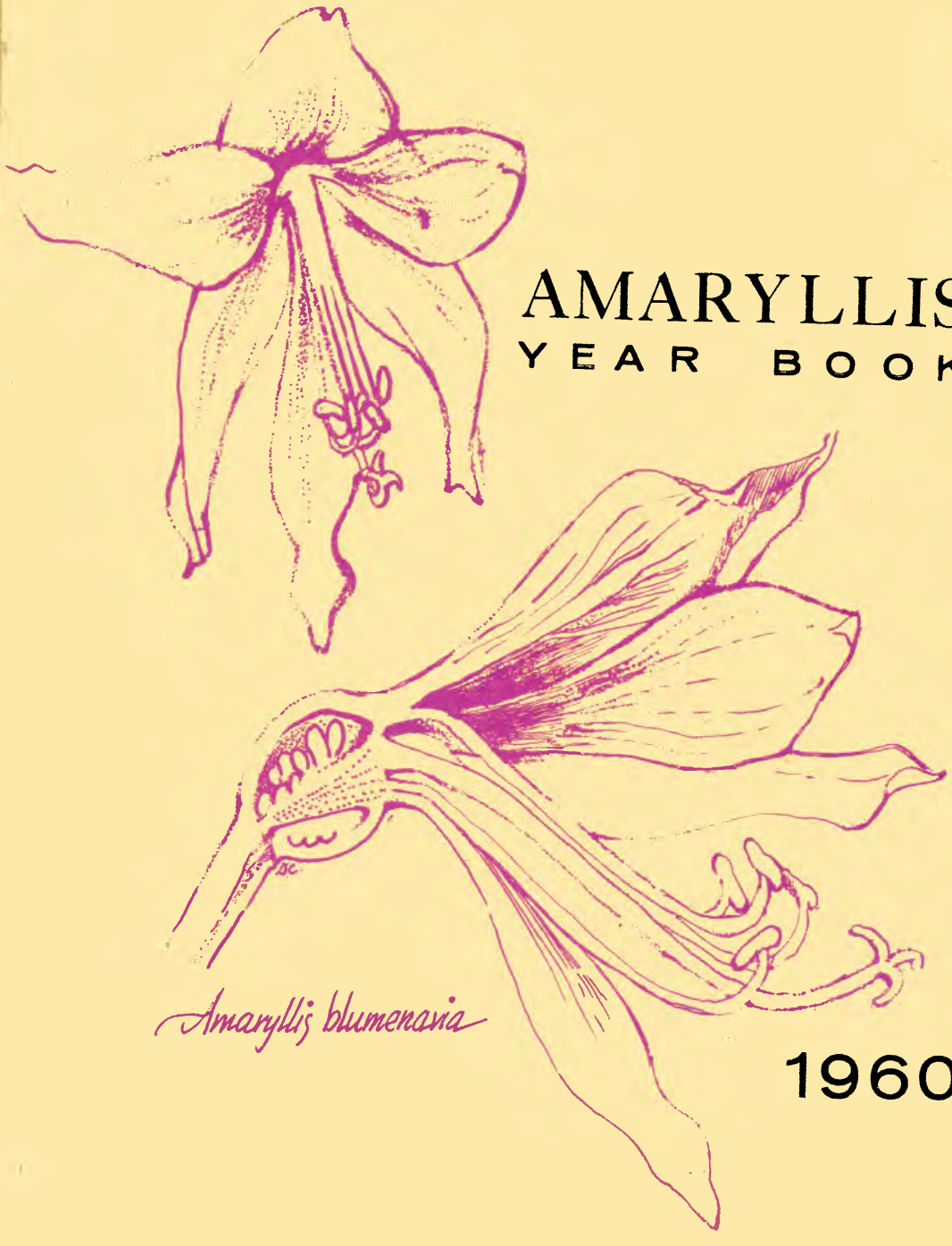
PLANT LIFE, VOL. 16, NO. 1, JANUARY, 1960



AMARYLLIS
YEAR BOOK

Amaryllis blumenavia

1960

THE AMERICAN PLANT LIFE SOCIETY

THE AMERICAN PLANT LIFE SOCIETY is organized for the "increase and diffusion of knowledge concerning plant life," and to carry out its objectives the main emphasis is placed on the publication of PLANT LIFE, the periodical devoted to plant life, incl., HERBERTIA, the yearbook devoted exclusively to the amaryllids, sponsored by the affiliated AMERICAN AMARYLLIS SOCIETY. The publications are international in scope. All paid up members are privileged to receive the current issues of PLANT LIFE, incl., HERBERTIA.

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All persons and organizations interested in amaryllids, and other plants are invited to become members. The annual dues vary from $3.50 to $5.00 (foreign, $4.50 to $6.00) depending on the publishing costs. At present they are $3.50 (foreign $4.50) in advance which should be sent to:

DR. THOMAS W. WHITAKER, *Executive Secretary*
The American Plant Life Society
Box 150, La Jolla, California

PLANT LIFE, VOL. 16, NO. 1, JANUARY, 1960

AMARYLLIS
YEAR BOOK
1960

Year Book of
The American Amaryllis Society
27th issue

GENERAL AMARYLLID EDITION

EDITED BY
HAMILTON P. TRAUB
HAROLD N. MOLDENKE

THE AMERICAN PLANT LIFE SOCIETY
Box 150, La Jolla, California

THE AMERICAN PLANT LIFE SOCIETY

For the roster of the general officers of the Society, the reader is referred to the inside front cover of this volume.

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[THE AMERICAN AMARYLLIS SOCIETY—continued on page 181.]

PREFACE

Again, Mr. Douglas D. Craft, of the DEPARTMENT OF DESIGN, ART INSTITUTE of Chicago, has furnished an interesting cover design based on *Amaryllis blumenavia* which flowered for him in 1959. He supplements his design with an article on the same plant, and adds two full page illustrations. We are all greatly indebted to Mr. Craft for his fine contributions.

The 27th issue of the AMARYLLIS YEAR BOOK (HERBERTIA) is dedicated to Prof. Ira S. Nelson, of SOUTHWESTERN LOUISIANA INSTITUTE, who received the 1960 HERBERT MEDAL AWARD for his outstanding contributions toward the advancement of the amaryllids by bringing in alive many *Amaryllis* species and other amaryllids obtained during two plant exploration expeditions in 1954 and 1958; and for his breeding experiments with the material collected. Prof. Nelson presents an interesting autobiography and also articles giving details about his plant explorations in South America, and his breeding experiments with *Amaryllis.* The congratulations of the members go to Prof. Nelson on his accomplishments.

The articles on *Amaryllis,* again, are of special interest. Those by Prof. Nelson and Mr. Craft have just been noted. Mr. Fred B. Jones writes about three *Amaryllis* from Saba Island, and *Amaryllis belladonna* L., in South Texas. Dr. Cardenas describes two new *Amaryllis* from Bolivia, one a pure white, fragrant species, and gives a report on successful hunt for a green-flowering *Amaryllis* species in the Andes. Mr. Boshoff-Mostert reports on the famous Buller hybrid *Amaryllis* strain that he has inherited. Mrs. Pickard writes about her *Amaryllis* breeding experiences giving results. Dr. Joseph C. Smith notes the growing popularity of species *Amaryllis,* and writes about moving day for amaryllis. Mr. Goedert gives instructions for sprouting *Amaryllis* seeds, and writes about *Amaryllis* for beginners. Mr. Perrin discusses *Amaryllis* as a hobby, and Mr. Beckwith D. Smith reports on greenhouse culture of *Amaryllis.* Prof. Claude W. Davis discusses the importation of *Amaryllis* bulbs.

The other amaryllis are also adequately covered. There is a catalog of *Nerine* cultivars; and also a catalog of *Brunsvigia* cultivars that is urgently needed. Dr. Bose contributes two articles on the chromosomes of *Lycoris;* and Prof Flagg presents an article on the chromosomes of *Zephyranthes clintiae.* Dr. Howard writes about Alliums and highly-colored Crinums. Prof. Claude W. Davis describes his experiences in growing amaryllids under artificial light. Mr. Gilmer discusses five distinctive *Hemerocallis* clones. Mr. Beckwith D. Smith writes about *Sprekelia* culture, and Mr. Morris on *Eurycles.* Mrs. Flick contributes extracts from the Round Robin letters, and Mr. Woelfle writes of his gardening activities in Cincinnati. There are other important articles, and also the reports on local Amaryllis shows.

Last, but not least, Mr. Percy-Lancaster contributes a most charming Southern Rhodesia News-Letter, and Mr. Forbert gives instructions

for photography in your garden. Altogether a wonderful harvest of knowledge.

Contributors to the 1961 issue of the AMARYLLIS YEAR BOOK are requested to send in their articles by August 1, 1960, in order to insure earlier publication of that edition. Unless articles are received on time, publication will again be delayed to June or July or even later as with some issues in the past several years. Your valued cooperation toward earlier publication will be greatly appreciated.

January 15, 1960,
5804 Camino de la Costa,
La Jolla, California.

Hamilton P. Traub
Harold N. Moldenke

CORRIGENDA

HERBERTIA VOL. 11. 1944 (1946), The Genus Allium in the U. S. S. R., A. I. Vvedensky

Page 86, 128th dichotomy, change "128" before "*A. leucanthum* C. Koch" to "174".
Page 89, 153rd dichotomy, change "122" before "*A. fibrosum* Regel" to "112".
Page 96, 209th dichotomy, change "209" before "*A. monophyllum* Vved." to "187".

CORRIGENDA

PLANT LIFE, VOL. 14. 1958

Page 26, 2nd and 4th lines from bottom, for "*traubara*" read "*traubiana*".
Page 59, 3rd, 4th and 10th lines from bottom, for "*degraafara*" read "*degraafiana*".
5th line from bottom, for "*pearceara*" read "*pearceana*".
11th and 13th lines from bottom, for "*stoutara*" read "*stoutiana*".
15th and 17th lines from bottom, for "*yeldara*" read "*yeldiana*".

CORRIGENDA

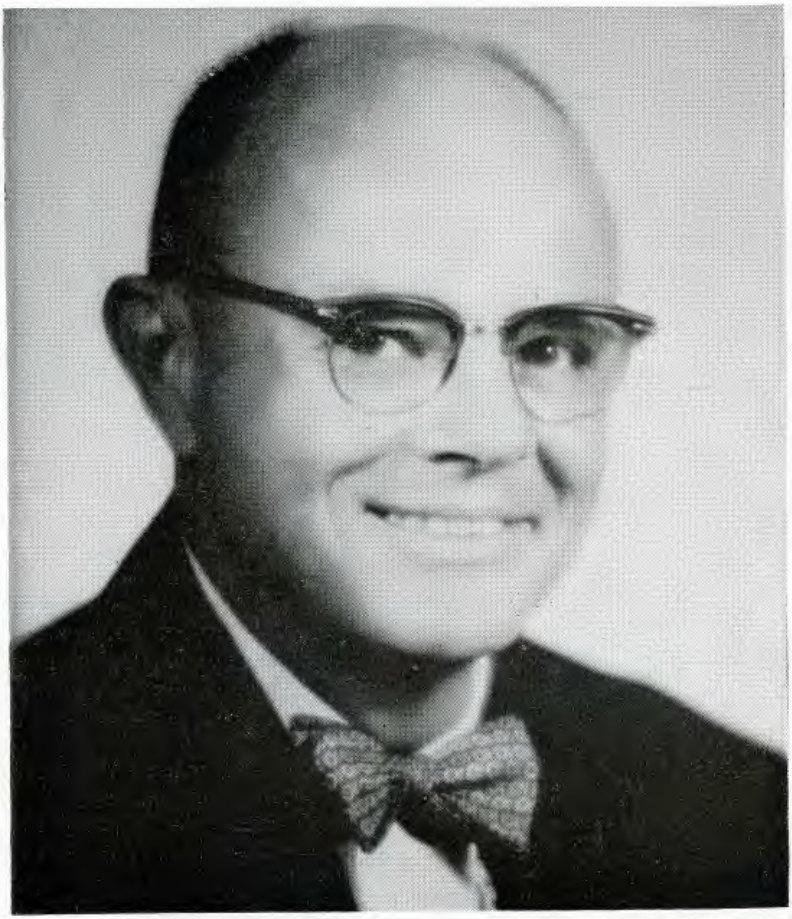
PLANT LIFE, VOL. 15. 1959

Page 16, 23rd line from bottom, for "damazana" read "damaziana".
Page 23, 1st line, for "Al" read "A. P."
Fig. 4, caption, for "A. C." read "A. P."
Page 36, 3rd line from top, for "intermermediis" read "intermediis".
Page 38, under "2. ZEPHYRANTHES BRAZOSENSIS"
At the end of the first paragraph, add: ", *nomen subnudum.*"
After the third paragraph, beginning with "NOTES.—", add:

[CORRIGENDA, PLANT LIFE VOL. 15. 1959, continued on page 78.]

DEDICATED TO

PROF. IRA S. NELSON



Herbert Medalist—Ira Schreiber Nelson, B. S., M. S.

IRA SCHREIBER NELSON, B. S., M. S.

An autobiography

To say that I was proud and pleased upon being notified that I was to receive the HERBERT MEDAL is a gross understatement. A very wise provision, however, tends to shrink swollen egos—the preparation of an autobiography as a prerequisite to this very great honor. As I write this introductory paragraph after having written the sketch which follows, I must confess that I have been humbled by the realization that I have taken so long to do so little. My only accomplishments which did not diminish as I wrote this are my children, three daughters and a son. Come to think of it, my wife has been playing the star roll in this category.

I was born on February 12, 1911, at St. Joseph, Missouri. Early childhood was spent on the farm where I enjoyed the freedom of fields and woods with an older brother and younger sister. When I was seven the family moved to town but for many years we returned to the farm for the summer months. I have vivid memories of the crop harvests, the paw-paw, *Asimina triloba,* patch, the bag swing in the big elm tree by the barn, the blacksnake that swallowed a glass nest-egg and countless other things that are commonplace for country youngsters to remember.

My father's determined fight to control soil erosion and to improve the productivity of his land made a lasting impression on me. This, I think, opened my mind to the possibilities for a career in some phase of scientific agriculture although I am not aware of the exact time when I made this decision. Constant encouragement from both my mother and father kept alive my interest in plants.

After completing elementary and secondary schools in the St. Joseph public school system I entered IOWA STATE COLLEGE where I majored in horticulture. To satisfy the senior-project requirement I spent the summer following my junior year on a field trip inspecting the horticultural plants and enterprises of Mexico. This trip, which I made alone, gave me my first real view of tropical vegetation and a tremendous urge to see more of it.

After receiving the Bachelor of Science (B. S.) degree and working for a year, I married Barbara Furnas of Wichita, Kansas, and returned with her to IOWA STATE COLLEGE to do graduate work in horticulture. With the help of her paycheck and by alternating work and schooling, I earned the Master of Science (M. S.) degree.

By February of 1941, I had joined the faculty of the COLLEGE OF AGRICULTURE at SOUTHWESTERN LOUISIANA INSTITUTE as Professor of Horticulture. Here I have remained except for brief periods of graduate studies at the UNIVERSITY OF MISSOURI and CORNELL UNIVERSITY.

To every teacher there is deep satisfaction in the success of former students. It is with no small pride that I see SOUTHWESTERN LOUISIANA INSTITUTE graduates in horticulture succeeding as commercial florists and nurserymen, serving on the horticultural faculties of some of our

great universities and doing graduate work in various sections of the country. I like to believe that I have played some part in guiding them to success.

Besides teaching, for which I am paid, I keep active in other phases of horticulture. For a number of years I have been show manager for both the state Iris and Camellia societies. I have held office in the AMERICAN IRIS SOCIETY and the AMERICAN CAMELLIA SOCIETY and am Director of Research for the LOUISIANA SOCIETY FOR HORTICULTURAL RESEARCH. I am a member of the SOUTHERN ASSOCIATION OF AGRICULTURAL WORKERS and several organizations devoted to special plants. I am a member of the AMERICAN PLANT LIFE SOCIETY and the affiliated AMERICAN AMARYLLIS SOCIETY, an Overseas Fellow of the ROYAL HORTICULTURAL SOCIETY and a member of Sigma Xi. THE NATIONAL COUNCIL OF STATE GARDEN CLUBS honored me with the SILVER SEAL AWARD and the AMERICAN CAMELLIA SOCIETY made me a Fellow of that organization.

Since 1941, I have been actively engaged in breeding Louisiana irises. In this connection I take pleasure in the knowledge that I have had a part in the development of wild Louisiana Irises as garden subjects. One of my seedlings, 'Cherry Bounce', was given the DEBAILLON AWARD, the highest award made to a Louisiana *Iris,* by the AMERICAN IRIS SOCIETY.

For a number of years I have served as judge for all American Rose, Annual Flower and Camellia Selections, and as an accredited judge of Irises, hemerocallis and camellias. This work has made me keenly aware of the need for better cultivars among all types of garden plants.

For several years I have been breeding *Amaryllis.* When this project was initiated an attempt was made to purchase species for foundation stock. To my great disappointment I was able to obtain only the scarlet *Amaryllis belladonna* L., *A. striata* and the Dutch and American hybrids. I soon realized that if species were to be used it would be necessary to reintroduce them from the wild. THE LOUISIANA SOCIETY FOR HORTICULTURAL RESEARCH had as its first major project this very objective, and I was fortunate to have been selected to go to South America in 1954 to collect *Amaryllis* species.

The success of the first trip was sufficient to justify a second trip which was made in 1958. These two expeditions have yielded at least ten species of *Amaryllis* in addition to others, still unidentified, which have not bloomed. Species of *Zephyranthes, Habranthus, Eucharis, Hymenocallis,* including subg. *Ismene, Lepidopharynx, Paramongaia, Bomarea, Crinum, Chlidanthus* and some 600 species of other plants were collected for their ornamental value. Detailed reports of these two expeditions will be found in the first four Bulletins of the LOUISIANA SOCIETY FOR HORTICULTURAL RESEARCH, and also in the 1955 AMARYLLIS YEAR BOOK (HERBERTIA) and in the present issue of the AMARYLLIS YEAR BOOK.

Three amaryllid species collected on these trips have proved to be new to science and have been properly described by Traub and Nelson.

They are *Amaryllis evansiae, Chlidanthus boliviensis* and *Habranthus cardenasiana.* The red Bolivian passion flower, *Passiflora coccinea,* which was collected on the first trip to Bolivia is now enjoying considerable popularity in southern gardens.

For the past 19 years I have had a rather heavy schedule of speaking engagements with FEDERATED GARDEN CLUBS in Louisiana and have taught horticulture in many of their schools. I have also participated in the programs of national conventions of the AMERICAN IRIS SOCIETY, AMERICAN HEMEROCALLIS SOCIETY, AMERICAN DAFFODIL SOCIETY and the WILLIAMSBURG GARDEN SYMPOSIUM. I have appeared on the program of both the Louisiana nurserymen's and florists' organizations and on the southeastern florists regional convention program. All of these as well as other speaking engagements in Texas, Arkansas, Mississippi, Alabama, Georgia and Florida have not only made me aware of the magnitude of ornamental horticulture but have also given me a deep concern for the mountain of unsolved problems in the field.

For many years we at SOUTHWESTERN LOUISIANA INSTITUTE have been assembling a collection of ornamental plants that are adapted to southern conditions. It is our ambition to see this institution become a fountainhead of first-hand information about ornamental plants for the south, and to be a perpetual source of living plant material for those who may have need for it. To this end we have worked out a system of plant records which makes it possible for anyone to quickly find out what our experiences with a given plant have been. Such a set-up is not a botanical garden nor an arboretum because the emphasis is on plants with ornamental horticultural significance, yet it embodies three of their basic features, the herbarium, the records, and the living plants. Perhaps the spirit of the great Liberty Hyde Bailey will not be offended if we call it a hortorium.

COLLECTING AMARYLLIDS IN SOUTH AMERICA

IRA S. NELSON

The writer has had the good fortune to have been able to make two plant exploration expeditions to South America; one in 1954, the other in 1958. These collecting trips which were jointly sponsored by the Louisiana Society for Horticultural Research and Southwestern Louisiana Institute had as one of their objectives the collection of *Amaryllis* species which were not otherwise available. Some of the results of these trips have been published in THE AMARYLLIS YEAR BOOK (HERBERTIA), the Bulletins of the Louisiana Society for Horticultural Research and elsewhere. This article will deal with the amaryllids collected during the second trip which was made during October, November, and December of 1958.

Cochabamba, Bolivia, was selected as a base headquarters because of its location in relation to other areas and its air facilities for the

shipment of plants. Some fruitful efforts were made in the Cochabamba area from which *Amaryllis vittata* var. *tweediana, Chlidanthus boliviensis* and an unidentified *Amaryllis* were obtained in 1954. *Amaryllis cybister* was collected at the base of Mt. Tunari at approximately 9,000 feet of altitude. It was in flower when collected on October 31, 1958, but no foliage was visible. This orchid-shaped *Amaryllis* species was found growing in almost pure deposits of half-rotted organic matter which had lodged in the crevices along the rocky slopes of a stream bank. Some of the bulbs were found under bushy deciduous plants while others were found in places completely exposed to the sun. The area has relatively light seasonal rainfall. Apparently, *A. cybister* produces its flower scapes and leaves early in the rainy season, makes its growth, then goes completely dormant during the dry season which ends in October. This area also yielded dormant bulbs which seemed to be amaryllids, perhaps species of *Habranthus* or *Zephyranthes*. These have not yet bloomed.

Amaryllis cybister was collected again on November 2, 1958, at Km. 145 on the Cochabamba—Santa Cruz highway. Here it was growing under similar conditions but in an area of somewhat less rainfall and at an altitude of 9300 feet. It was growing with *Zephyranthes tubiflora,* a large orange-flowered rainlily and an unidentified plant, the bulbs of which are the size and shape of bulbs of *Chlidanthus boliviensis.* These amaryllids were collected, but have not bloomed to date.

On November 3, 1958, a third collection of *A. cybister* was made at Comorapa, Bolivia, along the banks of a stream which runs between the airport and the town. This collection, unlike the others, had both leaves and flowers when collected. From the three stations visited, we may conclude that the primary cultural requirements of *A. cybister* are a light soil which is high in organic matter, good drainage and a long dry period following growth. This species thrives in areas subject to frosts and light freezes. *Amaryllis cybister* was collected at the Comorapa station in 1954 but the bulbs did not survive. It was not identified until collected again from the same place in 1958.

Amaryllis bulbs which were in full leaf but not in flower were collected in Yungas of La Paz at Km. 63 between La Paz and Irupana at approximately 6700 ft. altitude on November 7, 1958. This station is in an area of heavy rainfall and is apparently frost free. The bulbs were growing in deposits of pure organic matter about 3 inches deep which had accumulated on top of large rocks that were in rather dense shade. One of the bulbs has since bloomed in the greenhouse at Southwestern Louisiana Institute and has tentatively been identified as *A. forgetii,* a species not previously reported from Bolivia.

At Km. 90 on the La Paz-Irupana highway *Amaryllis* bulbs which were not in bloom were collected on November 6, 1958, when we were enroute to Rio La Paz. Dr. Martin Cardenas who was on this trip remembered the station from previous trips he had made by mule back years earlier. These bulbs have since proved to be *A. pardina* as Dr. Cardenas had predicted. The bulbs were found growing on a partially

shaded steep bank beside the road near a place called El Chaco. The altitude at El Chaco is slightly under 5000 ft.

Below Irupana on the road to the ford at Rio La Paz where a highway bridge crosses a stream at 4650 ft. altitude, *Amaryllis* bulbs were collected. These have not bloomed and remain unidentified. They do not appear to be *A. Pardina.*

Dr. Martin Cardenas planned the trip to Yungas of La Paz with a primary objective, the collection of *Lepidopharynx deflexa.* When he was a member of the Mulford Expedition 37 years earlier, he had seen it growing on the steep slopes where Rio Miguella joins Rio La Paz. Dr. Cardenas' memory seemed infallible. On many occasions he would go to an exact spot to find plants, which he had not seen for years. Never once did he refer to notes to refresh his memory.

Although *Lepidopharynx deflexa* was not in bloom when collected on Nov. 7, 1958, it was identified in the field by the flowers of a few withered scapes which were still attached to the bulbs. *Lepidopharynx deflexa* was growing on a nearly vertical south slope a few feet above the flood-line of the river. The slope had a coverage of shrubs and trees which afforded partial shade. The entire area is quite warm the year around at the relatively low altitude of 3586 ft. above sea level. This station, which is the type colony of *Lepidopharynx deflexa,* is near the edge of a heavy rainfall area.

A few kilometers up Rio Miguella from its junction with Rio La Paz other *Amaryllis* bulbs were collected in deep shade. They were growing in the leaf mold on the steep forest floor. These were not in bloom on Nov. 7, 1958, and have not yet bloomed at this writing. The altitude of this station is 3658 ft., essentially the same as for the previous station which is near by.

A three-day trip was made to San Antonio, Bolivia, from Cochabamba by truck Oct. 15-17, 1958. This trip yielded at least three and possibly four amaryllids. A species of *Eucharis* was collected in the rain forest at 1,550 ft. elevation. It was growing in rather dense shade and on flat land. *Amaryllis reginae* was collected from cultivation as were two other *Amaryllis* which were not in bloom when collected November 17, 1958. One of these was said to be white, the other pink. They have not yet bloomed at Lafayette, La.

Dr. Martin Cardenas had a most unusual chartreuse-flowered *Amaryllis* in bloom in Cochabamba which had been sent to him two years earlier by Rev. Fr. Lorenzo Hammerschmidt of San Ignacio, Bolivia. Dr. Cardenas and the writer flew to this isolated pueblo to spend a week collecting with Fr. Lorenzo. This *Amaryllis,* one of the *A. elegans* alliance, was collected in bloom on Oct. 20-26, 1958, between San Ignacio and San Miguel at 1250 ft. elevation. It was again collected near San Javier at 2000 ft. on November 14, 1958, and on December 12, 1958 at 2480 ft. near the village of Santiago, Bolivia. Dr. Cardenas describes this long-trumpeted species in this issue of Herbertia as *Amaryllis elegans* var. *divifrancisci* Cardenas. It offers another source of yellow color to *Amaryllis* breeders.

A second *Amaryllis* was collected in the San Ignacio area. Unlike the preceding one it was found on a hillside instead of on the relatively flat pampas and growing in dense shade instead of in partial shade. It was not in bloom but could be readily distinguished by its wide leaves which were almost horizontal. This collection was made on Oct. 19, 1958 at an elevation of approximately 1600 ft.

Amaryllis belladonna was collected over a wide area. The usual forms were found in the Santa Cruz, San Javier, San Ignacio and Santiago areas. An especially fine rose colored clone was collected from cultivation in the Evangelical Mission yard in Santa Cruz. This clone is unquestionably *A. belladonna* but is superior in color and form to the typical form. It is one of the most beautiful *Amaryllis* that the writer has seen.

Enroute back to the United States a brief stop was made in Peru on Dec. 18-19, 1958. Dr. Raymond Ferreyra and Ing. Joseph Tosi very kindly drove the writer about 120 miles north of Lima where *Paramongaia weberbaueri* was collected at Lomas de Lipin. This was found in a dormant state in crevices of rocks which had been completely filled with organic matter. Although the area is desert, a brief rainy season gives enough moisture for this plant to survive. The altitude here is 1085 ft. above sea level. In the same area a *Stenomesson* species was collected in bloom.

In all, the collections include 7 *Amaryllis* species for certain and possibly as many as five more which have not been identified, as well as species of *Habranthus, Zephyranthes, Lepidopharynx, Paramongaia, Eucharis* and *Stenomesson.*

It would be an injustice not freely to acknowledge the aid which was generously given by many people in South America. Although space does not permit acknowledgement to each person who contributed to the success of the expedition, the following persons contributed in numerous ways toward the collection of the amaryllids: Dr. Martin Cardenas, Wenislow Obando, and Lucio Arce, all of Cochabamba, Bolivia, and Joseph Tosi and Dr. Ramon Ferreyra of Lima, Peru. The writer is indebted to the Franciscan Fathers of San Ignacio, Bolivia, the Rev. John Breman of San Javier, Bolivia, and the Rev. George Haite of Santiago, Bolivia, for board, lodging and transportation in their respective areas; and to Anne Krieger of Santa Cruz, Bolivia, for aid in the shipments of plants from the Santa Cruz area.

There are still many *Amaryllis* species in South America which should be collected. These are not only of great scientific interest but are also potentially valuable for use in improving our garden *Amaryllis.*

PHOTOGRAPHY IN YOUR GARDEN

DAVE FORBERT *

It is generally thought that one active hobby is more than enough for the average person these busy times, but the flower enthusiast who also likes photography is in a position to get double enjoyment from his garden. He does this by shooting color slides of his choice blossoms or flower arrangements during their peak blooming season. Then when winter comes he can bring it all to life again by projecting them on a screen. Color photography is also a perfect way of keeping a permanent record of your flower bed arrangements: what was planted next to what, how the color harmony looked, etc. If each bed is photographed several times during the summer and the slides properly dated and identified it will be of tremendous value in future planning.

Most cameras on the market today have adequate lenses for garden photography, however, if you are about to buy a camera for your new hobby there are several points you should first consider. First you must decide if you want small economical 35mm color slides or larger 2¼x2¼ slides which are more impressive on the screen but also cost considerably more to produce. Generally speaking the two sizes of cameras will cost about the same so the only big problem is film cost. Also to be considered is the fact that some people will shoot more pictures than others; therefore if you plan to shoot in quantity your best bet will be 35mm which gives you 36 (or 20) exposures to a roll and is cheaper than the #120 (2¼x2¼) film which gives you only 12 pictures to a roll of film. On the other hand if you shoot few pictures you might be happier with the more expensive 120 film size. My only advice here would be to buy which ever your pocket book can best afford.

In the 35mm category I recommend the single lens reflex type camera. This type of camera offers the advantage of being able to see your actual picture on a ground glass. Of course the regular optical viewfinder type 35mm camera is also an excellent tool and can be had at a more reasonable price than the reflex type. You have a wide choice of cameras here from $30 on up to $500.

In the #120 (2¼x2¼) size camera I again recommend the reflex type and their prices range from about $40 on up to $500.

Now that we have a camera, lets take pictures of our garden. In outdoor shooting the first thing to consider is lighting. The relationship between the position of the sun and the single flower blossom or bed of flowers can make all the difference between a snapshot and a dramatic photograph. Outdoor lighting might be broken down into the following headings:

* Dave Forbert, the talented photographer, is the son of Mr. & Mrs. Sam Forbert, of Hattiesburg, Miss. He graduated with highest honors from the School of Modern Photography in New York, and is now head of the Readers' Digest photography staff; his wife Amy Daly Forbert serving as his research assistant. Dave and Amy Forbert, with daughter Leslie live in New York City. **—Hamilton P. Traub**

FRONT LIGHTING: The sun coming from behind the camera and shining directly on the front side of flowers. (Care must be taken not to show your own shadow in the picture with this type of lighting.)

TOP LIGHTING: The sun coming from directly above the flowers causing shadows to go straight down. As a rule noontime is a bad time of day to shoot pictures of your garden, particularly closeups due to the fact that the supporting stems will be in deep shadow.

SIDE LIGHTING: The sun striking the flowers from either extreme right or left. This is often referred to as texture lighting and is very effective in bringing out the three-dimensional character of flowers.

BACK LIGHTING: The sun coming from behind the flower. This type of lighting is a favorite for translucent blossoms such as tulips, gladiolus, daffodils, and amaryllis. Since the sun will be shining almost directly into the lens of the camera it might be necessary to shoot from a very low camera angle in order that the sun will be hidden behind the flowers. Or you might have a friend shade the lens by holding his hand or hat high above the lens blocking the sun.

In shooting your close-ups with any of the lighting directions listed above you might find it desirable to fill in the shadows with either artificial light (blue flashbulbs) or a white piece of cardboard or newspaper, used to reflect sunlight into the shadows. This is almost a necessity in backlighting pictures since the non-translucent stems and some flower leaves will need light to bring out their color—otherwise they would appear in silhouette.

The backgrounds in flower photographs should be as simple as possible in order to keep the attention focused on the subject, and to keep the picture from looking cluttered. It is therefore advisable to move in as close to the flower as possible and try to find a neutral background such as the side of the house, a solid fence, or shoot from a low angle and use the blue sky as your background. If none of these are possible you can buy at a reasonable price from an art supply store a set of colored cards suitable for backgrounds. But remember in shooting color that you do not want to drown the flowers subtle colors by using bright colored backgrounds. As a matter of fact I recommend a set of perhaps four or five colored cards, (i.e. a soft blue, pale green, gray, a soft yellow and a pure black). The latter is especially good for getting stark contrast with light colored flowers. Naturally these colored cards can also be used for your indoor shots of arrangements.

When shooting indoors you have more control over your lighting since you can move your flowers and light to achieve the best effect. The one thing you must keep in mind however, is that you want your lighting to look natural—as though it were sunlight or, in other words it should have one main light source (like the sun) with additional lights used only to fill in shadows, light background and accent certain areas. When shooting color film indoors you must be sure to consult the instruction sheet which is packed with the film concerning the type of lights to use, filters, etc. As for the type of film to use, Kodachrome is still a favorite even though its speed is considerable slower than the

newer films such as Ektachrome-Professional, Anscochrome, and Super Anscochrome. However, since Kodachrome is not made in the #120 film size your best bet here is Ektachrome and Anscochrome. I do not recommend the faster super Anscochrome and Ektachrome-Professional for flower photography unless you are shooting pictures under very unfavorable lighting conditions. The faster films do not seem to be as true in color as the slower films. As for exposure I strongly recommend a photo electric exposure meter for those who plan to take their photography seriously and who want the best possible results. However unless you plan to really master the use of the meter—which is tricky—you will be better off following the instructions packed with each roll of film. Color film is more critical in exposure than black and white and one must be pretty close to the exact exposure to achieve best results.

Unfortunately due to limited space it is only possible here to touch on a few points that might help make better garden pictures. I recommend that you use this short article only as a starting point and consult a good book on fundamental photography, which is available from the public library or your local camera store.

SOUTHERN RHODESIA NEWSLETTER, 1959

Sydney Percy-Lancaster

After a life time in India—fifty six years of it spent in active horticultural service—my wife and I decided to settle down in S. Rhodesia with our son, who is also a gardener. Leaving Bombay in early February (1959) by the S. S. Karanja we stopped for a day at the Seychelles and I took the opportunity of visiting the chief island, Mahé, to see the Double Coconut in the Botanic Gardens at Victoria. It was a Sunday and the guards were on leave so that vandals were busy inscribing their names on the several green fruit that were within reach. I had long wished to see the Palm on which the Double Coconut grew and at last my wish was gratified. There may be among the readers of this article some who may never see this palm in the Seychelles and I give a few notes I made about *Lodoicea seychellarum* at the time.

The Seychelles are a group of 92 islands of which Mahé is the largest; about 17 miles long by 5 miles wide. The Double Coconut is only found in a natural state on one island that is off the beaten track. Nuts however have been distributed to different tropical parts of the world while numbers of the palm are growing in Mahé. I had previously seen a small specimen of this palm in Calcutta (India) and the bilobed nuts, freed of the husk, as well as polished specimens, and various ornamental dishes, boxes, bowls, etc. made from the nuts, had passed through my hands for a Peace Celebration Exhibition after the First World War.

The palms in this garden are possibly 20 to 30 years old, the male specimen being eighteen or more feet tall and the females slightly less. The leaves of the male are larger than those of the female and measure 6-8 feet wide by 9-12 feet long, without the petiole, which must have

been 8 feet long. The leaves are palmate, intermediate between those of *Styloma (Pritchardia) pacifica* and *Sabal unbraculifera.* The male carried long pendant spadices, 3-4 feet long and 3-4 inches in diameter, while the trunk diameter was some 15 inches at the base. The female palms were slightly smaller and the fruit carrying spikes were 3-5 feet long; on some a solitary fruit appeared but five seemed to be the maximum on the plants seen. The fruit, when first pollinated, appears like a gigantic black acorn in a nine inch diameter cupule, a couple that were possibly more advanced, resembled three sided Coconuts *(Cocos nucifera).* The fruit in the husk at maturity measures 12-15 inches in width, 18 inches in length and 9-12 inches in depth. I could not get the weights but the largest could not have been less than 20 lbs. The popular names of this palm are *Coco-de-mer,* and *Maldive Nut,* the first fruits having been found on the sea shore of the Maldive Islands and, as it is not considered possible for a land plant to carry so large a fruit the Coconut of the Sea was a natural sequence. The Double Coconut grows to a height of 100 feet but a fully matured specimen takes a century to reach this height. The nut is the largest known fruit in the world and specimens have weighed as much as 50 lbs. but the great majority are about half this. The Palm does not commence fruiting till it is 20-30 years old and from the time of flowering till a fruit is mature ten years may elapse.

On reaching the coast of Africa the famous Baobab *(Adansonia digitata)* was seen in numbers but what a difference between these and specimens growing in different parts of India. The African Baobabs are stunted, with gouty trunks that must have been 20-30 feet in diameter at ground level. One specimen, measured at Mombasa, was between 15 and 18 feet. Neither Mombasa, nor Dar es salaam, had any outstanding plants to attract my attention. We disembarked at Beira for the train journey to Salisbury and my son, who had come to welcome us to the new country, took us round the station. He discovered a yellow *Gloriosa* resembling *G. superba* in shape of flower, but the foliage growth was different.

We left Beira at nightfall and traveled through Portuguese territory all night reaching S. Rhodesia in the morning. En route we saw masses of *Bauhinia galpinii,* huge bushes or rambling up trees to a height of 15-20 feet. *Aloe* and *Tritoma* were also seen wild and on either side of the railway track, at intervals, appeared drifts of *Cosmos,* the three common colours, and *Tithonia speciosa,* probably escapes from some garden. Salisbury, the capital, is 5000 feet in elevation and enjoys reverse seasons to what we have been accustomed. We arrived at the end of summer and in August are having winter weather, but temperatures are mild. The coldest night so far has been 39 degrees, usually the thermometer registers 40-50 degrees. The day temperatures range from 65 to 80 degrees. A number of the trees that grow in India at low elevations appear to thrive here for I have seen *Delonix regia, Bauhinia variegata, Spathodia campanulata, Cassia multijuga* and other species, *Cedrela toona, Jacaranda mimosaefolia,* etc. *Largerstroemia indica,*

Hibiscus in great variety, *Euphorbia pulcherrima (Poinsettia)* are well represented. I have been to two Shows in Salisbury, but the exhibits failed to show the wild flora of the country in which I am more interested than the cultivated species, and I am looking forward to scour the countryside as soon as Spring and Summer bring the dormant plants to life.

I was fortunate, through the kindness of the Director of the National Botanic Gardens, Lucknow (India), in being able to bring with me a collection of *Zephyranthes (Cooperanthes),* as well as a few *Amaryllis.* Some "out of season" flowers of both have already opened and I have raised seedlings of *Amaryllis* and of *Zephyranthes.* Among annuals I was interested in *Cosmos, Hollyhock* and *Petunia* and seeds sown on arrival have bloomed and the opportunity taken of cross breeding. I have therefore quite a number of irons in the fire.

We have a number of *Gloriosa* growing in my son's garden, some that came from India and others collected in Africa, these should flower during the Summer. My son has also collected bulbs of *Boophane (Buphane) guttata* (?), and a white form, and a few wild *Gladiolus.* A visit to a National Park introduced me to a collection of Aloes, most of them were in bloom and the flower ranged in colour from yellow through shades of orange to a deep scarlet. We have at least a dozen species in our garden collected locally. In this Park were a fine collection of *Encephalartos* as well as other succulents and Cacti but the specimen of *Portulacaria afra,* 12-15 feet high, made me rub my eyes in wonder. In India the oldest specimens were never more than four feet.

I trust that in my next letter Dame Flora will oblige and the beauties of S. Rhodesia be worth writing about.

[It is gratifying that Mr. Percy-Lancaster, who is now in his seventy-third year, is still hale and hearty and will keep us in touch with a most interesting part of the world with an annual newsletter. He is especially interested in *Zephyranthes,* including *Cooperia, Amaryllis* (syn.-*Hippeastrum),* other *Amaryllidaceae,* some of the *Iridaceae* and *Liliaceae.* He has *Amaryllis cybister* and hybrids of it, *Amaryllis recticulata* hybrid, clone 'Mrs. Garfield', *Amaryllis stylosa, Amaryllis belladonna* (syn.-*H. equestre)* and a half dozen of the Dutch Leopoldii (flat) type hybrids. Those who are in a position to assist Mr. Percy-Lancaster in his breeding work by furnishing additional material are requested to write to him at 799 Mansfield Road, Marlborough, Salisbury, Southern Rhodesia.—*Editor.*]

[**AMARYLLID NOTES, 1960,** continued from page 38.]

greenish. Thus this clone is almost the same as 'Harrison's Orientred'. Our plant does not seem to be as free-flowering as the named clone. It appears to have somewhat more whitish in the flower and thus could be used in breeding for a white *Sprekelia.*

Fig. 2. Queen of the New Orleans 11th Official Amaryllis Show, 1959. Miss Donna Gayle Mackenrath is crowned by Commissioner-at-large Victor H. Schiro.

1. REGIONAL ACTIVITY AND EXHIBITIONS

OFFICIAL NEW ORLEANS AMARYLLIS SHOW, 1959

MRS. A. J. HAYDEL, *Chairman*

The 11th Official Amaryllis Show at New Orleans with the theme "A Melody Tour", sponsored by The Garden Circle, affiliated with the American Amaryllis Society, the Federated Council of New Orleans Garden Clubs, the Louisiana State Federation of Garden Clubs, was held March 21-22, 1959 at Eleanor McMain School. Sixty-seven Garden Clubs participated in artistic arrangements and horticulture divisions.

Mrs. A. J. Haydel was Show Chairman, and Mrs. W. J. Perrin, Honorary Chairman.

The arrangements were judged by six accredited Judges and the horticulture entries were judged by twelve Amaryllis judges. Mrs. William Derbuesse received the Silver Tray for the most outstanding arrangement, labeled "Sailing, Sailing". Mrs. Sheryl Schlotter won the Gold Cup for the Junior Arrangement, "Deep in the Heart of Texas".

Mrs. A. J. Haydel [Fig. 3] won the Ludwig Challenge Cup for the best Ludwig specimen—'Apple Blossom' (Ludwig); the Reuter Seed Co. Trophy; the Sweepstake Award Gold Cup, for the most outstanding Dutch specimen—'Apple Blossom' (Ludwig).

Mrs. Harry St. John won the Harry St. John Memorial Challenge Cup Trophy for the most outstanding registered American Hybrid, 'Harry St. John' (St. John, 1957); and also the La Forest Morton Memorial Trophy for an American Hybrid, This latter was a Sweepstake Award in American Hybrids.

The Junior Horticulture Award was won by Ronnie Catalanotta.

The following AMERICAN AMARYLLIS SOCIETY awards were made:

'Daintiness' (Ludwig), **AWARD OF MERIT;** exhibited by Mrs. John Cucurullo.

'Fire Fly' (Ludwig), **AWARD OF MERIT;** exhibited by Mrs. A. J. Haydel.

Unnamed clone, **AWARD OF MERIT;** exhibited by Mrs. John Klein.

'Little Sweetheart' (Ludwig), **AWARD OF MERIT;** exhibited by Mrs. Emile Malbrough.

'Cardinal' (Ludwig), **AWARD OF MERIT;** exhibited by Mrs. W. J. Perrin.

'Harry St. John' (St. John, 1957), **AWARD OF MERIT;** exhibited by Mrs. Harry St. John.

The educational exhibits were displayed by Mrs. W. J. Perrin and Miss Judy Bowers.

The Official Amaryllis Queen of New Orleans, Miss Donna Gayle Mackenrath, was crowned by the Hon. Victor H. Schiro. [Fig. 2.] The 1957 Queen, Miss Heannie Wolf presented the maid, Miss Bethny Seruntie. The crown bearer was Miss Paula Jefferson, and the Registrars were Miss Lynn Latapie and Sharon Jacobs.

The Amaryllis Dance was directed by Mrs. Andree Gelpi, with dancers from Kingsley House, including Shirley Bivalacqua, Connie

Callaghan, Terry Canfill, Christina Callaghan, Karen Canfill, Barbara Griffin and Gaynell Tanisa.

Fig. 3. Mrs. Antoine J. Haydel in the greenhouse with some of her choice named hybrid *Amaryllis* clones. New Orleans, Louisiana, spring 1959.

1959 OFFICIAL MEN'S AMARYLLIS CLUB SHOW

EMILE MALBROUGH, *New Orleans, Louisiana*

THE MEN'S AMARYLLIS CLUB of New Orleans under the chairmanship of Mr. Emile Malbrough, with Mr. Edwin Authement as co-chairman, presented its SECOND ANNUAL AMARYLLIS SHOW on April 4th and 5th, 1959 at the Bienville School. Five gold cups, five AMERICAN AMARYLLIS SOCIETY awards of merit, and other awards were presented to the winners. Six accredited amaryllis judges, after careful consideration of over 250 entries, (approximately 200 of which were registered Dutch blooms), decided the winners of the following awards to be:—

Mr. Milo Virgin, winner of the tri-color award for his 'Superba' entry in the registered Dutch hybrid class. This is the second consecu-

tive time Mr. Virgin has won this award at a show presented by this organization.

Mr. Tim Calamari, sweepstakes winner in the Dutch hybrid class and recipient of the "President's Trophy", given to a member of the club for the most blue ribbons in the show.

Mrs. Harry St. John, tri-color award for her entry 'Harry St. John' in the American hybrid class.

The winners of the AMERICAN AMARYLLIS SOCIETY awards of merit were as follows:

Mr. Timothy Calamari for 'Ludwig's Goliath' and 'Ludwig's It'; Mr. Henry Fontcuberta for 'Audrey'; Mr. S. P. Gasperecz for an unnamed Dutch seedling, and Mrs. R. E. Duggen for a red American seedling.

The show is entirely horticulture and open to all amaryllis lovers. Along with two educational displays, and literature, the members of the organization gave first hand information on the growth and care of amaryllis to all of the guests. Members of amaryllis clubs from cities in the surrounding area along with many local citizens viewed the show and expressed their pleasure and congratulations for a fine presentation.

