variations but intensity of light is important. Deepest color is found in shady locations. Bone meal is a help, also wood ashes, but adding chemical fertilizer of known reliability or liquid manure will show good results during growing time. Cool conditions are best for them.

Other Brunsvigias. My consideration of the other Brunsvigias as house plants will be published after Dr. Dyer's monograph on the genus *Brunsvigia* has been published because the nomenclature is somewhat confused at present.

II. xCRINODONNA

The bigeneric hybrid, known as *Crinodonna Howardii* (syn. *Amarcrinum Howardii*) is greatly admired by anyone who has seen it. It is the result of the crossing of two amaryllids, *Crinum Moorei* (pollen parent) and *Brunsvigia rosea* (seed parent). It was produced by Mr. Fred H. Howard of Los Angeles, California, who had had a reputation for years as a keen plant breeder, especially of roses. It received the award of the Cory Cup from the R.H.S. in London in 1926. That award goes, I believe, to what is considered the best new plant of the year.

Though it is a flower of surpassing merit, it is rarely seen in cultivation, perhaps because it increases rather slowly, though it may be doubled in a year. In California gardens, where it lives out of doors, it blooms normally from early August till late October. The delicate, lovely rose-pink flowers are like those of one parent, *Brunsvigia Rosea*, but it has foliage like the Crinums. There are often from 16-20 flowers to a stalk, opening in succession so that it lasts at least a month. It is quite fragrant. The flowers have an open funnel-form with recurving segments and declinate style. The clusters are large on stems from 2-4 feet high. It is one of the most satisfactory of amaryllids for pots and for gardens. It is said to be recurrent blooming in California gardens. A robust, evergreen bulb, it is called by one admirer "an absolutely first-class plant." In pots, it may take a little time to start blooming but if it is like the other crinums, once started, it will bloom on for many years without a break. It may be planted late for winter blooming, being amiable, like so many of the South African amaryllids in that way.

An earlier hybrid of similar parentage has been called *xCrinodonna Corsii*. It was raised in Italy and is probably not in cultivation in America.

This bulb has conditions of cultivation like the Crinums. It needs more moisture. In pots, only the base of the large bulb should be covered. It needs some shade, which it is likely to have in house situations.

[The third installment of this article will appear in a later number of HERBERTIA.]

5. THE AMERICAN PLANT LIFE SOCIETY

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Correspondence about the registration of plant names should be sent directly to Prof. Norton, 4922 40th Place, Hyattsville, Maryland, and a self-addressed, stamped envelope should be enclosed if a reply is expected.

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REGISTRATION OF DAYLILY NAMES—Registrars: Prof. J. B. S. Norton, 4922 40 Place, Hyattsville, Maryland, and Mr. W. R. Ballard, 5102 41st Ave., Hyattsville, Maryland.

[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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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.

DATA CARD FOR HEMEROCALLIS

When describing daylily clones, all breeders and growers are requested to use the Official Data Card for Hemerocallis, devised by the eminent artist and horticulturist, J. Marion Shull, and full 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.

For information write to—

*Mr. E. Frederick Smith, Membership Secretary,
The American Plant Life Society,
Box 2398, Stanford, Cal.*

SCORE CARD FOR HEMEROCALLIS

For the official score card for Hemerocallis see *HERBERTIA*, Volume 7, page 126, 1940. Reprinted in Vol. 14 (1947), page 37.

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FLOWER TYPES AND SCORE CARD FOR HYBRID AMARYLLIS

For classification of flower types and score card for Hybrid Amaryllis see *HERBERTIA*, Volume 5, pages 141 to 145, 1938.

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[CORRIGENDA: DESCRIPTIVE CATALOG OF HEMEROCALLIS CLONES, continued from page 90.]

In several places there is a dash (—) after “syn.” or “err.” which should be “=.”

Any errors in publication dates of HERBERTIA may be corrected from the data on page 15 of the DCH.

Page 22, preceding “Aurora, l. hom. = Borealis.” insert “Aurora (Perry, 1946), Perry c. ? (105).”

Page 41, for “Gen” read “Gem.”

Page 42, (881) “Golden Emperor” is out of alphabetical order.

Page 58, (1462), for “Walgren” read “Walgreen.”