MEN'S AMARYLLIS CLUB SHARES IN GARDENING RENAISSANCE

SANTO N. CUSHINETTO, *Corresponding Secretary-Treasurer*

During the past two years garden clubs in the New Orleans area have increased 35% and now number 109. It was during the advent of this era that the MEN'S AMARYLLIS CLUB of New Orleans was organized. This club, now well established, has increased its membership 60% during the past year, publishes its own monthly newsletter, and has sponsored two successful Amaryllis Shows. Its members promote the growth of Amaryllis, take part in, and cooperate with flower shows.

Newly elected officers are H. P. Fontcuberta, President; W. J. Perrin, Vice-President; Jules X. Wille, Corresponding Secretary; Santo Cuchinotto, Recording Secretary and Treasurer. Mr. Fontcuberta has years of experience in gardening activities and is well qualified to head this growing club.

FIRST OFFICIAL AMARYLLIS SHOW, VALDOSTA, GEORGIA

BECKWITH D. SMITH, *Jacksonville, Florida*

Upon invitation of Mr. Guy L. Rice, President of the VALDOSTA MEN'S GARDEN CLUB and Show Chairman, Mrs. Smith and I attended the two day OFFICIAL AMARYLLIS FLOWER SHOW held at the Valdosta Garden Center, 900 North Patterson St., Valdosta, Georgia, Saturday and Sunday, April 18-19, 1959. We entered ten cut scapes from our

collection of Amaryllis and were gratified at winning two blue, two red, and three yellow ribbons.

The show was conducted along the lines outlined by the AMERICAN AMARYLLIS SOCIETY. Divisions were:

1. The Outstanding Horticultural Entry in the Show.
2. The Best Named Clone Grown in a Pot.
3. The Best Unnamed Clone Grown in a Pot.
4. The Best Named Clone; cut specimen.
5. The Best Unnamed Clone; cut specimen.
6. The Best Entry From the Hybridizer's Class.

There were 27 entries in the Artistic Division and 174 entries in the Horticultural Division. Awards of Merit were given by the AMERICAN AMARYLLIS SOCIETY to: J. Ritchie Rosa, Tallahassee, Fla., for outstanding horticultural entry; to Mrs. D. W. Lawton, for best named clone grown in a pot; to Guy L. Rice, for best unnamed clone grown in a pot; to Mrs. Oscar Kennon, for best named clone, cut specimen; to Mrs. J. A. Fausett, for best unnamed clone, cut specimen; to J. Ritchie Rosa, Tallahassee, Fla., for best entry from the hybridizer's class. Special awards of green ribbons were given to Clyde Carter and J. Ritchie Rosa. Tri-color ribbon for best entry in the show was awarded to Mrs. O. S. Ware by the Garden Club of Georgia.

The show was well attended by residents of Valdosta and by numerous out of town visitors from Alabama, Florida and Georgia. After the show on Saturday, April 18th, visitors toured the beautiful garden of Mr. & Mrs. Guy L. Rice, where hundreds upon hundreds of hybrid Amaryllis were growing, all developed by them over a period of years. Most were in the red shades, as well as orange and salmon, and many near whites and pure whites.

Saturday night, April 18th, members, visitors and their wives attended a banquet at Ashley Oaks Motel Dining Room, where all were most interestingly entertained by a talk by Prof. Ira S. Nelson, Director of Horticulture at Southwestern Louisiana Institute, Lafayette, Louisiana, and who showed colored slides of rare Amaryllis species brought back from Bolivia by him in 1954. The consensus of everyone who attended this show was that it was worth continuing in future years, so it is hoped that many more shows will be held subsequent to this initial Official Amaryllis Show at Valdosta in 1959.

[**EDITOR'S MAIL BAG**, continued from page 28.]

hybridizing *Cyrtanthus* for the past two years, and reports that he got "a very fine break which is far finer than any of the genus—4″ to 5″ bulbs, throwing an 18″ stem crowned with from 4 to 9 trumpets 2″ long x 1½″ across, a glowing 'ember' colour, the petals dusted with gold (reminiscent of *Nerine sarniensis*). It is a beauty, and selfed, its seeds is producing some even better. These haven't increased enough to sell. My *Cyrtanthus sanguineus* I am selling at 5/- a bulb or 4/- each for large quantities."

FIRST OFFICIAL SHOW OF THE HATTIESBURG AMARYLLIS SOCIETY, 1959

The Garden Center was the scene on May 2-3 of the first official Amaryllis show to be held in Hattiesburg under the sponsorship of the Hattiesburg Society, an affiliate of the American Amaryllis Society. Long tables of potted blooming Dutch and American hybrid bulbs, scores of cut specimens, artistic arrangements, and an educational display were evidence that the local Society is achieving its objective: "To promote

Fig. 4. Hybrid *Amaryllis* clone 'Ludwig's Dazzler' (Ludwig). This fine specimen was grown by Mrs. R. A. Fowler, and won a blue ribbon at the First Annual Official Amaryllis Show at Hattiesburg, Miss., 1959.

a fuller appreciation of a most majestic and beautiful flower, the Amaryllis." Blooms on display ranged in color from purest white of 'White Giant' through varying shades of pinks and salmon to the deep crimson of 'Alcyone'.

Through the cooperation of several local firms, seven sterling silver goblets were awarded to local gardeners for outstanding entries. The President's cup, given by Mrs. Sam Forbert, president of the local Society, for the most blue ribbons in show, was won by Mrs. R. A. Fowler. The R. A. Fowler Memorial award, given by Mrs. Fowler for the most outstanding horticultural potted specimen of Dutch Amaryllis

Fig. 5. Hybrid *Amaryllis* clone 'Fire Dance' (Ludwig). This well-grown specimen was among the best in the First Annual Official Amaryllis Show at Hattiesburg, Miss., 1959. The specimen was not entered in competition; it was grown by Mrs. W. H. Sparrow, and placed among the educational exhibits.

in the show, was awarded to Mrs. J. W. Snowden's, 'House of Orange'.

Mr. W. D. Morton, Jr., an official of the American Amaryllis Society and Registrar of American hybrid clones, attended the show and made three official Amaryllis Society Awards of Merit. These honors went to Mrs. J. W. Snowden's, 'House of Orange'; Mrs. C. R. Bethea's, 'Five Star General'; and Mrs. V. J. Lucas', unnamed American clone.

Mrs. A. C. Hopton, Mrs. N. J. Furr, and Mrs. Everett Hughes of Jackson; Mrs. Jeff Brown, Mrs. Hunter Kilpatrick, W. R. Lowe, W. C. Strain and Harry McCarn of Mobile and T. C. Calamari of New Orleans, National Accredited Amaryllis judges, scored the exhibits.

MOBILE AMARYLLIS FORUM

LOU COSTA, *President*
356 McMillan Avenue, Mobile, Alabama

When the MOBILE AMARYLLIS FORUM was established in September, 1958, the adopted objective was stated as "the pursuit of knowledge in every phase of amaryllis culture" as it applied to this Gulf Coast area. Events since that time have amply demonstrated the sincerity of its members in their determination not to be diverted from that policy.

Monthly meetings have been held continuously—even through the hot summer months. These have consisted of very brief and harmonious business sessions followed by lectures, demonstrations, round table discussions, panel shows and the showing of slides. Garden tours were taken in season and an Amaryllis Show held.

For its first Show, the AMARYLLIS FORUM staged a small, private event, but it was complete in practically every detail. With separate divisions for horticulture and artistic arrangements, there were the customary donated silver trophies with prizes and ribbons awarded in each section and classification. But what we feel was most important to members and invited guests was the unique judging experience: the judging, with all its attendant discussion, was performed openly and aloud for all to hear and observe. This, we feel, was a liberal education in itself. Each prize and award was fully explained and justified while each feature or criticism was heard by the entire assemblage.

At present (August, 1959) we are in the midst of a course of study subscribed to by the entire membership. Each meeting comprises one full lesson, with texts and illustrations. From these lectures under tutelage of "Prof." Bob Parker all of us expect to learn much, but more than that, we hope some of us will be able to take—and pass—the examination for AMARYLLIS JUDGE'S CERTIFICATES. This is something really worth while striving for—the first in Mobile!

COASTAL BEND AMARYLLIS SOCIETY (TEXAS)

Amaryllis growers in Corpus Christi, Texas, held meetings in May and June, 1959, which led to the formation of the COASTAL BEND AMARYL-

LIS SOCIETY and will sponsor the Amaryllis division of the Lola Forrester Flower Show held at Corpus Christi each spring. It is thought that because of the favorable growing conditions along the lower coast of Texas and the widespread local interest in the *Amaryllis* as a garden plant, that this exhibition will become an outstanding one. Members of the club will also pursue their special interests in culture, collecting and breeding.

Officers elected for the first year were Fred B. Jones, Pres., Mrs. H. L. Harris, Vice-President, Mrs. W. H. Anderson, Secretary and W. L. Bates, Treasurer.

PARKER'S—AMARYLLIS JUDGING STUDY COURSE FIRST EDITION, 1959

In 1959, Mr. Robert E. Parker, 3051 Baronne Street, Mobile, Alabama, an accredited Amaryllis Judge of the American Amaryllis Society, brought out the first mimeograph edition of his "Amaryllis Judging Study Course" given by The Amaryllis Forum, Mobile, Alabama. This is based on the best available information and the subject matter is divided into five sections so that the course can be given in five sessions: (1) The plant and its parts; (2) Divisions of Amaryllis; (3) Score card; (4) Group entries in Amaryllis shows; and (5) Artistic arrangements. The Appendix consists of the catalog lists of registered Amaryllis clones furnished by the Official Registrar of Amaryllis Names of The American Amaryllis Society, Mr. W. D. Morton, Jr.

This is an excellent presentation and it is hoped that Mr. Parker will revise it in the coming years as further progress is made in this field. It is suggested that a list of references to the selected literature on Amaryllis and Amaryllis judging be added in future editions. Mr. Parker is to be congratulated for a job well done.

POSTSCRIPT.—The writer suggested to Mr. Parker that the Study Course might be made available to Amaryllis Judges generally and those preparing for examinations. He writes that "consideration is being given to making copies available if the response warrants it and if anyone is interested, he should inquire, indicating the number of copies that are needed, if inquiring for a group." Mr. Parker's address is: 3051 Baronne Street, Mobile, Alabama.—*Editor.*

HOUSTON AMARYLLIS JUDGES COUNCIL

The HOUSTON AMARYLLIS JUDGES COUNCIL was organized on July 22, 1959. The purpose of the Council is to increase the members' knowledge as accredited Amaryllis Judges of the AMERICAN AMARYLLIS SOCIETY so that they may become well-grounded in the Society's judging standards and may apply these standards in actual practice, and offer suggestions that may be of value in raising judging standards at Amaryllis shows.

All accredited Amaryllis Judges of the AMERICAN AMARYLLIS SOCIETY in the Gulf Coast Area may become members, and are urged to attend three meetings each year. Such meetings offer outstanding opportunities for exchanging information on judging Amaryllis.

Mrs. W. S. Wheeler, Pres., of THE HOUSTON AMARYLLIS SOCIETY acted as chairman of the organizing meeting. Officers of the Houston Amaryllis Judges Council are Mrs. E. L. Bachelor, Pres., Mrs. A. C. Pickard, 1st Vice-Pres., and Instructor; and Mrs. Frank S. Bova, Secy.-Treas.

The necessity of classes offering instruction for the OFFICIAL AMARYLLIS JUDGES CERTIFICATE has been apparent for some time, and it is now possible to arrange for such a course of study to accommodate the Coastal Area by writing to Mrs A. C. Pickard, Official Amaryllis Judging Instructor, 1702 N. Blvd., Houston 6, Texas.

43RD INTERNATIONAL FLOWER SHOW, 1960

The 43rd International Flower Show was held in New York City, March 5 to 12, 1960. The theme of the show was "Flowers of the World." The show was held in the New York Coliseum, Columbus Circle (Broadway & 8th Ave., at 58th Street).

The members of the American Amaryllis Society will be interested to know that "Class 305. Amaryllis, one pot; Class 601. Amaryllis, one specimen; Class 602. Amaryllis, 6 plants, one bulb in a pot" and various classes for *Narcissus,* were provided in the field of the amaryllids.

The show was sponsored by the Horticultural Society of New York, and the New York Florists' Club—office: Suite 212, Essex House, 157th W. 58th Street, New York 19, N. Y.

AMARYLLIS JUDGES CERTIFICATES

Since the last report in the 1959 AMARYLLIS YEAR BOOK (page 24), the following AMARYLLIS JUDGE'S CERTIFICATES have been issued by the AMERICAN AMARYLLIS SOCIETY:

65. Mrs. Bertha B. Manley, Box 608, Tonkawa, Oklahoma.
66. Mr. Timothy A. Calamari, Jr., 1623 Pauger St., New Orleans, Louisiana.
67. Mr. W. D. Morton, Jr., 3114 State Street Drive, New Orleans 25, Louisiana.
68. Mr. H. E. McCarn, 916 Pace Parkway, Mobile, Alabama.
69. Mr. Robert E. Parker, 3051 Baronne Street, Mobile, Alabama.
70. Mr. Louis C. Costa, 356 McMillan Ave., Mobile, Alabama.
71. Mrs. Ruth Costa, 356 McMillan Ave., Mobile, Alabama.
72. Mrs. J. A. Brown, Jr., 700 Fulton Road, Mobile, Alabama.
73. Mrs. Frank Petry, 9 West Petain Street, Prichard, Alabama.
74. Mr. Ivan A. Owen, 2580 Pollard Lane, Mobile, Alabama.
75. Mr. M. R. Bond, Sr., 115 East Sherwood Drive, Mobile, Alabama.

76. Mr. J. A. Brown, Jr., 700 Fulton Road, Mobile, Alabama.
77. Mrs. H. P. Kilpatrick, 279 Park Terrace, Mobile, Alabama.
78. Miss Elizabeth Kilpatrick, 279 Park Terrace, Mobile, Alabama.
79. Mrs. W. P. Bain, 121 Mohawk Street, Mobile, Alabama.
80. Mr. W. P. Bain, 121 Mohawk Street, Mobile, Alabama.
81. Mrs. Earl Parker, 2552 Moffat Road, Mobile, Alabama.
82. Nell Keown, 2060 Pratt Drive, Mobile, Alabama.
83. Lois Koontz, 4200 Overlook Road, Mobile, Alabama.
84. Mr. W. C. Strain, 563 Mohawk Street, Mobile, Alabama.
85. Mrs. Henrietta R. Taylor, 11222 Green Bay Drive, Houston, Texas.
86. Mrs. W. C. Strain, 563 Mohawk Street, Mobile, Alabama.

EDITOR'S MAIL BAG

Under date of Sept. 9, 1959, Mr. L. S. Hannibal, 4008 Villa Court, Fair Oaks, Calif., writes that "visitors here at Fair Oaks will be given their selection of garden run material (free), should they drop in during the flowering season over the Labor Day holiday period [in 1960 and thereafter]. However, I am not interested in distributing bulbs by mail. Too much fuss."

Mulford B. Foster and Racine Foster announced that they are closing their business in the City of Orlando, Florida, as of Sept. 1, 1959, and that their address is now Route 3, Box 658, Orlando, Florida, their new estate at BROMEL-LA, where they find isolation and a private life. They are in "the process of retirement and thus will be open, mainly, for wholesale bromeliads, *by appointment only,* on two days of the week —Tuesdays and Wednesdays. In other words, we need a great deal of time to ourselves in order to catch up with our unfinished paintings, articles and books, as well as further bromeliad research. Out-of-town visitors will be given special dispensation on other days of the week by appointment." The telephone is CYpress 3-4616 (as listed in the Orlando directory).

The writer had a most interesting visit in La Jolla with Prof. Leo Brewer, 15 Vista del Orinda Road, Orinda, Calif. Prof. Brewer is a scientist and is now writing a book on his specialty; he is also a real gardener who is interested in the amaryllids and other plants.

Mrs. Ida Ford Deans writes that her mother, Mrs. J. B. Ford, 119 E. 4th. Ave., Petal, Mississippi, a member of the Society, is very much interested in *Amaryllis* although past 93 years of age (born May 4, 1866); and that she "is actively engaged in growing them, both from seeds and bulbs." Mrs. Deans asks if there is an older member of the AMERICAN AMARYLLIS SOCIETY?

Mr. P. Gordon McNeil, P. O. Ofcolaco, N. Transvaal, South Africa, writes that he grows a particularly fine form of *Cyrtanthus sanguineus* which he obtained from the late Miss K. C. Stanford. He has been

[**EDITOR'S MAIL BAG,** continued on page 22.]

2. SPECIOLOGY

[EVOLUTION, DESCRIPTION, CLASSIFICATION AND PHYLOGENY]

THREE **AMARYLLIS** FROM SABA ISLAND

FRED B. JONES
521 Vaky St., Corpus Christi, Texas

In the fall of 1954, I received from Saba Island, a tiny Dutch possession lying southeast of Puerto Rico, two small shipments of *Amaryllis* bulbs which had been grown under cultivation there. It was through the courtesy of Mrs. Edith Strout, then Chairman of the General

Fig. 6. *Amaryllis belladonna* L., hybrid from Saba Island. Note the stripe on the segs in the throat and the trifid stigma. It may be a cross of *A. belladonna* L. with *A. striata* Lam., since the stigma in *A. belladonna* L. is capitate (minutely trifid).

Amaryllid Committee of the American Amaryllis Society, that I was able to acquire these bulbs. She had made the acquaintance of the lady who dug and sent them while visiting there in the nineteen thirties.

Planted out in a well-prepared bed with afternoon shade, a few of the bulbs sent up scapes the next spring, but most did not bloom until March and April of 1956. Those which flowered were of three kinds. As anyone who has received bulbs under these circumstances well knows, an accurate identification is practically impossible unless the material turns out to be identical in every way with varieties or species already known. In this case, the plants differed considerably from any with which I was familiar. Mrs. Strout had previously grown and flowered

what were probably the same Saba plants and had likewise found it impossible to make a positive identification. It is the plants themselves, however, standing on their own merits as garden material, with which we are concerned here, and final decisions on their proper classification can wait until a later date. The names given below are intended only to suggest the likely affinities of the bulbs. One or more than one may represent true species or all may be hybrids.

Amaryllis belladonna L., species or hybrid (Fig. 6). Blooming in March, this produces usually four brick-red flowers on a stout scape. The greenish-yellow markings in the throat are unlike those found in *Amaryllis belladonna* var. *major*. A really choice bulb.

Fig. 7. *Amaryllis reginae* L., hybrid from Saba Island. Note that stigma is deeply trifid. The stigma in *A. reginae* L. is capitate (minutely trifid).

Amaryllis reginae L., species or hybrid (Fig. 7). Differing in form from the above, the flowers are about four inches across, the outer part of each tepalseg being cherry red, the inner white or greenish white. The scapes are relatively short as are also the pedicels. It blooms in March, slightly later than the above. Truly a gem.

Amaryllis vittata L'Hérit., species or hybrid (Fig. 8). The tall scapes, which appear later than either of the above (in April) are topped by white (not snowy-white) deep-throated flowers having faint crimson lines on the tepalsegs as can be seen in the close-up. On the whole, a less attractive variety than the others.

It will be interesting to see if one or more of these Saba Island plants can be permanently established as garden plants on the Texas coast. Judging from the experience of Mrs. Strout, who tried them in pots in her cool California climate, they will have to be grown in outside beds (personal communication). But further experiments with growing them in containers would be worth while. It is likely that they would resent being dug and stored each winter as is the practice with modern

Fig. 8. *Amaryllis vittata* L'Hérit. (species of hybrid). This may prove to be a variety of this species with lighter crimson lines instead of the more prominent markings in the type.

Amaryllis hybrids in some parts of the country. From my own experience with these bulbs to date (1958), it appears that they are no more particular about the soils in which they are grown than other commonly cultivated species or hybrids. The real limitation seems to be the low temperatures which may be expected during the winter months. These plants were not subjected to such conditions when grown on Saba Island.

NEW BOLIVIAN AMARYLLIS

M. CARDENAS, *Bolivia*

During the past five years the writer has searched for *Amaryllis* L. species in various parts of Bolivia. Of the many plants that came to his attention two are new to science and these are described below.

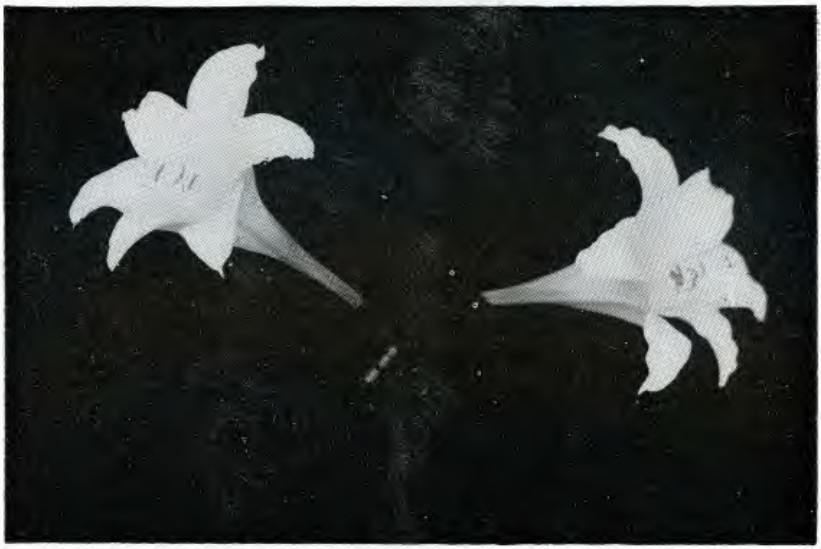


Fig. 9. *Amaryllis fragrantissima* Cárdenas, *sp. nov.*, native to Bolivia; pure white and delightfully fragrant.

Amaryllis fragrantissima Cardenas, **sp. nov.**

Geophyta 30-40 cm. alta. Bulbo 8-10 cm. long., 6-8 cm. crasso. Tunica exteriore brunea. Fallis in anthesi abscens. Scapo 30-40 cm long., 1.52 cm. a basim crasso, glauco. Bracteis lanceolatis atro purpureis 8 cm long., 1.5 cm. in base latis. Umbella 2 flora. Pedicellis 2.5-4 cm. long., 6-8 mm. crassis. Ovario 12 mm. long. arto viride. Tubo tepalorum 4-6 cm. long., 8 mm crasso supra ovarium. Setepal egmentis 16-18 cm. long., 3-4 cm. latis. Petepalsegmentis parce angustioribus. Omnibus segmentis inferne viridibus, superne niveis, fragrantibus. Staminibus inferne tubo adnatis usque 6 cm. supra ovarium, albis. Antheris 1 cm. long, atro viride. Tubo tepalorum 4-6 cm. long., 8 mm crasso supra ovarium. stamina superante. Stigma trifida, lobis 5 mm. long. deflexa.

Geophytic plant, 30-40 cm. tall, leafless at anthesis. Bulb large, 8-10 cm. long, 6-8 cm. broad. Scape 30-40 cm. long, 1.5-2 cm. thick at the base, glaucous. Spathe valves lanceolate, dark purple, 8 cm. long, 1.5 cm. wide at the base. Umbel (in three plants observed) 2-flowered. Pedicels 2.5-4 cm. long, 6-8 mm. thick. Ovary 12 mm. long, dark green. Tepaltube 4-6 cm. long, 8 mm. thick above ovary. Setepalsegs 16-18 cm. long, 3-4 cm. wide. Petepalsegs slightly narrower. All segments green-

ish below, pure white above, scented. Stamens inserted in the tepaltube. Free portion of stamens 9.5 cm. long, 2 mm. thick, pure white. Anthers about 1 cm. long, 2 mm. wide at anthesis, light yellow. Style free from the bottom of the tube, 15 cm. long, 2.5 mm. thick, white, slightly longer than stamens. Stigma trifid with deflexed 5 mm. long lobes.

Bolivia: Province of Chapare, Yungas of Corani, 1800 m. September 1959, M. Cárdenas No. 5512 (holotype) in Herbarium Cardenasianum.

Obs.—This new *Amaryllis* species was obtained by the writer under cultivation at Cochabamba. The grower had brought it back from Yungas of Corani, which is 3 days journey by foot-path beyond Colomi. It is one of the finest *Amaryllis* species known from Bolivia, having pure

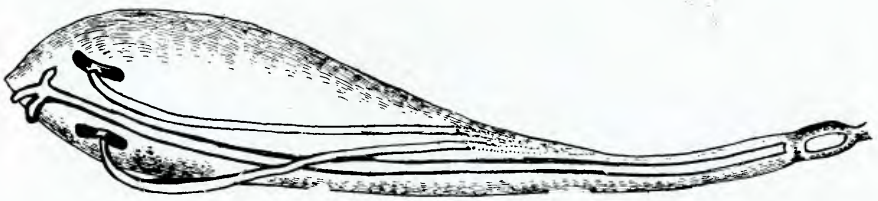


Fig. 10. *Amaryllis fragrantissima Cárdenas, sp. nov.,* showing ovary; place of stamen attachment at the apex of the tepaltube; and tepalseg above tepaltube; length of style; and trifid stigma. Approx. 2/3 natural size.

white, delightfully scented flowers. At first the writer thought that it might be close to *Amaryllis immaculata* Traub & Uphof, but our plant has a shorter tepaltube and only 2 flowers in the umbel as far as known. It is related to *Amaryllis vittata* L'Hérit., from which it differs by its narrower lower section of the flowers, and in the color.

Amaryllis elegans var. **divifrancisci** Cardenas, **var. nov.**

Geophyta 60-80 cm. alta. Bulbo ovoideo 8 cm. long., 6 cm. crasso, tunica exteriore paulisper fusca. Pseudocollo 10 cm. long., 2.5-3 cm. crasso parum complanato. Foliis 5-8, erectis 30-50 cm. long., 2.5-3 cm. latis pallide viridibus linearibus gladiatis, apice parce acuto, margine albescente vel rubescente. Scapo 50 cm. long. superne viride, inferne purpureo. Umbella 2-3-4 flora. Bracteis membranosis 8 cm. long., diluto bruneis. Pedicellis 4-5 cm. long. Tubo tepalorum 10 cm. long., 8 mm. crasso temperato viride. Perigonio 10 cm. long., cremae viridiscentis. Paraperigonio glabro. Segmentis tepalorum 10 cm. long., 2.5-3 cm. latis, lanceolatis. Filamentis adnatis basim segmentorum, subulatis, inferioribus viridibus, superioribus albidis. Stylo stamina 1 cm superante, inferne viride, superne albido. Stigmate trifido. Fructibus 3-4 cm. latis, 1-2 cm. altis, capsula trilocularis dilute fusca et rubida. Seminibus compressis obscure bruneis vel nigris 1-1.5 cm. diam., membranaceis.

Geophytic plant 60-80 cm. tall. Bulbs ovoid about 8 cm. long, 6 cm. broad, bulb-coats thin light brown. Neck 10 cm. long, 2.5-3 cm. thick terete or slightly flattened. Leaves at anthesis 5-8, erect light green 30-50 cm. long, 2.5-3 cm. wide, with whitish translucent margins, linear-lanceolate, slightly acute at apex. Scape about 50 cm. long, 2 cm. thick at the base. Spathe valves 8 x 2.5 cm., light brown, greenish at base, lanceolate. Flowers 2-3-4 in each umbel. Pedicels 4.5 cm. long, 8 mm.

Fig. 11. *Amaryllis elegans* var. *divifrancisci* Cárdenas, *var. nov.*, native to Bolivia; tepaltube light green, rarely tinged purple, tepalsegs creamy-whitish keeled green.

thick, dark green. Ovary 2 cm. long. Tepaltube about 10 cm. long, 8 mm. thick, light green, seldom purple tinged. Tepalsegs much alike, 10 cm. long from the end of the tube. Setepalsegs lanceolate, 10 cm. long, 2.5-3 cm. wide, light green at base, cream whitish at the apex with a green central rib outside. Petepalsegs quite as long as setepalsegs, narrower (2 cm. wide), acute, not mucronate as are the setepalsegs. All tepalsegs deflexed with curled edges. Stamens with the filaments adnate to the tube in its lower part, green below, whitish above, shorter than style, 6 cm. long in the free section. Style green below, whitish above. Stigma clearly trifid with three white round lobes. Paraperigone glabrous. Fruit trilocular, 3-4 cm. broad, 1.5-2 cm. high, light brown, reddish when shedding. Seeds in 2 rows inside each locule, more than 100 in number, circular, membranaceous, 1-1.5 cm. wide, dark brown to black. Locules with reddish interior walls after shedding.

Bolivia: Province of Velasco, Department of Santa Cruz, San Ignacio, 400 m., October 1958, M. Cárdenas No. 5508 (holotype) in Herbarium Cardenasianum. From the type locality near Ignacio, in savanna formation, in all directions, limits undetermined.

Obs.—This showy-flowered *Amaryllis* was sent to us in 1957 from San Ignacio de Velasco by Father Lorenzo Hammerschmid and it flowered in Cochabamba in 1958. In October 1958 we collected it over a wide area in company with Prof. Ira S. Nelson on the way to San Ignacio to San Miguel, and on the way from San Ignacio to Las Lajas. Later on Prof. Nelson collected it again at San Xavier and at Santiago de Chiquitos.

This plant is considered here as a variety of *Amaryllis elegans,* and differs from *A. elegans* var. *elegans* by its longer bulb neck, erect leaves, longer pedicels, more acute tepalsegs, and the clearly trifid stigma. Some plants bear cream-colored flowers suffused purple. No plants among hundreds that have been seen had more than 4 flowers.

HUNTING GREEN-FLOWERED AMARYLLIS IN BOLIVIA

M. Cardenas, *Bolivia*

In August 1902, R. S. Williams, botanist of the New York Botanical Garden while travelling as a member of a British Petroleum and Rubber Expedition in the interior of the Province of Caupolican in Bolivia, discovered a green-flowered *Amaryllis* species near the "Machichoriza" River. In 1910, Dr. Henry H. Rusby, described this plant as a new species under the binominal *Hippeastrum viridiflorus.* No living specimens of the plant were sent to the United States or Europe since that time. We do not know whether the Dutch *Amaryllis* breeders tried to obtain bulbs or seeds in the meantime. Prof. Ira S. Nelson from Southwestern Louisiana Institute while collecting *Amaryllis* material in Bolivia in 1954 and 1958 was determined to go to Apolo in order to locate this long lost plant. On November 1958, when we came back from a journey to Yungas of La Paz, he planned to fly to Apolo by the

beginning of December. Unfortunately, due to a shortage of time and the risk of the rainy season just starting, he could not carry out his plan. Since the beginning of the present year (1959) we have received several inquiries about the location of "Machichoriza" in Bolivia while in the search of the green flowered *Amaryllis*. That name did not appear on any of our maps. We began asking friends in Apolo about this geographical problem. No satisfactory answer was given. Then, looking at the dates and localities given by R. S. Williams during his journey, starting from Apolo and passing on to "Machichoriza," "Guerratuma," Aten and Inglis-Inglis between the end of July and the middle of August in 1902, we guessed at the way to reach the place where this plant might be found. Thus, we started on August 4, 1959 together with two assistants of the Department of Botany, University of Cochabamba, on the way to hunt the green-flowered *Amaryllis*. We reached La Paz by plane and waited until the 8th to fly to Apolo. At Apolo we realized that "Machichoriza" was Manchucuriza and that "Guerratuma" was Huarutumo. On August 11, we left Apolo, located on a grassy meadow at 1,400 m. altitude, for Curiza, an Amerindian settlement located at the lower section of the Rio Curiza. We travelled mostly on foot because the path was rough, having been maintained since the time of Amerindian Cinchona bark and rubber collectors. On the way, we crossed the Altunkama Cuesta at about 2,200 m. Then we descended from the grassy slopes to a deep tropical cañon where the Rio Curiza flows through at 1.100 m. After a whole day's travel we arrived at the Amerindian settlement named Curiza where there were abundant *Amaryllis belladonna* L. plants in full flower. We asked the local Amerindians about the green-flowered *Amaryllis*. They said we had to climb up the mountain to obtain it. On August 12 we traveled from Curiza Mountain up in the direction of Cargadero and found very showy specimens of *Amaryllis pardina* in bloom. These differ from those growing also wild in Yungas of La Paz by the larger and lighter colored flowers. By the way, Pearce, the early *Amaryllis* hunter in the Andes, stated that the "leopard" *Amaryllis* came from Peru. We do not know if anyone has collected wild specimens of it in Peru. After this difficult mountain climbing we came back to Curiza not having seen a single plant of *Amaryllis viridiflora*. The next day we started in the direction of the Rio Huarutumo and arrived at Guanay with the same unfortunate results. The next day, crossing rushing rivers, we reached Aten. From here in one more day's journey, we arrived at Apolo On the way between Curiza and Aten we passed through large areas of flowering *Amaryllis* into the wet forest. Some of these had giant leaves and scapes, scapes reaching up to 1.5 m. and leaves 10 cm. wide. Here we identified *Amaryllis crociflora* looking much like *A. belladonna* except for its shorter and regular tepaltube. Though we did not find the green-flowered *Amaryllis,* we became acquainted with the native Amerindians on the way down. This was fortunate. Some 15 days after our return to Cochabamba, we received three scapes of the green-flowered *Amaryllis* at long last from the Amerindians of the Rio Curiza, and comparing them with the original Rusby description, we concluded that we had in

hand the so long lost species Later on we received a few plants with bulbs and ripe capsules. These bulbs are growing in our nursery at the University of San Simon. The seeds are being distributed among a few of the American *Amaryllis* growers. We have also sent these to Dr. Hamilton P. Traub and Prof. Ira S. Nelson. The Missouri Botanical Garden has received a good supply of these seeds also. We had reached the type locality, only 15 days too early.

Now, returning to the characters of this long lost plant, we found it closely related to *A. elegans* Sprengel. Probably Dr. Rusby when describing it as a new taxon, did not have our plant in mind. The color of flower is not leaf green as we expected but light lettuce-green or rather "Love bird" or "Calliste" green. In any case, we hope that with our introduction of seeds into the United States, the American *Amaryllis* breeders will be able to use this rare green-flowered *Amaryllis* species in producing large-flowered green hybrids.

AMARYLLID NOTES, 1960

Hamilton P. Traub

ROSENBERG—CORONA AMARYLLIDACEA

This rare book containing 8 color plates was published for the author, Miss Rosenberg, by C. A. Bartlett, Bath. (1839). Folio. Each of the 8 plates is an original water color. It is not listed in Bruner, Lowndes, Pritzel, or Dunthorne, but is listed by Nissen.

NOTHOSCORDUM NERINIFLORUM

Nothoscordum neriniflorum (Herb.) Traub, comb. nov. Syn.—*Caloscordum neriniflorum* Herb., Bot. Reg. Lond. 30: misc. 67. 1844; Lindley, Bot. Reg. Long. 33: pl. 5. 1847, err. *nerinifolium; Allium thunbergii* Regel, A. H. P. 3: 234. 1875, non G. Don.

BRUNSVIGIA ROSEA VAR. BLANDA

Brunsvigia rosea var. *blanda* (Kew-Gawl.) Traub, *comb. nov.* Syn. —*Amaryllis blanda* Ker-Gawl., Bot. Mag. Lond. 35: pl. 1450. 1812.

AN INVIDIOUS DISTINCTION

In Article 2, of the International Code of Nomenclature for Cultivated Plants (1958), it is stated that "The International Code of Botanical Nomenclature governs the use of scientific ("Latin") names for both cultivated and wild plants." This implies that names in a modern language authorized in the Code for Cultivated Plants are "not scientific" names. This is an invidious distinction. The taxonomy and nomenclature of plants, including wild (invidiously called botanical) and cultivated plants (which are also a part of botany) are indivisible on the basis of either one being more or less scientific. The names of cultivated plants in a modern language are used in scientific articles on the same basis as the names of wild plants. The taxonomy and nomen-

clature of cultivated plants are aspects of a larger subject, and the names of cultivated plants in a modern language are in fact scientific names. This reminds one of the sign displayed in front of a cinema house stating—

THERE WILL BE **MUSIC** AND **SINGING** INSIDE

This is an invidious distinction, unless one holds the view, not without reason, perhaps, that the modern "*singing*" involved is *noise* and not *music.*

For the reasons indicated, it is proposed, that when the Code for Cultivated Plants is again revised, that then the word "scientific" with reference to names be eliminated in Article 2 and elsewhere in the text (Art. 39, "the scientific or cultivar (variety) names", etc.), and that the word "Latinized" or "latinized" be substituted for it in each case. And that the phrase "in a modern language" be used when referring to non-latinized cultivar names.

TYPE OF DIPHALANGIUM GRAMINIFOLIUM DESTROYED IN WORLD WAR II

Dr. K. H. Rechinger, Naturhistorisches Museum, Wein, in a letter under date of Sept. 30, 1959, writes—"unfortunately the type specimen of *Diphalangium graminifolium* Schauer is not available any more. All our old material of *Diphalangium* and of the closely related genera has been destroyed by war accident [World War II]." Among the list of other specimens destroyed are included all *Liliaceae* and *Amaryllidaceae.*

SPREKELIA FORMOSISSIMA SUPERBA HORT.

The commonly grown group of *Sprekelia* in the United States is known as *S. formosissima superba* Hort. Burbank had claimed that he crossed the smaller-flowered *Sprekelia* with *Amaryllis* and had thus obtained the larger-flowering form. However, attempts to duplicate this cross have uniformly failed and it is clear that what Burbank had was apparently a polyploid form with larger flowers. It was Burbank's habit to grow a great many seedlings and make selections.

Mrs. Morris Clint has recently collected various forms of *Sprekelia* in the wild in Mexico, and also cultivated forms from other *Sprekelia* enthusiasts. One of these larger-flowered forms was described as 'Harrison's Orientred' in the 1959 AMARYLLIS YEAR BOOK, pp. 63-64.

On December 19, 1959, another of Mrs. Clint's collection (Clint-832) flowered at La Jolla. She had obtained this from Sydney Wilderman, San Antonio, Texas. This belongs to the larger-flowered group. The flowers are 17 cm. across the face and orient red (HCC-819) in color, but the whitish-greenish pattern is slightly different. The whitish stripe from the bottom in the upper setseg, and the 2 side petsegs is about half as long as the segs, and these segs are whitish-greenish for a short distance on the upper side at the base. The upper margins of the 2 side setsegs, for about 2/3 their lengths, are whitish-greenish, and this coloration widens near the base. The base of the stamens is whitish-

[**AMARYLLID NOTES, 1960,** continued on page 17.]

CATALOG OF **BRUNSVIGIA** CULTIVARS

HAMILTON P. TRAUB AND L. S. HANNIBAL

The hybridization of brunsvigias started in the 40's of the 19th century in Australia and this interest in the group has continued there to the present day. Later in the 19th century breeding interest in this group is noted also in New Zealand and Europe. In the 30's of the 20th century, interest in the breeding of these fine plants was awakened in the United States as a result of the founding of The American Amaryllis Society, particularly through the efforts of the late E. O. Orpet of Santa Barbara, California, who imported the fine Australian hybrids. With the naming of various cultivated hybrid clones in Australia, Europe and the United States it becomes necessary to straighten out the confused nomenclature.

The objective of the present catalog is to take up the names in the literature and thus provide a checklist for those who name *Brunsvigia* cultivars in the future. This will serve to avoid duplication of names. Thus, this catalog of *Brunsvigia* cultivars, including also the species with their synonymy for the convenience of breeders, will serve as the starting point in their nomenclature. Future catalog lists will include only the cultivars that are known to be in cultivation in the various parts of the world.

THE INTERNATIONAL CODE OF BOTANICAL NOMENCLATURE (Lanjouw et al, 1956) and THE INTERNATIONAL CODE OF NOMENCLATURE FOR CULTIVATED PLANTS (Fletcher et al, 1958) are followed in this catalog.

In order to avoid duplication of names, it is desirable to register new named clones through the registration service for amaryllids, including *Brunsvigia,* provided since 1934 by THE AMERICAN AMARYLLIS SOCIETY, which is affiliated with THE AMERICAN PLANT LIFE SOCIETY. Registrations are published in the AMARYLLIS YEAR BOOK. Information about the registration of new clones should be addressed to Mr. W. D. Morton, Jr., Registrar, 3114 State Street Drive, New Orleans 25, Louisiana, U. S. A., or to Dr. Thomas W. Whitaker, Executive-Secretary, Box 150, La Jolla, California, U. S. A.

This is one contribution toward a complete CATALOG OF AMARYLLID CULTIVARS, which will list all of the cultivars of the Amaryllis Family *(Amaryllidaceae),* sponsored by THE AMERICAN AMARYLLIS SOCIETY. Menninger presents another contribution toward this goal—CATALOG OF HYBRID NERINE CLONES—in the present issue of the AMARYLLIS YEAR BOOK.

BREEDING PRINCIPLES

As a basis for an understanding of the results achieved by the pioneer brunsvigia breeders, it is desirable to consider the genetic principles involved which were not understood in the earlier years before 1900.

As far as known at present, the genus *Brunsvigia* is characterized by a basic chromosome number of $x=11$, and a somatic number of $2n=22$

(Inaryama, 1937; Sato, 1938; Traub & Moldenke, 1949; Gouws, 1949; Traub, 1958). Polyploid species in this genus have not been reported to date. Thus, in this genus, any changes observed in the hybrids are apparently not due in part to an increase in chromosome number

Fig. 12. *Brunsvigia grandiflora* Lindl. (received as *B. slateriana* (Herb.) Benth. & Hook.), as grown in an 8″ pot by L. S. Hannibal in central California. The umbel is 12″ in diameter. Photo by L. S. Hannibal.

(polyploidy), but the marked changes noted are to be attributed to other possible causes such as gene mutations and recombination of genes in the hybrid individuals, including the special case of heterosis commonly called hybrid vigor.

When *Brunsvigia* species were first hybridized in Australia over a century ago, and Europe in the 1890's, one of the first changes noted was an increase in the size of the flowers in some of the progeny; also rapid increase by offsets was noted (Van Tubergen, 1909). It is now known that this phenomenon is due to heterosis or hybrid vigor (Traub, 1958). This is due to bringing together by recombination in certain individuals of the more favorable genes (see Fig. 17). Such large-flowering individuals were selected and used in further breeding on a new flower size level.

Fig. 13. Leaves of a hybrid *Brunsvigia* reported as widely grown in Australia and New Zealand under the name "Brunsvigia josephinae". Two bulbs shown above with 7 offsets in three years; grown by L. S. Hannibal in central California. Photo by L. S. Hannibal. See Fig. 14 for flowers.

The cultivation of *Brunsvigia* species or any other species does not increase the gene mutation rate under ordinary conditions, but it does provide a means of preserving any such mutations, considered of value by the breeder, that do occur which might have been promptly eliminated by natural selection in the wild. Some of such marked changes in flower shape (see Fig. 17) apparently are conditioned by dominant, others by recessive, genes. The new dominant genes apparently have arisen by mutation under cultivation; the recessive genes such as suddenly manifest themselves when present in double dose, may or may not have been present in the original population.

Thus, the genes contributed by the original parent species plus any spontaneous gene mutations under cultivation, made possible further improvement by recombination of the genes in the many generations after the first crosses. Still further improvement on new levels is possible by bringing in new genes by crossing the hybrids with other *Brunsvigia* species not previously used.

ADDITIONAL BREEDING MATERIAL NEEDED

It is clear therefore that in addition to the species apparently used so far in *Brunsvigia* breeding—*B. rosea, B. grandiflora, B. josephinae,*

Fig. 14. Floral umbel of a hybrid *Brunsvigia* reported as widely grown in Australia and New Zealand under the name "Brunsvigia josephinae". Note that the general shape of the flowers is similar to those of *B. josephinae* but the curved trumpet is longer, and that the flowers are much larger. This may be a segregate in the direction of *B. josephinae* from a cross made in the past. Photo by R. E. Harrison, New Zealand. See Fig. 13 for leaves, which also show hybrid vigor.

B. appendiculata and *B. orientalis*—additional material is needed from the summer and winter rainfall regions of South Africa.

FOR SUMMER RAINFALL AREAS. It should be noted that up to the present, the breeding of brunsvigias has been based on the species that happened to be available—which apparently came from the winter rainfall areas of South Africa. Thus it happened that the hybrids obtained thrive only in the southwestern United States which have winter rainfall. All attempts to grow these species and their hybrids in the open in the Southeastern United States have uniformly failed. Some few have reported limited success when the hybrids are grown in

tubs and the bulbs are kept dry in summer and are watered for growth in winter, but this type of culture is not popular.

It has been pointed out (Dyer, 1950; 1951) that some of the species grow either in the summer rainfall areas of the Transvaal and Natal, or range from the winter rainfall areas into the summer rainfall areas. These species include *Brunsvigia natalensis,* from Natal; *B.* sp. unnamed (Dyer 1950, Plate 12), from the Transvaal; *B. radulosa,* ranging from the Orange Free State into Transvaal and Natal; *B. grandiflora,* ranging from Cape Province into Natal; and *B. undulata,* from Natal. The races of these species adapted to the summer rainfall climate from the Transvaal and Natal should be collected for use by the breeder. By making the appropriate crosses of these races with *Brunsvigia rosea* and available hybrids, large-flowering segregates in the second and later generations could possibly be obtained that are also adapted to the southeastern United States with a similar summer rainfall climate. At least, this additional breeding work is worthy of a trial. It is hoped that our South African friends will be able to supply this needed breeding material.

COLOR VARIATIONS.—In addition to breeding hybrids adapted to the rainfall areas it is desirable to give attention to an increase in hybrid flower color forms. These can best be obtained by using the various species as parent material. Table 1, indicating the number of flowers per umbel, the flower color, and fragrance, is presented for those interested in such a project.

TABLE 1. Flowers per umbel, flower color and fragrance in **Brunsvigia.**

Species	Flowers per umbel	Flower color and fragrance
***Brunsvigia rosea**	(4)-5-18-flowered	rose-red, with lighter and deeper colored forms; **fragrant**
Brunsvigia marginata	10-20-flowered	bright scarlet
Brunsvigia radula	3-5-flowered	flesh pink
Brunsvigia comptonii	6-13-flowered	pale to dark pink
Brunsvigia bosmaniae	about 20-flowered	shell pink with darker veining to almost white; **fragrant**
****Brunsvigia appendiculata**	20-75-flowered	deep pink
Brunsvigia minor	12-flowered	rose-colored, or rose, whitish within
Brunsvigia striata	about 20-flowered	red to rose
Brunsvigia gregaria	30-50-flowered	pink to crimson
Brunsvigia natalensis	30-60-flowered	deep pink
Brunsvigia radulosa	30-60-flowered	red or pink
***Brunsvigia orientalis**	20-40-flowered	bright red or pink
***Brunsvigia grandiflora**	about 30-flowered	light to dark pink, or bright red
Brunsvigia undulata	35-80-flowered	claret-colored
***Brunsvigia josephinae**	20-60-flowered	red with dull yellowish-orange on outer surface towards the tepaltube
Brunsvigia litoralis	14-40-flowered	deep red with small crystal-like yellow flecking

* Reported as used in the breeding hybrid Brunsvigias.
** Used by Hannibal, but so far no seeds have been obtained.