Page 60, (1534), for “Nicolette” read “Nicollette.”

Page 63, (1634), for “Hb. 15” read “DCH.”

Page 69, (1882), for “Ringleto” read “Ringlets.”

Page 73, for “*Serotina*” read “*serotina*.”

for “*H Thumbergii Bark.*” read “*H. Thunbergii Barr.*”

Page 90, (2691), for “Rev.” read “Rex.”

The date of publication for some Perry clones may be earlier than 1946, the date of his DIARY, which is the earliest seen by the compilers.

Other corrigenda have been recorded, chiefly typographical errors, and minor changes in descriptive data, which are available for future supplemental editions. Some of the more important, not as yet edited, are to appear in the 1950 HERBERTIA EDITION of PLANT LIFE, vol. 6.

POSTSCRIPT NOTE (*Hemerocallis*).—By cooperative arrangement with THE HEMEROCALLIS SOCIETY, completed as of Nov. 17, 1949, descriptions of only such *xHemerocallis* clones for which the 50c registration fee has been paid to the Registrar of THE HEMEROCALLIS SOCIETY will be published in this department beginning in 1950. This applies only to *xHemerocallis* clones for which the fee should be sent directly to Mr. Earl A. Holl, Registrar, THE HEMEROCALLIS SOCIETY, 3520 North Grant Ave., Indianapolis 18, Ind. All registered clones will bear a number (example: 3322-R). The number "3322" indicating the number of the clone and the "R", the information that it is registered.—J. B. S. Norton

NOMENCLATURE OF SOME BRUNSVIGIA HYBRIDS

HAMILTON P. TRAUB, *Maryland*

xBrunsdonna represents certain intra-generic crosses involving *Brunsvigia* species (See AMARYLLIDACEAE: TRIBE AMARYLLEAE, by Traub and Moldenke. 1949, p. 66.) and therefore is a synonym of *Brunsvigia* Heist. Such crosses are properly indicated as *xBrunsvigia* with an appropriate secondary epithet, the "x" indicating intra-generic hybridity, and the secondary epithet the particular two species crossed, including reciprocal crosses.

Genus **xBrunsdonna** van Tubergen, in Gard. Chron. Lond. Jan. 23, 1909, p. 57, fig.; Worsley, Gard. Chron. Nov. 14, 1925, pp. 391-392, f. 164; Worsley, in Jour. Roy. Hort. Soc. 51: 64-67. 1926. = **Brunsvigia** Heist.

xBrunsvigia Parkeri (W. Watson) Traub, **comb. nov.** Syn.—*xAmaryllis Spofforthiae* Herb. Amaryll. 278, 425. 1837, nomen; *Amaryllis Parkeri* W. Watson, in Gard. Chron. Lond. Feb. 6, 1909, p. 92; 50(2): 210, fig. 101. 1911; The Garden, 75:462, fig. on p. 460. 1911; Worsley, in Jour. Roy. Hort. Soc. 51:66. 1926; Hoog, in HERBERTIA 2:113-114, pl. on page 113. 1935; *xBrunsdonna Parkeri* (W. Watson) Worsley, Gard. Chron. Nov. 14, 1925, pp. 391-392, f. 164; Worsley, in Jour. Roy. Hort. Soc. 51:66, 64-65, 67. 1926; *xBrunsdonna Sanderæ*, Gard. Chron. 50(2): 210. 1911; The Garden 75:462. 1911.

Here belong all crosses involving *Brunsvigia Josephinae* Ker-Gawl. (syn.—*B. gigantea* (van Marum) Traub, non Heist.) and *B. rosea* (Lamarek) Hann. [See Plate 9, page 127.]

xBrunsvigia Bidwellii (Worsley) Traub, **comb. nov.** Syn.—*xBrunsdonna Bidwellii* Worsley, in Jour. Roy. Hort. Soc. 51:65, 67. 1926; (descr. only), J. C. Bidwell, in Gard. Chron. Lond. July 29, 1850, p. 470.

Here belong all crosses involving *Brunsvigia rosea* (Lamarek) Hann., and *B. orientalis* (Linn.) Eekl. (syn.—*B. multiflora* Ait., *B. gigantea* Heist., non (van Marum) Traub.)

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