FOR WINTER RAINFALL AREAS. In addition species should be collected in the winter rainfall areas of South Africa to bring in new characters into the hybrids for the winter rainfall areas of the United States. These species include *Brunsvigia radula, B. camptonii, B. bosmaniae, B. appendiculata, B. minor, B. striata, B. gregaria, B. radulosa, B. orientalis, B. grandiflora, B. josephinae, B. litoralis, B.* sp. (Dyer, 1951, p. 64) and *B. marginata.*

HISTORICAL REVIEW

Although there are two other references to *Brunsvigia* hybrids in the literature—Maund's Floral Register, 1st ed. p. 111, plate 879; and Herbert, Amaryll., 1837—there is no record of the parentage of the first and its fate; and no record that the second ever flowered. Thus the breeding of *Brunsvigia* hybrids, on the basis of practical results, begins with John Carne Bidwell (1815-1853), the Director of the Sydney Botanical Garden, 1843-1853.

BRUNSVIGIA PARKERI

BRUNSVIGIA x PARKERI Australian group.—J. C. Bidwell reported in Gardeners' Chronicle, July 29, 1850, page 470, that in 1841 he crossed "Brunsvigia multiflora" [=*grandiflora* Lindl.] with *Brunsvigia rosea* (Lam.) Hann., and he also crossed *Brunsvigia josephinae* with *Brunsvigia rosea* (Lam.) Hann. Unfortunately he described the progeny from both crosses as one group as follows:

"In February 1841 I raised a vast number of seedlings from [The Cape] Belladonna [=*Brunsvigia rosea* (Lam.) Hann.] by *B*[*runsvigia*] *multiflora* [=*Brunsvigia grandiflora* Lindl.] Seedlings flowered in six years and are extremely beautiful. Their colour is generally like that of *Passiflora kermesina,* but it varies in different specimens, and many are blotched with white. There are from twenty to forty flowers on a scape. The shape varies greatly, the crosses by *B*[*runsvigia*] *multiflora* [=*Brunsvigia grandiflora* Lindl.] being generally wider in the segments than the others, and of a better figure, shorter and more ringent. The germen [ovary] does not seem to contain any ovules, and the anthers are without pollen. Leaves varying in width from 1 inch to 4 inches, but always glaucous. . . . In 1847 I saw a pot containing about 300 seeds of *B*[*runsvigia*] *multiflora* [=*Brunsvigia grandiflora* Lindl.] x *A. Belladonna* [=*Brunsvigia rosea* (Lam.) Hann.] but not more than thirty of them germinated. I believe the bulbs are still living [1850]." [In the above quotation, the names of the probable parents and explanatory additions are inclosed in brackets.]

Bidwell apparently was in error in stating that the ovary "does not seem to contain any ovules, and the anthers are without pollen" since later workers have made abundant crossings among the Bidwell hybrid progeny. In fact, there are populations of hybrids based wholly or in part on the Bidwell hybrids in various parts of the world as will be shown below.

The tentative identification of the *Brunsvigia* parents used by Bidwell in the 1840's [as indicated in brackets in the quotation above] presents many difficulties at this late date.

Aiton proposed the name *Brunsvigia multiflora* Ait. in 1811 for the plant that is now known as *Brunsvigia orientalis* (L.) Eckl. (1827). This plant was pictured under the name "Brunsvigia multiflora" by Ker-Gawler in 1814 (Bot. Mag. Lond. vol. 39, plate 1619), and was described by Herbert in 1837 under the name "Brunsvigia multiflora Heister". He also gave a figure of the capsule and sprouting seedling. It is known that Bidwell was in communication with Herbert, and apparently had access to Botanical Magazine (London), and Herbert's Amaryllidaceae (1837). The Sydney Botanical Garden plant catalogue of 1857, as shown by a photostat from the Lindley Library lists "Brunsvigia multiflora Heir." The author's name "Heir." is apparently an abbreviation ["Hei . . . r"] for "Hiester". This apparently explains the source of the *name* "Brunsvigia multiflora" that Bidwell used. However, the *plant* that Bidwell used in his cross appears to have been a form of *Brunsvigia grandiflora* Lindl. (Fig. 12) on the basis of recent experimental evidence. This conclusion is based on the fact that recently Hannibal (1957) has shown that segregates in the direction of *B. grandiflora* Lindl. have been obtained among his breeding progeny based on available descendants of the Bidwell hybrids. This would indicate that Bidwell most likely used a form of *B. grandiflora* Lindl., which he erroneously listed as "Brunsvigia multiflora" in 1850 when he reported his original crosses. This species could have been introduced from the summer rainfall area of South Africa, and such a form and its hybrids would be conditioned for culture in Australia.

With reference to the form of *Brunsvigia josephinae* that Bidwell used, it should be realized that this species (from the winter rainfall area of South Africa) is difficult to maintain under summer rainfall conditions. Thus the genes conditioning for climatic compatibility in the hybrids would weaken them as far as adaptability to culture in Australia is concerned. However, some of the *B. josephinae* genes, such as those expressed in floral characters in the hybrids, in the absence of dominant genes for winter rainfall climatic adaptability, could possibly be retained in the progeny that possess mostly *B. grandiflora* and *B. rosea* genes without loss in adaptability to Australian growing conditions. This, however, is a problem that needs further study and should be considered in connection with the other problem posed by the *Brunsvigia* hybrid shown in Figs. 13 and 14.

As to the form or forms of the Cape Belladonna, *Brunsvigia rosea*, used by Bidwell in his original crosses, this represents a problem that has not been solved.

Recently, Harrison's Nursery, in New Zealand, has offered a plant under the name, "Brunsvigia josephinae". This is reported as widely grown in Australia and New Zealand and is believed by some to represent one of the parents used by Bidwell in his crosses. An inspection of Figs. 13 and 14 shows that the plant has very long narrowly oblanceolate-lorate leaves which differ markedly from the oblong leaves of

B. litoralis that are only up to 20 cm. long. The shape of the flowers is similar to those of *B. josephinae* but they are very much larger and

Fig. 15. An early illustration of the Australian *Brunsvigia* hybrids that appeared in The Horticultural Magazine of New South Wales in 1866. On the basis of priority of names these hybrids are now recognized as *Brunsvigia* x *parkeri* Australian Group. Photo courtesy The Bulb Society.

in this respect they are similar to those of *Brunsvigia* x *tubergenii* (Tubergen, 1909). This hybrid or a segregate from earlier hybrids (Figs. 13 & 14) apparently shows an intermediate stage between

B. josephinae and *B. rosea.* This hypothesis, however, has to be tested further, and under the circumstances, a more detailed study of the plant is required for a later report.

Bidwell died at the early age of 38 years, only 3 years after he published his report in 1850. Thus the development of his hybrids—which are his lasting monument—was presented as a challenge to other Australian breeders.

The later history of the Australian hybrids is becoming better known due to the researches of Cowlishaw, Hannibal and others. Bidwell apparently distributed his hybrids to his friends and these plants were usually known as *Brunsvigia* x *multiflora* Hort., hybrids, including *alba, pallida* and *rosea* forms. Other names were also used.

The earliest known illustration of these hybrids is shown in Fig. 15, reproduced from the Horticultural Magazine of New South Wales of 1866, and which appeared only 13 years after Bidwell's death. This should be representative of the better early results achieved by Bidwell's followers in Australia. It apparently points to the preponderance of *Brunsvigia grandiflora* (see Fig. 12) and/or *B.* x *josephinae* genes in the plant pictured in Fig. 15 that condition the smaller flowers and their shape. This is made clearer when compared with the selected clones of the present day breeders (see Figs. 16 and 17).

If allowance is made for hybrid vigor, the relatively larger imbricated flowers shown in Fig. 16, and in part of the flowers in Fig. 17, apparently indicates the preponderance of *B. rosea* genes (see *B. rosea* var. *rosea bicolor* Hort., in Fig. 17) in the plants that produced them. The flowers with narrow tepalsegs shown in Fig. 17 are apparently conditioned in part by *B. grandiflora* genes in the plants that produced them, if due allowance is made for any gene mutations that are expressed as irregular tepalsegs.

The nursery firm of John Baptist & Sons was the first to distribute the Bidwell hybrids commercially in Australia. Later workers with these hybrids include Henry Selkirk, Messrs. Holloway, Bradley, and Cowlishaw (1935; 1955) who is active to the present day. In Australia, according to Cowlishaw (1955), the "stock remained fairly true to type for more than 50 years while under the hands of the Baptists. Then Holloway (who introduced the fine clones 'Harboard' and 'Ovieto') mass produced seeds for the trade about 1910, and Bradley introduced his hybrid 'Hathor' in 1911. Finally the "Parkeri" bulbs were reintroduced from England. These latter were the Kew type seedlings of the original "Parkeri" . . .". Cowlishaw (1935; 1955) himself has made important contributions toward the development of these hybrids. He introduced the fine clone 'Alabaster' and others.

It is now in order to consider the further development of these hybrids in various parts of the world. But before proceeding with this, it is necessary to consider the inheritance of the tubular basal leafsheath (sometimes called a pseudo-neck) in the hybrids.

Cowlishaw (1955) cites the results obtained by Selkirk when Bidwell hybrids were crossed with *blanda.* Such crosses resemble the Bid-

well hybrids, and "in this instance the leafy stem is most pronounced. A vigorous leaf growth usually accompanies these plants, having a lengthy pseudo-stem. The flowers vary from good whites to rose pinks and are all reflexed."

TUBULAR BASAL LEAF-SHEATH.—In order to put this matter on a factual basis, the present writers have taken actual measurements of the characters concerned and these are recorded in Table 2.

TABLE 2. Deciduous basal distichous (opposite) bracts and deciduous basal tubular leaf-sheaths (the latter sometimes erroneously called "pseudo-stems") in the Cape Belladonna and its hybrids.
B. orientalis, B. grandiflora, B. appendiculata, and **B. radula** included for comparison. Measurements made as of January 15, 1960.

Species, variety or form	Deciduous basal distichous (opposite) bracts,1 length, cm.	Deciduous basal tubular leaf-sheath,2 length, cm.
Brunsvigia orientalis 5	none	none
Brunsvigia grandiflora 6	none	none
Brunsvigia radula 6	none	2
Brunsvigia appendiculata 6	none	none
Brunsvigia rosea var. **rosea**		
(a) naturalized in Colombia 5	none	2.2
(b) from Table Mountain, S. Afr.		
Stanford No. 1.5	2.2—3.0 3	1.1 3
Stanford No. 2.5	1.4—2.8	none
Brunsvigia rosea var. **major**		
(a) from garden, Santa Cruz, Bolivia 5	none	1.5
(b) cultivated, local, California 5	none	0.4—1.4
Brunsvigia rosea x **purposea** Hort.		
Received as **B.** x **purposea** Hort.5	none	2.0—2.2
Brunsvigia rosea x **rubra** Hort.		
Received as **B. rosea** x **rubra** Hort.5	none	2.2—2.5
Brunsvigia x **parkeri** Australian group		
(a) received as **B.** x **baptistii** Hort.5	1.5—2.2 3	0.5 3
(b) received as **B.** x **multiflora alba** Hort.5	none	2.6
(c) received as **B.** x **multiflora** Hort.5	1.2—2.3 4	1.0—1.4 4
(d) clone 'Clarke's Glory' 5	none	10.2—11
(e) clone 'Hathor' (Bradley, 1911)5	none	2.1—3.8
Brunsvigia x **parkeri** Zwanenburg group		
(a) close 'Lydenburg' (Van Tubergen)5	none	1.6—2.7
(b) close 'Jagersfontein' (Van Tubergen)5	none	3.0—3.8
Brunsvigia x **parkeri** English group		
Received as **B.** x **parkeri** 5	1.6—2.5 3	1.7—2.8 3
Brunsvigia x **parkeri** American group		
Clone 'Peaches & Cream' (Hannibal)5	none	2.6—4.1

1 When no recognizable basal tubular leaf-sheath is noticeable, there are two opposite deciduous bracts, one is slightly shorter than the one on the other side.
2 The basal sheaths below the first full leaf may have free lobes of varying lengths; these will not be considered here.
3 In some cases of bulbs with offsets in common bulb coats, there are opposite bracts on some sprouts and tubular sheaths on others.
4 These are a group of seedlings; some have basal opposite bracts; others have basal tubular leaf-sheaths.
5 Grown at La Jolla, California.
6 Grown at Fair Oaks, California.

The data in Table 2 show that in *Brunsvigia rosea* and its hybrids, there are two basic types of basal sheaths: (a) deciduous basal distichous (opposite) bracts with apparently no, or practically no tubular portions, and (b) distinct deciduous basal tubular leaf-sheaths. In some cases of bulbs with offsets still held in common bulb coats, there are both of the above mentioned types. When bulbs are partly above ground, the basal tubular leaf-sheaths may sometimes be very short.

The above mentioned types of distichous bracts and tubular leaf-sheaths, should not be confused with the usual dried tunics of the bulb and bulb-neck such as are found in all *Brunsvigia* bulbs. Among the other species studied, only *Brunsvigia radula* has a tubular leaf-sheath (2 cm. long), whereas, *B. orientalis, B. grandiflora,* and *B. appendiculata,* have none.

The data in Table 2 show that the length of the tubular leaf-sheath varies from less than 0.5 cm. to the extreme of 11 cm. in length. In the literature it has generally been assumed that the tubular leaf-sheath (called a pseudo-stem, a name that should be abandoned since it is not a stem; and nothing is "pseudo" in nature) was derived from crossing with *Brunsvigia rosea* var. *blanda.* However, it is now known that the original type plate of this variety shows no such tubular leaf-sheath in the drawing of the bulb. The data in Table 2 supply the key to the puzzle. *Almost* all of the entries for *Brunsvigia rosea* var. *rosea,* and all for *B. rosea* var. *major* Hort., show the presence of the tubular sheath with a range from 0.4 to 2.2 cm. in length. When such plants were crossed with other *Brunsvigia* species, the resulting hybrid vigor apparently *extended also* to the tubular leaf-sheaths so that even the extreme length of 11 cm. has been noted in some of the later hybrids. Thus, the special kind of heterosis known as hybrid vigor, the recombination in the individual of the most favorable genes, apparently explains the longer basal tubular leaf-sheaths in the *Brunsvigia* hybrids.

BRUNSVIGIA x PARKERI English group.—Hannibal has recently brought to light further information on the connection of Lady Parker with the Australian group of *Brunsvigia* hybrids, both in Australia and in England.

In Gardeners' Chronicle, Sept. 4, 1875, it is noted that "The Amaryllis (=*Brunsvigia* hybrid) exhibited by Mr. Boivell, gardener to Sir H. W. Parker, at the Royal Horticultural Society on August 18, is a seedling raised by Lady Parker in Australia from a cross between "Amaryllis belladonna" (=*Brunsvigia rosea,* the Cape Belladonna) and *Brunsvigia josephinae.* The cross was first effected by the late Mr. Bidwell, and since has been several times repeated by Lady Parker. Some of the seedlings so raised were superior, both in number and colour of the flowers to the specimen exhibited on the 18th." The reader is referred to the previous section with resepect to the parents used by Bidwell in Australia. Lady Parker apparently was working with the Bidwell hybrids since the English group based on the Parker introductions into England are quite similar to the Australian group.

It should be noted that Sir Henry Parker (1808-1881) sailed to New South Wales in 1838; married Emmeline Emily Macarthur, third daughter of John Macarthur, in 1843; was Premier of N. S. W. 1856-1857 and returned to England in 1858 where he settled at Stawell House, Richmond, Surrey. Sir Henry Parker is not to be confused with Sir Henry Parks (1815-1896) who was Prime Minister of N. S. W. 1872-1891.

Bidwell, the pioneer *Brunsvigia* breeder, was the supervising gardener on the Macarthur estate in Camden Park and lived on the

Fig. 16. *Brunsvigia* x *parkeri* Zwanenburg Group produced by Messrs. Van Tubergen in Holland. Photo by Messrs. Van Tubergen.

grounds. It was here in 1841 that he effected his *Brunsvigia* crosses, and where the first white-flowered segregate appeared in 1860 some seven years after his death.

Thus the English group of hybrids was derived from the Australian group. Among others connected with the development of these hybrids in England were A. Worsley and Messrs. Sander & Co.

BRUNSVIGIA x PARKERI Zwanenburg group.—Messrs. Van Tubergen in the Netherlands imported stock of *Brunsvigia* x *parkeri* (Australian group) and back-crossed these on forms of the Cape Belladonna—*Brunsvigia rosea rubra major* Hort. and *B. rosea purpurea Major* Hort.—and this gave rise to the free-flowering Zwanenburg group (Hoog, 1935; 1947). See Fig. 16. Messrs. Van Tubergen have introduced no less than 20 superior clones, such as 'Cape Town', 'Jagersfontein', 'Kimberley' and so on. These have been flowered in Southern California and they are excellent garden plants in every way.

BRUNSVIGIA x PARKERI American group.—Beginning in the 1930's, stock of the *Brunsvigia* x *parkeri* hybrids was imported into the United States from Australia, England and the Netherlands. The pioneer in this activity was the late E. O. Orpet who imported bulbs from Australia, including the fine white forms. Among others who have imported stock are L. S. Hannibal, Dr. Joseph C. Smith and Hamilton P. Traub. Once this stock was available, it was utilized in further breeding, and the various hybrids were, and are being intercrossed. The result is a distinctive American group (Fig. 17) which is still developing. The leader in this field is L. S. Hannibal (1955; 1957), who since 1940 has introduced no less than 15 named clones, including 'Blaze', 'Purity', 'Picotee', 'Stormy Sunset', and so on. Others who are active in this field are Dr. Joseph C. Smith, Mrs. Polly Anderson (1959), and Hamilton P. Traub. Many seedlings are being raised and thus many superior named clones can be expected to appear in the future in the United States.

NOMENCLATURE OF THE HYBRIDS.—By this time it is clear that all of these hybrids—the Australian, English, Zwanenburg and American groups—belong to one great group which was started in Australia by Bidwell; was, and is being, developed further there and in New Zealand; was exported to England, the Netherlands, and the United States. In each of these areas, further development has, and is, taking place. In accordance with the Botanical Code, it is necessary to adopt the earliest validly published name for this hybrid group. In 1909 (Gard. Chron. Lond., Feb. 6, 1909, p. 90), W. Watson applied the epithet *parkeri* to the English group, and this was recognized by Worsley who made a new combination, x*Brunsdonna* parkeri (W. Watson) Worsley in 1926. At the same time he proposed the name, x*Brunsdonna bidwellii* Worsley for the Australian group. Among other names that have been used in horticulture for the latter group are *Brunsvigia* x *baptistii* Hort., and *B.* x *multiflora* Hort., but these and others were not validly published and need not be considered further. It should be noted that the epithet *parkeri* which dates from 1909, has priority over *bidwellii* which was proposed in 1926. Therefore, the name, *Brunsvigia* x *parkeri* (W. Watson) Traub, (in Plant Life 5: 134. 1948) is the valid name for the entire great group including the Australian, English, Zwanenburg and American groups.

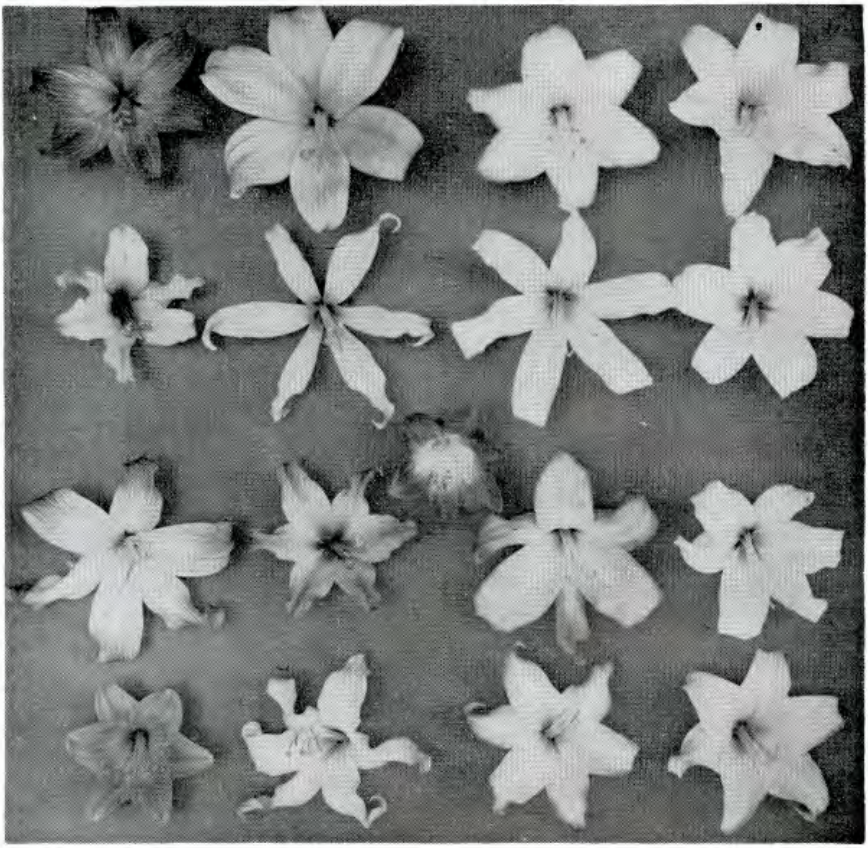


Fig. 17. Floral variation in *Brunsvigia* x *parkeri* American group, including selected Hannibal seedlings and named clones; and with *Brunsvigia rosea* var. *rosea bicolor* Hort. (center of Figure), *B.* x *parkeri alba* Hort. (Australian group), *B.* x *parkeri rosea Hort.* (Australian group), and *B.* x *parkeri* (Australian group) cl. 'Glory' (Allister Clarke), for comparison.

FIRST ROW, top; from left: *B.* x *parkeri* (Australian group) cl. 'Glory' (Allister Clarke), a deep rose-red; *B.* x *parkeri* (American group) cl. 'Pacifica' (Hannibal), a large pale pink; *B.* x *parkeri* (American group), unnamed broad- eged picotee: and *B.* x *parkeri* (American group), unnamed pink seedling.

SECOND ROW, from top; *B. x parkeri* (American group), unnamed seedling with outer segs ruffled; *B.* x *parkeri* (American group) cl. 'Spider' (Hannibal), a segregate from the following, *B.* x *parkeri alba* Hort. (Australian group), a form with linear segs [derived from *B.* x *parkeri* (Australian group) cl. 'Hathor' (Bradley, 1911]; *B.* x *parkeri* (American group) cl. 'Purity' (Hannibal), white-flowered, with smooth texture.

THIRD ROW, FROM TOP: *B.* x *parkeri* (American group) cl. 'Blaze' (Hannibal), with deep yellow throat, and colorful segs; *B.* x *parkeri* (American group), unnamed ruffled peppermint form with eye markings on segs near tips; [in center, a little above the four in row], *B. rosea* var. *rosea bicolor* Hort., for comparison;

[Caption—continued at the bottom of page 53—opposite.]

BRUNSVIGIA x TUBERGENII

In 1892, Messrs. Van Tubergen made the cross *Brunsvigia rosea* x *B. josephinae.* After many years the hybrids flowered, and a report appeared in Gardeners' Chronicle, Jan. 23, 1909, p. 57, with figure. This hybrid is relatively tender (Hoog, 1935; 1947), and it has not been widely grown. It is however of great interest since it is a *Brunsvigia* hybrid with a well documented record as to its parentage. The plants are marketed as seedling of a group.

The name, x*Brunsdonna* x *tubergenii,* was proposed under the assumption that two biologic genera were involved in the cross, but it has been proved conclusively as will be indicated below, that *Brunsvigia rosea,* the Cape Belladonna, belongs in the genus *Brunsvigia* and thus this is not an inter-generic but an *intra-generic* cross. Thus the name, *Brunsvigia* x *tubergenii* has to be applied.

THE CAPE BELLADONNA, BRUNSVIGIA ROSEA

One of the important parents in the breeding of the *Brunsvigia* hybrids is the Cape Belladonna, *Brunsvigia rosea* (Lam.) Hann., owing to its relatively larger, imbricated flowers. This character made it possible to achieve rapid progress toward larger-flowered hybrids. Before proceeding further however it is necessary to consider briefly the biologic status of this species.

BIOLOGIC STATUS OF THE CAPE BELLADONNA.--After considering the breeding history of the *Brunsvigia* x *parkeri* hybrids, and *Brunsvigia* x *tubergenii,* a very brief statement about the biologic status of the Cape Belladonna, *B. rosea,* will suffice. Since plant science is a *science* and it is not possible to set up artificial genera, such as the attempt to maintain the Cape Belladonna as the type of a purely artificial nomenclatural, non-biologic genus for purely sentimental reasons, when all of the scientific facts (see Traub & Moldenke, 1949, pp. 64-67; Traub, 1958, pp. 236-251) show that this is untenable. The facts show that *in its morphology,* the Cape Belladonna is similar to the rest of the *Brunsvigia* species, with any differences on a species level only. The Cape Belladonna crosses with other *Brunsvigia* species *giving rise to progeny that are usually inter-fertile.* And thus there are abundant *Brunsvigia* hybrid *inter-fertile* offspring involving the Cape Belladonna in various generations after the first crosses under cultivation in various parts of the world. Thus the evidence shows that there are no differences on a generic level, and there is thus *no decided generic gap* between the

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[Caption—continued from bottom of page 52—opposite.]

B. x *parkeri* (American group) cl. 'Hibiscus Queen' (Hannibal), with broad flat face, throat and rest of segs bronze; *B.* x *parkeri alba* Hort. (Australian group), seedling with twisted segs.

BOTTOM ROW: *B.* x *parkeri rosea* Hort. (Australian group), shape and color similar to those obtained from England [*B.* x *parkeri rosea* Hort. (English group)]; *B.* x *parkeri* (American group), seedling with orchid type flowers; *B.* x *parkeri* (American group), seedling with *B. rosea* var. *pallida* markings; and *B.* x *parkeri* (American group), seedling with lavender-colored flowers. Photos by L. S. Hannibal.

Cape Belladonna and the other *Brunsvigia* species. In view of this overwhelming evidence, any statements to the contrary are academic and are outside the realm of science.

FORMS OF THE CAPE BELLADONNA, BRUNSVIGIA ROSEA.—Various forms of the species have been used in developing the *Brunsvigia* hybrids, and it is worth-while to present a brief inventory of available material for further breeding. The species and the varieties are listed below. These and the various horticultural forms are included in the Catalog of *Brunsvigia* Cultivars.

Brunsvigia rosea (Lam.) Hann. This designation of the species includes all of the following varieties and hybrids, and the horticultural forms listed in the Catalog. It is a useful handle in referring to all of them collectively.

Brunsvigia rosea var. *rosea*
This variety includes the type element and any other wild and cultivated forms associated with it. The type is a late, relatively few-flowered variety. See listing in the Catalog.

Brunsvigia rosea var. *major* Hort. This variety, with light pink flowers, is widely grown in southwestern United States, South America, Australia and elsewhere. It is a larger plant than the type and flowers earlier, and the umbel is many-flowered.

Brunsvigia rosea var. *pallida* (Delile-Red.) Hann. Hb. 10: 63. 1943.
A variety with pale pink flowers; other similar forms are grouped here.

Brunsvigia rosea var. *blanda* (Ker-Gawl.) Traub, PL 16: 37. 1960.
This was described in 1812 as having flowers "white fading to a blush or a pale rose color but not in streaks." It is indicated as not scented. The type plate (Bot. Mag. plate 1450) shows a yellowish throat and yellowish base of the tepaltube, but these details are not indicated in the description. The drawing of the bulb shows no basal tubular leaf-sheath. Thus it is doubtful if the statements in the literature to the contrary are well founded.

Brunsvigia rosea hybrids. There are apparently a number of hybrids between the varieties and forms, but these have not in all cases been determined.

The four reported Italian hybrids, known only from the literature (Bull. Soc. Tosc. Ortic. 20: plate 1. 1895) may belong here, and they are placed here tentatively pending further study. It is hoped that our Italian friends will trace these hybrids and report on them.

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Traub, Hamilton P. Nomenclature of some **Brunsvigia** Hybrids. Plant Life **5:** 134. 1949.
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Tubergen, Jr., C. G. Van. **[Brunsvigia josephinae** ♀ **x B. rosea** ♂]. Gard. Chron. Jan. 23, 1909, p. 57, with suppl. fig.
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Worsley, A. The x Brunsdonnas. Jour. Roy. Hort. Soc. **51:** 64-67. 1926.

CATALOG OF BRUNSVIGIA CULTIVAR NAMES

The species names are included for the convenience of the breeders and growers.

VALID NAMES under the International Code for Botanical Nomenclature (1956), and the International Code for Cultivated Plants (1958) are in **boldface—Brunsvigia rosea** (Lam.) Hann.; **Brunsvigia** x **parkeri** (Australian group) cl. **'Hathor'** (H. B. Bradley, 1911). SYNONYMS are in ordinary Roman type,—Callicore rosea (Lam.) Link=**Brunsvigia rosea** (Lam.) Hann. MISAPPLIED NAMES AND INVALIDLY PUBLISHED NAMES under the Codes, are in ordinary Roman type with double quotation marks,—"Amaryllis belladonna Herb.", not of Linnaeus (a misapplied name) =**Brunsvigia rosea** (Lam.) Hann.; "Amaryllis x spofforthiae Herb." (an invalidly published name). CLONAL NAMES in a modern language are in single quotation marks,—**Brunsvigia x parkeri** (Australian group) cl. **'Hathor'.** HYBRIDS WITH LATINIZED NAMES: in such cases a multiplication sign "x" precedes the epithet,—**Brunsvigia** x **parkeri** (W. Watson) Traub.

ABBREVIATIONS

Brr=**Brunsvigia rosea** var. **rosea**
BxpAm=**Brunsvigia** x **parkeri** American group
BxpAu=**Brunsvigia** x **parkeri** Australian group
BxpE=**Brunsvigia** x **parkeri** English group
BxpZ=**Brunsvigia** x **parkeri** Zwanenburg group
Bxt=**Brunsvigia** x **tubergenii** Hort.
cl.=Clone
fl., fld., fls.=flower, flowered, flowers
GC=Gardeners' Chronicle (London)
Hb=Herbertia, vols. 1—15 (1934-1948)
Hort.=horticulture; also when used in connection with Latinized plant names, e. g. Brunsvigia x multiflora Hort., not of Ait., it means that the name is used in horticulture without valid publication, and thus the name has no standing under the International Code.
JRHS=Journal, Royal Horticulture Society (London)
PL=Plant Life, Vols. 1—16 (1945 to date—1960)
segs=tepalsegs

sl=slight, slightly
var.=used here only in connection with Latinized names, and designates a subdivision of a species.

'Alabaster' (Cowlishaw); (ExpAu). Hb 2: plate on p. 45. 1935. Umbel 23-fld; fls pure white with yellow throat.

"AMARYLLIS Herb.", in Herb. Appendix Bot. reg. Lond. 15. 1821; Amaryll. 275-280. 1837; Baker, Amaryll. 95-96. 1888; a misapplied name (for history of misapplication see Traub & Moldenke, Amaryllidac.: Tribe Amaryll. 25-67; 1949; Traub, Amaryllis Manual, 236-251. 1959.)=**Brunsvigia** Heist.

Amaryllis banksiana Lindl.=**Brunsvigia grandiflora** Lindl.

Amaryllis x baptistii Hort.=**Brunsvigia** x **parkeri** Australian group.

Amaryllis x baptistii alba Hort.=**Brunsvigia** x **parkeri (Australian group)** alba Hort.

"Amaryllis belladonna Herb.", a misapplied name. See under "AMARYLLIS Herb.", above, for notes and literature citations.=**Brunsvigia rosea** (Lam.) Hann., **The Cape Belladonna**

"Amaryllis belladonna x alba Hort."=**Brunsvigia rosea x alba** Hort.

"Amaryllis belladonna alba Hort."=**Brunsvigia rosea** var. **rosea** alba Hort.

"Amaryllis belladonna blanda (Ker-Gawl.) Baker"=**Brunsvigia rosea** var. **blanda** (Ker-Gawl.) Traub

"Amaryllis belladonna x carminea Hort."=**Brunsvigia rosea** x **carminea** Hort.

"Amaryllis belladonna elata Hort."=**Brunsvigia rosea** var. **major** Hort.

"Amaryllis belladonna var. latifolia Herb."=**Brunsvigia rosea** var. **rosea**

"Amaryllis belladonna x magnifica Hort."=**Brunsvigia rosea** x **magnifica** Hort.

"Amaryllis belladonna major (err. maior) Hort."=**Brunsvigia rosea** var. **major** Hort.

"Amaryllis belladonna var. maxima (Delile-Red.) Herb."=**Brunsvigia rosea maxima** Hort.

"Amaryllis belladonna var. minor Hort."=**Brunsvigia rosea** var. **rosea**

"Amaryllis belladonna var. pallida (Delile-Red.) Herb."=**Runsvigia rosea** var. **pallida** (Delile-Red.) Hann.

"Amaryllis belladonna rubra major Hort."=**Brunsvigia rosea** x **rubra major** Hort.

"Amaryllis belladonna (rubra) minor Hort."=**Brunsvigia rosea** var. **rosea**

"Amaryllis belladonna speciosa purpurata Hort."=**Brunsvigia rosea** var. **rosea rubra** Hort.

"Amaryllis parkeri Hort."=**Brunsvigia** x **parkeri** Zwanenburg group

"Amaryllis belladonna parkeri var. Zwanenburg Hort."=**Brunsvigia** x **parkeri** Zwanenburg group

"Amaryllis belladonna purpurea major Hort."=**Brunsvigia rosea** x **purpurea major** Hort.

"Amaryllis belladonna rosea maxima Hort."=**Brunsvigia rosea** var **rosea maxima** Hort.

"Amaryllis belladonna rosea perfecta Hort."=**Brunsvigia rosea** var. **rosea perfecta** Hort.

"Amaryllis belladonna x rubra major Hort."=**Brunsvigia rosea** x **rubra major** Hort.

"Amaryllis belladonna spectabilis bicolor (err. tricolor) Hort."=**Brunsvigia rosea** var. **rosea bicolor** Hort.

"Amaryllis belladonna stenopetala Hort."=**Brunsvigia rosea** x **stenopetala** Hort.

Amaryllis blanda Ker-Gawl.=**Brunsvigia rosea** var. **blanda** (Ker-Gawl.) Traub

Amaryllis gigantea van Marum=**Brunsvigia josephinae** (Delile-Red.) Ker-Gawl.

Amaryllis grandiflora (Lindl.) Herb.=**Brunsvigia grandiflora** Lindl.

Amaryllis grandiflora var. banksiana (Lindl.) Herb.=**Brunsvigia grandiflora** Lindl.

Amaryllis josephinae Delile-Red.=**Brunsvigia josephinae** (Delile-Red.) Ker.-Gawl.

Amaryllis josephiniana Herb.=**Brunsvigia josephinae** (Delile-Red.) Ker.-Gawl.

Amaryllis josephiniana var. griffiniana Herb.=**Brunsvigia josephinae** (Delile-Red.) Ker-Gawl.

Amaryllis marginata Jacq.=**Brunsvigia marginata** (Jacq.) Ait.

Amaryllis x multiflora Hort. (not of (Ait.) D. Dietr.)=**Brunsvigia** x **parkeri** Australian group

Amaryllis multiflora (Ait.) D. Dietr.=**Brunsvigia orientalis** (L.) Eckl.

Amaryllis x multiflora alba Hort.=**Brunsvigia** x **parkeri** (Australian group) alba Hort.

Amaryllis nobilis Salisb.=**Brunsvigia orientalis** (L.) Eckl.

Amaryllis orientalis L.=**Brunsvigia orientalis** (L.) Eckl.

Amaryllis pallida Delile-Red.=**Brunsvigia rosea** var. **pallida** (Delile-Red.) Hann.

Amaryllis x parkeri W. Watson=**Brunsvigia x parkeri** (W. Watson) Traub

Amaryllis x parkeri rosea Hort.=**Brunsvigia** x **parkeri** (English group) rosea Hort.

Amaryllis x pseudoblanda Worsley=**Brunsvigia x parkeri** English group

Amaryllis pudica Ker-Gawl.=**Brunsvigia rosea** var. **rosea**

Amaryllis purpurascens Hort.=**Brunsvigia rosea** var. **rosea**

Amaryllis radula Jacq.=**Brunsvigia radula** (Jacq.) Ait.
Amaryllis regalis Salisb.=**Brunsvigia rosea** var. **rosea**
Amaryllis rubra major Hort.=**Brunsvigia rosea** x **rubra major** Hort.
Amaryllis slateriana Herb. ex Lindl.=**Brunsvigia grandiflora** Lindl.
Amaryllis speciosa purpurea Hort.=**Brunsvigia rosea** var. **rosea**
"Amaryllis x spofforthiae Herb."=**Brunsvigia x tubergenii** Hort.
Amaryllis striata Jacq.=**Brunsvigia striata** (Jacq.) Ait.
Amaryllis stricta Hort.=**Brunsvigia rosea** var. **pallida** (Delile-Red.) Hann.
Amaryllis variabilis Hort.=**Brunsvigia rosea** var. **rosea variabilis** Hort.
Amaryllis verreauxii Hort.=**Brunsvigia rosea** x **verreauxii** Hort.
'Arbuckle' (BxpE), GC **29**: 37-38; **53**: 71-72; 89-90; 111-112. 1901; Hb. 1: 57. 1934; JRHS Jan. 1926, p. 67; The garden **75**: 462. 1911.
"Arthington Worsley", not a clone.=**Brunsvigia** x **parkeri** (English group) **pseudoblanda** Hort.
"Australian Rose", not a clone.=**Brunsvigia** x **parkeri** (Australian group) **rosea** Hort.
'Australian Snow' (D. C. W. Chandler, 1948) (BxpAu). White without yellow throat; form in the direction of **B. rosea.**
Aylett's Hybrids=**Brunsvigia** x **parkeri** (Australian group)
"Baptisti", not a clone.=**Brunsvigia** x **parkeri** Australian group
'Barberton' (Van Tubergen), (BxpZ), in Van Tubergen Catalogue; uniform rose pink; large umbel.
Belladonna Lily, The Cape;=Brunsvigia rosea (Lam.) Hann.
BELLADONNA Sweet, Hort. Brit. ed. II. 506. 1830.=**BRUNSVIGIA** Heist.
Belladonna baccifera Lam.=**Brunsvigia rosea** var. **rosea**
Belladonna blanda (Ker-Gawl.) Sweet.=**Brunsvigia rosea** var. **blanda** (Ker-Gawl.) Traub
Belladonna pallida (Delile-Red.) Sweet, Hort.=**Brunsvigia rosea** var. **pallida** (Delile-Red.) Hann.
Belladonna pudica (Ker-Gawl.) Sweet.=**Brunsvigia rosea** var. **rosea**
Belladonna purpurascens Sweet.=**Brunsvigia rosea** var. **rosea.**
Belladonna purpurascens var. pallida Hort.=**Brunsvigia rosea** var. **pallida** (Delile-Red.) Hann.
Belladonna purpurea Hort.=**Brunsvigia rosea** var. **rosea**
'Betty Cowlishaw' (Cowlishaw ex Hannibal, 1947); (BxpAu). PL 15: 47. 1959. Fl alba type with radial umbel; segs medium wide, sl ruffled, reflexed
"Bidwell", not a clone; Hannibal in Hb 10: 68. 1943 = **Brunsvigia** x **parkeri** Australian group
'Blaze' (Aylett ex Hannibal, 1957.) (BxpAu); PL 13: 65. 1957. An introduction of W. P. Aylett, Mongoplah, N. S. W.; chrome yellow throat; flame orange segs.
'Blushing Sally' (Hannibal, 1957); (BxpAm); Pl 13: 65. 1957; Umbel many-fid; fls flesh pink; segs long, irregular, reflexed; color aging to deep bluish pink.
xBrunscore tubergenii Hort., Hannibal in Hb 10: 69. 1943.=**Brunsvigia x tubergenii** Hort.
xBRUNSDONNA Hort.=**BRUNSVIGIA** Heist.
xBrunsdonna bidwellii Worsley.=**Brunsvigia** x **parkeri** Australian group
xBrunsdonna blanda Hort.=**Brunsvigia** x **parkeri** English group
xBrunsdonna parkeri (W. Watson) Worsley.=**Brunsvigia** x **parkeri** English group
xBrunsdonna parkeri var. tubergenii Hort.=**Brunsvigia** x **tubergenii** Hort.
xBrunsdonna sanderae alba Hort.=**Brunsvigia** x **parkeri** (English group) **alba** Hort.
xBrunsdonna pseudoblanda Hort.=**Brunsvigia** x **parkeri** (English group) **pseudoblanda** Hort.
BRUNSVIGIA Heist. Descript. Brunsv. 3, cum ic. 1753 et Beschr. Brunsv. 3, cum ic. 1755; Ait., Hort. Kew, 2nd. ed. **2**: 230. 1811; Herb. Append. Bot. Reg. 16. 1821; Amaryll. 280-281. 1837; Kunth, Enum. Pl. 5: 605-606. 1850; Baker, Amaryll. 96-97. 1888; Fl. Capensis, **6**: 204-208. 1896; Traub, Herbertia **5:** 113. 1938; Hannibal, Herbertia **9:** 101-102. 1942 (1943); **10**: 55-70. 1943 (1944); Traub & Moldenke, Amaryll. 64-67. 1949; Traub, Amaryllis Manual, 236-251. 1958.
Syn.—Coburgia Herb., Bot. Mag. **47**: sub pl. 2113. 1819; Callicore Link, Handb. **1:** 193. 1839; Belladonna Sweet, Hort. Brit. 2nd ed. 506. 1830; CALLIROE Endl. Gen. 176. 1837.
Species are listed below. Hybrids, including clones, are listed separately.
Brunsvigia appendiculata Leighton, in S. Afr. Gard. **22:** 137, 143. 1932; Dyer, In PL **6:** 73-75. 1950.
Brunsvigia x baptistii Hort.=**Brunsvigia** x **parkeri** Australian group
Brunsvigia x bidwellii (Worsley) Traub.=**Brunsvigia** x **parkeri** Australian group
Brunsvigia x bidwellii rosea Hort.=**Brunsvigia** x **parkeri** (Australian group) rosea Hort.
Brunsvigia blanda (Ker-Gawl.) Hann., Hb 10: 62. 1943 (1944).=**Brunsvigia rosea** var. **blanda** (Kew-Gawl.) Traub
Brunsvigia bosmaniae Leighton, in S. Afr. Gard. **22**: 137, 143. 1932; Dyer, in PL **6:** 72-73, plate 8. 1950.
Brunsvigia burchelliana Herb.=**Brunsvigia radulosa** Herb.
Brunsvigia comptonii Baker, in Jour. S. Afr. Bot. **14:** 29. 1948; Dyer, in PL **6:** 72. 1950.
Brunsvigia cooperi Baker=**Brunsvigia orientalis** (L.) Eckl.

"Brunsvigia coranica Hort.", in Maund's Floral Register, 1st. ed p. 111, plate 879; Cowlishaw, in Bulb Society News-Letter, No. 70, Aug. 1955. "A hybrid raised in 1821. Flowers pure white with pale orange. It is a pale flowered variety of Bot. Reg. t: 1219."

Brunsvigia gregaria Dyer, in PL **6**: 79; 81, plate 10. 1950.

Brunsvigia gigantea Heist. ex Schult. f.=**Brunsvigia orientalis** (L). Eckl.

Brunsvigia gigantea (Van Marum) Traub, non Heist. ex Schult. F.=**Brunsvigia josephinae** (Delile-Red.) Ker-Gawl.

Brunsvigia grandiflora Lindl., in Bot. Reg. **16**: pl. 1335. 1830; Dyer, in PL **7**: 51-56, figs. 7 & 8, plates 10 & 11. 1951.

Syn.—Amaryllis banksiana Lindl. in Bot. Reg. **28**: pl. 11, 1842; Amaryllis slateriana Herb. ex Lindl. Bot. Reg. **30**: 76. 1844; Amaryllis grandiflora (Lindl.) Herb., Amaryll. 278-279. 1837; D. Dietr. Syn. Pl. **2**: 1181; Schnizlein, ic. **1**: pl. 64. 1846; Brunsvigia slateriana (Lindl.) Benth. Gen. Pl. **3**: 727. 1883; "Brunsvigia multiflora Bidwell", in GC Jul. 29, 1850, p. 470 (not of Ait.), a misapplied name= Brunsvigia grandiflora Lindl.; Amaryllis grandiflora var. banksiana Herb. Amaryl. 279, pl. 32, fig. 2. 1837; ?Brunsvigia spaerocarpa Baker, in Fl. Cap. **6**: 207. 1896.

Brunsvigia josephinae (Delile-Red.) Ker-Gawl., in Bot. Reg. sub plates 192-193. 1817; Dyer, PL **7**: 57-62, figs. 9, 10 & 11; plate 12. 1951; Allg. Deutsch. Gart. Mag. **3**: pl. 13; 14 (color). 1806; Herb., Bot. Mag. **52**: pl. 2578. 1825.

Syn.—Amaryllis gigantea van Marum, in Nat. Verh. Bat. Maats. Weetens. **3**: 345, 352, et pl. B(color). 1806; Bot. Mag. **24**: pl. 923(color). 1806, err. **ornata** var.; vide Bot. Mag. **29**: sub pl. 1172. 1809; Kerner, Hort. Sempervir. pl. 217(color). 1906; Amaryllis josephinae Delile-Red. Lil. **7**: pls. 370-372(color). 1812; Brunsvigia josephinae var. angustifolia Ker-Gawl. in Bot. Reg. **3**: pls. 192-193(color). 1817; Brunsvigia josephinae maior Burch. ex Herb., Append. Bot. Reg. pl. 2, 1821; Amaryllis josephiniana Herb. Amaryll. 278, pl. 36, figs. 2, 9. 1837; Coburgia josephinae Herb., in Trans. Hort. Soc. Lond. **4**: 181. 1822; Amaryllis josephiniana & var. graiffinia Herb. Amaryll. 278. 1837; Brunsvigia gigantea (van Marum) Traub, in Hb **5**: 132-5. 1838, non Heist. ex Schult. f. 1830.

Brunsvigia josephinae var. angustifolia Ker-Gawl.=**Brunsvigia josephinae** (Delile-Red.) Ker-Gawl.

Brunsvigia josephinae maior Burch. ex Herb.=**Brunsvigia josephinae** (Delile-Red.) Ker-Gawl.

Brunsvigia kewensis Hort.=**Brunsvigia x parkeri** English group

Brunsvigia kirkii Baker, Amaryll. 99. 1888.

Brunsvigia litoralis Dyer, in PL **7**: 62-64, fig. 11. 1951.

Brunsvigia marginata (Jacq.) Ait., Hort. Kew, ed. 2, **2**: 230. 1811, Dyer, PL **6**: 67-69, pl. 7. 1950. Syn.—Amaryllis marginata Jacq., Hort. Schoenbr. **1**: 34, pl. 65. 1797; Imhofia marginata Herb., Append. Bot. Reg. 18. 1821; Nerine marginata (Jacq.) Herb., Amaryll. 283. 1837; Elisena marginata Roem., Amaryllid. 63.

Brunsvigia minor Lindl. in Bot. Reg. **11**: pl. 954. 1826; Dyer, PL **6**: 75-76, Fig. 11. 1950.

Brunsvigia multiflora Ait.=**Brunsvigia orientalis** (L.) Eckl.

"Brunsvigia multiflora Bidwell" (not of Ait.)=**Brunsvigia grandiflora** Lindl.

"Brunsvigia x multiflora Hort." (not of Ait.)=**Brunsvigia x parkeri** Australian group.

"Brunsvigia x multiflora intermedia Hort."=Clone **'Montague'** (BxpAu).

"Brunsvigia x multiflora rosea Hort."=**Brunsvigia x parkeri** (Australian group) **rosea** Hort.

Brunsvigia natalensis Baker, in Fl. Cap. **6**: 208. 1896; Dyer, in PL **6**: 81; 83, plate 11. 1950.

Brunsvigia orientalis (L.) Eckl. in Trop. Verz. **7**: 1827; Dyer, in PL **6**: Fig. 10. 1950; **7**: 47-51, pl. 9. 1951.

Syn.—Amaryllis orientalis L. Sp. Pl. 293. 1853; Buchoz, Hist. Reg. Veg. **6**: Dec. 9, pl. 5. 1775; Jacq. Hort. Schoenbr. **1**: 38, pl. **74.** (color) 1797; Haemanthus orientalis (L.) Thunb. Prod. **1**: 59. 1790; Brunsvigia multiflora Ait., Hort. Kew, ed. 2, **2**: 230. 1811; Ker-Gawl., in Bot. Mag. pl. 1619. 1814; Herb. Amaryll. 280, pl. 36, fig. 1. 1837; Brunsvigia gigantea Heist. ex Schult. f., Syst. **7**: 844. 1830; Baker, Amaryll. 98. 1888; Coburgia multiflora (Ait.) Herb., Bot. Mag. sub pl. 2213. 1820; Amaryllis multiflora (Ait.) D. Dietr, Syn. Pl. **2**: 1180, Brunsvigia cooperi Baker, in Saund. Ref. Bot. pl. 330. 1782; Amaryllis nobilis Salisb., Prodr. 235

Brunsvigia x parkeri (W. Watson) Traub, in PL **5**: 134. 1949. Syn.—Amaryllis x parkeri W. Watson, in GC Feb. 6, 1909, p. 92. This includes all of the following **Brunsvigia x parkeri** groups.

Brunsvigia x parkeri American group. The various introduced clones are marked **(BxpAm).**

Brunsvigia x parkeri Australian group. Syn.—See Amaryllis x parkeri W. Watson under **B. x parkeri,** above. xBrunsdonna bidwellii Worsley, JRHS **51**: 65. 1926; Brunsvigia x bidwellii (Worsley) Traub, in PL **5**: 134. 1949; "Brunsvigia x multiflora Hort." not of Ait., Cowlishaw, in Hb 2: 46. 1935; Aylett's Hybrids, Hann. in Hb 10: 66. 1943; Amaryllis x baptistii Hort., Montague catalogue; Hann. in Hb 10: 68. 1943; 'Baptisti', Hann. in Hb 10: 68. 1943; Brunsvigia x baptistii Hort., Hann. in Hb 10: 68. 1943. The various introduced clones are marked **(BxpAu).**

Brunsvigia x parkeri (Australian group) **alba** Hort. syn.—xBrunsdonna parkeri (Australian group) alba Hort., in GC Ser. III. lxxviii: 391, with fig.

1925; lxxxiv: 331, with fig. 1928; Gard. Illus. Oct. 3, with fig. 1925; JRHS **51**: 66. 1926; **54**: xciii, cix, Sept. 11. 1928; Amaryllis x baptistii alba Hort., Worsley, GC p. 413. 1932; "Brunsvigia x multiflora alba Hort.", Cowlishaw, in Hb **2**: 46. 1935; 'White Multiflora', Hann. in Hb **10**: 68. 1943.

Brunsvigia x **parkeri** (Australian group) **rosea** Hort. Syn.—"Brunsvigia x multiflora rosea Hort.", Cowlishaw, Hb **2**: 46. 1935; 'Australian Rose', Hann. in Hb. **10**: 68. 1943. Larger flower heads than in **Brunsvigia x parkeri alba** Hort.

Brunsvigia x parkeri English group. Syn.—Amaryllis x parkeri W. Watson in GC Feb. 6, 1909, p. 92; ser. III. **1**: 210-211, fig. 101. 1911; xBrunsdonna parkeri (W. Watson) Worsley, in JRHS **51**: 66-67. 1926; Amaryllis x pseudoblanda Worsley, in GC **84**: 349. 1928; xBrunsdonna blanda Hort., in JRHS **54**: cx. Sept. 11, 1928; Brunsvigia x kewensis Hort; Kewensis Hybrids, Hann. Hb **10**: 66. 1943; 'Lady Parker', Hann. Hb **10**: 66. 1943. The various introduced clones are marked **(BxpE).**

Brunsvigia x **parkeri** (English group) **alba** Hort. Syn.—xBrunsdonna x parkeri alba Hort., Worsley, in The Garden **75:** 460-462. 1911; JRHS 65-69. 1926, 'White Queen', Hann. in Hb **10**: 67. 1943; xBrunsdonna sanderae alba Hort., JRHS vol. **37**: ccxxxi, Sept. 12. 1911; 'Sander White', Hann. Hb **10**: 67. 1943.

Brunsvigia x **parkeri** (English group) **pseudoblanda** Hort. Syn.—xBrunsdonna pseudoblanda Hort., Worsley, in GC 1928, p. 349. A white form which turns pale with age; 'Arthington Worsley', Hann. in Hb **10**: 67. 1943.

Brunsvigia x **parkeri** (English group) **rosea** Hort. Syn.—Amaryllis x parkeri rosea Hort., in The Garden, 1898, p. 57; GC Ser. III. **50**: 211.; The Garden **75:** 462. 1911, with fig. pn p. 460.
462. 1911, with fig. on p. 460.
var. Zwanenburg Hort., Hoog, in Hb **2**: 114, fig. on p. 113. 1935; Amaryllis belladonna parkeri Hort., Hoog, in Van Tubergen's New Bulbous Plants, p. 50. 1947; Hann., in Hb **10:** 67. 1943.

The various introduced clones are marked **(BxpZ).**

Brunsvigia radula (Jacq.) Ait., Hort. Kew, ed. 2, **2**: 230. 1811; Dyer, PL. **6**. 70; 71, Plate 8, 1950. Syn.—Amaryllis radula Jacq., Hort. Schoenbr. **1**: 35, pl. 68. 1797.

Brunsvigia radulosa Herb., Amaryll. 281, pl. 22, fig. 2; p. 423 (**B.** burchelliana), 1837; Dyer, PL **7:** 45-57, plate 8, & fig. 6. 1951.

Brunsvigia rautanenii Baker, in Bull. Herb. Boiss. ser. II. **3**: 667. 1902; Dyer, PL **6**: 67. 1950.

Brunsvigia rosea (Lam.) Hann., in Hb **9:** 101-102; 146. 1942 (1943). The Cape Belladonna.

Syn.—Amaryllis rosea Lam., Encycl. Meth. Bot. **1**: 122. 1783; "Amaryllis belladonna Herb." (=Brunsvigia rosea (Lam.) Hann.) in Herb., Appendix Bot. Reg. 15. 1821; Amaryll. 275-280. 1837; Baker. Amaryll. 95-96. 1888, a misapplied name (for History of misapplication see Traub & Moldenke, Amaryllidac.: Tribe Amaryll. 25-67. 1949; Traub, Amaryllis Manual, 236-251. 1958).

This includes all of the wild varieties and forms, and also the various cultivated forms and hybrids of the species, which are listed separately below:

Brunsvigia rosea x alba Hort., Syn.—Amaryllis belladonna x alba Hort., in Bull. Soc. Tosc. Ortic. **20**: pl. 1. (color) 1895. A reputed Italian hybrid.

Brunsvigia rosea var. **blanda** (Ker.-Gawl.) Traub, in PL Vol. 16. 1960. Syn.—Amaryllis blanda Ker-Gawl., Bot. Mag. **3**: pl. 1450. 1812; Herb. Append. pl. 2. 1821; Geel, Sert. Bot. Cl: 6. (color). 1832; Reichenb., Fl. Exot. **4**: pl. 258 (color). 1835; Herb., Amaryll. Pl. 36; fig. 10. 1837; Loudon, Ladies' Fl. Gard. pl. 28. 1841, in textu, Belladonna blanda in ic.; Paxton, Fl. Gard. **2**: pl. 68 (color). 1851-52; Lem., Jard. Fl. **3**: pl. 254 (color). 1852; Belladonna blanda (Ker-Gawl.) Sweet, Hort. Brit. ed. 2, **2**: 506. 1830; Coburgia blanda (Ker-Gawl.) Herb., in Bot. Mag. 47: sub pl. 2113, p. 4, 1819; Amaryllis belladonna var. blanda (Ker-Gawl.) Baker, Amaryll. 96. 1888; GC Ser. III. liii: 441. illus. 1913; Brunsvigia blanda (Ker-Gawl.) Hann., in Hb **10**: 62. 1943.

Herbert (Amaryll. 277. 1837) speculated that this might be a natural hybrid, but there is no evidence to substantiate this assertion. The type illustration (Bot. Mag. pl. 1450. 1812) shows the lvs dark dingy green, scarcely more than ½" broad; umbel 13-fld; fls about 4" long; "white fading to a blush or pale rose color but not in streaks; no scent noted; the bulb shows no basal tubular leaf-sheath.

Brunsvigia rosea x carminea Hort. Syn.—Amaryllis belladonna x carminea Hort., in Bull. Soc. Tosc. Ortic. **20:** pl. 1 (color). 1895.

Brunsvigia rosea var. elata Hort.=**Brunsvigia rosea** var. **major** Hort.

Brunsvigia rosea var. **longipetala** (Lem.) Traub, in PL **6**: 61. 1950. Syn.—Amaryllis longipetala Lem. L'Illus. Hort. **13**: 78-79. 1866. A tri-colored variety; fls yellowish at the throat and exterior base, changing to white and delicate rose toward apex; with relatively long segs; discovered in S. Afr. by Vroom.

Brunsvigia rosea var. looseriana Hort.=**Brunsvigia rosea** var. **pallida** (Delile-Red.) Hann.

Brunsvigia rosea x magnifica Hort. Syn—Amaryllis belladonna x magnifica Hort., in Bull. Soc. Tosc. Ortic. **20:** pl. 1 (color). 1895.

Brunsvigia rosea var. **major** Hort. Hann. in Hb **10**: 64, Fig. 89. 1943. Syn.—Amaryllis belladonna var. major Hort. Hann. Hb **10**: 64. 1943; Amaryllis belladonna var. elata Hort., Barr Catalogue; Brunsvigia rosea var. elata Hort., Hann.

10: 64. 1943; Amaryllis belladonna major Hort., Jour. Dept. Agric. Victoria **5**: 725. 1907.

This variety is widely cultivated in America, Australia, Europe and elsewhere.

Brunsvigia rosea var. minor Hort.=**Brunsvigia rosea** var. **rosea.**

Brunsvigia rosea var. **pallida** (Delile-Red.) Hann. Hb. **10:** 63. 1943.

Syn.—Amaryllis pallida Delile-Red. Lil. **7**: pl. 479 (color). 1816; Amaryllis belladonna var. pallida (Delile-Red.) Ker-Gawl., Bot. Reg. **9:** pl. 714 (color). 1823; Bury, Hexand. Pl. pl. 45 (color); Belladonna pallida (Delile-Red.) Sweet, Hort. Brit. ed. II. 506. 1830; Florist's Mag. Lond. **1**: 47 (color). 1836; J. W. Loudon, Ladies' Fl.-Gard. pl. 28 (color). 1841, in textu, Belladonna purpurascens var. pallida in ic; Herb. Amaryll. 275-277. 1837; "Chilean Belladonna, or Brunsvigia rosea var. looseriana Hort., Hann. Hb **10:** 63. Fig. 89. 1943; Nat. Hort. Mag. **21:** 48. 1942 (as Amaryllis belladonna); Amaryllis striata Hort., Montague Catalogue; Brunsvigia var. stricta Hort., Hann. Hb **10:** 65. 1943.

Brunsvigia rosea var. perfecta Hort.=**Brunsvigia rosea** var. **rosea perfecta** Hort.

Brunsvigia rosea var. pudica (Ker-Gawl.) Hann.=**Brunsvigia rosea** var. **rosea.**

Brunsvigia rosea var. purpurascens Hort.=**Brunsvigia rosea** var. **rosea.**

Brunsvigia rosea x purpurea major Hort. Hann. Hb **10**: 66. 1943. Syn.—"Amaryllis belladonna purpurea major Hort.", Hoog. Hb **3:** 114. 1935; Hb **5**: 57. 1938; Hb 10: 66. 1943. Blooms regularly in Holland and other cooler regions; fls. deep pink changing to purplish with age.

Brunsvigia rosea var. **rosea.**

This includes the type element, and various forms associated with it. The original type is few-flowered; fls. rose-colored, throat white; segs reflexed; late blooming.

Syn.—Amaryllis rosea Lam. Encycl. Meth. Bot. **1:** 122. 1783. See under **Brunsvigia rosea** (Lam.) Hann. for the misapplied name "Amaryllis belladonna Herb.", Bot. Mag. **19:** pl. 733. 1804; Amaryllis pudica Ker-Gawl. Jour. Sci. & Arts. **2:** 379. illus. 1816; Belladonna pudica (Ker-Gawl.) Sweet, Hort. Brit. ed. 2. 506. 1830; Brunsvigia rosea pudica (Ker-Gawl.) Hann. Hb **10**: 64. 1943; Amaryllis regalis Salisb. Prodr. 232. 1796; Belladonna purpurascens Sweet, Hort. Brit. ed. 2. 506. 1830; "Amaryllis belladonna var. latifolia Herb.", Amaryll. 275. 1837; Belladonna baccifera Lam. Fl. Fr. **2**: 255; "Amaryllis belladonna (rubra) minor Hort.", Hann. Hb **10**: 65. 1943; Brunsvigia rosea var. minor Hort., Hann. Hb **10**: 65. 1943; "Amaryllis belladonna var. minor Hort." Hann. in Hb **10:** 65. 1943.

Additional illustrations: J. Miller, Illustr. Syst. Sex Linn. pl. 18. (color) 1770; Plantarum Indig. & Exot. Ic **2**: plate 63 (color). 1789; Delile-Red. Lil. pl. 180 (color). 1807; Joh. Kerner, Hort. Sempervir. pl. 378. 1813; pl. 765 (color). 1827; Maund. Bot. Gard. **13**: pl. 306. 1839-51; Tratt., Taf. Arch. iv: 369 a & b (color). 1814; Tratt., Thes. Bot. pl. 40 (color). 1819; Vellozo, Fl. Flum. **3**: pl. 116. 1827; Ann. Blumisterei **2**: 203. 1827; (pl. 10 (color). 1833); Mordant de Launay, Herb. Amat. **8**: pl. 551 (color). 1827; Drapiez, Herb. Amat. Fl. **2**: pl. 102 (color). 1829; Loudon, Ladies' Fl.-Gard. pl. 28 (color). 1841; Penfold, Madeira Fl., Fr. & Ferns, pl. 1 (color) 1845; Berge & Riecke, Giftgewaeche, pl. 40 (color). 1850; Fl des Serres, Ser. I. ix. pl. 911 (color). 1853-54; Ill. Hort. **6**: 228. color illus. 1859; A. Braun in Abh. Akad. Berlin, 1850, pl. 6, Fig. 9. 1860; Decaisne & Naud., Amat. Jard. **2**: 216. 1862-66; Reveil, Rigne Veg. **14**: pl. 20 (color). 1870; Eeden, Album Bulb Pl. 40 (color). 1872-81; Pinto, Diccion Bot. Brasil, fig. 16. 1873; Decaisne, Naud. & Hemsl., Trees, shrubs & Herbs. Pl. 481. 1873; Jour. Hort. liv. 184. 1875; ser. III. xlviii. 116. 1904; liii. 301. 1906; lxi. 388. 1910; lxviii. 445. 1913; lxxi. 177. 1915; Florist, 1881, p. 185.; W. Robinson, Engl. Fl. Gard. pl. 11. 1883; Nicholson, Illustr. Gard. Dict. **1**: 62. 1884-88; Jardin **2**: 42. 1888; Garden, xxxiii. 268. 1888; xliii. 490. 1893; lxxv. 483. 1911; Bois, Dict. Hort. 73. 1893; Brehm, Mem. Nat. Mondes des Pl. **2**: 572. 1894-96; Gard. Chron. Ser. III. xxiv. 315. 1898; xxxvi. 454. 1904; Bull. Arboricult. Belg. p. 35. 1904; Marloth, Fl. S. Afr. iv. pl. 37, 38 (color). 1915; Marloth, Fl. S. Afr. **3**: 262. 1932; Strong, American Fl. **3**: 37 (color). 1849.

Brunsvigia rosea var. **rosea bicolor** Hort. Hann. in Hb. **10**: 65. 1943. Syn.—"Amaryllis belladonna spectabilis bicolor Hort.", Wein. ill. Gart.-Zeit. **15**: 361. illus. 1890; **21**: 215. illus. 1896; Sprenger, Gartenfl. **45**: 358. illus. 1896. err. A. b. spectabilis tricolor: "Amaryllis speciosa purpurea Hort.", Barr, Catalogue, Hb **10:** 65. 1943. A rich rose-purple fls; white throat; fls in Aug.

Brunsvigia rosea var. **rosea maxima** Hort., Hann. Hb **10**: 64. 1943. Syn.—"Amaryllis belladonna rosea maxima Hort.", Barr, Catalogue; Gardener's Mag. **45**: 303; Hb 10: 64. 1943; "Amaryllis belladonna var. maxima Hort.". Early flowering, large deep rose; umbel 9-10-fld; very vigorous.

Brunsvigia rosea var. **rosea perfecta** Hort. syn.—"Amaryllis belladonna rosea perfecta Hort.", Wein Illus. Gart.-Zeit. **20**: 361. illus. 1890; **21**: 214. illus. 1866; Gartenfl. xlv: 443. illus. 1896.

Brunsvigia rosea var. **rosea rubra Hort.** Syn.—"Amaryllis belladonna rubra Hort.", Flore des Serres, Ser. 2. **4**: pl. 1415 (color). 1861; Cowlishaw, Hb **2**: 46. 1935; Amaryllis rubra major Hort., GC Ser. 3. lxxxiv: 349. illus. 1928; "Amaryllis belladonna speciosa purpurata Hort." Hann. Hb **10**: 65. 1943; Brunsvigia rosea var. rubra Hort., Hann. Hb **10:** 65. 1943.

Brunsvigia rosea var. **rosea variabilis** Hort. Syn.—Amaryllis variabilis Hort., in Montague Catalogue; Brunsvigia rosea variabilis Hort. Hann. Hb 10. **10:** 66. 1943. Opens nearly white; deepens to ruby red with age; free-flowering; segs narrow; common name "Table Mountain Lily."

Brunsvigia rosea x **rubra major** Hort. Syn.—Amaryllis rubra major Hort. Elwes, GC **84:** p. 349. with fig. 1938; "Amaryllis belladonna x rubra major Hort.", Hoog, in Van Tubergen's New Bulbous Plants. p. 50. 1947. Origin unknown; bulb with pronounced basal tubular leaf-sheath; leaves wide; free-flowering; segs narrow, 1" wide; fls brilliant crimson-rose with yellow base; plant hardy; obtained by Elwes about 1913.

Brunsvigia rosea x **stenopetala** Hort., Syn.—"Amaryllis belladonna x stenopetala Hort.", in Bull. Soc. Tosc. Ortic. **20**: pl. 1 (color). 1896.

Brunsvigia rosea var. stricta Mort.=**Brunsvigia rosea** var. **pallida** (Delile-Red) Hann.

Brunsvigia rosea variabilis Hort.=**Brunsvigia rosea** var. **rosea variabilis** Hort.

Brunsvigia rosea x **verreauxii** Hort. Syn.—Amaryllis verreauxii Hort., Jour. et Flore Jard. **2**: pl. 119. 1832.

Brunsvigia slateriana (Lindl.) Benth.=**Brunsvigia grandiflora** Lindl.

Brunsvigia sphaericarpa Baker—**Brunsvigia grandiflora** Lindl.

Brunsvigia striata (Jacq.) Ait., Hort. Kew, ed. 2, **2:** 231. 1811; Dyer, in PL **6:** 76, 79, pl. 9. 1950. Syn.—Amaryllis striata Jacq., in Hort. Schoenbr. **1**: 36, pl. 70. (color). 1797; Tratt., Hort. Ausw. Gartenfl. **1**: pl. 29 (color). 1821.

Brunsvigia x **tubergenii** Hort. Syn.—"Amaryllis x spofforthiae Herb.", in Amaryll. 278-279; 422; 425. 1837, invalidly published name; **(B. rosea** var. **blanda** x **B. josephinae);** (xBrunsdonna) Messrs. Van Tubergen, in GC Jan. 23, 1909, with fig. in suppl. (without specific name); xBrunsdonna tubergenii Hort., Haggag, Hort. Rev. Egypt, no. 39, p. 5, with fig. 1918; Messrs. Van Tubergen, in New Bulbous Plants, pp. 52-53. 1947; xBrunsdonna parkeri var. tubergenii Hort., Worsley, in JRHS **51**: 66-67. 1926. See also under 'Selkirk's Red'; 'Queen Wilhelmina', and 'Van Tubergen' Hann. in Hb **10**: 69. 1943.

Bulb without deciduous basal tubular leaf-sheath; fl. in Sept.; umbel 22-fld.; fls clear, deep rose, suffused with carmine.

Brunsvigia undulata Leighton, in Fl. Pl. S. Afr. **14**: pl. 552. 1934; Dyer, in PL **7**: 57. 1951.

CALLICORE Link, in Handb. **1:** 193. 1829.=**BRUNSVIGIA** Heist.

Callicore rosea (Lam.) Link, in Handb. **1**: 193. 1829=**Brunsvigia rosea** (Lam.) Hann.

CALLIROE Endl. Gen. 176. 1837=**BRUNSVIGIA** Heist.

Cape Belladonna, The;=**Brunsvigia rosea** (Lam.) Hann.

'Cape Town' (Van Tubergen); (BxpZ), Van Tubergen Catalogue. Fls rose red; rounded umbel; very free-flowering.

"Chilean Belladonna"=**Brunsvigia rosea** var. **pallida** (Delile-Red.) Hann.

COBURGIA Herb. (1819)=**BRUNSVIGIA** Heist.

COBURGIA (Herb.) Traub, subgenus of genus **BRUNSVIGIA** Heist., in PL **15:** 17. 1959. Syn.—COBURGIA Herb., in Bot. Mag. **47:** sub pl. 2113, pp. 4-5. 1819.

Coburgia blanda (Ker-Gawl.) Herb.=**Brunsvigia rosea** var. **blanda** (Ker-Gawl.) Traub.

Coburgia josephinae (Delile-Red.) Herb.=**Brunsvigia josephinae** (Delile-Red.) Ker-Gawl.

Coburgia multiflora (Ait.) Herb.=**Brunsvigia orientalis** (L.) Eckl.

Coburgia pudica (Ker.-Gawl.) Herb.,=**Brunsvigia rosea** var. **rosea.**

'Concord Lass' (Hannibal, 1957): (BxpAm); in PL **13:** 65. 1957; segs snow white with tips faintly marked flesh pink.

'Cream Pitcher' (Hannibal, 1957); (BxpAm); in PL **13**: 65. 1957. Cream white clone derived from 'Hathor'; segs broad and ruffled; throat deep butter yellow.

'Durban' (Van Tubergen); (BxpZ); Van Tubergen Catalogue; fls carmine red; white center; umbel rounded; free-flowering.

Elisena marginata (Jacq.) Roem.=**Brunsvigia marginata** (Jacq.) Ait.

"Elwes Rubra"; not a clone.=**Brunsvigia rosea** x **rubra major** Hort.

'Ethyl Houdyshel' (Hannibal, 1943); (Brr); Hb **10**: 66. 1943. Fls rose-colored changing to deeper rose with age; throat white.

'Frank Leach' (Hannibal, 1943); (BxpAm); in Hb **10**: 66-67, Fig. 89. 1943. Plant with deciduous basal leaf-sheath; fls in Aug; fls pale to deep satiny pink; fragrant; segs narrow.

'G. H. Frances' (Montague); (Brr); in Montague Catalogue; Hann. in Hb **10**: 64. 1943. fls deep pink.

'Glory' (Clarke ex Hannibal), (BxpAu); Hann., in PL **11**: 61. 1955; Allister Clarke introduction; umbel many-fld; deep rich red.

'Grace' (Hannibal, 1957); (BxpAm); in PL **13**: 65. 1957. Back-cross of 'Frank Leach' on **B. rosea;** umbel compact, fls ruffled, light pink with picotee markings.

Haemanthus orientalis (L.) Thunb.=**Brunsvigia orientalis** (L.) Eckl.

'Harboard' (Holloway); (BxpAu); Hb **2**: 46. 1935.

'Hathor' (H. B. Bradley, 1911); (BxpAu); Hb **2**: 46. 1935; Fls pure white, small yellow throat; segs ruffled, margins undulating. Reputed B. josephinae x **B.** x parkeri Australian group, according to Cowlishaw. RHS-NSW Baptist Award, 1911.

'Hibiscus Queen' (Hannibal, 1960); (BxpAm); in PL vol. 16. 1960. Fls. bronze, turning pink in setseg area; segs wide, linear.

Imhofia marginata (Jacq.) Herb.=**Brunsvigia marginata** (Jacq.) Ait.

'Jagersfontein' (Van Tubergen); (BxpZ); Van Tubergen Catalogue; Hb **10**: 67. 1943. Fls deep rich pink; yellow throat; fls. large.

'Janice Gayle' (Hannibal, 1957); (BxpAm); in PL **13**: 65. 1957. Back-cross 'Hathor' on **B. rosea;** 10-12-fld; fls widely flared; throat short, light yellow, segs slender, reflexed, tips colored bright pink.

'Johannesburg' (Van Tubergen); (BxpZ); Van Tubergen Catalogue; Hb **10**: 67. 1943; Fls light rose, white throat, yellow base; free-flowering.

"Kewensis Hybrids".=**Brunsvigia** x **parkeri** English group.

'Kimberley' (Van Tubergen); (BxpZ), Van Tubergen Catalogue; Hb **10**: 67. 1943. Fls deep pink, segs sl. striped, again to deep pink.

"Lady Parker"; not a clone.=**Brunsvigia** x **parkeri** English group.

Leopoldia belladonna M. Roem. Syn. Ensat. 129. 1847=**Brunsvigia rosea** (Lam.) Hann.

'Montague' (Hannibal, 1943): (AxpAu); Hann. in Hb **10**: 68. 1943. Syn.—Brunsvigia multiflora intermedia Hort., Montague Catalogue. Fls cream white, sl. shaded pink.

Nerine marginata (Jacq.) Herb.=**Brunsvigia marginata** (Jacq.) Ait.

"Oarhurst Hybrids", Hann. Hb **10**: 67. 1943. Various **Brunsvigia** x **parkeri** clones and seedlings.

'Orpet White' (Hannibal, 1943); (BxpAm); Hann. in Hb **10**: 68. 1943. Seedling of 'Hathor'; fls nearly white.

"Orpet White Hybrids" (BxpAm), Calif. Hort. Jour. **13**: 13. 1952. Segregates from bulbs imported from Mrs. Bullard in Australia.

'Ovieto' (Holloway); (BxpAu); Hb **2**: 46. 1935. Fls deep pink.

'Pacifica' (Hannibal, 1957); (BxpAm); PL **13**: 66. 1957. Fls perfectly shaped; very pale pink, short white tepaltube; segs very broad; fls long lasting.

'Perfecta' (Montague); (Brr); in Montague Catalogue; Hann. Hb **10**: 64. 1943. Dwarf habit; fls large, pink and white.

'Picotte' (Hannibal, 1955); (BxpAm); in PL **11**: 61. 1955. 'Hathor' x 'Frank Leach'; umbel many-fld; fls ruffled, pinkish color tends to concentrate on margins of segs giving a picotee effect.

'Pretoria' (Van Tubergen); (BxpZ); Van Tubergen Catalogue; Hb **10**: 67. 1943. Fls large, deep pink, white throat, yellow base.

'Purity' (Hannibal, 1957); (BxpAm); in PL **13**: 65. 1957. 'Hathor' self; fls large snow white, segs very broad, regular, reflexed, spirally arranged.

"Queen Wilhelmina", not a clone.=**Brunsvigia** x **parkeri** Zwanenburg group.

'Radiata Queen' (Hannibal, 1960); (BxpAm); Pl Vol. 16. 1960. 'Hathor' self; pure white; umbel 30-fld; fls in large **radial** umbel about 18" in diam., hence its name.

'Red Shadow' (Hannibal, 1955); (BxpAm); PL **11**: 61. 1955. Brunsvigia rosea var. rosea bicolor Hort. x 'Hathor'; like **B. rosea** var. **major** Hort., in shape; white tepaltube; brilliant rose red segs.

'Sander White", Hann. in Hb **10**: 68. 1943.=**Brunsvigia** x **parkeri** (English group) sanderae alba Hort.

'Santa Barbara' (Hannibal, 1943); (BxpAm); Hann. Hb **10**: 67. 1943. Late rose and white with yellow-orange throat; tender to frost.

'Selkirk's Red' (Selkirk); (Bxt); cross of **B. josephinae** x **B. rosea;** fls deep rose red with narrow unbalanced segs.

'Spider' (Hannibal, 1960); (BxpAm), Pl Vol. 16. Fig. 18. 1960. Cross of **B. rosea** var. **pallida** type with narrow-seged 'Hathor' seedling; segs very narrow, reflexed; tepaltube butter yellow, rest of fl soft pink darkening with age.

'Stellenbosch' (Van Tubergen); (BxpZ); Van Tubergen Catalogue; Hb **10**: 67. 1943. Fls large, large white center, segs edged with pink lines; throat yellow.

'Stormy Sunset' (Hannibal, 1955); (BxpAm); JRHS 1955, p. 519; PL **13**: 99. 1957. Fls medium small, short trumpeted; tepaltube deep copper bronze, rest of fl deep red to red-purple; umbel 12-14-fld, radial. 'Sunset' is similar in color but lighter.

'Sunset' (Cowlishaw ex Hannibal): (BxpAu); in PL **15**: 47. 1959. Fls radial, medium-sized; throat deep yellow inside, copper red on outside; segs rich pink.

"Van Tubergen", not a clone.=**Brunsvigia** x **tubergenii** Hort.

'White Jasmine' (Hannibal); (BxpAm); syn.—**Brunsvigia** x **parkeri** (Australian group) alba Hort.; Strout, in Hb **15**: 159, fig. 209. 1948. Segregate from 'Hathor' with very narrow, linear segs, reflexed. This may be a parent of 'Spider', according to Hannibal.

"White Multiflora", not a clone.=**Brunsvigia** x **parker** (Australian group) alba Hort.

"White Queen", not a clone.=**Brunsvigia** x **parkeri** (English group) alba Hort.

'Windhoek' (Van Tubergen); (BxpZ); Van Tubergen Catalogue. Fls rose; white throat.

"Zwanenburg Hybrids".=**Brunsvigia** x **parkeri** Zwanenburg group.

CATALOG OF HYBRID **NERINE** CLONES

1882—DEC. 31, 1958

Compiled by EMMA D. MENNINGER,
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INTRODUCTION

THE INTERNATIONAL CODE OF NOMENCLATURE FOR CULTIVATED PLANTS, 1958, Article 26 states: "In order to be valid the publication of a cultivar (variety) name after 1 January 1959 must be accompanied by a description or by a reference to a previously published description." Therefore, it may be assumed that this list of names of nerine clones in cultivation previous to January 1, 1959, whether published or not, is valid.

Since to my knowledge, no list of hybrid nerine clones has been published, an attempt has been made to compile a fairly complete list. Because of the limitations of time and of available reference material, it is not to be hoped that this list of some 350 names is complete or without errors. Any additions or corrections will be welcomed by the compiler.

Where other information is available for awarded clones, reference to publication is omitted, since this is easily available in the Journal of the Royal Horticultural Society. The earliest hybrids that were found were 'Cami' and x *excellens,* both listed for 1882. The records in many cases are very vague as to the name of the hybridizer and date of origination. Therefore this feature of the list may seem very incomplete.

It is hoped that nerine hybridizers will take advantage of the opportunity of registering new *Nerine* clones in the AMARYLLIS YEAR BOOK edition of PLANT LIFE, giving a description as required by the Code with any other pertinent data, and thus assure the validity of the new names.

HYBRIDIZERS, GROWERS, SUPPLIERS AND EXHIBITORS OF HYBRID NERINE CLONES

ABBREVIATION	NAME, ETC.
A	Anderson, E. B. English grower.
B	Barr, Peter. Early English hybridizer, grower and exhibitor.
Be	Bennett-Poe, J. T. Early English hybridizer.
Bu	Butchert, Thos. Croydon, England. Supplier.
C	Cam, Dr. Early English grower.
Ch	Chapman, H. Hybridizer and exhibitor.
Cl	Clarke, Mrs. and Col. S. R. Clarke. Borde Hill, England. Hybridizers, growers and exhibitors.
Cr	Cranfield, W. B. Enfield, England. Exhibitor.
E	Elliott, H. Sussex, England. Hybridizer and exhibitor.
El	Elwes, H. J. Colesborne, England. One of the most active early English hybridizers and exhibitors.
F	Fletcher, W. H. B. Hybridizer of the bigeneric hybrid *N.* x *fletcheri.*
G	Godman, F. D. Horsham, England. Early hybridizer and exhibitor.

H	Hanger, Francis. Curator RHS Gardens, Wisley, England. Hybridizer.
He	Herbert, Wm. [1778-1847] Early hybridizer and Amaryllid authority.
Ho	Houdyshell, Cecil. La Verne, California. Supplier.
J	Jacob, Rev. J. Hybridizer and exhibitor.
Ja	James, W. M. California. Hybridizer and grower.
Jo	Joel, H. J. St. Albans, England. Grower and exhibitor.
K	Kew Gardens, England. Growers.
L	Lilley, F. Hybridizer and exhibitor.
M	Mansell. Early hybridizer.
Me	Menninger, E. Greenoaks, Arcadia, California. Hybridizer and grower.
O	Oakhurst Gardens. J. Giridlian, Arcadia, California. Supplier.
O'B	O'Brien, James. Early English hybridizer.
Or	Orpet, E. O. [1863-1956] Former supplier. Santa Barbara, California.
P	Palos Verdes Begonia Farm. Waltheria, California. Grower and supplier.
R	Rice, W. E. Former California supplier.
Ro	Rose, J. Oxford, England. Grower and exhibitor.
ER	Rothschild, Edmund de. Exbury, England. Hybridizer, grower and exhibitor.
LR	Rothschild, Lionel de. Exbury, England. Former hybridizer and grower and exhibitor.
S	Stern, Col. F. C. Sussex, England. Hybridizer and grower.
St	Strickland, Sir Charles. Early English hybridizer.
V	Vandertang's Nurseries. Guernsey, Channel Islands. Exhibitors.
Ve	Veitch Exotic Nurseries. Hybridizers and growers, formerly of Chelsea, England.
W	Ware, T. S., Hybridizer and grower.
Wa	Watkins & Simpson, Covent Garden, London. Suppliers.
Wi	Wisely, Royal Horticultural Society Gardens. England. Growers.
Win	Winkfield Manor Nurseries. Ascot, Berkshire, England. Suppliers.

LITERATURE REFERENCES WITH ABBREVIATIONS

BS	Bailey, L. H. Standard cyclopedia of horticulture. 4 vols. 1935 ed.
GC	Gardeners' Chronicle, London.
FS	Flora and silva, ed. by W. Robinson. Nerines in vol. 3, 1905.
H	Herbertia, [1934-1948] ed. by Hamilton P. Traub and Harold N. Moldenke.
JRHS	Journal of the Royal Horticulture Society, London.
M	Macself, A. J. Amateur's greenhouse. 2nd ed., n. d. (Before 1941)
N	Nicholson, George. Illustrated dictionary of gardening. 4 vols. 1884-1888.
NS	———————— Second supplement. 2 vols. 1901.
P	Palos Verdes Begonia Farm. How to grow nerines. Gives descriptions. n. d.
PB	Plant buyer's guide. 6th ed. 1958.
PL	Plant Life, [1945-to date] ed. by Hamilton P. Traub and Harold N. Moldenke.
RHSDS	Royal Horticultural Society. Dictionary of gardening. Supplement 1956.

[CATALOG, NERINE CLONES, ABBREVIATIONS, continued on page 74.]

CATALOG OF HYBRID NERINE CLONES, 1882—DEC. 31, 1958

NAME	HYBRID-IZER	G=GROWER S=SUPPLIER	2n	AWARD	PUBLICATION, DESCRIPTION AND CROSS
'Aachen'		G-ER&Me			Rose pink, narrow tepalsegs.
'Abundance'		G-Wi	22		JRHS:372, 1951.
'Adela'	Cl	G-Cl	22		JRHS:372, 1951. 'Countess Grey' x 'Aurora'.
'Aerolite'		G-ER&Me			PL:140. 1959. Parent of many fine ER hybrids.
'Alice'	LR	G-ER&Me	36	FCC, ER, 1945	JRHS:258, 1946 & 375 illus. fig. 173, 1951. ♀ parent of 'Inchmery Kate'.
'Alpha'	Me	G-Me			Salmon, narrow tepalsegs, but nice.
x **amabalis**					BS:2138, 1935. **N. pudica** x **humilis major.** Rose with darker stripe.
'Amalfi'	ER	G-ER&Me			Deep pink.
'Amoretta'		G-Wi	22		JRHS:372, 1951.
'Andromeda'		G-ER&Me			Cerise.
'Apache'	LR?	G-ER&Me		PC, LR, 1933	JRHS:cxxv, 1934. No description.
'Arcadia'	Me	G-Me			PL:141, 1959. Turkey red HCC 721/3 and 721/2.
'Argonaut'	ER	G-ER&Me			Salmon.
'Aries'		G-ER&Me			JRHS:258, 1946. "Darkest of all nerines".
'Arnhem'	ER	G-ER&Me		AM, ER, 1944	Fine large scarlet. A **N. fothergillii** hybrid.
'Athene'		G-ER&Me	22		JRHS:372. 1951.
x **atrosanguinea**	M				N vol.4:573, 1888; FS:123, 1903. **N. plan'ii** x **flexuosa.** 1883.
'Attar'					JRHS:cxxvi, 1934. Exhibited by A. Worsley. No award or description.
'Aurora'	Ro?	G-ER&Me	33	FCC, Ro, 1920	Fine satiny rose. **N. curvifolia** x **bowdenii.** Not summer dormant.
'Avalon'	Me	G-Me			PL:140; illus.:141, 1959. Good deep pink.
'Bagdad'		G-ER&Me	25		JRHS:374, 1951. **N. fothergillii** x 'Purple Prince'.
'Balmoral'		G-ER&Me			Rose pink with lavender median line.
'Barbara'	LR	G-ER	22		JRHS:258. 1946 & 372. 1951. Shell pink.
'Barcarolle'		G-P			P-list; old rose, gold dusted.
'Basil'	H	G-Wi	24		JRHS:374, 1951. 'Francis' x 'Edith Amy'.
'Battersea'	ER	G-ER&Me			Scarlet.
'Beacon'					RHSDS:52, 1956. Soft coral scarlet.
'Ben Hendy'	ER	G-ER&Me			Deep salmon.
'Ben Hills'	ER	G-ER&Me			Beautiful crimson.
'Bengal Rose'	Me	G-Me			Brilliant rose bengal HCC 25/1 & 25/-.
'Best Blue'		G-ER&Me			Dark blue.
'Best Mauve'		G-ER&Me			
'Best White'		G-ER&Me			
'Blazing Star'		G-P			P-list; fiery scarlet with large umbels.
'Blenheim'	ER	G-ER&Me			Pale mauve salmon red vein.
'Blue Gem'	Me	G-Me			Old rose and blue.
'Blue Seedling'		G-ER&Me			Blue and magenta.
'Bright Scarlet'					Has been reported in unnamed cross with Herga.
'Briquete'			23		JRHS:374, 1951.
'Bunty'	Cl	G-Cl	22		JRHS:372, 1951. 'Countess of Altamont' x 'Mrs. Clarke'.
'Burgundy'		G-P			JRHSDS:52, 1956. Copper red and mauve.

NAME	HYBRID-IZER	G=GROWER S=SUPPLIER	2n	AWARD	PUBLICATION, DESCRIPTION AND CROSS
'Burma Road'		G-ER			JRHS:258, 1946. Light crimson, strong grower.
'Cachary'		G-ER&Me			Magenta and blue.
x **caerulea**					RHSDS:270, 1956. **N. sarniensis** x **pudica.**
'Cami' (or x **camii**)	C?				N vol.4:573, 1888. **N. sarniensis** x **curvifolia.** 1882 pink & blue hybrid.
'Candida'					BS:2136, 1935. Pure white, 15 to 20, 2 inch flowers.
'Candystick'	Me	G-Me			PL:137, 1959. White with magenta median stripe.
'Cardinal'	ER	G-ER		AM, ER, 1945	Deep blood red HCC 820/-.
'Carita'	ER	G-ER&Me			Pale pink.
'Carmenata'(& 'Carmenita'?)	LR	G-ER&Me	33		JRHS:375, 1951. 1933 hybrid. Salmon pink, mauve median line.
'Carole'	Me	G-Me			Scarlet.
'Carolyn'	H	G-Wi	33		JRHS:375, 1951. 1948 hybrid.
'Caryatid'	ER	G-ER&Me		AM, ER, 1947	Mandarin Red HCC 17/1. 17 flowers.
'Castletop'	Cl	G-Cl		PC, Cl, 1957	JRHS:67, 1957. No description.
'Cerise'		G-ER&Me			Rose with lavender stripe.
'Chameleon'	Ja		22		H:135, 1940 & 115, 1941. **N. filifolia** x **corusca.** Evergreen rose & purple.
'Chanticleer'		G-ER&Me			Dark purple with magenta stripe.
'Cherry Ripe'	Me	G-Me			Cherry HCC 722/- with lighter tones.
'Chloe'	ER	G-ER&Me			Pale salmon.
x **cinnabarina**	M				NS:552, 1901. Cinnabar scarlet. **N. curvifolia** x **flexuosa.**
x **colossum**		G-K	33		JRHS:375, 1951. Old hybrid grown at Kew.
'Coralina'		G-Cl	22		JRHS:372, 1951.
'Coronation'	ER	G-ER&Me		AM, ER, 1953	Porcelain rose HCC 620/-.
'Countess Bathhurst'		G-El		AM, El, 1897	Large blush white, rose stripe.
'Countess Grey'					JRHS:372, 1951. Parent of 'Adela'.
'Countess of Altamont'	G?			AM, G, 1908	Shrimp pink, vigorous grower.
'Crimson King'		G-E	33	AM, E, 1906	JRHS:371, 1951. Crimson, broad recurving tepalsegs.
'Crimson Seedling'		G-Me, S-Bu			
'Cupid'	ER	G-ER&Me, S-Win			Pale pink.
'Curiosity'	El	G-Cl	24		JRHS:374, 1951.
'Dark Crimson'		G-ER&Me			Fine dark red.
'Dark Seedling'		G-ER&Me			Dark orange scarlet.
'Dawn'		G-P			P-list; pink with gold and mauve, fine umbel.
'Desdemona'		G-ER&Me			Rose pink with salmon tinge.
'Diana Oliver'		G-Cl	22		JRHS:374, 1951.
'Dolores'	ER	G-ER&Me			Bright pink.
'Duchess'		S-Win			
'Dunkirk'	LR	G-ER&Me	33	AM, ER, 1942	JRHS:375, 1951. Cherry HCC 722/-. 1940 hybrid.
'Eddy' (or x **eddii**)		G-ER&Me			JRHS:258, 1946. "Best true orange".
'Edith Amy'	LR	G-ER	33	AM, ER, 1942	JRHS:375, 1951. Light salmon pink. 'Aurora' x ?
'Electra'		G-ER&Me			Old rose.
x **elegans**	W	G-K	22(26)	var. alba FCC, W, 1893	JRHS:373 & 374, 1951. **N. flexuosa** x **sarniensis.**

NAME	HYBRIDIZER	G=GROWER S=SUPPLIER	2n	AWARD	PUBLICATION, DESCRIPTION AND CROSS
x **elegantissima**	L		28	AM, L, 1910	H:115, 1941 & JRHS:374, 1951. **N.** x **mansellii** hybrid. Cerise.
'Empire Day'		G-P			RHSDS:52, 1956. Glowing rose crimson, strong grower.
x **eruhescens**					RHSDS:271, 1956. Syn. of **N. roseo-crispa** & **pulchello-undulata.**
'Eve'	ER	G-ER&Me			Pale pink.
x **exburiense**		G-ER			JRHS:258, 1946. Salmon with white center.
x **excellens**	He		28	FCC, W, 1888	N vol. 2:447, 1885 & JRHS:374, 1951. Carmine rose of 1882.
'Exonia'		G-K	22	AM, Ve, 1919	JRHS:373, 1951. **N. bowdenii** x **fothergillii.** Cerise.
'Fairy Wand'	Me	G-Me			Pl:141, illus.139, 1959. Geranium lake HCC 20/-, crisped tepalsegs.
'Falaise'	ER	G-ER		AM, ER, 1947	Scarlet HCC 19/-. 15 flowers to umbel.
'F. D. Godman'	G?			AM, G, 1907	Pink tepalsegs with waved ends.
'Festival of Britain'	ER	G-ER&Me			Salmon.
'Firebird'		G-ER&Me			Fine scarlet.
'Firewheel'	Me	G-Me			Bright scarlet.
'Flamboyant'	Me	G-Me			PL:141, 1959; illus.:139. Fine large flame color.
'Flame'		G-ER&Me			
x **fletcheri**	F		22		JRHS:370, 1951. Cape belladonna (**Brunsvigia rosea**) x Nerine ?
'Flexudica'					JRHS:488, 1908-9. **N. flexuosa** x **pudica.**
'Francis'	LR		22		JRHS:373, 1951. 1941 hybrid.
'Fred Wynniatt'	ER	G-ER&Me		AM, ER, 1955	Vermilion HCC 18/-. 'Carminata' x 'Joan'.
'Fuchsine'		G-A			JRHS:125, 1956. Pink.
'Gaby Deslys'		G-ER&Me&S	22		JRHS:372, 1951.
'Gazelle'		G-ER&Me			
'Giantess'		G-B		AM, B, 1913	Large carmine. **N. bowdenii** ♀ x **Corusca major** ♂.
'Glitter'		G-B		AM, B, 1922	Rich orange scarlet, waved tepalsegs.
'Gloaming'	S	G-S	22		JRHS:373, 1951.
'Glory of Sarnia'			33	AM, B, 1913	JRHS:371, 1951. **N. corusca major** ♀ x **fothergillii** ♂. Scarlet.
'Good Pink'		G-ER&Me			
'Good Red'		G-ER&Me			
'Granada'	Me	G-Me			Large deep orange pink.
'Grilse'	S	G-S	22		JRHS:373, 1951.
'Hadrian'	LR	G-ER	22		JRHS:373, 1951. 1941 hybrid.
'Hamilton'		G-ER&Me			
x **hayloekii**	He				BS:2138, 1935. **N. sarniensis** x **flexuosa.** One of the oldest.
'Hebron'		G-ER&Me			Coral.
'Helene'	ER	G-ER&Me			Pale pink.
'Helena Chapman'		G-S	22		JRHS:372, 1951.
'Henrietta'		G-ER&Me			Cherry HCC 722/2.
'Henry Elwes'	El			PC, El, 1946	JRHS:v, 1947. No description.
'Her Majesty'		G-P			P-list; glowing rose cerise, gold dusted. Extra fine.
'Hera'	Ro	G-ER&Me&P	33	FCC, Ro, 1920	JRHS:375, 1951. Large rose pink, fairly hardy.

NAME	HYBRIDIZER	G=GROWER S=SUPPLIER	2n	AWARD	PUBLICATION, DESCRIPTION AND CROSS
'Herga'	LR	G-ER&Me	33	AM, ER, 1942	JRHS:375, 1951. Cherry HCC 722/- 'Purple Prince' x **N. 'othergillii.**
'Hilda'		G-P			P-list; tall light salmon, gold dusted.
'His Majesty'	B	G-K	22	AM, B, 1922	JRHS:373, 1951. Striking glowing scarlet.
'Honourable Miss Gibbs'	El			AM, El, 1911	Sparkling deep velvety crimson.
'Honourable Mrs. Wynne'	Cl		22		JRHS:373, 1951. Orange scarlet.
'Hood'	ER	G-ER&Me			Red.
'Horsa'		G-ER&Me			Shell pink.
'Hurricane'	LR		22		JRHS:373, 1951. 1937 hybrid.
'Inchmery Elizabeth'	ER	G-ER&Me		AM, ER, 1949	Dutch vermilion HCC 717/-. Fine flowers 2½ inches across.
'Inchmery Kate'	LR	G-ER&Me	44	AM, ER, 1949	JRHS:366, 1951; illus. fig. 174 1951. Rose Pink HCC 427/3. 3 inch flowers.
'Ingens'	Ja?	G-P&Ja?	33(32, 34)		H:234; illus. pl.84, 1937 &:115, 1941.
'Inominata'		G-S	22		JRHS:373, 1951.
'Irene'		S-Win			
'Isobel Beckwith'	El			PC, El, 1934	Salmon pink with broad crisped tepalsegs.
'Ispahan'	ER	G-ER&Me			Orange flushed mauve.
'Jarabutt'		G-ER&Me,			Claret rose HCC 021/- with lighter centers.
'Jewel'		G-S	22		JRHS:373, 1951.
'Joan'	LR	G-ER&Me S-Win	26		JRHS:374, 1951. 1942 hybrid.
'Jocelyn'	ER	G-ER&Me			Pale pink deeper pink vein.
'Judith'		G-P			P-list; no description.
'Juliet'		S-Win			
'Kappa'		G-S	33		JRHS:375, 1951.
'King of the Belgians'	Ch	G-ER&Me&S	23		JRHS:374, 1951; illus. PL:139, 1959. Dawn pink HCC 523/3. Large.
'Kitty'		G-Cl	22		JRHS:373, 1951. ('Lady Rankin' x 'Mrs. Shelley') x 'Mrs. Praed'. Salmon.
'Knight Errant'		G-P			P-list; bright rose crimson.
'Knight Templar'		G-ER&Me			RHSDS:52, 1956. Rose amethyst, robust grower.
'Lady Ackland'		S-Win			
'Lady Bromley'	El			AM, El, 1897	Scarlet with slate colored median band.
'Lady Clementina Mitford'	El	G-Cl	22	AM, El, 1898	JRHS:373, 1951. Shell pink suffused with rose.
'Lady de Walden'		G-Cl	22		JRHS:373, 1951. Free flowering.
'Lady Dorington'	El		22	AM, El, 1897	JRHS:371, 1951. Large pink striped rosy purple.
'Lady Downe'		G-Cl	22		JRHS:373. 1951.
'Lady Ffolkes'	El	G-P		AM, El, 1904	Rich bright clear pink, dwarf grower.

NAME	HYBRID-IZER	G=GROWER S=SUPPLIER	2n	AWARD	PUBLICATION, DESCRIPTION AND CROSS
'Lady Foster'					M:187, n.d. (Before 1941) JRHS:370, 1951. ♂ parent of 'Inchmery Kate'?
'Lady Houlkes'		G-Cl	22		JRHS:373, 1951.
'Lady Lawrence'	El			AM, El, 1897	Moderate size orange and salmon.
'Lady Llewellyn'	**El**	G-Cl	33	AM, El, 1897	JRHS:375. 1951. Blush white with pink centers. Large flower.
'Lady Loder'					JRHS:375, 1951. Parent of 'Dunkirk'.
'Lady Louisa Longley'	El			AM, El, 1900	Salmon pink striped rosy crimson.
'Lady Lucy Hicks Beach'	El	G-Cl	22	AM, El, 1897	JRHS:373, 1951. Rose crimson, large umbel.
'Lady Mary Shelley'	El	G-P	22	AM, El, 1897	JRHS:371, 1951. Vigorous pale pink and salmon.
'Lady Montague'		G-Cl	22		JRHS:373, 1951.
'Lady Rankin'					JRHS:373, 1951. In the background of 'Kitty'.
'Lady Stanley'		G-Cl	22		JRHS:373, 1951.
'Lady Stirling Maxwell'	El	G-Cl	33		JRHS:375, 1951. Among the earliest triploids. 1897.
'Leo'	ER	G-ER&Me			Red.
'Liberty'					RHSDS:52, 1956. Coral with deeper stripe.
'Lighthouse'		S-Win			
'Lillian'		G-P			P-list; no description.
'Lionel'	ER	G-ER&Me	24	AM, ER, 1947	JRHS:374, 1951. Vermilion HCC 18/-. Originally called 'Oriflamme'?
'Lizzie Moore'					RHSDS:52, 1956. Satiny rose with crimson bar.
'Lord Grenfell'		G-S, S-Wa	22		JRHS:373, 1951.
'Lucifer'		G-P			RHSDS:52, 1956. Deep crimson scarlet.
'Lydia'		G-P			P-list; pink waved tepalsegs.
x **magnifice**		G-Or, S-Ho			P'nker and larger than N. **bowdenii.**
x **mansellii**	M	G-Me&P	22(24)	FCC, M, 1887	N vol.4:573, 1888; H:115, 1941. **N. flexuosa** x **curvifolia.** Late rose.
'Margaret'	Me	G-Me			Pink with deeper centers.
'Marie Antoinette'	ER	G-ER&Me			Pale salmon orange.
'Marie Louise'					JRHS:258, 1946. Shell pink with deeper markings.
'Mariloo'	ER	G-ER		AM, ER, 1954	French Rose HCC 520/-. 'Aerolite' x 'Lionel'.
'Mary'	Cl	G-Cl	22		JRHS:373, 1951. 'Countess of Altamont' x 'Mrs. Praed'
'Mary Alice'	Me	G-Me			Good cerise.
'Maryclaire'		G-ER&Me			Scarlet HCC 19/1 striped HCC 19/3.
'Mascote'				AM, B, 1920	Crimson scarlet with central band of scarlet.
x **meadowbankii**		G-Cl	22		NS:552, 1901; JRHS:373, 1951. **N. fothergillii** x **sarniensis.** Orange scarlet.
'Minerva'					H:229; illus. pl.82. 1937. RHSDS:52, 1956. Salmon scarlet. gold dusted.
'Miranda'		G-P			RHSDS:52, 1956. Rich cerise, strong grower.
'Miss Carrington'	El?	G-Cl	22	AM, El, 1902	JRHS:373, 1951. Rose with red median band.
'Miss Cecily Elwes'	B?			AM, B, 1919	Mauve with broad carmine stripe.
'Miss E. Cator'	El	G-Cl		AM, El, 1924	Large rose cerise.

NAME	HYBRIDIZER	G=GROWER S=SUPPLIER	2n	AWARD	PUBLICATION, DESCRIPTION AND CROSS
'Miss Frances Clarke'		G-Cl	22		JRHS:373, 1951.
'Miss Jekyll'	El			AM, El, 1898	Large rosy salmon.
'Miss Norton'		G-Cl	22		JRHS:373, 1951.
'Miss Rosamond Elwes'		G-Cl	22		JRHS:373, 1951.
'Miss Sheepshanks'	Cl	G-Cl	22		JRHS:373, 1951. 'Countess of Altamont' x 'Mrs. Clarke'.
'Miss Shelley'	El	G-Cl	22	AM, El, 1904	JRHS:373, 1951. Handsome pale pink.
'Miss Willmott'	El	G-Cl	22	AM, El, 1899	JRHS:373, 1951. Large orange scarlet.
'Miss Woolward'	Be?			AM, Be, 1903	Rose pink, broad tepalsegs.
'Mrs. A. Eoden'		G-Cl	22		JRHS:374, 1951.
'Mrs. Aimes'		C-Cl	26		JRHS:374, 1951.
'Mrs. Arthur Elwes'	El			AM, El, 1924	JRHS:258, 1946. Shell pink, thin flowers.
'Mrs. Bazley'					JRHS:iii, 1946. Exhibited flowers showed virus break.
'Mrs. Berkeley'	El	G-Cl	22	AM, El, 1899	JRHS:373, 1951. Pale orange salmon.
'Mrs. Clarke'	Cl?	G-Cl			JRHS:374, 1951. White tinted carmine at base.
'Mrs. Cooper'		G-Cl	22		JRHS:374, 1951.
'Mrs. Dent Brokenhurst'		G-Cl	22		JRHS:374, 1951.
'Mrs. Douglas'	El			AM, El, 1898	Large salmon with undulating telapsegs.
'Mrs. Elliott'	El			AM, El, 1901	Sturdy, broad salmon red tepalsegs.
'Mrs. F. R. S. Balfour'	El			AM, El, 1911	Rose pink to white at base.
'Mrs. George Barr'			23		H:115, 1941; JRHS:374. 1951.
'Mrs. Godman'	El			AM, El, 1899	Large bright rose, suffused magenta.
'Mrs. H. J. Elwes'	B	G-ER&Me&P	22	FCC, B, 1919	JRHS:258. 1946 & JRHS:374, 1951. Shell pink.
'Mrs. J. W. Barr'					M:187, n.d. (Before 1941). Soft salmon pink.
'Mrs. Kingscote'		G-Cl	22		JRHS:374, 1951.
'Mrs. Meade Waldo'	El			AM, El, 1911	Large lustrous orange scarlet.
'Mrs. Miller Mundy'	Cl	G-Cl	22		JRHS:374, 1951. 'Countess of Altamont' x 'Mrs. Clarke'.
'Mrs. Moore' (also Miss Moore'?)			22	AM, Be, 1903	JRHS:373. 1951. Rosy crimson, tall scape.
'Mrs. Newman'					JRHS:xxiii, 1935. Exhibited by Dame Alice Godman.
'Mrs. Praed'					JRHS:373 & 374, 1951. Parent of 'Kitty' and 'Peggy'.
'Mrs. Ruthe'		S-Win			
'Mrs. Shelley' (Same as 'Lady Mary Shelley'?)					JRHS:373, 1951. In parentage of 'Kitty'.
x mitchamiae					RHSDS:271, 1956. **N. sarniensis x undulata.**
'Montreuil'		G-S	22		JRHS:373, 1951.
'Moscow'	LR		22		JRHS:258. 1946 & 373, 1951. Good white hybrid of 1941.
'Motley'					JRHS:125, 1956. Used in unnamed cross with **N. bowdenii.**

NAME	HYBRIDIZER	G=GROWER S=SUPPLIER	2n	AWARD	PUBLICATION, DESCRIPTION AND CROSS
x **mutabilis**					NS:552, 1901. **N. flexuosa** x **humilis;** syn. x **excellens.**
'Myra'	S-Win				
'Naomi'	ER	G-ER		AM, ER, 1955	Clear pale salmon. 'Aerolite' x 'Lionel'.
'Nautilus'		G-ER&Me			JRHS:258, 1946. Striped mauve and purple.
'Near Queen Mary'		G-Cl	22		JRHS:374, 1951.
'Nell Gwynne'	ER	G-ER&Me			Deep salmon.
'Nelson'	ER	G-ER&Me		FCC, ER, 1955	Fuchsia purple and red. 'Aerolite' x 'Lionel'.
					Illus. GC:156, Nov. 5, 1949. Rhodamine pink HCC 527/-. Large .
'Nena'	Cl?	G-Cl		AM, Cl, 1949	
'Nest Rankin'	El			PC, El, 1934	Bright crimson, narrow tepalsegs.
'Nicola'	H	G-Wi	33		JRHS:375, 1951. 1948 hybrid.
'Norma'	Me	G-Me			Free flowering rose pink and lavender.
'Novelty'	W		22	AM, W, 1896	JRHS:374, 1951. Alleged cross of nerine with agapanthus. Rose.
'Nymph'		G-P			P-list; pure white with pink stripe.
x **o'brienii**	O'B				NS:552, 1901. Carmine to slate. **N. pudica** x **plantii.**
'October David'	ER	G-ER&Me			Dark crimson.
'Odette'		S-Win			
'Olive Archer'		G-Cl		PC, Cl, 1957	JRHS:Pt.2:66, 1957. No description.
'Optimist'		G-ER&Me			Bright scarlet, Capsicum Red HCC 715/-.
'Orangeade'		G-ER&Me			Salmon orange.
'Oriflamme'	ER		22		JRHS:374, 1951. **N. fothergillii major** x 'Aerolite'. 1947 hybrid.
'Othello'	LR	G-Win	22		JRHS:374, 1951. 'Miss Shelley' x 'Mrs. Praed'.
'Pale Pink'		G-ER&Me			Variable pink, sometimes darker.
'Pamela'		G-ER&Me			JRHS:258, 1946. Illus. Pl:141, 1959. Porcelain rose HCC 620/1.
'Pantaloon'		G-ER&Me			JRHS:258, 1946. Mauve and purple striped.
'Paula Knight'	Jo?	G-Jo		AM, Jo, 1958	China rose HCC 024/1. Flowers 3 inches.
'Peggy'		G-Cl	22		JRHS:374, 1951. 'Miss Shelley' x 'Mrs. Praed'.
'Pekin'	ER	G-ER&Me			Deep pink flushed mauve.
'Peru'	ER	G-ER&Me	22		JRHS:374, 1951. Pink flushed mauve.
'Peter Barber'	ER	G-ER&Me			Flame.
'Peter Barr'		G-P			JRHS illus. fig. 97, 1946. Glistening rose pink, gold sheen.
'Pink'		G-Me, S-Win			Rather small dawn pink HCC 523/1 and 523/-.
'Pink Beauty'					RHSDS:53, 1956. Late, bright rose pink **N. bowdenii** hybrid.
'Pink Seedling'		G-ER&Me			
'Pink Triumph'		G-V		AM, V, 1957	Fuchsine pink HCC627/2.
'Pompadour'		G-ER&Me			PL:137, 1959. Wide tepalsegs. Vermilion HCC 18/1.
'Prince of Orange'					M:187, n.d. (Before 1941). Bright orange scarlet.
'Princess Mary'		G-P			P-list; no description.
x **pulchello-humilis**					JRHS:488, 1908-9. Syn. of x **excellens?**
x **pulchello-undulata**					N vol. 2:447, 1885; JRHS:488, 1908-9. Syn. of x **excellens?**
'Pure White'		G-ER&Me			

NAME	HYBRIDIZER	G=GROWER S=SUPPLIER	2n	AWARD	PUBLICATION, DESCRIPTION AND CROSS
'Purple Prince'	E	G-Cl	33	AM, E, 1900	JRHS:375, 1951. Crimson flushed purple.
'Purple Princess'				AM, El, 1907	'Purple Prince' x 'Novelty'. Large light crimson.
'Queen Mary'	Cr?	G-ER&Me&P	33	AM, Cr, 1947	JRHS:375, 1951. Coral pink, flowers 2½ inches across.
'Queen Natalie'		G-P			P-list; no description.
'Queen of Sheba'	ER	G-ER&Me			Pale rose pink.
'Queen of the Belgians'					ER has unnamed cross with 'Aerolite'.
'Rachel'		G-ER		PC, ER, 1953	JRHS:10, 1954. No description.
'R. B. Whitehead'		G-Cl	22		JRHS:374, 1951.
'Red Hussar'		G-P			P-list; large salmon scarlet, gold dusted.
'Red Knight'		G-ER?			ER has unnamed cross with 'Aerolite'.
'Robert Berkeley'		G-P			P-list. RHSDS:53, 1956. Rich salmon rose, shot gold.
'Rodacea'	ER	G-ER&Me			Salmon orange.
'Romeo'		S-Win			
'Ronald'		G-P			P-list; deep coral red with deeper red stripe.
'Rosalba'	ER	G-ER&Me			White, pale pink edge.
'Rosebud'	B?			AM, B, 1915	Attractive dark rose, lighter at base.
'Rosella'		G-P			P-list; bright rose pink, reflexing tepalsegs.
'Rosemary'	ER	G-ER&Me			White flushed pink.
x **roseo-crispa**		S-Ho			NS:552, 1901. **N. flexuosa x undulata.**
'Rose Parade'	Me	G-Me			Azalea pink HCC 618/-.
'Rosinante'	ER	G-ER&Me		AM, ER, 1953	Deep porcelain rose. 'Aerolite' x 'Lionel'.
'Rosy Dawn'	Me	G-Me			Beautiful salmon pink.
'Rotherside'	Ch	G-ER&Me	33	AM, Ch, 1916	JRHS:375, 1951. Signal red HCC 719/-. **N. corusca** x **Fothergillii.** Fine.
'Roweana'		G-P			P-list; coral red with deep crimson star.
'Royal Dragoon'		G-P			P-list; deep rose crimson, gold dusted.
'Royal Prince'		G-P			P-list; scarlet, shot purple.
'Roza Stevenson'	ER	G-ER&Me		AM, ER, 1955	French rose HCC 520/2. 'Caryatid' x 'Alice'.
'Ruffles'	Me	G-Me			Pale pink, much crisped.
'Ruth'	ER	G-ER&Me			Deep pink.
'Salmon'		G-ER&Me, S-Win			
'Salmon Perfection'		G-P			P-list; clear light salmon, strong tall grower.
'Salmon Pink'		G-ER&Me			Deep crimson pink.
'Salmon Queen'				AM, El, 1913	Reddish salmon, tall scape.
'Salmon Trout'		G-ER&Me		AM, ER, 1955	Azalea Pink HCC 618/1, deeper vermilion stripe.
'Salmone'		G-ER&Me			Salmon, narrow tepalsegs.
'Santa Anita'	Me	G-Me			Bright carmine, lighter centers, crisped.
'Scarlet Beauty'					M:186, n.d. (Before 1941). Brilliant orange scarlet.
'Scarlet Gem'	Me	G-Me			Fine scarlet.
'Scarletta'					RHSDS:53, 1956. Rich rose scarlet, gold dusted.
'Scintilla'					RHSDS:53, 1956. Large glowing crimson scarlet and purple.

NAME	HYBRIDIZER	G=GROWER S=SUPPLIER	2n	AWARD	PUBLICATION, DESCRIPTION AND CROSS
'Sea Shell'	Me	G-Me			Bright shell pink.
'Sequin'	Me	G-Me			PL:140, 1959. Carmine rose HCC 621/2, silver dusted.
'Sharon'	Me	G-Me			PL:140, 1959; illus.:141, 1959. Salmon pink with lighter edges.
'Shell Pink'		G-ER&Me			Deep pink, narrow tepalsegs.
'Sieglinde'		G-P			P-list; tall glistening satiny pink.
'Snow'	ER	G-ER&Me			White.
'Snowdrift'					JRHS:258, 1946. Good white.
'Snowflake'	El	G-ER&Me	22	AM, El, 1911	JRHS:374, 1951. Pure white, medium size.
'Solent Swan'		G-ER&Me			Illus. PL:139, 1959. Fine pure white except pink stamens.
'South Saxon'				PC, Cr, 1934	Bright cerise, broad crisped tepalsegs.
'Sparkler'					RHSDS:53, 1956. Deep rose, gold dusted.
'Sparta'		G-ER&Me			Porcelain rose HCC 620/-.
'Spitfire'		G-ER&Me			Very fine rose crimson.
x **spofforthiae**					RHSDS:271, 1956. **N. sarniensis x undulata.**
'Stella'		S-Win			
'Stephanie'	Cl?	G-Cl&ER&Me	22	AM, Cl, 1949	JRHS:374, 1951. Rhodamine pink HCC 527/2, large flowers.
x **stricklandii**					NS:522, 1901. **N. sarniensis x pudica.**
'Sugarstick'		S-Win			
'Susan'	ER	G-ER&Me		AM, ER, 1954	Illus. PL:141, 1959. Very fine porcelain rose HCC 620/2.
'Talisman'		G-P			P-list; salmon scarlet, gold dusted.
x **tardiflora**					NS:552, 1901. Old cross confused with **N. flexuosa.**
'Thalia'		G-P			P-list; deep salmon pink, gold dusted.
'Theresa'	ER	G-ER&Me			Salmon, flushed mauve.
'Tonga'	ER	G-ER&Me			Deep mauve.
'Trafalgar'	ER	G-ER&Me		AM, ER, 1952	Fine carmine. 'Aerolite' x 'Lionel'.
'Ultra Violet'	Me	G-Me			Bright rose and blue.
'Unique'	ER	G-ER&Me			Pink flushed mauve.
'Vampire'	ER	G-ER&Me		AM, ER, 1953	Turkey red HCC 721/3. 'Aerolite' x 'Lionel'.
x **versicolor**					RHSDS:271, 1956. **N. sarniensis x undulata.**
'Vivid'		G-ER&Me		AM, B, 1915	Deep scarlet red.
'Vivien'		G-Cl	??		JRHS:373, 1951. ('Lady Rankin' x 'Mrs. Shelley') x 'Mrs. Praed'.
'Wales'	J	G-Wl		AM, J, 1927	Rich orange red, long wide tepalsegs.
'Waterloo'		G-ER&Me		PC, ER, 1952	JRHS:14, (Extracts) 1953. No description.
'Wellington Koo'		G-ER&Me			
'White'		G-ER&Me			PL:140, 1959. White with tinge of pink.
'White Knight'				AM, B, 1923	Large white with pink median stripe.
'Wisley Bridesmaid'		G-ER&Me			PL:140, 1959. Porcelain rose HCC 620/2.
'Zanzibar'	Me	G-Me			Fine brilliant cerise.
'Zoroaster'					BS:2138, 1935. **N. pudica x sarniensis.**

[**CATALOG, NERINE CLONES, ABBREVIATIONS,** continued from page 64.]

OTHER ABBREVIATIONS

PC	Preliminary Commendation, Royal Horticultural Society award.
AM	Award of Merit, Royal Horticultural Society award.
FCC	First Class Certificate, Royal Horticultural Society award.
2n	Somatic chromosome number. All counts referred to JRHS 1951 are by E. K. Janaki Ammal and Margery Bridgewater, except 'Chameleon', x *mansellii,* x *elegantissima,* 'Mrs. George Barr' and 'Ingens' which are also by W. M James and F. T. Addicott in Herbertia 1941.

[**PLANT LIFE LIBRARY,** continued from page 178.]

THE GARDEN FLOWERS OF CHINA, by H. L. Li. Ronald Press Co., 15 E. 26th St., New York 10, N. Y. 1959. pp. 240. illus. $6.00. This charming and beautifully illustrated book by an outstanding Chinese botanist explains why China is called the mother of gardens. Going back to the original Chinese sources, the history of each plant treated is detailed, including scientifically established facts as well as the legendary tales. This book is highly recommended to orientalists and gardeners generally.

ORCHIDS IN AUSTRALIA, by Fred Moulen. Charles T. Branford Co., 69 Union St., Newton Centre 59, Mass. 1959. pp. 148, including 100 color illustrations. $15.00. This delightful volume contains a selection of 100 excellent color plates of Orchids cultivated in Australia, based on 35 mm. color transparencies made by the author, who has had years of experience in his chosen field. The selections include Cymbidiums, Cattleyas, Vandas, Cyprepediums, Dendrobiums, Miltonias, and so on. This fine contribution to Orchid lore is recommended to all who are interested in these interesting and beautiful plants.

PLANTS AND ENVIRONMENT, 2nd. ed., by R. F. Daubenmire. John Wiley & Sons, 440 4th Av., New York 16, N. Y. 1959. pp. 442. illus. $6.75. This second edition, subtitled a textbook of plant autecology, by an outstanding authority, will be welcomed by all students of plant science. The subjects treated include—the soil, water, temperature, light, atmospheric, biotic and fire factors, followed by the consideration of the environmental complex, and ecologic adaptation and evolution. Some of the new subjects included are—the evaluation of stoniness of soils, significance of dew to plants, new concepts of evapotranspiration, shielding of precipitation gauges, urban microclimate, frost-churning of soil, and atmospheric pollution by smog and hydrogen fluoride. This stimulating textbook is highly recommended.

PERSPECTIVES IN VIROLOGY, edited by Morris Pollard. John Wiley & Sons, 440 4th Av., New York 16, N. Y. 1959. pp. 312. illus. $7.00. The objective of this symposium volume, dedicated to F. R. Beaudette (1897-1957), is to explore the implications of basic contributions to virology for public health applications. It includes papers by twenty authorities, and extemporaneous discussions of these papers by forty-five leading American and European virologists. This stimulating book is required reading for students of virology, and those who are interested in preventive medicine and public health. An epilogue on Tulipomania in 17th century Holland, and the benevolent virus is of special interest to plant scientists and gardeners.

BIOPHYSICAL SCIENCE—A STUDY PROGRAM, planned and edited by J. L. Oncley et al. John Wiley & Sons, 440 4th Av., New York 16, N. Y. 1959. pp. 568+ indices. $6.50. This comprehensive study program in biophysical science is based on the carefully integrated series of papers by sixty-one authorities who contribute compact summaries of certain key problems and critical evaluations of

[**PLANT LIFE LIBRARY,** continued on page 158.]

REGISTRATION OF NEW AMARYLLIS CLONES

Registrar: Mr. W. D. Morton, Jr.

This department has been included since 1934 to provide a place for the registration of names of cultivated *Amaryllis* and other amaryllids. The procedure is in harmony with the INTERNATIONAL CODE OF BOTANICAL NOMENCLATURE (edition publ. 1956) and the INTERNATIONAL CODE OF NOMENCLATURE FOR CULTIVATED PLANTS (edition publ. 1958). Catalogs of registered names, as well as unregistered validly published names, will be published from time to time as the need arises. The first one, "DESCRIPTIVE CATALOG OF HEMEROCALLIS CLONES, 1893-1948" by Norton, Stuntz and Ballard was published in 1949. This may be obtained at $2.50 prepaid from: Dr. Thos. W. Whitaker, Executive Secy, THE AMERICAN PLANT LIFE SOCIETY, Box 150, La Jolla, Calif. CATALOG of HYBRID NERINE CLONES, 1882-1958, by Emma D. Menninger; and CATALOG OF BRUNSVIGIA CULTIVARS, 1783—1959, by Hamilton P. Traub and L. S. Hannibal, are published in the present (1960) issue of the AMARYLLIS YEAR BOOK. A catalog of Amaryllis names, and also a catalog of the names of other cultivated amaryllids, is scheduled for publication in 1961 HERBERTIA.

Only registered clones of Amaryllis and other amaryllids are eligible for awards and honors of the AMERICAN AMARYLLIS SOCIETY. Numbers of registered clones are preceded by a prefix, an abbreviation for the genus concerned. Thus, A-390, the "A" standing for *Amaryllis;* Z-1, the "Z" standing for *Zephyranthes*, etc.

Correspondence regarding registration of all amaryllis such as *Amaryllis, Lycoris, Brunsvigia, Clivia, Crinum, Hymenocallis,* and so on, should be addressed to: Mr. W. D. Morton, Jr., Registrar, 3114 State Street Drive, New Orleans 25, Louisiana. The registration fee is $2.00 for each clone to be registered. Make checks payable to AMERICAN PLANT LIFE SOCIETY.

HYBRID **AMARYLLIS** CLONES

Introduced by Mrs. H. L. Harris, 3645 South Saxet Drive, Corpus Christi, Texas:

'Fan Tan' (Harris, 1959), reg. no. A-549, 7-1-59. D-5a (Leopoldii). Basic color is signal red (HCC-719), each seg has ½" white stripe extending 2/3" from throat to ¾ the length of each seg, forming a star; deepest part of throat slightly green; stamens and pistil signal red; segs markedly recurved with narrow white border extending around each seg. 22" tall; flower length 3⅞"; size across face, 8"; evergreen; spring blooming; faint fragrance. Parentage: cross between Dutch and American hybrids.

Introduced by Ludwig & Co., Hillegom, Netherlands:

'Circus' (Ludwig, 1959), reg. no. A-538, 6-22-59. D-5a (Leopoldii). Signal red (HCC-719-719/2) with white stripe and white outer edge; scape 28" tall; flower length 3"; size across face 8"; spring blooming.

'Christmas Gift' (Ludwig, 1959), reg. no. A-539, 6-22-59. D-5a (Leopoldii). white with soft green throat; scape 23" tall; flower length 3½"; size across face 8"; spring blooming, but flowers later than all other Ludwig pure white Amaryllis.

'Ludwig's Ace' (Ludwig, 1959), reg. no. A-540, 6-22-59. D-5a (Leopoldii). Pink (HCC-016/1—618 to 618/2), shaded light brick red with delft rose throat; scape 23" tall; flower length 3½"; size across face 8"; spring blooming.

'Prima Donna' (Ludwig, 1959), reg. no. A-541, 6-22-59. D-5a (Leopoldii). Begonia rose (HCC-619) with reflections of azalea pink and darker rosy red throat; scape 28" tall; flower length 3½"; size across face 9"; spring blooming.

'Spring Dream' (Ludwig, 1959), reg. no. A-542, 6-22-59. D-5a (Leopoldii). Delft rose (HCC-020/1); scape 25" tall; flower length 3½"; size across face 8"; spring blooming.

Introduced by Charles Ramelli, 126 Jeff Davis Ave., Biloxi, Miss.:

'Cathedral Windows' (Ramelli, 1960), reg. no. 542, 7-6-59. D-5 (Leopoldii). Brick red (HCC-016) with white, giving the effect of light orange; scape 23" tall; flower length 4"; size across face 6½"; spring blooming; deciduous with foliage at blooming time.

'Dresden Beauty' (Ramelli, 1960), reg. no. 544, 7-6-59. D-4 (Reginae). White with porcelain rose (HCC-620) edging and markings, scape 22" tall; flower length 4½", size across face 6½"; spring blooming; deciduous with foliage at blooming time.

'Fuchsia Rose' (Ramelli, 1960), reg. no. 545, 7-6-59. D-5 (Leopoldii). Fuchsia rose, between Fuchsia purple (HCC-28) and magenta rose (HCC-027); scape 22" tall; flower length 4"; size across face 6½"; spring blooming; deciduous with foliage at blooming time.

'Silver Halo' (Ramelli, 1906), reg. no. 546, 7-6-59. D-5 (Leopoldii). Scarlet (HCC-19) with a white throat shading to greenish in center, and a silver ⅛" halo or picotee edging around the edges of the tepalsegs; scape 22" tall; flower length 3½"; size across face 6½"; spring blooming; deciduous.

'Springsōng' (Ramelli, 1960), reg. no. 547, 7-6-59. D-5 (Leopoldii). Oriental red (HCC-819) over white, with white star in throat; scape 22" tall; flower length 3½"; size across face 7½"; spring blooming with foliage at flowering time.

'Tropical Sunset' (Ramelli, 1960), reg. no. 548, 7-6-59. D-5 (Leopoldii). Signal red (HCC-719) with a white throat and cardinal red (HCC-822) spots in deepest part of throat; scape 26" tall; flower length 4"; size across face 7" spring flowering; deciduous with foliage at blooming time.

Introduced by W. S. Warmenhoven (P. J. Komen, Anna Paulowna, Holland):

'Red Majesty' (Warmenhoven, 1955), reg. no. A-550, 9-30-59; introduced 1955. D-5 (Leopoldii). Huge very broad segmented red with frosty sheen; scape 24" tall; flower size across face 10"; spring blooming; foliage with reddish tinge; deciduous. Valleevue 1953 rating AA.

'Red Master' (Warmenhoven, 1950), reg. no. A-551, 9-30-59; introduced 1950. D-5 (Leopoldii). Huge dark red of great substance; scape 24" tall; florets flat, flower size across face 11-12"; spring blooming; deciduous. Rating 1950 Valleevue Trials AA.

'Royal Ruby' (Warmenhoven, 1955), reg. no. A-552, 9-30-59, introduced 1955. D-5 (Leopoldii). Brilliant clear medium red of excellent substance; scape 28" tall; flower size across face 9"; spring blooming; deciduous. Rating 1953 Valleevue trials A.

Introduced by Hamilton P. Traub, La Jolla, Calif.

'Alabaster' (Traub, 1960). Reg. no. A-553, Jan. 1, 1960. Leopoldii D-5a. Plant 22" tall; spring flowering; 4 flowers per umbel, very large pure white, long lasting. Of easy culture outdoors in southern California. Deciduous.

HYBRID BRUNSVIGIA CLONES

Introduced by L. S. Hannibal, Fair Oaks, California:

Brunsvigia x *parkeri* clone 'Spider' (Hannibal, 1960), see Fig. 18. This is a new cultivar resulting from the crossing of *Brunsvigia* x *parkeri alba* and *Brunsvigia rosea* var. *pallida*. Presumably the *B. rosea* strain which J. C. Bidwell used in effecting his hybrids with *B. grandiflora* Lindley was quite distinct from the *pallida* form which is more common to the western side of the Cape. Consequently the crossing of var. *pallida* with Bidwell's hybrids leads to some striking colors and unusual tepalseg forms. To obtain 'Spider', a form of *Brunsvigia* x *parkeri alba* with narrow linear tepalsegs, was chosen as the seed parent and some of the resulting seedling represent the extreme in narrow tepalsegs obtained so far. The throat to the blossom is butter yellow and the open perianth is a soft pink which turns rose in two or three days.

Fig. 18. *Brunsvigia* x *parkeri* clone 'Spider' (Hannibal); segs narrow, linear, throat of flower butter yellow, rest of flower is soft pink changing to rose with age. Photo by L. S. Hannibal.

Brunsvigia x *parkeri* clone 'Hibiscus Queen' (Hannibal, 1960), see Fig. 17. This bulb is of the same general parentage as 'Spider' but the inner tepalsegs are very broad and reflexed to give a flat blossom. The throat and inner portion of the limb are a deep yellow, blending to a soft bronze and pink over the face of the blossom, which gives it the appearance of being a large hibiscus blossom. During mild or cool weather the blossoms take on a much deeper tone of color.

Brunsvigia x *parkeri* clone 'Radiata Queen' (Hannibal, 1960). This cultivar was derived from interbreeding various white *Brunsvigia* x *parkeri* seedlings. The scape carries some 30 or 35 white blossoms on pedicels some six to eight inches in length. The blossoms are shaped like those of *B. grandiflora* Lindley and tend to open together producing a flowering umbel some eighteen inches in diameter. The general overall appearance is that of a white *B. grandiflora*. Contrary to most white hybrids the plant produces copious quantities of seed but few offsets.

Brunsvigia x *parkeri* clone 'Appleblossom' (Hannibal, 1960). This cultivar is a pale pink *picotee* type. The tepalsegs are very elliptical in form and resemble those of a large apple blossom. The parentage probably involves that of the clone 'Grace' or of 'Frank Leach'. The plant produces no seed.

STANDARD ABBREVIATIONS FOR TREES, SHRUBS AND HERBS FOR AN IBM MECHANIZATION PROGRAM

In connection with the above subject, W. M. Marshall, Engineer of Administrative Service, Division of Highways, State Office Bldg., Springfield, Ill., writes as follows: "We are endeavoring to convert relevant material into an IBM mechanization program. Acceptable abbreviations are imperative to this program. We have thus far been unsuccessful in our attempts to locate any course material of this variety."

Anyone who is able to offer constructive suggestions should write directly to Mr. Marshall.

[**CORRIGENDA, PLANT LIFE, VOL. 15. 1959,** continued from page 4.]

"The name, *Cooperia oberwetteri* (err. *C. oberwetti*) is a *nomen subnudum,* without a type specimen. It is supported only by the phrase, "In *C. oberwetti* the foliage is narrower than *C. drummondii* and has less bloom." This is insufficient as a diagnosis. A more detailed description and a type specimen would now be needed to validate the name. Since one can only speculate as to the true identity of the original plant—as has been done here in connection with a hybrid—validation at this late date is not possible. Apparently Lancaster's father obtained the plant from P. H. Oberwetter of Texas, and labeled it with the sender's name without formally proposing it. The reference to it is incidental to the discussion of the hybrids."

Page 39, last line, bottom of page, for "Smith" read "Jones".

Page 70, 12th line, for "tetroploids" read "tetraploids".

Page 72, last paragraph, 2nd line, change "*lilioasphodelus* var *rosea* (Stout) Traub* to "*fulva* var. *rosea* Stout."

bottom of page, delete entire footnote beginning "**Hemerocallis lilioasphodelus* etc. . . ."

Page 73, caption, Fig. 9, 2nd line, change "*lilioasphodelus*" to "*fulva*".

Page 150, 13th line from bottom, for "*iamesonii*" read "*jamesonii*".

CORRIGENDA

THE AMARYLLIS MANUAL, BY HAMILTON P. TRAUB. MACMILLAN CO. 1958.

Page 19, 1st paragraph, 5th & 6th lines; and page 278, 17th line from bottom, Delete "Prince's Island in the estuary of the Congo River", and substitute "Principe Island".

CYTOLOGICAL INVESTIGATIONS IN THE GENUS **LYCORIS.** 4. CHROMOSOME NUMBER AND KARYOTYPES IN **LYCORIS AUREA, "L. SPERRYI," L. ALBIFLORA** and **L. ELSIAE**

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INTRODUCTION

Because of the recent introduction of several undescribed *Lycoris* taxa into the United States, karyotype analyses and a consideration of phylogenetic relationships among the known and unknown species in this genus has taken on a new importance. Taxonomically, much care and attention has been given by Traub (1957; 1958) to new species in this genus and as a result the total number of *Lycoris* species presently listed is seventeen. Attempts to cross different species of *Lycoris* have also been started rather extensively by Caldwell (1958), who has re-reported reciprocal crosses involving seven species. In the present paper the author describes the chromosome number and morphology of three species of *Lycoris,* belonging to subgenus LYCORIS (Traub, 1958) and also of one undescribed species designated as "L. sperryi" native to the hillsides and mountains between Huchow and Hangchow in Checkiang Province, China (Caldwell, 1958).

MATERIALS AND METHODS

Table 1 lists the plant material used in this investigation, together with their source and accession numbers.

Table 1

Source and accession numbers of **Lycoris** taxa

Taxa	Source	Accession number
aurea	H. P. Traub, La Jolla, California	14069-57
"sperryi"	S. Caldwell, Nashville, Tennessee	14382-58
albiflora	W. Hayward, Orlando, Florida	13104-55
elsiae	S. Caldwell, Nashville, Tennessee	14381-58

In order to get maximum scattering of chromosomes in the metaphase divisions of the root tip cells, two chemicals were tried as pretreatment fluids (Table 2).

Table 2. Chemicals used as pretreatment fluids and their use

Chemicals	Concentration	Hours of treatment	Temperature
8-Hydroxyquinoline	0.002 mol/l	4	10-15°C
Colchicine	0.2 per cent	4	20-26°C

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After pretreatment the root tips were rinsed in water and were then fixed in acetic acid: alcohol, 1:3 for 24 hours. Following fixation, root tips were hydrolyzed in 10 per cent HCl for 12-15 minutes at 58°-60°C. They were then rinsed and placed in Feulgen staining solution for from 15 to 30 minutes and the brightly stained tips smeared in a drop of 45 per cent acetic acid in the usual way.

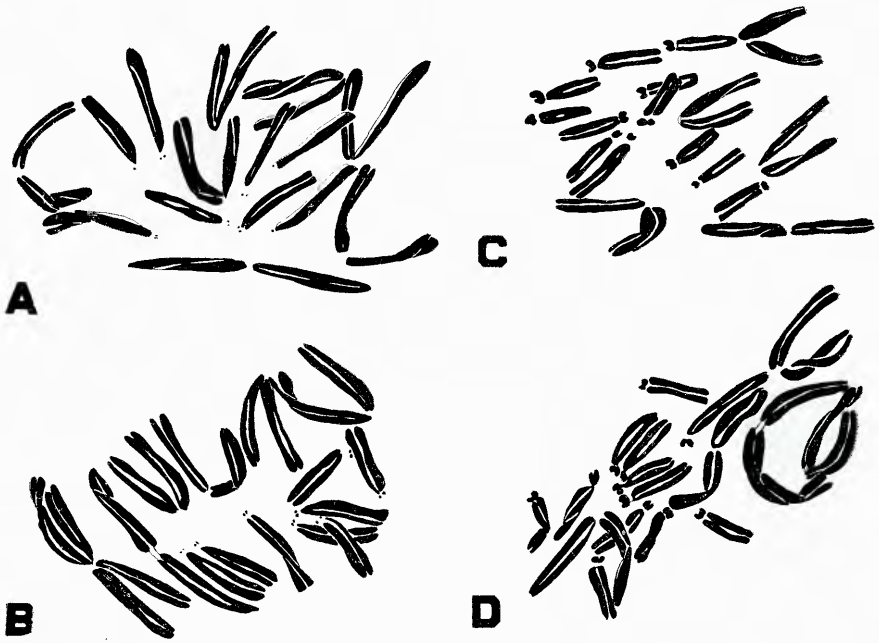

Figure 19. Somatic metaphase polar views of *Lycoris* taxa spaced for clarity and drawn at x2500. 19-A and 19-C had the chromosomes spread by pretreatment with 0.002 mol/l, 8-Hydroxyquinoline. 19-B and 19-D had chromosomes spread by pretreatment with 0.2 per cent Colchicine. A. *Lycoris aurea,* 2n=15. Chromosome types A, B and D. B. *"L. sperryi",* 2n=15. Chromosome types A, B and D. C. *L. albiflora,* 2n=17. Chromosome types A, B and C. D. *L. elsiae,* 2n=17. Chromosome types A, B and C. Drawn at x2500 and reduced to x1125 in reproduction.

The same chromosome type designations are used as in previous papers (Bose 1958a; 1958b; 1958c). These types are:—A, B, C, D, E and their sub-types.

Drawings were made with a camera lucida using a 1.25 N. A. objective (x90) with a compensating eye piece (x15) giving a magnification at table level of approximately x2500.

OBSERVATIONS

On the basis of the present study the chromosome complement can be classified into the following types:—

Type A:—Chromosomes with median primary constrictions.
Type B:—Chromosomes with submedian primary constrictions.
Type C:—Chromosomes with subterminal primary constrictions.
Type D:—Chromosomes with nearly terminal centromeres and a dot like shorter arm.

The bulbs of *Lycoris aurea* used in the present study have a somatic chromosome number of 15. Since previous numbers known for this species have been 2n=12 and 2n=13 and 14, this means that a new chromosome race has been dealt with here. In the complement of this 2n=15 *L. aurea* chromosome types A, B and D have been seen to occur (Fig. 19-A).

In "L. sperryi" a somatic chromosome number of 15 is found. Here also, the types A, B and D occur and in general, the chromosome morphology is similar to that found in the 2n=15 chromosome race of *L. aurea* (Fig. 19-B).

The somatic chromosome numbers in *L. albiflora* and in *L. elsiae* are found to be 2n=17. In each species, A, B and C types occur, and hence these two species are similar cytologically (Figs. 19-C&D). One characteristic feature of the karyotypes of these two taxa is the presence in each of the type C-chromosomes with subterminal primary constrictions.

A comparison of the measurement of the chromosomes of the four taxa was not attempted as they were pretreated with different chemicals.

DISCUSSION

Similarities in chromosome number and morphology were reported previously between *L. aurea* and *L. traubii* (Bose, 1958a). In the present investigation a new chromosome race in *L. aurea* with a somatic number of 15 has been found to be identical in chromosome number and morphology with that of an undescribed taxon—"L. sperryi." A newly described species—*L. elsiae* (Traub, 1958), with a 2n number of 17 has shown similarity with *L. albiflora* in its chromosome number and karyotype (Figs. 19-C&D).

Gene mutation would seem to be the chief factor in the differentiation of these species. The cytological evidence would suggest *L. albiflora* and *L. elsiae* to be very closely related. According to the taxonomic classification of Traub (1958), the closest relative to *L. elsiae* is *L. houdyshelii* on the basis of its having a loosely arranged umbel and medium or dark green leaves, while in *L. albiflora* the umbel is tightly packed and the leaves are medium green in color. In this classification, *L. albiflora, L. houdyshelii* and *L. elsiae* all belong to the same section of the subgenus Lycoris, and they are placed here for their distinctly irregular perigones and for having leaves which show lighter stripes or bands in the center. On cytological grounds, *L. elsiae* seems far removed from *L. houdyshelii*—a species with not only a different chromosome number—2n=30, but which is also quite different in its chromosome morphology (Bose, 1957; 1958c).

Inariyama (1951) suggested the natural hybrid origin of *L. albiflora*. He believed that a cross between *L. radiata* var. *pumila* (2n=22)

and *L. aurea* (2n=12) gave rise to *L. albiflora* with 5V and 12 rod chromosomes. As evidence for this assumption he mentions the morphological and karyological similarities that a hybrid of *L. radiata* var. *pumila* by *L. aurea* might be expected to have with that of *L. albiflora*. He also obtained F_1 plants from a cross between *L. aurea* (2n=14) and *L. radiata* var. *pumila* (2n=22). However, he did not attempt cytological investigations of the F_1 seedlings because of their immaturity. The above discussion would suggest that the origin of *L. albiflora* by hybridization between *L. aurea* with 8V and 6 rods and *L. radiata* with 22 rods must take into consideration the addition of two V chromosomes and the loss of four rod chromosomes, in order to give rise to *L. albiflora* with 5V and 12 rods. Any explanation accounting for the origin of *L. albiflora* would seem to possibly apply to the origin of *L. elsiae*, also.

Chromosome numbers and morphology are known for thirteen species and one undescribed taxon of *Lycoris*. It is evident from this data that the present state of our knowledge regarding the karyotype evolution in *Lycoris* indicates, either that fusion of two rods to form a V; or the fragmentation of a V to form two rods could be taken as the principal mechanism in this genus for the origin of forms with different chromosome numbers of differing morphology (Inariyama, 1951; Bose, 1958c). Speciation and chromosome number variation apparently occurred within the diploid and triploid groups in *Lycoris* without the additions of extra chromosomal elements or materials. The finding of different chromosome races within the same species suggestively indicates a pattern of karyotype evolution in *Lycoris* (Bose, 1958c).

SUMMARY

In *Lycoris aurea*, a clone with 2n=15 chromosomes has been found. In *L. albiflora*, the somatic number of 17 has been confirmed, and new numbers of 2n=15 and 2n=17 have been found for "L. sperryi" and *L. elsiae* respectively.

ACKNOWLEDGEMENTS

The author wishes to acknowledge his indebtedness to Dr. W. S. Flory, Jr., for his guidance and criticism during the course of this investigation.

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CYTOLOGICAL INVESTIGATIONS IN **LYCORIS.** 5. CHROMOSOME NUMBER AND KARYOTYPE IN **LYCORIS CHINENSIS**

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INTRODUCTION

In a preliminary study the chromosome number in *Lycoris chinensis* was reported to be 2n=16 (15) (Bose, 1959b). The present work has attempted to determine the exact chromosome number and to analyze the karyotype of this new species described by Dr. Traub in 1958.

MATERIALS AND METHODS

A single bulb of *L. chinensis* was obtained through the courtesy of Dr. J. L. Creech of the United States Plant Introduction Station. Actively growing root tips excised from the potted bulb were pretreated in a saturated solution of paradichlorobenzene for four hours, fixed in acetic acid: alcohol, 1:3, for 24 hours, hydrolysed in 10 per cent HCl for 10-12 minutes and then squashed in a drop of 2 per cent aceto-orcein. Only unbroken cells with well scattered chromosomes were used in making the present observations. As in our previous *Lycoris* studies, all observations have been with somatic figures only.

Drawings were made with a camera lucida using a 1.25 N.A. objective (x90) with compensating eye piece (x15), giving an initial magnification at table level of about x2500.

OBSERVATIONS

The chromosomes in *L. chinensis* are easily recognizable to be either V or rod types (Fig. 20-A), like those found in the other species of *Lycoris* investigated. Chromosome types: A (median primary constriction); B (submedian primary constriction) and D (nearly terminal primary constriction and a dot like shorter arm), can be identified in this material. It might be mentioned here, that the karyotypes of *L. aurea, L. traubii* (Bose, 1959a) and *L.* "sperryi" (Bose, 1960) are all composed of chromosomes of these three types only. In addition to these, a new type of chromosome unlike any found in the species of *Lycoris* previously studied is recognized in *L. chinensis*. This chromosome is being designated as "small v" (nearly submedian constriction) be-

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cause of its shape and size (Fig. 20-A). This small v. chromosome always occurred singly in all the metaphase stages. In a single anaphase stage two chromosomes of this type were observed at one pole and one of the same type at the opposite pole (Fig. 20-B). No explanation of this occurrence can be made at this time. The distribution of chromosomes in this anaphase figure may be represented as follows:—

2n=16: 6V+2v+8R
2n=16: 6V+1v+9R

In metaphase stages the distribution was always observed to be 6V+1v+9R with a total of 2n=16 (Fig. 20-A).

In one doubtful case, a karyotype with 7V+1v+7R was found, suggesting a somatic number of 2n=15.

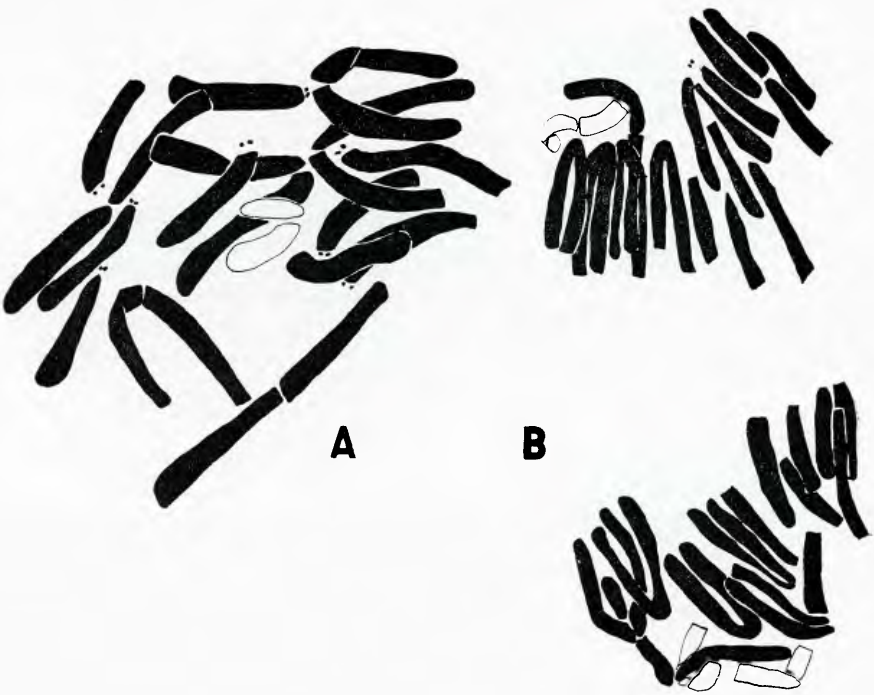

Figure 20. Somatic chromosomes of *Lycoris chinensis*, 2n=16. Chromosome types A, B, D and "small v" (drawn in outline) seen. Spread by pretreatment with paradichlorobenzene for four hours; drawn at x2500 and reduced to x1525 in reproduction

A. Somatic metaphase of *Lycoris chinensis*, 2n=16. Chromosome types A, B, D and one "small v" (drawn in outline) seen.

B. Somatic anaphase of *L. chinensis*, 2n=16. The distribution of chromosome types are as follows:—Lower pole—2n=16: 6V+8R+2v (drawn in outline). Upper pole—2n=16: 6V+9R+1v (drawn in outline).

DISCUSSION

The finding of the new type of chromosome—a small v-shaped one with a nearly submedian constriction—suggests the role of translocation or inversion in the origin of this type. It may be pointed out again that in no other species of *Lycoris,* studied thus far, has this type of chromosome been observed.

In one doubtful case, where 7 V chromosomes seemed apparent, the possibility that this might be a true condition, with one of the V's usually fragmenting across the centromere (perhaps due to the weakness of the centromeric region of one of the chromosomes) to give rise to two rods, could not be considered as likely because of the otherwise constant occurrence of 6 V's, even with very light pressure during squashing. In the future additional material of *L. chinensis* will be studied following pretreatments of root tips with different chemicals, in an effort to determine whether the effects of such chemicals—or perhaps an inherent genetic weakness of the centromere—may possibly cause some V's to break easily under slight pressure during squashing.

Lycoris straminea is the only other species reported to have 16 somatic chromosomes (Inariyama, 1951). In this species 6 V's and 10 rod chromosomes are found in somatic cells. According to Traub's (1958) classification, *L. straminea* and *L. chinensis* occur in the same subgenus *Lycoris* of the genus *Lycoris.*

One can speculate on the possibility of the *L. chinensis* chromosome complement originating from that of *L. straminea* by one single change —a pericentric inversion of one of the rod chromosomes of the latter. Or contrarily, (but seemingly more unlikely), perhaps by such an inversion of the small v of *L. chinensis* to give rise to another rod in the *L. straminea* complement. Neither possibility seems very likely, since there are flower color and other differences in the two species, and if such an inversion was responsible for the differences in the two taxa there would still be essentially the same genic structure. A different arrangement of the genes would occur in chromosomes with such inversions, of course.

SUMMARY

The somatic chromosome number in a recently described species, *Lycoris chinensis* Traub, is reported to be 16. The chromosome complement is composed of 6 V's, 9 rods and a single "small v" chromosome. The latter, has a nearly submedian centromere. This small v type is new to the genus, not having been observed in any other species of *Lycoris* studied so far.

ACKNOWLEDGEMENTS

The author wishes to express his indebtedness to Dr. W. S. Flory, Jr., for his guidance and criticism during the course of this investigation.

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Traub, H. P. 1958. Two new *Lycoris* species. Plant Life 14: 42-44.

THE **ZEPHYRANTHES CLINTIAE** COMPLEX. I. INITIAL REPORT ON THE SOMATIC CHROMOSOMES

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Zephyranthes clintiae Traub (1952) is part of a variable complex brought to attention by the recent collection of Mr. and Mrs. Morris Clint (1952; 1957). A biosystematic investigation is underway in an attempt to determine the source of variability in *Z. clintiae* and the relationship of the complex to other Mexican species of *Zephyranthes*.

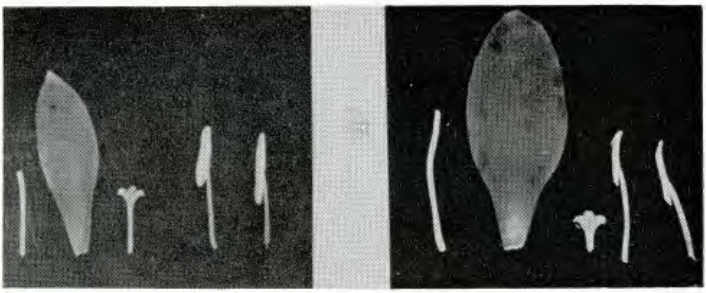

Figure 21. Flower parts of *Zephyranthes clintiae* (M-283) (natural size): t—tepaltube length represented by included style; p—petseg; s—style and stigma excerted beyond tepaltube; f—stamens, petaline filament next to stigma and sepaline filament on the outside.

Although this is primarily a cytological report, the extreme variation in the complex dictates a concomitant description of gross morphology.

MATERIAL: **Zephyranthes clintiae,** M-283

Mrs. Clint sent W. S. Flory 12 bulbs (Clint No. M-283, B. E. F. No. 14163-57) from a large group of seedlings raised from seed collected near K 280 on Mexican Route 80 in the state of San Luis Potosi. Mrs. Clint (1959) writes, "This form may have a wider range over the mountains than we have so far found, but we have always collected them in the same place, give or take a few tenths of a mile. So this places them on the [western] edge of a seasonable wet, forested part of the

mountains. . . . rainfall is beginning to decrease [as one goes west], so neither the trees nor the vegetation is quite so thick, yet still pretty jungly in the wet season. Most of the soil in this area is a porous red clay loam, but there are spots where the red color is absent and M-283 is found in one of these spots, in rather stony soil or among heavy rocks in pockets. The ground and rock crevices are usually covered with leaf mold."

Regardless of the considerable range (Fig. 21) shown by the following description, M-283 is here and in its natural habitat, as Mrs. Clint has written, ". . . very neat in habit and almost never varying in size or height or color." Growing in a five-inch pot in the B. E. F. greenhouse, M-283 is virtually evergreen. In the following description all data were secured at anthesis. *Leaves:* erect, glossy, bright green, sometimes tinted mahogany at base; linear; channeled on upper side, convex and slightly fluted on lower side, flat apically. *Peduncle* (scape): 9-15 cm. high. *Pedicel* (stripe): 10-26 mm. long. *Spathe:* entire or fen-

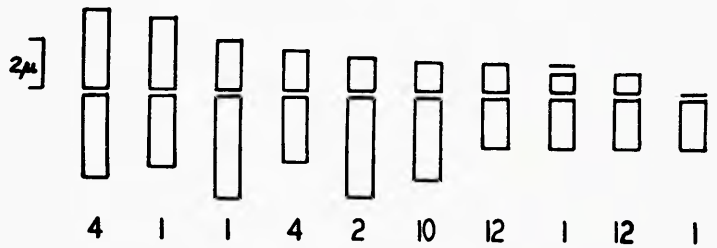

Figure 22. Idiogram of somatic metaphase chromosomes of *Zephyranthes clintiae* (M-283). The number of chromosomes of each type is shown below.

estrate; 28-34 mm. long, united about ½. *Tepaltube:* 11-19 mm. long. *Tepalsegs:* light salmon pink; oblanceolate to spatulate. *Petsegs:* 25-31 mm. long; 8-13 mm. wide. *Setsegs:* usually 1-2 mm. longer and wider than the petsegs. *Stamens:* The petaline filaments are consistently 1-2 mm. longer than the sepaline filaments. The anthers on the petaline filaments are equal to or 1-2 mm. shorter than the anthers on the sepaline filaments. Thus the stamens are sometimes of equal height. Free petaline *filament:* white, 9-13 mm. long. *Anther* on petaline filament: 6-8 mm. long, versatile. *Stigma:* trifid; lobes short, globulose; white; located below or surrounded by bases of anthers.

CYTOLOGICAL METHOD

Actively growing root tips were excised and placed in a 0.2 percent aqueous solution of colchicine at 62° F. for 4½ hours. After fixation in acetic-alcohol (1:3) 12-24 hours, they were stained in two percent acetic orcein (9 parts) to which normal HCl (1 part) had been added. The staining solution containing the root tips was heated to nearly boiling. The meristems were then squashed on slides in one percent acetic

orcein. The slides were made permanent with Euparal after floating off the cover glasses in 95 percent alcohol (Blackwood, 1958). Three slides are on deposit in the B. E. F. Permanent Slide File.

RESULTS

In *Z. clintiae* (M-283) 2n=48. The several types of chromosomes found in almost every clear cell examined (over 200) in several root tips from each of three bulbs are shown in Figure 22—the data on these are presented in Table 1. One cell with 24 chromosomes, presumedly a

Table 1. The number of chromosomes of each type (Number) in **Zephyranthes clintiae** (M-283), the length of each (Length) in microns at metaphase following colchicine treatment, and the ratio of short arm length to total length of each type (C. Index.)

Number	4	1	1	4	2	10	12	1[s]	12	1
Length	6.5	5.8	6.2	4.4	5.4	4.8	3.3	3.3	3.0	2.2
C. Index	.5	.5	.33	.38	.27	.27	.38	.38	.29	*

[s]—satellite on short arm. *—acrocentric chromosome

result of somatic reduction (Huskins and Cheng, 1950), was observed.

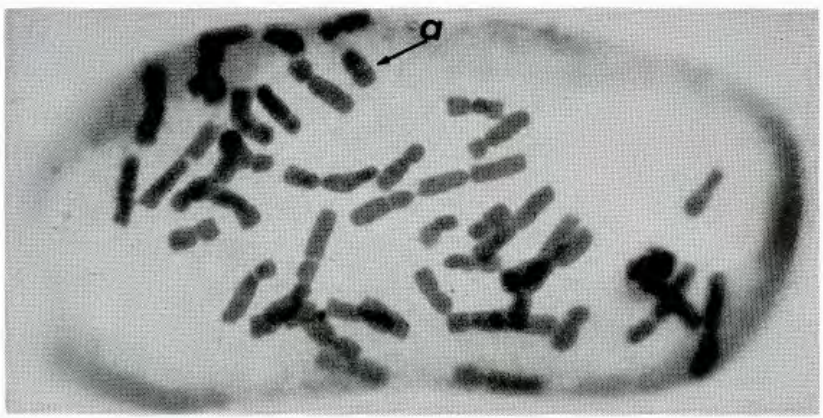

Figure 23. Photograph of colchicine treated, root-tip cell (x1833) of *Zephyranthes clintiae* (M-283), a—acrocentric chromosome.

Occasionally a cell with a somewhat different karyotype was seen, but no two of these anomalous cells appeared alike. Most of the variations detected were centric shifts in the long, normally metacentric chromosomes.

DISCUSSION

Hume (1935) listed a dozen species of *Zephyranthes* reported from Mexico, although "not more than half are known except as herbarium specimens." Since then two new species *(Z. Fosteri* Traub and *Z. clintiae* Traub) have been described, while *Z. concolor* (Lindl.) Baker has been determined to be an *Habranthus* (Flory and Flagg, 1958) as was originally thought to be the case.

No cytological information is available for seven of the reported species: *Z. arenicola* Brand., *Z. brevipes* (*Z. carinata* var. *brevipes* Baker), *Z. Conzattii* Greenm., *Z. erubescens* S. Wats., *Z. Fosteri*, *Z. Nelsonii* Greenm. and *Z. tepicensis* Greenm. Somatic chromosome numbers have been reported for five species:

Species	2n	References
Z. grandiflora Lindl.	46	Nagao and Takusagawa, 1932.
(syn.: *Z. carinata* Herb.)	48	Inariyama, 1937; Sato, 1938; Flory, 1941; Coe, 1954.
	48, 49, 46–54	Flory and Flagg, unpub.
Z. Lindleyana Herb.	48	Fernandes, 1930 and 1931.
	24	Sato, 1938.
	ca. 96	LaCour, 1955.
Z. longifolia Hemsl.	46	Flory, 1940.
	44–50	Coe, 1954.
Z. macrosiphon Baker	48	Flory, 1940.
	46	Flory, 1941.
Z. verecunda Herb.	24	LaCour, 1952.
	48	Flory, unpub.

Along with the apparent polyploidy and aneuploidy, it is of interest to note that a taxon with a somatic complement of 48 chromosomes has been observed for each of these five species.

Inariyama (1937) supposed that *Z. grandiflora* was a tetroploid on the basis of quadrivalent formation; meiotic clumps containing more than four chromosomes were interpreted by him to result from reciprocal translocations. Sato (1938), and also Sharma and Ghosh (1954), concluded that six was the base (x) number for *Zephyranthes*. This belief was founded primarily on the existence of *Z. robusta* and *Z. Taubertii*, both of which are synonyms for *Habranthus robustus* with six pairs of chromosomes. Evidence accumulated in our own laboratory leads to the conclusion that six is probably the basic chromosome number for most, if not all, members of the tribe ZEPHYRANTHEAE (Pax) Hutchinson. Published reports on *Zephyranthes*, *Cooperia* and *Habranthus* (Flory, 1939, 1944, 1948, 1954, 1958, 1959a, 1959b; Flory and Flagg, 1958, 1959) as well as considerable work (with regard to somatic chromosome numbers, structure, etc.) chiefly support this postulation. The situation in *Sprekelia* (Bose, 1958), included in the ZEPHYRANTHEAE by Traub (1940), also seems to indicate six as the base number here. If six is the base number in *Zephyranthes*, then members of this genus, such as *Z. clintiae* (M-283), with somatic complements of 48 chromosomes are octoploid.

Chromosomes with dot-like second arms are referred to as *cephalobrachial, rod-shaped, telocentric* or *acrocentric* by various authors. Some writers use the term cephalobrachial in conjunction with heterobrachial and isobrachial. The term rod-shaped is ambiguous—being used to describe chromosomes with either subterminal or reportedly terminal centromeres. The term telocentric is classically reserved for chromosomes with terminal centromeres. 'Telecentric' is unfortunately somewhat

equivocal in that it has been used to designate chromosomes with dot-like second arms (White, 1945) and some authors (particularly persons working with mammalian tissue cultures) still misuse it for that purpose. Although 'acrocentric' might also imply a terminally located centromere, to the best of our knowledge it is used only in describing subtelocentric chromosomes when the tiny second arm is not usually seen (White, 1954) (Figs. 23 and 24).

Sharma and Ghosh (1954) reported "telocentrics" and "other fragments" in *Z. rosea* Lindl. (native to the West Indies and Guatemala) as resulting from the combined use of oxyquinoline pretreatment and fixation in chromic-formaline mixture. It may be worth noting that the present writer has seen chromosomes which were broken at the primary

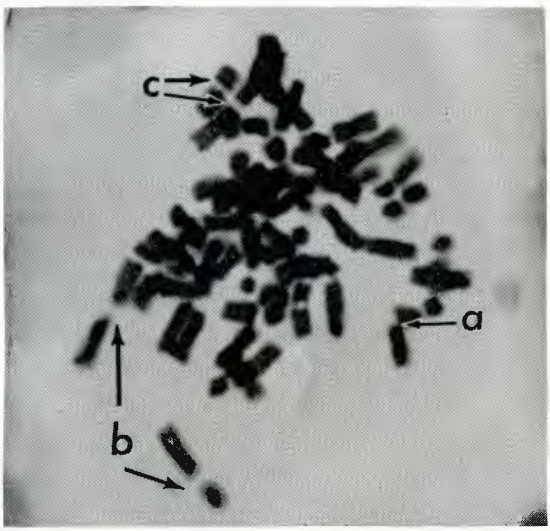

Figure 24. Photograph of colchicine treated, root-tip cell (x2000) of *Zephyranthes clintiae* (M-283), a—acrocentric chromosome, b—broken primary constrictions, c—primary constrictions slightly stretched.

constriction (Fig. 24b) following pretreatment with 0.2 percent colchicine or saturated *p*-dichlorobenzene solution and fixation in acetic-alcohol. This was assumed to result from excessive pressure during squashing, for the number of breaks increased as greater force was applied. Sometimes the primary constriction was stretched but unbroken (Fig. 24c). Whether breakage at the primary constriction indicates a natural physical weakness or one produced by chemical treatment is an unanswered question.

Inariyama (1937) reported on *Z. candida* Herb. (Argentina), ". . . exact points of insertion being different in different chromosomes, and in a few of them it is terminal or median." Regarding *Z. grandiflora*

he wrote, "The different chromosomes are characterized by various types of insertion as in *Z. candida.*" No telocentric or acrocentric chromosome is shown in his drawing of *Z. grandiflora.* Telocentric and acrocentric chromosomes have not been observed as natural cytological components in any accession of these two species at Blandy Farm (Flory, unpub.) The acrocentric chromosome found in *Z. clintiae* appears to be a constant, natural cytological component for the taxon described here. It was present in all the clear cells examined. Neither telocentric nor acrocentric chromosomes have been reported in other species of *Zephyranthes.*

SUMMARY

In *Zephyranthes clintiae* (M-283) 2n=48. The somatic chromosome complement consists of five long metacentrics, one short acrocentric, and 42 submetacentrics which can be distinguished as: one long, two long nearly subtelocentric, 10 medium nearly subtelocentric, four medium, 13 short (one of which has a satellite on the short arm), and 12 short nearly subtelecentric chromosomes. The cytology of Mexican *Zephyranthes* and reports of telocentric chromosomes in *Zephyranthes* are reviewed. It is postulated that the basic chromosome number of the ZEPHYRANTHEAE may be six.

ACKNOWLEDGEMENTS

We are greatly indebted to Mrs. Morris Clint for supplying plants and excellent ecological data. We thank Mr. L. R. Emmons for assistance with the photography. Deep gratitude goes to Dr. W. S. Flory, Jr., for his stimulating interest and constructive criticism.

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AMARYLLID GENERA AND SPECIES

HAROLD N. MOLDENKE

[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 the readers.]

Hippeastrum damazianum Beauv. Bull. Herb. Boiss. ser. II, 6: 585, fig. 3. 1906. Leaves loreate-linear, obtuse, 25—30 cm. long, 2—3 cm. wide; scape compressed, glaucous, purple-variegated, 16—25 cm. long; leaves of the spathe lanceolate-obtuse, membranous, pink, purple-dotted, surpassing the pedicels, 6—7 cm. long; perigonium campanulate, 10—11 cm. in size, glistening vermilion, with a shiny greenish star, purple-punctate, the tube shorter than the ovary, 0.7—0.9 cm. long during anthesis, naked in the throat within; sepals obovate, attenuate, with the midrib yellowish-green and prolonged into a callous point, 3 cm. wide, the outer ones wider than the others; stamens ascending, 9—10 cm. long; filaments flattened, pink, purple-dotted; anthers 0.7 cm. long; style pink, surpassing the perigonium, 11—12 cm. long, trigonous; stigmas vermilion, 3-fid, linear, 0.5 cm. long, spreading-recurved after anthesis, slowly becoming erect; pollen yellow.—Related to H. rutilum Herbert.—The type was collected by L. Damazio (no. 1481) in October, 1904.

CRINUM ASIATICUM VAR. CUPREFOLIUM

HAMILTON P. TRAUB, *California*

In the 1954 Amaryllis Year Book (Herbertia), page 47, it was indicated that Mr. & Mrs. Corbet of La Canada, Calif., had obtained a reddish-leaved *Crinum* from a garden in Hawaii, and that they had

Fig. 25. *Crinum asiaticum* var. *cuprefolium* Traub, *var. nov.*, a bronzy-coppery-red leaved, dahlia purple flowered variety that is grown in Hawaii; and in the United States since 1954. Lower, showing the plant as grown in an 8-inch pot at La Jolla, Calif. Upper, close-up of part of the same plant. Bulb obtained through the kindness of Mr. & Mrs. Corbet of La Canada, Calif.

kindly presented an offset to the writer. It was stated that this could not be *Crinum erythrophyllum* Herb., a dwarf prostrate species from Burma. In 1958 and 1959, the reddish-leaved *Crinum* from Hawaii bloomed in July in the writer's garden at La Jolla, Calif., a frost-free

spot on the Pacific Ocean. The plant was grown in an 8-inch pot where it apparently could not reach its maximum development, and the vigorous root-system broke apart the clay pot in 1959. The bulb has since been planted outdoors beside the giant everblooming *Crinum asiaticum* var. *asiaticum* where the former also can reach full development. Specimen leaves obtained from other growers show that they are much longer and wider in large specimen plants.

Our plant apparently belongs to the *Crinum asiaticum* alliance, but it differs in a number of characters from *C. asiaticum* var. *asiaticum*. The leaves are narrowed toward the base. When first produced, the leaves are bronzy-coppery-red, but there is a tendency for some of the color to be lost with age, particularly if the plant is exposed to full sunlight. In partial shade, the color persists longer and to a greater extent. It is a handsome and colorful plant worthy of a place in the tropical and sub-tropical garden (Fig. 25). The plant appears to bloom only once each season—in summer—as contrasted with *C. asiaticum* var. *asiaticum* which is everblooming here. Our plant has dahlia purple flowers, the color showing through the white ground color from the outside to the inside of the segs.

The variety has been named for its most outstanding character—the bronzy-coppery-red leaves.

Crinum asiaticum var. **cuprefolium** Traub, **var. nov.**

Haec varietas a forma typica speciei foliis aeri-cupri-rubris deinde rubiginosi-viridibus et floribus purpureis aestivalibus recedit.

Bulb, in the type plant, almost narrowly oblong, with slight enlargement toward the base, 20 cm. long, 8 cm. in diam. *Leaves* up to 10 or more, sheathing at the base, at first bronzy-coppery-red, changing to a rusty green with age, up to 92 cm. long or longer, nearly elliptic, lorate toward the base, 5.5 cm. wide at the base, widening to 10.5 at the middle, narrowing to an acute-bluntish apex. *Scape* solid, near dahlia purple (HCC 931), flattish, with rounded edges, 45 cm. long or longer, 9 x 14 mm. in diam. at the base and apex. *Spathe* 2-valved, lanceolate, valves deeply tinged with dahlia purple, 8—8.2 cm. long, bracteoles very much smaller, mostly filiform. *Umbel* 12-flowered. *Pedicels* near dahlia purple (HCC 931) 0.5—2 cm. long, 4 x 5 mm. in diam. *Ovary* 1.4 cm. long, 5 mm. in diam., near dahlia purple (HCC 931); ovules few per locule. *Tepaltube* near dahlia purple (HCC 931), 8—8.5 cm. long, 4 x 4.5 mm. in diam. at the base, 4.5 mm. diam. at the apex. *Tepalsegs* linear, held more or less horizontally, upper ends slightly recurved, magnolia purple on under side, keel deeper colored (HCC O30/1), lighter towards the margins, much lighter (HCC O30/3) on upper side (due to the showing through of the magnolia purple in the white ground color). *Setsegs* 7.2—7.5 cm. long, 9—10 mm. wide; *Petsegs* 7—7.2 cm. long, 9—10 mm. wide. *Stamens* attached at the base of the tepalsegs, longer than the style; filaments 4.4—4.8 cm. long, deep magnolia purple (HCC O30); anthers 1.3 cm. long at anthesis; pollen yellow; *style* filiform, deep magnolia purple (HCC O30), 3.6 cm. long; stigma minute.

Holotype: Traub Nos. 621a+621b (TRA), July 15, 1958, cult. La Jolla, Calif., grown from bulb collected in 1954 by Mr. and Mrs. Corbet of La Canada, Calif., in a garden in Hawaii. Also observed by Otto Degener in Hawaii; and received from Hawaii by Wyndham Hayward, Winter Park, Florida, and Cecil Houdyshel, La Verne, Calif.

3. GENETICS AND BREEDING

THE AMARYLLIS BREEDING PROJECT AT SOUTHWESTERN LOUISIANA INSTITUTE

Ira S. Nelson

The problem of obtaining living bulbs of *Amaryllis* species for foundation stock has been quite frustrating at times. However, by 1954, a collection had been assembled and the breeding work was started in earnest. How this collection was assembled will be found in other pages of this volume. It is only fair to acknowledge that the project would not have been possible without the species obtained by the Louisiana Society for Horticultural Research. Most of the species mentioned in this article were obtained by two plant-collecting expeditions sponsored jointly by that organization and Southwestern Louisiana Institute.

The basic objective of the *Amaryllis* breeding project at Southwestern Louisiana Institute is to develop new types of garden *Amaryllis* rather than to improve the existing types. This project is aimed at tapping the great store of diverse characteristics found within the genus. It is hoped that new types can be developed which will appeal to gardeners not now growing the fine modern hybrids as well as the confirmed *Amaryllis* fans.

This project is based on the use of species as a source of characteristics not found in the modern hybrids. As many species as possible are being crossed; they also are being crossed with available hybrids. The primary crosses as well as the species are being retained for future breeding stock as little can be expected until advanced generations are produced.

This report will be confined to the crosses which have been successfully accomplished. Others which were tried but failed will be omitted. The female parent of the hybrids will be given first and, if made, reciprocal crosses will be indicated. There is no evidence to date that the progeny of any cross differs from that of its reciprocal. In some cases, however, better seed set was obtained by using one species than by using the other as the pod parent.

Amaryllis belladonna x *A. evansiae* and reciprocal

This cross and its reciprocal were very readily made. Seed set abundantly and most of it was viable. The leaves of the progeny showed intermediate characteristics from the very early seedling stage. The flowers resembled *A. belladonna* in shape and size but in color were shades of pink on a yellowish ground instead of tomato red. They retained the droopy appearance of *A. belladonna* and might easily pass for color variations of that species. The F_1 generation varied in width of floral segments more than in any other characteristic. This was not unexpected in view of the same tendency in *A. evansiae*.

Self and sib-pollinations were made within the F_1's. A noticeable reduction in fertility was observed. The F_2 generation has not yet bloomed.

Amaryllis belladonna x White Dutch Hybrid

Most of the progeny of this cross exhibited the *A. belladonna* color and color pattern. Of approximately 50 seedlings only 3 showed any marked deviation in color. These three were a delightful salmon-pink with the characteristic *A. belladonna* marking in the throat. The size of the blossoms, however, approximated that of the White Dutch hybrid parent. In all cases the stigmas were trifid and the tepaltubes proportioned like those of *A. belladonna.* Both sib and self-pollinations were made with the F_1 generation. Little loss of fertility was observed in these hybrids. The F_2 generation has not yet bloomed.

Amaryllis belladonna x Pink Dutch Hybrid

This cross produced progeny with varying shades of pink flowers all of which had the white pattern in the throat and the longer tepaltube of *A. belladonna.* A few individuals with exceptionally brilliant pink color were self and sib-pollinated. There was apparently little loss of fertility in the F_1 generation. Like the above mentioned cross the flowers were large and had trifid stigmas. More variation was observed in this cross than in the preceding cross. The F_2 generation has not yet bloomed.

Amaryllis belladonna x Red Dutch Hybrid

Some of the progeny of this cross did not exhibit the typical *A. belladonna* pattern in the throat. However, the *belladonna*-type tepaltube and somewhat pointed floral segments persisted in the F_1 generation.

On the whole the flowers were larger than those of *A. belladonna* but smaller than the flowers of the red Dutch hybrid parent. The form of the flowers tended to be more like *A. belladonna* than the red Dutch parent except for color, which closely approximated the color of the red Dutch parent.

Orange-pink *Amaryllis belladonna* x *A. striata*

These two species are very similar in general conformation, color, size and color pattern. Their hybrids are intermediate between them, some favoring one parent more, some the other. They have the trifid stigmas of *A. striata* as well as its light-yellow pollen color. The throat pattern is intermediate between the two species.

Amaryllis evansiae x White Dutch Hybrid and reciprocal

The reciprocal of this cross was attempted at the same time that this cross was first made with complete failure. However, in subsequent years it has been accomplished with limited success. Our experience indicates that this cross can be facilitated by using *A. evansiae* rather than the white Dutch hybrid as the female parent. The hybrids here reported had *A. evansiae* as the female parent. The color of the progeny of this cross which have bloomed are pink or partially pink. They all

exhibit a greenish-white star in the throat and a trifid stigma. The tepaltubes are longer than those of the white Dutch parent. The flowers are as large as those of the Dutch parent and the floral segments as wide.

The intensity of the pink color varies to some extent. It is, however, a very clean pink which is free from the blue cast so commonly found in many of the Dutch hybrids. This clear pink color, a result of crossing pale yellow with white flowers is probably unstable genetically because of its hybrid origin. Both yellow and white-flowered sorts should appear in the F_2's which have not yet bloomed.

Apparently the progeny of this cross are reasonably fertile as no great difficulty was encountered in obtaining seed from either self or sib-pollinations.

Amaryllis evansiae x *A. striata* and reciprocal

This cross, which was reported in the 1959 issue of Herbertia, offers something different and we believe worthwhile in hybrid *Amaryllis*. Unfortunately black and white pictures are incapable of conveying the delicate beauty of the flowers.

The reciprocal cross was made with equal ease and the resulting progeny are the same. Because the progeny of this cross is so uniformly good and distinctive, clonal selections will not be made at this time. Instead the entire progeny is being released as the S. L. I. "Senorita" hybrids. In these hybrids we find a new type of *Amaryllis* which should be equally suited to garden and cut-flower purposes. The blossoms are relatively small (about 3½ inches in diameter), graceful and exquisitely colored. The ground varies from cream to pale yellow which is overlaid with a blushing of pastel pinks. Tepalseg width varies to about the same extent as that of *A. evansiae*. The posture of the trumpets is slightly above horizontal which gives a jaunty aspect to the flowering scapes. Slight ruffling of the tepalseg edges adds to the attractiveness of the series. The pollen color is pale yellow and the stigmas are trifid like *A. striata*. See Fig. 26 on following page.

The S. L. I. "Senorita" hybrids can readily be obtained by the simple process of repeating this cross. Since both parents are available commercially it is possible to get into quantity production of bulbs rapidly by seed.

Amaryllis evansiae x *A. pardina*

Color prints of *A. pardina* appearing in an old horticultural journal show this species to have either white or pale yellow ground color with red spots. Although the writer has collected this species in three localities in Bolivia, only the form with the white ground color was observed. In one locality both *A. pardina* and *A. evansiae* were found. This brought up the possibility that the yellow ground colored form of the illustration could possibly be a natural hybrid and thus could be reproduced artificially.

The progeny of this cross which have bloomed to date (5 seedlings) all resemble the illustration mentioned. The flowers have a pale yellow

Fig. 26. Prof. Claude W. Davis, of Baton Rouge, and Prof. Ira S. Nelson, of Lafayette, Louisiana, are studying the Southwestern Louisiana Institute (SLI) *Amaryllis* group hybrids "Senorita", at Lafayette, Louisiana, March 1959. The "Senorita" group hybrids are crosses of *Amaryllis evansiae* and *A. striata.*

ground copiously overlaid with minute red dots on the inner surface of the tepals. The outer surface is pale yellow with no markings. Apparently, the genes which represent the white ground color of *A. pardina* are different from those which represent the white of the white Dutch hybrid. The F_1 progeny has reduced fertility, but some F_2's were obtained which have not yet bloomed.

Amaryllis vittata var. *tweediana* x White Dutch Hybrid

Limited success was had in effecting this cross. Only about a half-dozen seeds germinated. Of these only three have bloomed. The bulbs which have bloomed show flowers of considerable promise. The trumpet length is intermediate between the parents. The flowers are well poised on the pedicels and are of medium size (about 5 inches across). The color pattern is picote. The flowers are white with a narrow line of deep pink around the edges of the tepals. Pink dots are lightly scattered over the inner surface of the flowers. The posture of the flowers is slightly above horizontal.

These hybrids failed to set seed but because of the small number of flowers pollinated no conclusions can be drawn concerning their fertility.

Amaryllis vittata var. *tweediana* x *A. reginae*

The single bulb which bloomed from this cross bore flowers with a striking resemblance in form to *Amaryllis* x *johnsonii,* the first hybrid reported; the color, however, was pink instead of red. No seed was set from self pollination of the single F_1 hybrid which bloomed.

Amaryllis pardina x *A.* x *johnsonii*

This cross produced most unusual appearing flowers. The *A. pardina* color and color pattern persisted but the number of red dots on the inside of the flower was greatly increased. The outside of the tepalsegs were white as in *A. pardina.* The flower shape and posture also more nearly resembled *A. pardina* than *A.* x *johnsonii.* This cross demonstrates the possibility of producing cultivars with contrasting colors on opposite sides of the tepalsegs. No seed was set from the progeny of this cross.

Amaryllis reginae x *A. evansiae*

This cross produced a generation of hybrids that is pinkish in color. The drooping habit of the *A. reginae* is transmitted to the hybrids. The entire progeny has less intense color on the outer side of the tepalsegs than on the inside. Compared to other hybrids involving *A. evansiae* these are rather drab in appearance. Tepalseg width is generally wider than the *A. evansiae* x *A. belladonna* hybrids.

The F_1 generation does not appear to be completely sterile as a small amount of viable seed was produced. The F_2 has not yet bloomed.

LIST OF CROSSES WHICH HAVE NOT YET BLOOMED

A. belladonna pink Bolivian form x **A. evansiae**
A. belladonna x **A. cybister** and reciprocal *
A. evansiae x **A. aglaiae** and reciprocal **
(A. belladonna x Orange Dutch Hybrid) x Self
(A. belladonna x White Dutch Hybrid) x Self
(A. belladonna x Red Dutch Hybrid) x Self
(A. belladonna x Pink Dutch Hybrid) x Self
(A. evansiae x **A. pardina)** x Self
A. evansiae x **(A evansiae** x **A. pardina)**
A. evansiae x **(A. evansiae** x **A. striata)** and reciprocal
(White Dutch Hybrid x **A. evansiae)** x **A. evansiae**
A. evansiae x **A. striata** very small-flowered selections were used
(A. evansiae x **A. pardina)** x **A. pardina**
(A. evansiae x White Dutch Hybrid) x Self
A. evansiae x **(A. evansiae** x White Dutch Hybrid)
A. evansiae x **A. cybister**
(A. belladonna x White Dutch Hybrid) x **(A. evansiae** x White Dutch Hybrid)
(Red Dutch Hybrid x **A. belladonna)** x (Pink Dutch Hybrid x **A. belladonna)**
(Pink **A. belladonna** x White Dutch Hybrid) x White Dutch Hybrid
A. striata x **A. pardina**
Pink Dutch Hybrid x Pink **A. belladonna** 1958 collection
A. pardina x **A. cybister**
A. pardina x Red Dutch Hybrid
(A. pardina x **A. evansiae)** x Freckled Pink Dutch Hybrid
(Orange-pink **A. belladonna** x **A. striata)** x Self
(Pink Dutch Hybrid x **A. Belladonna)** x Pink **A. belladonna** 1958 collection
Near-white Dutch Hybrid x (Pink Dutch Hybrid x **A. belladonna)**
White Dutch-Mead Hybrid x **A. divi-francisci**
A. forgetii x Self
A. pardina from trip 1 x **A. pardina** from trip 2
A. divi-francisci x Self
(A. reginae x **A. evansiae)** x Self

* Additional seed of the reciprocal cross was sent to the writer by Dr. Martin Cardenas, Cochabamba, Bolivia.

** Pollen of **A. Aglaiae** received from Dr. Joseph C. Smith, La Mesa, Calif,, who made the reciprocal cross by using **A. evansiae** pollen shipped to him from Lafayette, La. Dr. Smith reported later that the reciprocal cross did not materialize.

[**HIGHLY COLORED CRINUMS,** continued from page 110.]

description as given by Bailey. The late H. Nehrling had a descriptive list of *Crinum* species included in Baileys Cyclopedia, on pp. 57-58, which also mentions *C. campanulatum* as follows: "*C. campanulatum (C. caffrum)*—Very distinct with beautiful glaucous green leaves and umbels of six to eight rosy-red campanulate flowers. The flowers are much recurved at their edges. It blooms several times a year. One plant, although 18 years old never made a side-shoot. It grows wild in ponds in Southern Africa and very likely needs moist soil." It is likely that this species may be closely related to *C. graminicola.* Certainly, such red-flowered species might prove a real asset to anyone wishing to develop highly colored *Crinum* hybrids, when used with such species as *scabrum, moorei,* and *bulbispermum.*

Crinum breeding has been going on since Herbert's time and apparently is still in the toddling stages. There is still much to be learned and the field is wide open. Perhaps some day we will break past the sterility problem and really produce a galaxy of improved hybrids. Lilies were once considered difficult to hybridize until a few breeders leveled their guns at them and broke down the barriers. Such a thing can be accomplished with Crinums in the near future with perseverance.

AMARYLLIS IN SOUTH AFRICA

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[PART 1—A TRIBUTE TO A GREAT HYBRIDIST.]

Here in South Africa, hybrid *amaryllis* should be synonymous with the name of the late Mr. A. C. Buller, who passed on early in 1959, when he was over 90 years of age. His interest in *Amaryllis* dates back to the turn of the century when he started acquiring bulbs of several species and also seeds of various unrelated hybrids from friends and acquaintances in overseas countries. In his acquisition of a valuable nucleus of what ultimately became a coveted collection, he was greatly assisted by the famous collector, Rothschild of England, who had contacts all over the world. Needless to say, Buller, in turn, contributed towards the Rothschild collection by the addition of specimens of flora indigenous to South Africa.

Buller's breeding programme continued uninterruptedly for half a century. He did not name his clones and none was ever registered—they were given stock numbers. He must have raised an astronomical number of seedlings, for he told me that he had retained for numbering only about two out of every thousand seedlings that bloomed for him—and he had many hundreds of numbered clones. From my own observations I knew that he was most critical in his selection. I have watched him discarding bulbs which would have been the envy of many a discerning gardener.

I first heard of Mr. A. C. Buller in 1947. Even to-day, there are many people in this country who have been growing *Amaryllis* for years and have never heard of the name of Buller. It must be added, however, that I have yet to meet a person so shy of publicity as was this great horticulturist. He was a man of means and one of the biggest exporters of grapes, pears and plums from South Africa. At first I thought his financial independence accounted for his avoidance of publicity of his *Amaryllis* collection, but I was soon to change my opinion. In viticultural and other research work in the plant world, he was as meticulous and patient as he was in his breeding of *Amaryllis* and through his discoveries and the practical application of methods which he had evolved, the whole of our viticultural industry was revolutionised. Of this and other of his achievements I learned from his contemporaries but never from Buller himself.

My own interest in *Amaryllis* was kindled in 1932, the year before my marriage. This is one of those pleasant mother-in-law stories. My wife's mother, a Berliner by birth, had a few lovely blooms. They are still in existence and even by present-day standards they remain attractive enough though somewhat out of date. She gave me a few clones which I lost through those wretched worms before the advent of D. D. T. This, however, only tended further to stimulate my interest in and love for those majestically beautiful blooms.

It was at a flower shop in Johannesburg in 1947 that I heard of Buller. I drew the attention of a friend to some attractive *Amaryllis* blooms on display, trying to find words to express my admiration. She conceded that they were good but added that I would not rave about them if I had seen the Buller collection at Stellenbosch in the Western Province, as was her privilege. I was all ears to find out more about that man Buller, his address, his prices, whether he issued a catalogue, etc. Her reply was that I should not waste my time with Buller. He was a crank. He bred only for his own pleasure. His garden was open to the public on specified dates when visitors were allowed entry upon payment of specified fees and the gate money was handed over to specified charities. Every few years he would stage an exhibit at a suitable place in Capetown, some twenty odd miles from Stellenbosch, and the exhibition to which entry was charged, would be in aid of the Red Cross Society. Buller did not sell bulbs. Not long after that, still in 1947, I had to come across the name Buller on two further occasions, the second of which played an important part in my life and was destined to change my career.

At that time I was connected with the steel industry and held the office of Controller of Iron and Steel and Assistant Director of Imports and Exports. This was also the year that the late King George VI and the Royal family visited the Union. Having been chosen as a member of the Royal Choir to appear before their Majesties with their reception in Johannesburg, I felt rather more closely connected to them than the "man in the street" and consequently followed every bit of news of them in every available paper. There I read about the hundred *Amaryllis* clones which their Majesties had accepted as a personal gift from the "famous hybridist." All of those clones are to-day growing at Kleinskuur, but more of that anon.

During the war years and the eight years following, whilst I held various governmental posts, my wife concentrated on Iris and devoted her time to popularising the Rainbow Flower in our country and introducing her own hybrids together with imported clones bred by the leading American and English breeders and those that came from Jean Stevens in New Zealand. By 1947, being the first commercial grower in South Africa, my wife was already well known to everyone who had an interest in Iris and that was how Mr. Buller came to hear of her. He wrote, requesting her to make up a collection for him to the value of the cheque enclosed and left the choice entirely to her.

Now, if you knew my wife with her alert mind and the faculty for doing the right thing at the right time, you would already correctly have guessed what she did. Yes, she made up a choice collection, including even some new clones which had not yet been catalogued and, moreover, returned Mr. Buller's cheque to him. This, of course, was done tactfully with an explanation that her husband was an *Amaryllis* lover. She knew he was the Amaryllis King of South Africa and she begged just a few of his bulbs in exchange for the Iris. She wished to have the bulbs

for a present to her husband and would be happy even if Mr. Buller could send only six.

The response was prompt and generous. A parcel of 150 clones arrived in perfect condition. I could barely believe the good news when my wife phoned me to my office in Johannesburg, fifty miles from our home KLEINSKUUR near Balfour. Suitable pots were immediately procured, brought home that week-end and the bulbs, all of which were already showing signs of buds, were duly potted. They were soon in bloom and were the cause of sensation, not only to us at KLEINSKUUR, but to all our friends and visitors. Correspondence between us and my benefactor at Stellenbosch, close on a thousand miles from us, became regular and Mr. Buller was bombarded with questions on cultural methods. These were answered in detail and he appeared to take pleasure in supplying much more information than that requested. He quite correctly assessed my ignorance whilst undoubtedly enjoying the sincere enthusiasm evidenced in my letters. On going through our voluminous Buller file before writing these notes, I became somewhat alive to the fact that after twelve years my childish exuberance had not waned.

During the ensuing six years I remained a week-end gardener. It was not until end of 1953 that I settled on the farm and relinquished office in the city in favour of full-time concentration on *Amaryllis* breeding.

Having apparently been satisfied that my enthusiasm was not merely a temporary fever or flash in the pan, Mr. Buller sent me more bulbs the following August, most of which, I would say, were of finer quality than the previous consignment. There were three to four bulbs each of many clones and the total weight of the parcel was close on 200 lbs. They bloomed in October and my letters to Mr. Buller became "essays" of evaluation and comparison as opposed to his "lectures" on colour, form, substance, texture, etc. Fortunately, I obviously did not make too much of an ass of myself in my bold appraisals, since the maestro tended to show more and more faith, not only in my treatment of the bulbs, but to some extent also in my judgment and taste.

It was in the winter of 1949 that the great event came to pass. A letter came from Buller, the otherwise reserved and undemonstrative English gentleman, displaying, what one might term, an emotional outburst for one so staid. He did not disclose his age but said he was over 80. For the past ten years he had been on the look-out for some worthy person to take over from where he intended relinquishing his breeding and propagation work and he thought that in me he had found that person. He expressed himself in a manner which could have led one to believe that the writer was asking a friend to do him a great favour. In the event of my favourable consideration of his suggestion, he would be glad if, during the coming October (blooming season) I could find time to visit him, so that he could acquaint me more fully and personally with his methods of cultivation, selection of parents etc., and ABOVE ALL,

to disclose to me his most secret method of vegetative propagation, a system on which he had worked for eleven years to perfect.

My wife and I counted the days till that October morning when we set off for Stellenbosch. At Mr. Buller's nearby farm, nestled amongst those impressive mountains which bring fame to the Western Province of the Cape, we were accorded a royal welcome. In a spacious conservatory of structural steel and frosted glass, a few hundred cut specimens were displayed in single vases as for an exhibition. These were arranged on ascending concrete tiers, in themselves shallow flower boxes in which grew blue Lobelia that cascaded down the sides. We gasped with amazement at such a feast of beauty and the beaming countenance of our host showed delight at our being so impressed.

The two years of pen-friendship was quickly moulded into a lasting close personal relationship. Within a few days my standard-size notebook was almost full of shorthand notes, a fair share of which was devoted to the great "secret". Mr. Buller informed me that cuttage had been practised for many years, but that the apparatus which he had designed, six units of which he had in operation, was something still unknown to the Amaryllis world. I solemnly undertook to guard his secret.

In principle, basically, the system is similar to that described by Mr. J. F. Stewart in Herbertia 1959, page 102, and which is grounded on the earlier experiments of Traub and Heaton (see Traub, "Amaryllis Manual"). During my visit to Mr. Buller in 1949 we discussed the feasibility of electric heating and the introduction of thermostatic control, which we were both sure would be an ideal improvement. After further enquiries upon my return, it proved that our domestic generating plant was inadequate for a departure from the conventional heating system applied by Buller. Whilst in principle the two systems are similar, the Buller "incubators" bear no resemblance to the apparatus described in the article by Mr. Stewart. In the Buller method which I have adopted, with a few adjustments designed to simplify operation, the moisture control of the medium is automatic. Whilst heat control is not automatic, it is an easy matter to limit variations in temperature to about 5°F. and thereby ensure optimum temperatures.

I have usually 100% success and I must assume that maturity with the Buller system is reached sooner. Upon reading Mr. Stewart's article, I kept a special check and found that a large proportion of the bulbs from segments placed in my incubators in September, 1957 came into bloom in October 1959. It is just possible that the composition of the medium tends to enhance development which pure sand, as advocated by Mr. Stewart, does not do. Whilst on the subject of heating, I find it most interesting to come across the following question in a letter from Mr. Buller dated July 26th, 1951: "Are your 'incubators' made of galvanized iron and are you heating by electric current and thermostats?" The answer is, of course, still "No."

All that I know about *Amaryllis*, I learned from Mr. Buller during those two weeks. Together, we spent many hours a day amongst his

plants and alone I spent as many again in his beautiful garden. He selected for me, we selected together and I made a number of selections on my own. Careful notes were taken of the stock numbers, a list of which I undertook to post to him the following July for lifting of the clones. When these arrived, the old veteran had added a few more which he felt I should have and in his letter advising of their despatch, he expressed his conviction that I then would have all of his very top-notch stuff. Again he sent extra bulbs of each clone so that, apart from incubation material, I should have a reasonable control stock.

In October 1951 Mr. Buller paid a flying visit to KLEINSKUUR. I always was and still am of the opinion that he wished personally to ascertain whether I was worthy of the confidence he had placed in me and of the results of his life-long task with which he had entrusted me. By that time I had laid out a fair-sized *Amaryllis* garden and a few hundred potted plants were suitably housed. Cold frames to accommodate thousands of propagated bulblets had been constructed and were partly in use and thousands of seedlings were being raised in neatly kept beds. Buller was visibly pleased. He was also impressed by the buildings I had erected and the water system I had provided. I did not have the heart to tell him that the few thousand pounds his benevolence cost me had left me broke and would prolong my sojourn in the Golden City from which I derived the cash income that was to pay for all this.

Although Mr. Buller for himself did not sell any of his *Amaryllis*, he did on occasions dispose of surplus stocks and "not-too-good" seedlings by way of sales for charity. A few weeks before my visit to him, he received a call from representatives of a firm of Holland bulb brokers or growers who offered him £10,000 (about $25,000) for his collection which he declined, I learned, with not too good grace! He similarly declined a further offer of £250 for one specimen each of four selected varieties. And yet, during his visit to Kleinskuur, Buller was looking forward to the day when the Kleinskuur catalogue would include Buller *Amaryllis*. During the few days he was here, we had a lot of fun together giving names to his varieties, so that they may one day be sent out to South Africa as "individuals" and not as mere "entities." It was also then that I learned from him of a few clones—his very latest and the last of his breeding efforts, which I had not seen, because the young incubated stock had not yet bloomed at the time of my first visit to him. In 1952, I received my last parcel of *Amaryllis* from A. C. Buller.

[To be concluded in the 1961 Amaryllis Year Book]

AMARYLLIS BREEDING REPORT, 1959

MRS. A. C. PICKARD
Houston, Texas

A walk through my *Amaryllis* garden when in full bloom gives me new inspiration to carry on with experiments in breeding. Two year old seedlings are progressively yielding blooms that are a constant source of delight.

One of the greatest joys of gardening is the production of new plants from seed and I was so excited this past April over two exceptional blooms which were obtained from a planting of dark red seedlings only two years old. My final choice, 'Dr. Pickard,' [Fig. 27] named for my husband, is a beautiful dark red clone with sturdy scape;

Fig. 27. Hybrid *Amaryllis* clone, 'Dr. Pickard', produced by Mrs. A. C. Pickard, Houston, Texas.

Leopoldii type flower with the inner tepalsegs lobed. The diameter across the face measured 9 inches; the top tepalsegs 4 inches across; and the color unblemished.

The parents of this clone are two Dutch hybrids, 'Superba' ('Purple Queen') and a very dark red (the color very dark; almost black) which

we had grown in the garden for about 10 years; which bloomed each year, and which had produced one or more offsets.

Anyone undertaking a breeding project with plants soon comes up against the problem of space since the chances of securing an outstanding color and form are greatly enhanced by growing large numbers of seedlings. Knowledge of strains with good potentialities can speed up efforts for obtaining outstanding hybrid Amaryllis. There are plenty of chances for disappointment but the more careful the selection of the parents, the more certain are outstanding offsprings. Beauty of flower, however, is the first consideration and without it all other qualities are worthless.

When the seedlings are blooming each flower should be checked, scoring it with the standard of perfection. Those that do not score the highest points should be destroyed. It is far better to get one or two outstanding *Amaryllis* than to save fifty or more that show no improvement over existing clones. One should work with the thought in mind to developing a hybrid a "little bit better."

My results with vegetative propagation have been most satisfactory. It is my objective not only to produce better clones but also to branch out in producing hybrids in the various flower type divisions which will encourage enthusiasts to grow *Amaryllis* that appeal to every taste. For you who have never grown Dutch hybrids—try them. I'll assure you that you will be delighted and will never grow tired of them.

HIGHLY COLORED CRINUMS AND A NEW HYBRID

THAD M. HOWARD, *D. V. M.*

Ever since I first became addicted to *Amaryllids,* I have been especially fond of Crinums. My introduction to the genus was limited to the "Milk-and-Wine" types, such as *Crinum bulbispermum,* and a few other unidentified types of similar coloring. I shall never forget the time when I added the hybrids to my collection and the impression that I got from the pure white umbels of *C. powellii album,* the rich pink of 'C. Houdyshel,' and the dazzling wine-rose of 'Ellen Bosanquet.' I also found the pink and white Louis Bosanquet very pleasing, but of all the hybrids I liked the color of 'Ellen Bosanquet' best. I marveled at the mystery surrounding the origin of this darkly colored hybrid and wondered what species Mr. Bosanquet might have used to achieve his "break" from the lighter shades. Shortly afterwards I was to discover the storehouse of information in HERBERTIA and learn that older and wiser heads than mine had not fathomed Mr. Bosanquet's mystery to anyone's real satisfaction.

My introduction to *C. scabrum* was a high point in my *Crinum* interest, for here was a huge widely opened flower of intense fragrance; of startling red and white coloration. What is more, it sets seed freely. Surely, I thought, this species must be of great importance in the production of highly colored hybrids. To my surprise, I found very little

in the literature about this species being much used for hybrid work. Apparently others had taken the "powellii" route by concentrating on *C. moorei* and *C. bulbispermum* for new hybrids. It seemed that *C. scabrum* had been overlooked in the quest for new hybrids to a great extent. I determined to try out this species to find out what it might transmit through hybridization. I tried many crosses using it as both pollen plant and seed plant, but unfortunately I found that most existing hybrids were sterile and would not set seed when pollinated by *scabrum*, nor would *scabrum* set seed when pollinated by these hybrids. My own attempts at crossing scabrum with 'Ellen Bosanquet' proved fruitless, even though Dr. Traub's crossing of these two Crinums was very successful. One day in 1952, I happened to have both *scabrum* and *bulbispermum* in flower at the same time and so I decided to try a new mating using these two "milk-and-wine" types. I very nearly talked myself out of attempting the cross since I could not see any good coming of it. I felt certain that my results would only be more mongrel "milk-and-wine" types that are often listed as "unidentified" in the trade. Still curiosity got the best of me and I made the crosses. I was pleased to find that I had obtained a few seed and that they sprouted at once. The few *scabrum* seedlings pollinated by *bulbispermum* had foliage that was typically *C. scabrum*. On the other hand, one of the *bulbispermum* seedlings pollinated by *scabrum* had bright green leaves in contrast to the usual bluish green foliage that typifies *C. bulbispermum*. I knew that I had a hybrid from the first, but now I had to wait patiently for it to mature in order to see it flower. I must admit that I had curiosity rather than any optimism holding my interest.

Four years later, in 1956, the seedling flowered during my absence and I was told that the flower had been pink. I was very surprised to know that I had gotten a solid-colored hybrid instead of a bicolor but the following year I got a chance to see it in bloom for myself. As the scape developed and the buds began to take on color I was shocked to find that they were very much like 'Ellen Bosanquet' in the darkness of the buds. The umbel was small, having only four buds, but the entire plant showed a superficial kinship to Mr. Bosanquet's hybrid. The foliage was similar too. When the flowers expanded, I raced to find a specimen of 'Ellen Bosanquet' in flower at a friend's garden in order to compare the two. I was elated to find that though somewhat similar in some respects, they were not identical, and that my new hybrid had a few characteristics of its own that made it distinct from any other hybrid crinums that I had seen. I pondered its virtues and its faults. The following year, the new clone flowered again, and this time there were three scapes and each scape now had eight blooms each. That year (1958) it also produced two offsets. This season it has flowered again and the plant now seems even finer than ever. Some of its early faults have vanished with maturity, but one important one still remains. The brightly colored buds tend to burn in the heat of the afternoon sun in our climate. If the day is cloudy or if the plant is grown where it receives light afternoon shade, the flowers will not be damaged and will open to perfection. What are its virtues? There are many, but the

most important one seems to be its unique coloring. The flower is much darker than 'Cecil Houdyshel,' and much lighter than 'Ellen Bosanquet,' being nearly intermediate in hue between the two. Unlike these two hybrids, the new clone has a much darker coloring concentrated down the center of each tepalseg so as to subtly suggest a stripe, thereby revealing its "milk-and-wine" origin. This combination produces an effect of dark rose laid over a deep pink background. Were the coloring only a shade less subtle, we would indeed have a true bicolor. As it stands, this effect is only hinted, but it is a strong hint at that. The plant is a strong grower.

The new clone is just another good example of how much surprise can be found in hybridization. There is very little in it to suggest the identity of either parent, either in color, form, fragrance, or habits. To be sure a few characteristics are retained, but these could go unnoticed. The umbels have 6-8 flowers, as in *scabrum,* and the scape is only a bit taller than the scape of that species. The flowers are funnel-shaped, opening less widely than *scabrum,* but much more so than *bulbispermum.* The fragrance is pleasing, but not as strong and sweetly scented as *scabrum,* yet far more pleasing than that of *bulbispermum.* The bulb increases at a slow but steady rate by offsets, as do both parents, but not nearly as rapidly as 'Ellen Bosanquet.' Thus far, no seeds have been produced from the new hybrid, and there is little reason to doubt that it is sterile or nearly so, since this seems to be the case with most hybrid Crinums.

All in all, I believe that we have a new hybrid that should prove acceptable in the trade due to its distinctive coloring and pleasing habits. In our hot South midland it does well in full sun, but will produce more perfect flowers where given light afternoon shade. In cooler climates this should not be a problem. The general garden effect is like that of 'Ellen Bosanquet,' but lighter in color with a darker pigmentation in the center of each tepalseg. Mr. Houdyshel chose his famous hybrid 'Cecil Houdyshel' from among some 600 seedlings of the same parentage. Other breeders have likely done the same. In the case of the new hybrid, I have but a single seedling to choose from. Even within such a limited sample, I feel that it has enough merit to deserve introduction. If this particular cross could be repeated many times, I would not be surprised to find that at least one such seedling might prove to be a duplication of Mr. Bosanquet's own vividly colored hybrid. At least we now have some strong clues that may help to solve the mystery.

In checking through early editions of HERBERTIA, I have found several statements by early hybridizers that seem to add fuel to theory that *C. scabrum* had an important part in the creation of Mr. Bosanquet's famous hybrid. In the 1935 HERBERTIA, Mr. A. Worsley had an article entitled HYBRIDIZATION OF AMARYLLIAE, which was reprinted from GARDENERS CHRONICLE (London), in which he discussed some of his own *Crinum* breeding. On page 57, he states "Recently I raised a new hybrid *Crinum* out of *C. scabrum* by *C. moorei schmidtii.* The female parent was a Jamaican variety, which is by far the finest form of *C. scabrum.* The seedlings flowered in three years and ten months,

and the foliage partook of the characters of both parents. The flowers were most like *C. moorei* in shape, but of a brilliant crimson-pink colour, more intense than in any *Crinum* I have ever seen before. Another seedling from the same fruit was not so intense in color. Both have refused to carry seed so far." This splendid red-flowered *Crinum* was later named *Crinum* x *worsleyi,* but was lost to cultivation shortly after flowering. W. Watson chose to name it after its originator. In Worsley's autobiography in the 1936 edition of HERBERTIA he said of his hybrid "When Mr. Watson first saw it in flower in 1900, he took off his hat to it, saying, 'This is a gentleman.' "

William Herbert also dabbled around with *Crinum scabrum* and *C. bulbispermum.* In his "Amaryllidaceae," 1837, pp. 335-380, he speaks of a hybrid *Crinum* using these two species. He also used several other species on *bulbispermum,* but he said that the *scabrum-bulbispermum* cross had the most beautiful flowers. In the 1947 edition of HERBERTIA is an excellent article on *Crinum* breeding entitled "Semi-Hardy Crinums" by Les Hannibal. In this enlightening article Mr. Hannibal mentions a hybrid 'Elizabeth Traub,' developed by Dr. Traub using the pollen of 'Ellen Bosanquet' on *C. scabrum.* "Out of a number of interesting F-1 seedlings, one of particular merit appeared, which was intermediate between the parents." This new hybrid is now available in the trade. Mr. Hannibal also mentioned the "walking-stick" hybrid Crinums developed in Australia, of which a few bore some similarities to 'Ellen Bosanquet,' but no mention is made of the species involved in these crosses.

A few years ago I received a very large *Crinum* bulb from Joseph E. Werling of Los Angeles which he had obtained from a South African bulb nursery. It was identified as *C. graminicola,* and had been sent with the following comments in their bulb catalog: "A new introduction and originally collected by us in N. Transvaal. The flowers, which are carried on 1 foot stems, are an umbel of big wine-red blooms. This is by far the most spectacular Crinum that we have seen to date." The large bulb was planted in my Aunt's garden in East Texas at that time, in 1954, since my Army duty prevented me from doing much gardening. It grew well the first year sending up very wide low growing foliage of a bluish green color. It seemed to make all of its growth at once and then rested the rest of the summer. I later moved it to San Antonio where it has continued to exist but grows very little each year. Strangely, the bulb has remained quite large considering the small amount of annual growth that it makes. Mr. Werling writes that his bulbs have never flowered either, but continue to exist. It is too bad that this species chooses to be difficult since the description of it is so glowing and it sounds so desirable.

Another red-flowered South African *Crinum* is listed in Bailey's "Hortus Second" and in his "Standard Cyclopedia of Horticulture" as *C. campanulatum.* There is a milk-and-wine *Crinum* that has been listed in the trade under this name, but it is in no way similar to the

[**HIGHLY COLORED CRINUMS,** continued on page 100.]

FIRST DECADE OF HEMEROCALLIS WASHINGTONIA

HAMILTON P. TRAUB, *California*

[PART II. SECTIONS 4 THROUGH 7; CONTINUED FROM VOL. 15, PAGE 79.]

In the 1959 issue of Plant Life, the first three sections of this article were published—(1) Colchicine-induced tetraploid parents; (2) pollen storage, pollination and hybrid tetraploids; (3) selfing tetraploids. In this article, the remaining four sections are briefly presented—(4) obtaining triploids by crossing tetraploids and diploids; (5) natural and artificial selection; (6) cultural methods, including collection and sprouting of seeds, transplanting of seedlings to field; and (7) the evaluation of tetraploid seedlings for garden value.

4. PRODUCING TRIPLOID HEMEROCALLIS

As soon as colchicine-induced tetraploid *Hemerocallis* were on hand, the writer attempted to produce triploids by crossing tetraploids with diploids. One early success was the triploid clone, 'Coronado' (Traub, 1954) which was obtained by crossing 'Tetra Starzynski' (Traub, 1949) and the diploid, 'Iowa' (Traub, 1949). 'Coronado' is self-sterile clone (Traub, 1951; 1954). Many other attempts were made later but the progeny were never quite as good as the tetraploid parent. This does not mean that it is not possible to obtain superior triploid daylilies by this method, but only that the writer has not used the right combination of parents in these instances. Others should by all means try this method of daylily breeding, and it is hoped with better success.

5. NATURAL AND ARTIFICIAL SELECTION

Those interested in daylily breeding have undoubtedly observed that breeders in the deep South and the southwestern states usually have a relatively large proportion of evergreen clones, and that breeders in the North depend mostly on deciduous clones. This state of affairs is brought about largely by natural and artificial selection.

First it is necessary to consider *tentatively* the types of plants on the basis of growing habit.

(a) Seeds of certain hybrids derived wholly or in part from deciduous species native to cold climates do not appear to sprout without cold-pretreatment; these are designated as *deciduous-A*. Experiments of the effect of cold pretreatment on the germination of seeds from deciduous-A type plants, of which the writer is not aware, may have been carried out by others. The writer has not made any controlled experiments and the statements made here are based on the observation of thousands of seeds planted, and seedlings observed growing in the field. Thus the conclusions reported here are subject to correction if they conflict with those obtained from controlled experiments.

(b) Seeds of certain hybrids derived wholly or in part from deciduous species such as *Hemerocallis fulva* sprout in warm climates without cold pretreatment; these are designated *deciduous-B*.

(c) It is generally known that there is still another class consisting of intermediates between the rigidly deciduous and evergreen types that were obtained by crossing deciduous and evergreen type plants. If the plants in the breeding plot are examined in January, for instance, in southern California, it will be found that in addition to the rigidly deciduous types there is the series of intermediate type plants that die down sometime before January but then send up new foliage by midwinter. Seeds with this combination of genes apparently sprout in warm climates without cold-pretreatment since they are relatively numerous. These intermediates are designated *deciduous-C*.

For *deciduous-A* seeds, the cold treatment is apparently necessary in order that the embryos may be prepared for sprouting. Of course, those breeding daylilies in the South could subject the seeds to the required cold period by storage in a refrigerator at the proper temperature. However, this is extra work, and apparently none of the southern breeders has as yet used this method to any great extent. The embryos with dominant *decidous A* genes do not sprout unless cold pre-treated, and thus the large proportion of the seedlings produced in the South are evergreen, with the exception of *deciduous-B* and *deciduous C* seedlings that may be present.

In the North, where the usual practice of planting seeds out of doors in the fall is followed, the hardy *deciduous A* seedlings apparently survive, and the less hardy evergreen seedlings may be eliminated. The fate of the *deciduous C* seedlings has not been investigated and these may or may not survive. The net result is that mostly deciduous clones are produced in the North.

Some of the evergreen seedlings produced in the South may not survive when planted in the North without protection with a mulch; and conversely, some of the deciduous seedlings produced in the North may not survive long in the South. Thus such a clone as the deciduous 'Crimson Glory' (Carpenter, 1950) died out here at La Jolla for the writer because it was not adapted to the frost-free climate of this spot. Those who have tried to grow *Hemerocallis* species that come from the colder parts of China, Korea and Siberia, have found out to their sorrow long ago that these will not thrive in the South. If they linger on for a time, they will sooner or later die out. The genes for the evergreen habit are derived from the species *Hemerocallis aurantiaca* which is native to the warmer parts of Japan. Thus the evergreen habit derived from this one species predominates in the hybrids grown in the South, and the deciduous habit of the wild deciduous species predominates in those produced in the North under the conditions indicated.

In the long run, therefore, the decidedly deciduous clones, the intermediate clones perhaps, and the evergreen clones sometimes, will be observed in the North; and the wholly evergreen, the intermediate clones, and the decidedly deciduous clones sometimes, will be observed in the South.

In scientific language this type of survival is referred to as natural selection since selection operates automatically under the given (natural)

climatic conditions. When man takes a hand and eliminates individuals capriciously, then artificial selection is involved by definition.

Thus natural selection is apparently the more important factor in the survival of hybrid daylilies on the basis of the deciduous versus the evergreen plant habit with different results in the South as contrasted with those in the North. But artificial selection does enter in to some extent when the breeder in warm climates eliminates the weaker ever-

Fig. 28. *Hemerocallis washingtonia* clone 'Tetra Arthustar' (Traub), a recurrent blooming tetraploid which has from three to four flushes of bloom each season at La Jolla, Calif., under good culture, showing second heavy seed crop for 1955 by self- and cross-pollination.

green plants; looks with disfavor on the weaker deciduous plants and deliberately discards them—preferring to save the relatively vigorous evergreen type plants. In the North weaker plants may also be discarded. To this extent, artificial selection enters into the survival of the seedlings on the basis already indicated.

On the other hand, when it comes to selection for plant stature, vigor, floral characters and frequency of blooming, artificial selection is responsible for survival. This type of artificial selection will be con-

sidered below in detail at the end of the article under the evaluation of tetraploid seedlings for garden value.

6. CULTURAL METHODS

Efficient cultural practices have much to do with the rapidity with which results are obtained. These include such operations as collecting and sprouting seeds, transplanting seedlings, mulching, watering, and so on.

SEED SETTING, COLLECTING AND PLANTING.—When early in the project it was found that certain seedlings were very efficient seed producers, the breeding stock was selected with this characteristic in mind. Thus 'Tetra Arthustar' (Traub, 1959), an early outstanding F_2 seedling was made the corner-stone for the red tetraploids. In Fig. 28 is shown the second seed crop of the season on 'Tetra Arthustar' in 1955. After even a larger first seed crop in late July, this second crop in September was almost as heavy. Mixed pollens from the superior reds were used in crossing on 'Tetra Arthustar', and also single flowers were pollinated with 'Tetra Rosalind' pollen. Thus, the capacity for seed production was combined with the superior red, rose and pink flower color. Ever after most of the progeny from these lines have been self- and inter-fertile; in fact so fertile, that it has been a real task to remove the many open-pollinated seed pods. A similar method was followed with the yellow, orange, purplish, golden-sheen and deep red (black) strains.

With such breeding stock it has been possible to produce large quantities of seeds each year, in fact so many, that only a portion of the crop could be planted each year due to lack of space.

Seeds may be harvested as soon as the three valves of the capsule are loose when manipulated by the hand. Seeds should be gathered before any are shed naturally. Seeds of tetraploid *Hemerocallis* are as a rule relatively larger and succulent. If stored in the dry condition at room temperature, they may soon wrinkle. The writer stored them in a closed glass container in the refrigerator at 43° F. for several weeks until all or most of a particular color strain were harvested. In this manner each strain can be planted at one time. How long the seeds can be stored in this manner has not been determined—the writer did not store them in the manner indicated for longer than about 4 weeks.

The seeds were planted in 5- or 6-inch plastic tubs or azalea pots (see Fig. 29) in a mixture of half sand and half granulated peat. Canadian high-press peat was first soaked and expanded in water for a week or more, and the expanded peat was measured from this stock volume for volume. The seeds were sprouted in half-shade (lath-house). Germination was excellent in almost all cases as shown in the typical results (Fig. 29). A complete fertilizer was applied every three weeks.

PLANTING TO THE FIELD.—Seedlings reach the transplanting stage in about two months. At this stage they have from 2 to 4 leaves and a good root system if the correct soil medium is used. Thus seeds sown in July should give seedlings for transplanting in September; and those

sown in August may be transplanted from October to February. [Fig. 29]

Fig. 29. *Hemerocallis washingtonia* seedlings from the 1958 seed crop. Upper, tetraploid seedlings two months old (seeds planted Aug. 1958): left, in 5-inch plastic pot; right, pot removed to show root system.

Lower, part of 5 double-row plot. Seeds sown in pots Aug. 1958 and seedlings transplanted in Oct. 1958 are shown as the larger plants in the plot; several of these flowered in early July, 1959, nine months from seeds. Smaller seedlings shown in plot at lower first row (left) and 5th row (right), transplanted in Febr. 1959, showing effects of later transplanting. Block of 1956 seedlings (extreme right) being destroyed; only superior ones saved. Pacific Ocean in far background.

SPACING IN THE FIELD.—The seedlings are planted in *double* rows 1½ ft. apart. Within the *double* rows, the two rows are spaced only 5 inches apart, and the plants in each of the rows are spaced 3 inches apart. By this method—4 plants per single-foot row, and 8 plants per *double*-foot row—it is possible to accommodate 400 plants per double

50-foot row. Thus during the planting season fall, 1956—winter, 1957, for instance, there were available 11 double rows, each 50 ft. long; and in this space it was possible to accommodate approximately 4,400 seedlings [Fig. 30]. In spite of this close spacing, a great many seedlings had to be discarded for lack of space. Although some seedlings bloom in 9 to 12 months from seed germination, in this climate—frost-free location on the Pacific Ocean—it requires about 18 to 24 months for all of the remaining seedlings to bloom. In the intervening season, it is not possible to make an entirely new set of crosses, and thus as a rule only some experimental crosses for revealing genetic principles are made. Thus in the planting season, fall, 1957—winter, 1958, only about three

Fig. 30. Part of field plot of the tetraploid *Hemerocallis washingtonia* in flower, La Jolla, Calif. 1958—mostly red-flowered seedlings. From Kodachrome slide by Dr. I. L. Furnas. Unfortunately, the blooms of the many red-flowering seedlings are difficult to distinguish in this reproduction; the fewer yellows show up fairly well.

Two color slides of this scene have been donated to the American Hemerocallis Society collection so that anyone interested may borrow these.

50-ft. double rows were planted, accommodating about 1,200 seedlings. In the planting season fall, 1958—winter, 1959, again, the seeds represented a full complement of new crosses. There were available 6 double 50-ft. rows, accommodating 2,400 seedlings [Fig. 29]. Again, many seedlings had to be discarded for want of space.

This method of close planting has obviously some advantages and disadvantages. Under advantages should be listed the important one that a great many seedlings can be tested on a relatively small area. Close planting is important in California, especially at La Jolla, where the land is limited, and where every foot of land is eagerly sought. The writer was lucky in being able to obtain a relatively large lot by standards here, but even this is small when considered on the basis of growing thousands of *Hemerocallis* seedlings.

The disadvantages are several, but can be overcome by additional time in testing after the selections have been made. Under close planting, the more vigorous plants may be observed, and a fair estimation of the flower color may be made. Since flower-color value is so important, the main objective of the breeder is realized. He can make his selections on the basis of color. These selected seedlings, usually only a limited number out of thousands, may then be tested in wider spaced plantings for optimum performance as garden plants.

Thus the disadvantages are indicated indirectly in discussing the advantages. In addition, one great disadvantage in close planting here is that the deciduous plants which go dormant in winter are crowded by the evergreen plants next to them. This can be overcome by planting deciduous seedlings in a separate block. Deciduous seedlings are characterized by relatively short initial leaves as contrasted with evergreen seedlings which make longer initial leaves. Another disadvantage in close planting is that it is difficult to get at the flowers for making pollinations.

Soil, cultivation and mulching.—The soil here is a virgin rich heavy clay which seems to be excellent for *Hemerocallis* since in five years no fertilizer has been applied, excepting mulching with lawn clippings when the seedlings are small. And later, after flowering, the dead flower scapes are placed between the rows, and the decaying leaves are left in place to increase the mulch. Under this type of culture, the weeding problem is practically eliminated. No cultivation is needed.

Watering.—In this climate, with an annual average rainfall of about 12 inches, all falling during October to June, and a dry season from June to October, it is necessary to water *Hemerocallis* by overhead irrigation for 2—3 hours once each week during the dry season from June to October, using a rain-bird type of sprinkler. Although the clay soil may be water-logged during some periods during the rainy season, this does not harm *Hemerocallis* in this climate. In Florida, the Lords grew their *Hemerocallis* on water-logged hammock land with great success. It has been reported, however, that in the North, well-drained soil is required for the survival of *Hemerocallis*.

Diseases, insects, mites, snails & slugs.—*Hemerocallis*, including the tetraploids, are relatively free from pests. Aphids may be present on the tender new growth during winter and spring, but usually they do little or no damage. Only rarely is there any stunting. Aphids are checked or controlled by overhead sprinkling, and by natural rains.

Mites and thrips may be present in hot weather on the under side of the leaves but usually cause no important damage under good culture with weekly overhead watering for three hours.

Snails are present in this area and make their home in *Hemerocallis* plants but rarely do any damage since they eat the foliage only as a last resort. They are controlled by the regular snail poisons obtainable locally.

Sow-bugs and slugs may damage or even kill very small seedlings just set out into the open but will rarely harm them if ordinary weeds

are present as their food. Mulching with lawn clippings will keep them under control, or they may be controlled with the regular snail bait. So far no phytopathic or virus diseases have been observed on *Hemerocallis.*

7. EVALUATION FOR GARDEN VALUE

Hemerocallis are excellent greenhouse plants. Such a diploid clone as 'General MacArthur', for instance, likes warmth and produces the most dazzling red flowers under such culture. Tetraploids also make fine greenhouse plants. Since there is little interest in this subject at present, the discussion here will be confined to the evaluation of tetraploids for outdoor culture.

The objective of producing plants with beautiful flowers for the garden is ever present in the mind of the breeder, and thus he practices artificial selection of the most rigorous kind. The writer has found a few combinations of parents that give an unlimited number of excellent reds; all so nearly alike that it is hardly possible to make selections. These, however, are the exceptions *that test* the rule. As a general practice thousands of seedlings that do not quite measure up to the rigid standard in each generation, especially during the first several years of a project, must be destroyed. It is realized that such discards may yield excellent plants if used in further breeding, but a choice has to be made due to lack of space and financial means for carrying on an impossibly large project.

The more important characteristics sought in the hybrids include (1) plant vigor, (2) proper stature, (3) sufficient flowers per scape, (4) deciduous or evergreen plant habit, (5) recurrent blooming habit, (6) flower color, (7) flower size, (8) flower scape, and (9) resistance of flowers to heat (sun), wind and rain.

PLANT VIGOR AND STATURE.—Most growers prefer a rather vigorous plant habit, but it is clear that some of the tetraploids that grow over 6 ft. tall must obviously be discarded. Stature from dwarf to 3.5 ft. appears to be most desirable, but some that grow from 3.5 to 4 ft. may also be valuable in background plantings. The writer's personal preference is for clones that are intermediate in vigor and stature. Clones with rhizomes and those with numerous aerial scape offsets are quickly destroyed.

WELL-BRANCHED SCAPE.—The scape should be well-branched, producing 12 or more flowers. Clones with outstanding breaks in color but with fewer flowers per scape should only be maintained until the new flower color can be transferred by breeding methods to a plant with a many-flowered scape.

DECIDUOUS VS. EVERGREEN HABIT.—This subject has been previously discussed. In general the evergreen habit is preferred in the South and the deciduous habit in the North. However, there is a possibility that intermediates may become popular in both regions.

RECURRENT BLOOMING HABIT.—One of the important developments in the breeding of tetraploids is the general occurrence of recurrent blooming. At La Jolla, almost all seedlings bloom more than once each

season; many bloom three or more times, and a few are practically everblooming. Thus 'Tetra Carmine', 'Elizabeth Traub' and others appear to bloom whenever they grow actively from spring to early winter. Whether they will bloom as often when planted in the North or other southern locations still has to be determined. With respect to their practically everblooming habit, the tetraploids are similar to the diploids, 'Salmon Orchid', 'George Gilmer', 'Winged Victory', and so on. Thus it appears that the recurrent blooming habit can be developed in all daylilies.

FLOWER COLOR.—Flower color is of the greatest importance and an all out effort is to be made to obtain distinctive and pleasing colors. The yellows and oranges were developed early in the history of the project. The first outstanding clones selected were 'Elizabeth Traub', an immaculate tangerine orange; 'Rev. Traub', a silky cadmium orange; and 'Magdalena Luethi', a lily-shaped, large wax-like empire yellow. Later, 'Canary Butterfly', a bright canary yellow, was obtained.

Really outstanding reds appeared only later with 'Billy Budd', a large, wide-open cardinal red; 'Capt. Reid', near chrysanthemum crimson; 'Madrid', flaming red; and finally somewhat later, 'Tetra Carmine', bright carmine red.

Much later, 'Lucia', a sunfast light pink, and 'Tetra Rose', a medium rose, appeared. And then also 'Purple Premier', purplish-reddish, and 'Violetta', lavender-reddish-violet, made their appearance.

Excellent polychromes, blends, eyed and bicolors appeared rather early, including 'Wyndham Hayward', a very large, wide-open tangerine orange with bright reddish eye-zone; 'Lemon Beauty', lemon yellow with faint reddish eye-zone; 'Alcazar', unique velvety nasturtium orange, with reddish eye-zone, and so on.

FLOWER SIZE & SHAPE.—There seems to be discrimination against smaller flowers and for that reason clones with medium-sized to large and very large flowers have been selected. Efforts have been made to select many kinds of flower shapes, from the very long narrow tepalsegs of 'Madrid' to markedly imbricated flowers as found in 'Elizabeth Traub'; from the large lily-shaped flowers of 'Magdalena Luethi' to the wide open flowers of 'Wyndham Hayward'.

RESISTANCE OF FLOWERS TO HEAT, WIND AND RAIN.—It is not always possible to achieve a desirable flower color and also the ultimate in its resistance to heat, wind, low atmospheric humidity, and rain. Thus very deep reds (black) have appeared that are outstanding in the morning but lose lustre by late afternoon. More work has to be done in such cases. However, such clones as 'Elizabeth Traub', 'Capt. Reid', 'Wyndham Hayward', 'Canary Butterfly', 'Madrid', 'Billy Budd', and many others stand up well here at La Jolla. Only wider testing will reveal if the flowers will also withstand unfavorable weather conditions in other regions.

THE NEXT DECADE

In the case of the diploid daylilies, the pioneers, beginning with Yeld (1893), Perry, Stout and others, did yeoman's service in providing

a vast reservoir of diploid germ plasma derived from the crossing of the various species. It was then easy for later hybridizers to grow vast numbers of seedlings and select out various desirable recombinations, including selfing to obtain desirable clones. In the case of the tetraploids, this first step was also necessary. The stock produced has been obtained by intercrossing the colchicine-induced tetraploids, including 'Tetra Rosalind' for pink color, in many possible ways by mixing pollens and thus obtaining more than one kind of cross in each capsule. The first stage was achieved in a relatively short time by this method. After ten years of this, the stage has been reached when the best selections from this vast reservoir of tetraploid germ plasma can now be used as the basis for further progress. From now on, it will not be necessary to grow so many thousands of seedlings each year and the effort can be directed toward perfecting the color strains by selfing, back-crossing, and recrossing with newly colchicine-induced tetraploids. Thus the most absorbing part of this adventure in plant breeding is just before us. The next ten years in the history of *Hemerocallis washingtonia* will undoubtedly see important progress in the development of the tetraploids. This will be recorded in a paper, "The Second Decade of *Hemerocallis washingtonia*" to be published in 1970.

LITERATURE CITED

Traub, Hamilton P. Triploid Daylilies. Euclides *14*: 221. 1954.
(See page 79, PLANT LIFE, vol. 15, 1959, for other references to literature cited.)

POSTSCRIPT.—In the above discussion the writer failed to mention that a semi-double yellow-flowering mutation bloomed among the tetraploids for the first time in 1958 (from 1956 seed crop). Thus it will be possible to breed a group of semi-double tetraploids from this starting point. It is hoped that a similar mutation in the red- and pink-flowering seedlings will take place. This would make unnecessary the crossing of red- and pink-flowering with the yellow-flowering plants and would speed up the breeding of semi-doubles.

Some of the uninitiated seem to believe that all tetraploids are over vigorous, but this is a misconception. By selection, it is possible to obtain a strain that is not too vigorous in growth. The main advantage of the tetraploids is in the greatly improved thick texture of the flowers. This thicker texture seems to be responsible for the high quality of the flowers, and this is the chief competitive advantage of the tetraploids over the diploids. This has to be seen to be fully appreciated.

4. AMARYLLID CULTURE

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

AMARYLLIS BELLADONNA L. IN SOUTH TEXAS

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Of the nearly fifty species of *Amaryllis* now recognized, only one can be said to be in common cultivation as an outdoor plant in south Texas, this one being the scarlet *Amaryllis belladonna* L., described as early as 1789 by Hermann in Holland. A second species, *Amaryllis striata,* occasionally finds its way into gardens, but is more frequently grown in containers. *Amaryllis* x *johnsonii,* even more common in gardens than the Belladonna Lily, might easily be mistaken for a species, but most authorities consider this to be of hybrid origin.

As to how long *Amaryllis belladonna* has been grown on the Gulf Coast from Louisiana to the southern extremity of Texas, it is impossible to say. The early naturalist, Henry Nehrling, found *Amaryllis* x *johnsonii* growing abundantly in Houston, but did not see *Amaryllis belladonna* until he visited Florida in 1886 (Nehrling, *The Plant World in Florida,* 1933; *Die Amaryllis,* 1909, in translation by L. S. Hannibal). That the bulb has been growing in Houston, Corpus Christi and Brownsville for many, many years cannot be doubted, however. It appears to be a well-established species which is destined to stay with us.

An interesting question is that of the origin of the variety (or varieties) which we grow. One would suppose that our stock came from Florida where the species was very common in the higher sandlands of the central part of the state until fairly recently. It is a fact that at least one Texas nurseryman distributed this Florida material in the southern part of Texas (Otto Locke, New Braunfels, Texas). But it must be taken into account that the Florida form shows a preference, at least in Florida, for well-drained, sandy soils which are known to be slightly acid. Our bulbs, in contrast, appear to be perfectly happy in alkaline clays which need not be much amended with organic matter and not at all with sand. Perhaps at least a part of our bulbs originated in Mexico where the species is widely grown. One Corpus Christi gardener is known to have brought from Mexico, not many years ago, a single bulb, and from this small beginning, has hundreds in her garden now. It is hard to see much difference, when the bulbs are blooming, between this form from Mexico and the forms already growing here. It may be that a common form is grown in Florida, in Mexico and on the Texas coast. If such is the case, this form is adaptable to a wider range of soil types than generally supposed.

It is hoped that further observations of the species as represented in Texas will clear up some of the questions raised. Helpful in arriving at a correct conclusion would be a study of our bulbs grown under Florida conditions where a close comparison could be made with the

Florida form. Wyndham Hayward reports, incidentally, that the latter has become a rarity in Florida because of a succession of unusually severe cold spells.

Acknowledgements: To the following who contributed information used in this note I am most grateful: Mrs. Morris W. Clint, Brownsville, Texas; Mr. Wyndham Hayward, Winter Park, Florida; and Mr. Otto Locke, New Braunfels, Texas.

GROWING POPULARITY OF SPECIES AMARYLLIS

JOSEPH C. SMITH, *M. D., California*

Each year more *Amaryllis* fans become interested in growing the species, and the search for stock and information on how to grow them after they are found leads in many directions. Until recent years there were few species being grown anywhere in the United States. Now, thanks to such collectors as Mulford B. Foster, Harold N. Moldenke, Mary G. Henry, and Ira S. Nelson, we are in a position to enjoy more of the fifty known species of *Amaryllis* in our greenhouses and gardens. No collection now in existence, however, includes anywhere nearly all the species.

Among the earliest introductions were the *Amaryllis striata* forms which have been in cultivation in the southeastern section of the country since grandma's childhood and no one seems to know just how they arrived or how long they really have been grown there. From Tennessee southward and eastward one sees them as potted plants on many a rural front porch in summer. Their normal flowering period is January to March though they will often throw a scape again in the fall also. They are evergreen and multiply rapidly by offsets. They are usually fertile and set seeds readily. If they have a resting period it is immediately following the flowering period and at this time growth should not be forced by over-watering and fertilizing until the bulbs show sign of wanting to grow by sending up new leaves. They have a tendency to bloom themselves to death, and the hulk of a bulb that remains can be easily rotted with too much water. The color range is from very pale shades of salmon in the form *crocata* through salmon orange to bright scarlets in the varieties *fulgida* and *striata*. This is a very desirable species and many charming color shades can be found. The *striata* form should be carried over into white and solid red miniature hybrids. The "Gracilis" type hybrids is a step in this direction.

One of the other species long in cultivation is *Amaryllis belladonna* var. *major* that has been successfully naturalized in sections of Central Florida. Many a fancier has taken bulbs of this one home and tried to grow it in pots only to lose them in a short while. There are other forms of *A. belladonna* that are more reliable as potted plants, and if these could be made available, the unique *belladonna* forms would not have to be absent from many of our collections. The Louisiana Society for Horticultural Research has imported a Bolivian form that takes well to pot culture. Hybrids between *A. belladonna* and the giant hybrids

are coming on the market but these lose too much of the belladonna beauty in taking on the color and the shape of the Dutch hybrids.

Amaryllis reticulata var. *striatifolia* in the form of the hybrid 'Mrs. Garfield' has been in limited cultivation for a number of years. This is a first generation hybrid with many differences from the species. It retains the white stripe through the leaves and is much easier than the species to grow. The flower is nice and the season of bloom may be either spring or fall though usually it is in the fall.

Another amaryllis long in cultivation especially in Louisiana is *Amaryllis* x *johnsonii*. It is still argued as to whether this is a descendant of the original cross between *A. reginae* and *A. vittata* or whether this is a species that closely resembles this cross. I have had it to set seed but none have flowered as yet to show whether they will show characteristics back toward these species. *Amaryllis* x *johnsonii* is not too difficult in culture if one remembers to give it a heavy clay type soil.

Amaryllis immaculata has been grown in California to a limited extent since its introduction in the early 1940's as *Amaryllis candida* from Argentina. It is more exacting in its requirements but other areas might be found suitable to it if bulbs were plentiful enough to effect a wide distribution. I have not succeeded in flowering this one to date. *Amaryllis ambigua* has been grown equally as long but it too has not reached wide distribution. This species is currently available from at least one nurseryman. It is a long trumpet type and one of the few species now being grown that has a fragrance. It is next to self sterile though it is reported to produce parthenogenetic seed if pollinated with pollen from other species or hybrids. *Amaryllis ambigua* has a stubborn habit of remaining dormant over a whole season on occasions after being transplanted. Possibly it requires a little cold to break dormancy. It normally will stand more cold and rain than any other species I know except *Amaryllis elegans* itself. *Amaryllis psittacina* var. *decorata* is another species available from time to time. This is a more beautiful form of the red and green parrot colored amaryllis. The background color is green with red bordering the green keel and red stripes running the full length of the tepalsegs. It is a winter grower and should be allowed a dry dormant period of at least three months in the summer.

Amaryllis aglaiae is still relatively new on the scene and as far as I know has only been flowered once in the States. This occurred for me in 1958 when attempts were made to cross it with other *Amaryllis* hybrids and species. Mr. Nelson of Southwestern Louisiana Institute reported a cross with *Amaryllis evansiae* from pollen sent to him. I obtained but few seed and these resulted in even fewer seedlings. The interest here is to obtain the yellow color in the hybrids and eventually to have large flowered yellow hybrids. I understand that the Louisiana Society for Horticultural Research has had some success in this direction starting with the yellow form of *Amaryllis evansiae* which they introduced from Bolivia in 1954. *Amaryllis aglaiae* is not difficult to grow either potted or in the ground. It has been reported to be evergreen

which it is not at all. It comes from a region where there is seasonal rain fall of about 20 inches therefore when water is given to it when the temperature is high it will respond with about three spurts of growth per season sending up a full set of leaves four to six in number. When cooler weather comes in November it goes dormant not to resume growth until the soil is warm enough in mid April. It flowers soon after growth starts with a scape of yellow blossoms well above the new growth. This is a delightful miniature species of more formal growth than *Amaryllis evansiae,* the other miniature yellow species. In 1959 I did not obtain bloom and I am testing out a theory that too short and too wet a dormant period may be cause of failure to flower. Also it might require a little chilling during the dormant period. Cultural requirements of new species just have to be worked out by trial and error methods while at the same time trying not to make a mistake that will cost you your entire stock of bulbs.

Amaryllis evansiae has grown and flowered for me but I have lost much stock presumably because it was infected with virus disease. I have now obtained bulbs that are certified to be free of virus, and I hope to be more successful with this fine species. I have never had it set seed for me. If this could be accomplished it would be an easy matter to grow a quantity of seedling free from virus infection. From Louisiana interesting hybrids of this species have been reported and it may be just a matter of time until we have some new colors and forms to enjoy.

Amaryllis blumenavia is in cultivation in several collections. This is the smallest of the *Amaryllis* species. *Amaryllis blumenavia* is easily grown in the greenhouse. I have never tried it out doors probably for fear of losing the bulbs which are only about the size of a quarter when full grown. It seeds well and stock can be increased rapidly. At least one grower may soon offer it for sale.

Amaryllis aulica has been grown successfully both in California and Florida as an outdoor subject in the open ground. It is also quite adaptable to pot culture. Here it tends to grow in the winter months and go dormant in the summer. Flowering time is after growth starts in the fall; some times it flowers as late as Christmas time. Forms of this species have entered into the hybrid lines where it tends to give a characteristic red signet ring in the throat of the hybrid. It is too bad that its distinct flower form has not also been retained in some of the hybrids as this is a most interesting deviation from the usual but not to the extreme as the orchid flowered form *Amaryllis cybister.*

Amaryllis elegans var. *divifrancisci* is a very new species described in the present issue. Its flowering time and many of its cultural requirements have not been worked out as yet. My bulb has put up two blunt tipped leaves this fall that are of a medium green color. Seeds obtained last winter were easily germinated. I hope to have more to report about this species in the future.

I have recently obtained stock of *Amaryllis cybister* from Bolivia. This one to my knowledge has not been in cultivation in the States in recent years. It is orchid-flowered, like a *Sprekelia,* but has four or more flowers to the umbel. I have not flowered it yet and am cautiously

working out its cultural requirements. This one should give some very interesting new forms to the hybrids judging from its unique shape. Other species as yet unflowered include one reported to have rose colored flowers sent from Brazil and one with reddish foliage also from Brazil. One bulb has been received labeled *Amaryllis (Rhodaphiala?) marginata.* It has narrow leaves with a serrated margin and a very heavy bloom. An *Amaryllis* bulb obtained from Buenos Aires three years ago and illustrated here is probably a hybrid. It keys out in the *A. correiensis* group but seems a little too vigorous for a true species. Selfed seed are being grown to check on segregation. It is a very good garden subject and soon makes a clump. It is quite showy being cherry red with a broad cream white keel that extends well out toward the tip of the tepalsegs. There are four flowers five inches in diameter. I have had and lost *Amaryllis forgetii* but should be able to get it again from Peru. *Amaryllis stylosa* I have not yet received though promised from India. I have also a promise of a cream white species from Bolivia when the students return to the American Universities this fall.

Thus the quest for new *Amaryllis* species goes on with no stone being left unturned by the avid collector. Letters are written to far away places, missionaries and travelers abroad are contacted, foreign students to our schools are implored to help, and some of us are lucky enough to be able to go in search of bulbs ourselves. Growing the species is both fascinating and challenging, and a never ending source of enjoyment and accomplishment, especially when a rare specimen can be well-grown.

AMARYLLIS BLUMENAVIA

DOUGLAS D. CRAFT, *Illinois*

In the Spring of 1958, three small bulbs of *Amaryllis blumenavia,* about the size of acorns, were received from Mr. Mulford Foster. They arrived in bloom with four to six flowers to an umbel and one to two scapes per bulb. As no reference was included in shipment as to cultural requirements, the writer looked up the available authorities on the subject.

Mr. Mulford B. Foster in PLANT LIFE 6: *Collecting Amaryllids in South America,* p. 50, 1950 wrote that he found this Amaryllis growing:

> ". . . in a rather rich, moist section both in the forest and on the meadow edging the forest. Evidently it prefers rather moist conditions. With an umbel of 6 to 8 flowers, white, streaked with pale rose, this cheerful *Amaryllis* surely must come back to our collections. It is a small plant, only 6 to 8 inches high, but nevertheless a very worth while subject."

Dr. Hamilton P. Traub in THE AMARYLLIS MANUAL, p. 35, 1958, wrote:

> "In its native habitat *Amaryllis blumenavia* grows in wet meadows, . . . It should be well watered during the summer growing season, and sparingly during the winter resting period. It is best not to dry off the plant entirely at any time, . . ."

Fig. 31. *Amaryllis blumenavia* (C. Koch & Bouché ex Carr.) Traub. Showing plant in flower and fruit; slightly more than half (x 0.55) natural size. Drawing from living material by Douglas D. Craft.

Fig. 32. *Amaryllis blumenavia* (C. Koch & Bouché ex Carr.) Traub. A Front view of flower, about actual size. B. Flower in longi-section, showing ovules, short tepaltube, segs, stamens and style with trifid stigma; enlarged. C. Bursting fruit (capsule) showing seeds; enlarged. D. Seeds; greatly enlarged. Drawings from living material by Douglas D. Craft.

These two authorities thus constituted the basis for the following growing and cultivational experiment.

The bulbs were potted up in a 9-inch clay pot in a soil mixture composed of three parts leafmold, one part garden soil, one-half part Fertilife (a Chicago Stockyard by-product), five parts torpedo sand and one rounded tablespoon bonemeal. A layer of broken pot shards was placed at the bottom of the pot and a layer of sphagnum moss was added above it. Above this the soil mixture was added. The three bulbs were covered over their necks in the soil mixture as they would seem to have been growing previously.

The writer's cultivation diary records for September 1958 that *Amaryllis blumenavia* was growing well. Pot had been sunk to its rim outside for the summer in bright light. No direct sunlight struck them any part of the day. They were kept well watered and moist, but never soggy. Before frost, the pot was lifted and brought into the house and again placed in a bright light of the west window but with no direct sun.

In December, three young offsets had formed. Soil was watered occasionally during winter—it was never allowed to become completely dry as with some other *Amaryllis* species.

In April 1959, one scape appeared with but two flowers in the umbel. The other scape followed with four flowers to the umbel. Bloom wasn't as floriferous as expected. The question arose as to whether the pot was too large in diameter for the three bulbs. Should they have been crowded into a smaller pot? Or was the watering schedule during dormant period too frequent?

For the summer period of 1959, the procedure of the previous year was repeated. All leaves seemed to have died back after blooming except for the largest bulb. At this writing—the latter end of summer—*Amaryllis blumenavia* is showing its former healthy growth and new leaves have returned to replenish the old along with about four to five young offsets.

Regular feeding schedules at about two week intervals were maintained throughout the summer with Atlas fish emulsion (an organic liquid fertilizer) and Spoonit. Also, 3-12-13 commercial formula as per *Amaryllis striata* forma *fulgida* was used. The fish emulsion was used in preference to liquid manure, the latter being difficult to maintain in the city. Feeding was discontinued upon bringing the plants indoors for the winter.

The writer is convinced that rain water is to be preferred over city water whenever possible. It is also noted that this species would appear to be practically an evergreen one.

Amaryllis blumenavia is indeed a beautiful and fragile, jewel-like *Amaryllis*. It is also most ornamental when not in bloom because of the unusual and decorative shape of its leaves. It is highly recommended for all *Amaryllis* enthusiasts. Patience and experimentation with soils and feeding would do much to determine its exact cultural requirements. This *Amaryllis* species is well worth the growers effort as it has rewarded the writer already with a richly decorative and beautiful plant.

ADDED NOTE.—Mr. Foster, under date of October 1, 1959, writes: ". . . *Amaryllis blumenavia* will always be in the top list of *Amaryllis.* I treat it entirely as an evergreen and water it throughout the year. My soil is porous and there is never any danger of over-watering. In fact, I am as neglectful of it as I am of my thousands of Bromeliads."

PLANTING INSTRUCTIONS FOR AMARYLLIS SEEDS

ROBERT D. GOEDERT, *Florida*

Amaryllis seeds should be planted as soon as possible after they are received for best results since they will not keep their viability long during warm weather.

Well drained soil is essential. A sandy loam that has an open texture will do, however, most soils will be benefited by adding coarse sand as well as leaf mold or peat. It is best to use a liberal portion of well rotted cow manure or sheep manure in the soil with some bone meal or good organic fertilizer of a 4-8-8 mixture.

After your soil is mixed with the fertilizer and well pulverized, it is placed in a flat 3 or 4 inches deep or a bed is made 3 or 4 inches above the ground level in the open. A board is used to firm the soil down by pressing it lightly on the surface of the soil.

The seeds are planted directly on the firmed soil and sand is sprinkled on them lightly—just enough to keep the seeds from flying away in the breeze, however not enough to cover them. The seeds are covered with some fine rubbed peat about ⅛ or ¼ inches deep. The soil is watered well and then the surface of the peat is watched. If the surface shows signs of drying, it is sprinkled lightly to replace the moisture. One quick pass with a sprinkling can every day or so should be sufficient. The seed bed should only be kept slightly moist. The seeds usually will germinate in 2 to 4 weeks.

After the seedlings are up, a sprinkling with a solution of thy-grow or other good liquid fertilizer every two or three weeks will help.

The bed or flat should be protected from heavy rains and partially shaded until the plants are about three or four months old. I find it is best to let the seedlings remain in the seed bed the first year as it is easier to keep them weeded and at one year of age they are larger and can be planted out more easily. The seedlings will keep growing during the winter if protected from frost and will give some blooms in two years if this is done. Three to four years, however, is the usual time required for them to mature to blooming size. They should be fertilized about 3 times during the growing season with a good organic fertilizer of a 3-9-9 or 4-8-8 mixture. The bed is allowed to dry out a bit between waterings after the first season. This seems to make them store food in the bulb rather than go to leaf growth.

You will find with the Dutch strain seed that you will get many very nice flowers and some outstanding ones worthy of naming. If you get an outstanding one, you should by all means show it in an accredited *Amaryllis* show. If it can win several times in competition, then surely

it is worthy of a name. If you have an outstanding seedling you should contact the registrar of the AMERICAN AMARYLLIS SOCIETY and get the name properly registered. The registrar is Mr. W. D. Morton, Jr., 3114 State Street Drive, New Orleans 25, Louisiana.

AMARYLLIS AS A HOBBY

W. J. PERRIN, *Louisiana*

Growing *Amaryllis* is without equal as a hobby. Very few undertakings are capable of holding year-round interest as does *Amaryllis.*

In the Gulf States area, starting February 1st and going through April we bring the *Amaryllis* cycle to a close with the blooming season. This is the time we take stock on the many details we have covered in the preceding 9 months; namely proper planting, fertilizing, location and summer care. At this time of year our thoughts are on the many spring *Amaryllis* shows and just how many flowers we will be able to show. Don't miss this important experience starting about February 1st, when flower buds start making their appearance.

Timing the flower for shows requires close study during this time. Without the aid of greenhouse, one has to keep close watch on temperatures and wind. A sheltered location similar to a back porch works very well. Fresh air and some sun is necessary to assure proper color of flower. When timing plants for late March and early April shows, a special check on progress of buds should be made about February 15th. Plants moving too slowly should be moved to a location where a higher temperature is available; moving plants indoors works very well. Care must be taken not to keep plants indoors too long as this will cause scapes to grow too long, and will reduce intensity of color in the flower. Warm water (to soil) used moderately, does some good toward bringing about bloom.

All are not show prospects, and it is not advisable to force the slow bulbs too drastically as many good bulbs are set back and shrink through forcing. It is hard to injure plants showing early foliage which indicates the root system has started growing. If you have never participated in Amaryllis shows don't miss the thrill of receiving that first blue ribbon. Your hobby will take on added interest immediately.

[Editorial note.—The above article is based on material published in Men's Amaryllis Club of New Orleans Newsletter, vol. 1, No. 6, January 1959].

GROWING PLANTS UNDER ARTIFICIAL LIGHT

CLAUDE W. DAVIS, *Louisiana*

Many plant lovers frequently feel the need for an inexpensive facility to be used in carrying tender plants through the winter months. They do not own a conservatory as a part of the home and the plants are not of sufficient importance to justify the cost of a greenhouse equipped

with a heating system, water and lights. The available window exposures to light inside the dwelling seriously limit the number of plants which may be grown during the winter months.

This problem may be easily solved by the use of fluorescent lights in any available room which has heat and space for plants. During the winter of 1958-59 the writer used a room, 8′ x 18′, which was built on one end of the garage and used as a storage and tool room. There were four small windows which did not give sufficient light for normal plant growth. Heat was supplied by a stove which burned natural gas and which was vented through one of the walls.

Additional light was furnished by stringing four, 48″, single tube units of fluorescent lights end to end over the plant bench for the length of the room. The 40 watt light tubes were connected in parallel. Homemade reflectors of sheet aluminum were bent in a semi-circle and attached over the top of each unit The units were individually suspended from the ceiling by dog chains which permitted raising or lowering of the light as needed for adjustment to plant growth. All material was purchased at wholesale at a total cost of $26.50 for the lighting equipment.

Lights were burned only during the daytime. The units were adjusted for height so that the light tubes were just barely above the foliage. Cost of operation was no greater than would have been experienced from burning a 160 watt light for the same length of time.

Plants were put in the hothouse in late October and kept inside until danger of frost was past in late March. The species which were thus carried through the winter were *Amaryllis* bulbs in pots, *Amaryllis* seedlings in flats, *Clivia,* seedlings of *Zephyranthes, Habranthus, Cyrtanthus* and *Lilium longiflorum,* a potted vine of *Passiflora coccinea,* a pot of *Allamanda* and a pot of *Eucharis grandiflora.*

All plants came through the winter in excellent condition, though most of the seedlings had become a trifle "leggy". The *Clivia* bloomed and the potted Dutch hybrid *Amaryllis* bloomed in February and set an excellent crop of viable seed. The Amazon Lily *(Eucharis grandiflora)* flowered for the first time in my experience and the tender *Allamanda* and *Passiflora* vines made considerable new growth. *Amaryllis belladonna, A. striata* and *A. evansiae* all flowered normally under these artificial lights.

Based on one winter's experience the change which I would recommend would be to install units with two tubes of light instead of single tubes. It is my conclusion that when adequate artificial light is provided that fluorescent lights will provide the energy for photosynthesis and normal plant growth.

GROWING AMARYLLIDS IN NORTH FLORIDA

BECKWITH D. SMITH, *Jacksonville, Florida*

During the years in which I have been growing *Amaryllis,* the fact has been brought to my attention many times that good established strains produce the best bulbs and the most beautiful flowers. The Dutch hybrids, notably the Ludwig, Warmenhoven, Van Meeuwen, Van Waveren, and Van Tubergen strains, have given us some magnificent Reginae and Leopoldii blooms. These strains provide unlimited possibilities for crossing the many individual clones. Certainly, they are valuable in the improvement of the Mead strains, prevalent in the Southern States.

Fig. 33. Hybrid *Amaryllis* clones as grown by Beckwith D. Smith at Jacksonville, Florida: Left, 'Fantasy' (Ludwig), rose and white. Right, 'Silver Lining' (Ludwig), salmon pink and white. Both flowered April 1959. Photos by Beckwith D. Smith.

In April of this year (1959), our *Amaryllis* beds were a blaze of color, such as we have never before had, and some of the hybrid clones literally outshone themselves in performance. We had the improved Mead strain from crossing with the Dutch hybrids, and the crosses between the Dutch strains. There were many solid colors, all shades of red and pink, some that approached lavender and wine, and numerous pastel shades and pure whites. Of named clones, the Ludwig collection purchased from Mr. Claude W. Davis, proprietor of the University Hills Nursery, Baton Rouge, Louisiana, in the fall of 1958, potted and placed in the greenhouse, produced bloom stalks from the fifty-three separate bulbs, and these, like the bulbs in ground beds, were all photographed in Kodak Ektachrome and Kodachrome color transparencies. The resulting color slides have provided a reincarnation of spring for us at any time we wish, and we can renew the pleasure of the blooming season for many happy hours when we have no blooms. The flowers that were most photogenic, according to selection made by Dr. Traub, are reproduced

herein in figures with a description of the clones in the captions. The named clones are Ludwig's 'Silver Lining' (Fig. 33), salmon pink and white; 'White Giant' (Fig. 34), white; 'Fantasy' (Fig. 33), rose and white. Also, Warmenhoven's 'Red Master' (Fig. 34), red, and Van Meeuwen's 'Alcyone' (Fig. 35), red; John T. Weisner's 'Dr. Robert

Fig. 34. Hybrid *Amaryllis* clones as grown by Beckwith D. Smith at Jacksonville, Florida: Upper left, 'Grace Primo' (B. D. Smith), light pink with green throat; named in memory of Mrs. A. Primo, the late noted amaryllidarian. Upper right, 'Dr. Robert Moon' (Weisner), light salmon, darker salmon (chocolate) throat. Lower left, 'Red Master' (Warmenhoven), a fine red. Lower right, 'White Giant' (Ludwig), an excellent white. All bloomed April, 1959. Photos by Beckwith D. Smith.

Moon' (Fig. 34), salmon with chocolate throat; and, lastly, my own origination, 'Grace Primo' (Fig. 33), an outstanding pink with light green throat.

A large number of our hybrid seedlings, the results of crosses from Dutch named clones, as well as Dutch on Mead stock, produced flowers

with varying results in form. Some were classed as Reginae and Leopoldii in form; some as striata, some in the Belladonna division, and some were just a moderate improvement over the Mead parent. One very beautiful seedling is a lovely white with slightly green throat, the flowers having a tendency to lift upwards. This bloom also possessed a delightful fragrance. We believe it is a worthwhile flower. The bulbs are rather small, but still put up two succeeding scapes. The pure white Mead reported in 1959 HERBERTIA, produced two scapes this year. The flowers were again a glistening white on the face. The reverse bore a little bit of brown color on one tepalseg. It was not visible unless light was placed behind the bloom. It is hoped this plant will eventually establish itself and become set in its habit of bloom.

Fig. 35. Hybrid *Amaryllis* clone 'Alcyone' (Van Meeuwen), a very fine red; flowered in April, 1959, by Beckwith D. Smith at Jacksonville, Florida. Photo by Beckwith D. Smith.

Some of our Dutch bulbs have surprised us by splitting entirely in two, so this happy result produced an additional bulb in each instance. Ludwig's 'Marie Goretti', a pure white, seems to have a strong inclination to divide in this manner.

As a result of having become an active member of the Louisiana Society for Horticultural Research by invitation in 1957, my share of the division of Amaryllids this year, which were grown in the greenhouses of Southwestern Louisiana Institute at Lafayette, Louisiana under the direction of Professor Ira S. Nelson, have added several to our species collection. Mrs. Smith and I are looking forward to their producing blooms after becoming established in our garden. From the

above source we obtained at least one each of the following bulbs: *Amaryllis belladonna,* Bolivian form; *A. reginae, A. evansiae; Habranthus cardenasiana,* a white Argentine rain lily, a pink Panama rain lily and a pink *Zephyranthes.* In addition to these bulbs the following delightful additions were made by Dr. Traub from his garden at La Jolla, California: *A. aglaiae, A. barreirasa,* and *A. aulica; Crinum americanum* (discovered at Beaumont, Texas), and *Crinum asiaticum, Hymenocallis kimballiae* (discovered in north West Florida); and *Vallota purpurea.*

The new species *Amaryllis,* yellow flowered form of *A. evansiae* from Bolivia, which we had already purchased in small quantity, is growing for us in a gratifying manner. It has bloomed for us this year and is an intriguing and fascinating flower. It will provide new genes for the *Amaryllis* breeder. This new species is now available in limited supply from growers.

With the rapid rate of growth we are experiencing this year with our *Amaryllis,* it is our hope that in another season some outstanding flowers will appear. We are constantly trying to improve flower form and color.

Fellow amaryllisarians from wherever they are may be certain of a warm welcome at any time to see the results of our efforts, and to discuss the cultivation of these 'beautiful ladies'. Our normal bloom season is during March and April.

ALLIUMS OF THE SOUTHWEST MIDLAND

THAD M. HOWARD, *D. V. M.*

I owe a great deal of my interest in collecting Alliums to the help and encouragement received from Victor Cory, former field botanist at Southern Methodist University, and now retired. The copious notes that he supplied have frequently proved valuable in tracking down a rare species across the State of Texas.

Allium elmendorfii.—In a limited region south and East of San Antonio, in Bexar and bordering Counties, is an "Island" of very sandy loam country known as the Carrizo Sands. Within this limited area grows the little-known *A. elmondorfii.* It is a tall fragrant species with white or pale pink flowers that do not open widely, giving the individual flowers a somewhat tulip-like shape. The umbel is fairly large in good specimens and often has twenty or more flowers, and the scape towers above the rush-like bluish green foliage.

The bulbs of this little *Allium* are tiny and have membranous coats instead of the reticulated coats found in most of the other native Alliums. They are characterized by the numerous little stalked bulblets which surround the base of the parent bulb. Oddly, the presence of these bulblets does not seem to hasten the development of large clumps, as one might suspect, as the parent plant is usually found growing singly or in very small clusters. Just how long many of these little bulblets remain relatively inactive before maturing is anyones guess. If they are re-

moved from the parent bulb and planted individually, they will all mature quickly. Nowhere common within its limited range, it may be found at the summits of sandy hills and along fences where they are safe from grazing cattle. Indeed, many Alliums and other bulbous plants are now to be found only along the fences bordering our highways since grazing and plowing have practically eliminated them from the rest of the area. I wonder what will happen to many of our native floral treasures in the years to come as all of our highways are widened, and these plants are unearthed from the places where they have sought refuge from progress to make their last ditch stand. The little Elmendorf *Allium* is a good example of a plant that is too specialized to compete for survival with cultivation and grazing. Being taller than most species (to 18″), it falls easy prey to cattle which easily decapitate the floral head before seed can be set.

When seen at its best it is one of our most floriferous *Allium* species. It is not unusual to find as many as six scapes springing from a single bulb. A few such plants in flower will give the effect of large clumps. It seems to do well in cultivation but must be planted in full sun in sandy soil in order to maintain itself. I doubt that this species will ever find its way into commercial avenues because of its peculiarities and unexciting appearance, though it might very well be appreciated by gardeners who like to collect and grow unusual Alliums.

Allium ruyonii.—In general appearance, *A. runyonii,* the "Runyon Onion" as we have humorously dubbed it, is almost identical with *A. elmendorfii.* Basically, the main difference seems to lie in the bulb coats of the two species, as well as their having different ranges in which they are found. Were it not for the fact that *A. runyonii* has reticulated bulb coats while *A. elmendorfii* has membranous bulb coats, I could not tell them apart. The Runyon Onion occupies an area midway between San Antonio and the Rio Grande Valley and grows in sandy loam that is heavier than the fine sand with which one associates *A. elmendorfii.* One would have to be an unusually intense collector to want both of these species in the garden since they are so similar. Even though the Runyon Onion grows over a much larger area than its cousin, it seems to be becoming even more rare. In retracing some botanical field trips made by Victor Cory in the early 30's and late 40's, I found that this species has nearly disappeared from its former habitats.

Allium ecristatum.—In this we find an *Allium* that could easily become a favorite with bulb collectors everywhere. Unlike the two preceding drab species, this one is refreshingly distinct and cheerful in its shades of lavender and pink. It has large white bulbs with reticulated coats, that quickly divide into nice clumps in a short time. A large colony of this *Allium* in full flower is an impressive sight and a rare one at that. Like the two preceding species, *A. ecristatum* has the misfortune of being tall enough to furnish browse material for cattle and so is becoming a vanishing species. Not at all common, it is to be found in low areas where water tends to stand after heavy rains. These flooded pastures do not hold water long enough to be classed as bogs, but the

heavy clay gumbo remains fairly moist during the growing season of this *Allium* and then becomes quite dry during the summer. In April, the 12″-18″ stems tower above the sprawling foliage bearing compact umbels of starry fragrant flowers in shades of pink and lavender. *A. ecristatum* is to be found in a limited area a few miles South East of San Antonio, and again farther south in the coastal prairie around Corpus Christi. It is easy to grow under cultivation if kept fairly moist during its growing cycle in the spring.

Allium perdulce.—In Northeast Texas near the Oklahoma border, one may come across a tiny and unusually sweet scented member of the *Allium* genus growing on sandy or gravelly prairies in early spring. Although many hesitant sniffers are surprised to find that many Alliums have fragrant flowers, the almost overpowering sweet scented blooms of *A. perdulce* may come as quite an awakening to the uninitiated. A group of these rosy-purple dwarfs in bloom will perfume a garden with a fragrance suggestive of lilacs. The short stems with their large florets nestled among the thread-like foliage arise from small reticulated coated bulbs and quickly form small clumps by division. Because of its earliness and its intense fragrance, the species should prove to be a very important addition to any collection of unusual bulbs.

Allium acetabulum.—This species was formerly known as *A. fraseri* and also incorrectly as *A. mutabile,* the latter name being properly a synonym for *Nothoscordum bivalve.* Apparently this creamy-white flowered species has passed through the 20th century under many synonyms so that some confusion exists. There are at least two other closely related species or subspecies that possibly may have been mistakenly or accidentally lumped under the same name or names. *A. acetabulum* itself is a very satisfactory garden plant with pleasing compact habit. While living in Arlington, Texas, in the spring of 1949, in the Dallas-Ft. Worth area, the writer first became acquainted with this little *Allium.* Bulbs collected ten years ago have continued to flower each spring and gradually increase in number. They grow in sandy open woods and open ground in the Eastern Oak Belt and West to the Red Plains and is said to be rather common. Although the flowers can be said to be fragrant, the scent is not as noticeable as some other species. *A. acetabulum* has the typical reticulated fibrous coats found in most of our native Texas Alliums. The individual flowers are small but numerous in the tightly compact little umbels that hover about 10″ above the bluish green foliage. It is not an exciting plant, but a pleasing one none-the-less.

In the hilly Live Oak area immediately North and Northwest of San Antonio grows a taller, slightly later flowering *Allium* which may be a different species or perhaps a subspecies of *A. acetabulum.* It too has creamy-white flowers which differ only slightly from the preceding species in minor characters. This one grows in rich heavy black loam in loose rocky soil in colonies scattered between the native Live Oak trees. It is fragrant, much more so than *A. acetabulum.* It is much more robust than that species and the bulbs have unusually heavy reticulated coats compared to other species. Being a late spring bloomer,

it makes a welcome addition to any *Allium* collection. Perhaps some day we will have it positively identified and find that it is a new species or perhaps only a geographical variety of *A. acetabulum.*

The Lakes Region of the Colorado River in Central Texas has yielded us an *Allium* that is close to *A. acetabulum,* but differs in several particulars. About the only similarity that it possesses with *A. acetabulum* is that it is a tall white flowered species having a slightly later flowering season. The individual flowers are creamier in coloration and open wider, displaying a white ovary in contrast to the green ovary of *A. acetabulum.* Victor Cory came across this new *Allium* several years ago while on a field trip in granite outcrops surrounding the Lakes Region and noted that unlike *A. acetabulum,* this new variety had only vestigial reticulated bulb coats which did not persist, leaving only the inner white membranous bulb coats in view. He described it as *A. fraseri var. eulae,* in honor of Eula Whitehouse who has done much to promote Texas wild flowers and who has also collected this species. This species, or sub species is confined to wet areas in the granite outcrops and in the tiny streams in this particular area of Central Texas. Only further study will reveal its worth as a garden plant. It will be interesting to find how well it adapts itself to different soils and moisture conditions since it seems to be a specialized plant. Now that the name *A. fraseri* is relegated to a synonym of *A. acetabulum,* perhaps this new variety with the membranous coated bulbs will be called *A. acetabulum var. eulae.* At this writing, having *A. acetabulum,* flowering alongside our tall white Bexar County species, this Central Texas stream-side species, I can't help but feel that all three are too distinct from one another to be "lumped" into a single species. Perhaps time and further study by one more qualified than I will solve the riddle.

Allium canadense.—It is difficult to discuss any native Alliums without mentioning *A. canadense* and its numerous varieties, though one would prefer to omit them. For the most part, *A. canadense* is a bulbil bearing weed. It is found in wet places over much of the State sending up its tall scapes containing a mixture of flowers, bulbils and green sprouts. In some individuals the bulbils are reddish and the flowers sometimes a bit more numerous so that an attractive appearance results in combination with the green sprouts in the umbel. It is not a plant to be introduced into the garden for the aerial bulbils scatter everywhere and it then becomes a noxious weed pest. I have found several varieties of this plant, but most texts list only a single species. Having grown and studied them in the garden, I personally feel that many of them could be classified, but apparently no one is that interested. Since they usually have a few or no flowers, the main character differences seem to be in foliage, robustness, etc., and geographical distribution. Usually the few flowers that may be present are white, but one subspecies *A. canadense var. parksii* has lavender flowers. It has no more garden merit than the rest of the lot.

Allium vineale.—Since we are discussing the weed plants of the genus *Allium,* we may as well mention *A. vineale,* the troublesome wild garlic from Europe. While living in Georgia, I found that this weed

ran rampant over the highways and byways in that state. It is said to grow into Northern Texas also. It is tall, wiry, and tough as nails. Once introduced into the garden it is almost impossible to eradicate from flower beds and lawns. The numerous tiny bulbils scatter everywhere. Actually, were it not so somber in color, it might very well be considered attractive in a few individuals which have more than the usual number of flowers in the scape. Being a garlic-type, it is edible and not unpleasant when used as a substitute for that herb, but it is too mild in taste and too small in bulb to offer any culinary competition.

Allium Hyacinthoides.—Getting back to the more pleasant and desirable *Allium* species, we may cheerfully enjoy the fragrant pink and lavender umbels of the early blooming *A. hyacinthoides,* from North Texas. In the Blackland Prairies of the Dallas-Ft. Worth area this *Allium* is fairly common. In early spring the squat little buds arise from the flat bluish foliage that hugs the ground, and lengthen to about 10″ in the individual flowers which do not open widely but they are numerous, sweetly scented, and of a pleasing color. The large white coated bulbs with their faint reticulations increase very slowly but steadily by division and in time will form nice clumps in the garden. It is a pleasing garden species and very adaptable to cultivation.

Allium Coryi hybrid clone *'Margaret Kane'* (Howard).—Perhaps one of the most unique Alliums that I have ever seen is a hybrid of garden origin, between the yellow-flowered *A. coryi* and the pinkish *A. drummondii.* This plant was given to me by Mrs. Margaret Kane several years ago, since she knew that I was interested in Alliums. A few years earlier she had secured a few bulbs of *A. coryi* from a West Texas nurseryman and had planted them in her garden. After flowering, they set seed and went dormant, never to reappear. A few years afterwards she called me to come and identify a peculiar *Allium* in her garden that was in flower. The flowers were pale yellow with buff and pink markings. It grew several feet away from the old original planting of *A. coryi* which had since died out. Since she had a few clumps of *A. drummondii* planted in another part of her garden, we could only theorize that this plant was a chance hybrid seedling of *A. coryi* which had been fertilized by some insect with pollen from the pink *A. drummondii.* Mrs. Kane gave me the lone bulb and it has now increased to about a dozen bulbs by division It sets seed but somehow I have always misplaced the seed that I have harvested from it so that as yet there are no living seedlings from this clone. It flowers later than either assumed parent and seems to be intermediate in color and habit. I have named this clone 'Margaret Kane' in honor of this gracious lady in whose garden this unusual hybridization chanced to occur. Perhaps some day I will have enough stock of this rarity to share with others. Although not as brilliant in color as the golden yellow *A. coryi,* the hybrid clone 'Margaret Kane' is much more reliable and longlived.

While collecting near the Rio Grande border in the mountains north west of Del Rio, I recently found an *Allium* new to me on the slopes of some of the rocky hills. These bulbs do not have the usual reticulated coats and the foliage is slender. This may prove to be the

autumn-flowering *A. kunthii* or some other relative. The wait to see it flower for the first time in my garden will be as interesting as the actual blooming itself. There are doubtless still other *Allium* species growing in Texas that I look forward to collecting some day. One of these is *A. stellatum* which is said to be an autumn-flowering North Texas species. There are a few Alliums in Mexico too, and perhaps someday these will also be available to those interested in this oft-neglected genus.

NERINE CULTURE

John T. Warren, in GARDENERS CHRONICLE Vol. 146, page 18, 1959, gives the following directions for the care of Nerines in England: "Next month (August), nerine bulbs will begin to show signs of activity after being kept dry and exposed to full sun since the foliage died down in spring. Any repotting that may be required must be carried out just before growth begins. It must be borne in mind, however, that they do not require frequent repotting and, by and large, they resent disturbance at the roots; usually they are more floriferous when well and truly root-bound. An annual top dressing of new compost gives the roots a little fresh soil in which to ramify, and makes available just that extra little supply of plant nutrients for use when required; this job, too, must be carried out before growth restarts."

The American gardener interested in growing nerines should compare this procedure with that given by Emma D. Menninger for Southwestern America on pages 143 and 144 in 1959 PLANT LIFE.

GREENHOUSE CULTURE OF AMARYLLIS IN NORTH FLORIDA

BECKWITH D. SMITH, *Jacksonville, Florida*

The sun is not too hot in winter to seriously affect the growing of *Amaryllis* seedlings under greenhouse conditions, and when it does get cold here (as it most always does, going down in the low thirties), your green house will afford ample protection through the use of a low voltage electric heater, and automatic ventilation.

A little more than two years ago I acquired an Orlyt aluminum and glass house, inside dimensions eleven feet by fourteen feet. It is equipped with manually operated sash on one side, and automatic motor driven sash on the other. Heat is supplied by a thermostatically controlled electric heater.

Last winter, this house was equipped with wooden benches, waist high, on the sides and in the center of the house. A light coating of lime paint was applied to the interior glass to reduce strong light on the young seedlings.

Pollinating of my Dutch *Amaryllis* was done in April and May when they bloomed, seeds were gathered in June and July and promptly planted in a soil mixture of sand and well rotted oak leaves, fortified with commercial sheep manure. This mixture was placed in wooden

flats, in which such crops as tomatoes, guavas and grapes are packed, which were obtained from local grocers. Seeds gave best results when planted flat, spaced one-half inch apart. They grew during the winter, fed on soluble liquid fertilizer, and by the beginning of March had well established leaves. It is to be noted that while in the greenhouse the little plants had even, uniform heat twenty four hours per day. Most plants had three leaves, with some of the reds producing four. Root systems were very vigorous, and when the young plants were set out in a new, raised bed last spring, all responded well, had little or no shock from being moved, and immediately began a healthy growth.

Watering during growth in the greenhouse was done with a fine mist spray. Plants grown in this manner look very well, having a glossy sheen, which indicates their satisfactory response with happy growing conditions.

Greenhouse facilities may also be utilized without the use of benches. In doing so the seeds are planted directly in beds at the ground level. It is, however, much harder on the individual to care for them in this manner as it is rough on the back and knees. The rewards of steady growth are fine plants, a jump of many months over the normal time required to grow bulbs outside, where they are subject to vagaries of changing weather. The uniformity of growth in the greenhouse greatly accelerates the ultimate time of bloom to which we all look forward.

Additional space, if any, in your greenhouse may be used for frost tender house plants. My wife is somewhat prejudiced against a jungle of plants in our house during the winter, so the comforts of the glass greenhouse are an ideal solution for keeping our prize specimens.

FIVE DISTINCTIVE HEMEROCALLIS

GEORGE GILMER, *Virginia*

Most of you like to have the finest in the popular shapes, sizes and colors and so do I, but I like some plants that are clearly different in some characteristics from the mass. I have eight fine, large, golden yellows. They have come from different breeders, but they are so much alike that if the labels were pulled off it would be impossible for me to be sure about replacing even half of them. I only want to keep two or three of them, but they are all so good and similar.

I have selected five from some 300 growing in my garden.

'Pink Ripples' (Russell) is the one in my garden I would hate worst to lose because I know of none like it. There are some I would prefer if I could grow but one variety. The petals are rippled or crumpled down in the heart of the flower. At first glance it might appear to be a double, though it has but six petals. It is a good pink with some yellow.

'Pink Lace' (Kraus) is the brightest day lily I have seen. It is a yellow-pink. But it reflects more light than any light yellow I know. It is not a white, but it looks to me like it has a good chance to be the ancestor of the first white day lily.

'Selena Bass' (Bright Taylor) is the best lavender I have seen. It has some blue in it, though far from a true blue. It may be one of the ancestors of the true blue we all hope to live long enough to see.

'Florence Clary' (Flory) is a good yellow with narrow reddish margin.

This is distinctly different from any I have seen except 'Jessie Shambaugh' and it is better than 'Jessie Shambaugh'.

'Skeeter' (Russell) is a miniature, melon pink. There are a lot of good yellow miniatures and some red ones, but none that I have seen or heard of that are melon pink.

No one would have any trouble distinguishing any of these from any others I know. It looks to one who does not breed day lilies, but has grown over 1000 named varieties during the last 30 years, that these would all be good for breeding.

In this list I would have included 'Captain Russell' but for the similarity to 'Mollie Gloye'. 'Captain Russell' has been a favorite for years. 'Mollie Gloye' has not been in my garden long enough to produce blooms on a mature plant. Both these are bicolors of lavender and soft light yellow, with wide petals.

AMARYLLIS ROUND ROBIN NOTES, 1959

Mrs. Fred Flick, *Chairman,*
Amaryllis Round Robins, Carthage, Indiana

[The following notes were extracted from Round Robin letters by the Chairman of the Amaryllis Round Robins.—*Editor*].

SUBJECT:—AMARYLLIS SEED SOWING AND CARE OF SEEDLINGS

Mrs. Joseph Elias, Conn.—I use a very easy, lazy way to grow seedlings. As soon as the seed is ripe, I prepare bulb pans with broken crocks, moss and our regular potting soil of sifted compost and sand, with a six inch pot of bonemeal added to a wheelbarrow of soil. This is firmed down to within ½ inch of the top. The fresh seeds are laid flat, very close, until the surface is all covered. More of the soil mixture is put on top, and gently firmed down. The entire pot is stood in a pan of water until moisture shows on the soil surface. The pot is covered with a piece of newspaper and glass, then placed in a warm spot on a window sill.

As soon as germination starts, the newspaper is removed and the glass lifted. Surface watering is done gently when the soil looks dry. Then the little seedlings are on their own, along with the other plants. They stay in the original pan until after the first of the year, this when the seeds are planted in April or May. Then I give them more room in bulb pans. In June, all are set in rows in the garden along with older seedlings and flowering bulbs.

Feeding is done irregularly, but I know that a twice a month feeding would bring them along much faster. Blooms appear in from three to four years.

[Mrs. Elias has over 300 amaryllis bulbs to care for during the growing season.]

POLLY ANDERSON, CALIFORNIA.—I use pots of composty soil mixture with an inch layer of screened sphagnum on top. I place the flat seeds and cover with screened sphagnum. My problem has been to find a good medium in which to repot the year old seedlings. They like my seedling method, but seem to resent transplanting to soil afterwards. This year I have used some of the pressed peat pots and am transplanting earlier and using a very peaty soil mixture with the hope that I can plant pot and all into soil by the second year.

LYDIA PAHLS, FLORIDA.—I start amaryllis seeds in coffee cans, in a sterilized mixture of soil and gravel (grit or parakeet gravel), with enough peat moss to make a loose mix. The seeds are planted flat, well spaced, 7 or 8 to a can. The cans are covered with waxed paper. After they are up, they get an occasional feeding of Hyponex. In February or March, they are planted in the ground.

DICK GUERDAN, MISSOURI.—In planting amaryllis seeds, I prepare a flat with a sandy soil mixture, 1 part each of peat, sand and soil, mixed well. Seeds are planted individually with tweezers so that the seed stand on edge at a 45 degree angle. Then they are covered with sand until the seeds are covered. The flat is covered with a sheet of glass, or plastic until germination is nearly complete.

The plants are grown in about 50% sunlight and kept growing in the flat for about a year, or until the next spring, when they are individually potted.

I use any liquid fertilizer about once a month from the time the seeds germinate until the bulbs come into bloom when they are put on the schedule of mature bulbs. They must be shifted into larger pots as they grow, and usually bloom in 4's, or 5's, in from 2 to 3 years in the greenhouse.

When seeds are planted on the angle, the root seems to find its way into the soil more readily than when planted flat.

MRS. FRED FLICK, INDIANA.—I have not grown amaryllis from seed for some time. A number of years ago, I usually planted many seed each year; and even did some hybridizing with my very fine collection of bulbs. I have now lost all my Royal Dutch hybrids, and no longer let any seed mature.

I planted the seed in coffee cans, using a very loose mixture of soil, woods dirt, peat and sand. I placed the seeds flat, close together, and covered lightly with the soil mixture. As soon as the seeds germinated, the cans were placed in a sunny window.

During the second year, the little bulbs were repotted, using the same soil mix, but adding a little bonemeal, and old rotted cow manure. My seedlings bloomed from the third year to the fifth year. I had a few very nice ones from seed, and it was an interesting experience.

For some years I have grown my bulbs in Black Magic mix, and I believe this would make a good seed medium, though I have not tried to start seeds in it.

SPREKELIA FORMOSISSIMA IN NORTH FLORIDA

BECKWITH D. SMITH, *Jacksonville, Florida*

Sprekelia formosissima (AZTEC LILY, ORCHID AMARYLLIS), a native of Mexico, has been a trial to me for some years since it failed to bloom. I had seen it bloom year after year in Marianna, Florida in my Mother's bulb garden, where it was planted in a clay soil, and the winters were always very cold and the ground dry. However, when I started growing them in Jacksonville, where the soil is predominantly sandy loam, they grew well and multiplied vigorously, but refused to produce a single bloom. This was a puzzling situation and made me determined to find out why these sturdy bulbs would not produce flowers.

Upon asking various friends about their experience with *Sprekelia formosissima* in this area, they reported results similar to my own. This went on for several seasons. Meanwhile, I had tried fertilizing the bulbs, not fertilizing them, moving them from one location to another, watering and not watering, but without avail.

Last fall I was much discouraged and about ready to give up the culture of these bulbs. In the latter part of December, 1958 dug them all, allowed the tops to dry off and stored the cleaned bulbs in orange bags in the garage. The first of March this year all of the bulbs were replanted in beds, spaced four inches in the row. Soon they started to put out new foliage, and all during April put up bloom after bloom after bloom, until every mature bulb had produced at least one flower. It would therefore appear they require most of all a resting period after a good growing season, and I am setting forth this experience in the hope it will help other Amaryllid growers in this section to obtain similar results with these beautiful flowers.

During the winter a soil thermometer in the old growing beds registered a uniform temperature of approximately fifty degrees to a depth of about one foot. This might account for the fact that I was unable to get the bulbs to go dormant, as apparently they were continuing to grow underground during the winter season.

When hand pollination was attempted during last spring, I was only able to get one plant to set seed from fifteen blooms so treated, but this one pod produced thirty-six seeds which were planted, and three seedlings are now growing well in eight inch pots.

IMPORTATION OF AMARYLLIS BULBS

CLAUDE W. DAVIS, *Louisiana*

As has previously been pointed out in the columns of Herbertia, there are numerous pitfalls in the experiences of importers of Dutch hybrid *Amaryllis* from Holland. The most serious hazard is from cold. *Amaryllis* are tropical plants which are severely injured or killed if

allowed to freeze. The bulbs are shipped during the winter months and the bulk of the imports come through the port of New York where the shipment is frequently exposed to sub-freezing temperatures. The bulbs may be insured against loss from cold, but the effects frequently do not show up until the shipment has been distributed to customers throughout the country.

For three seasons, including 1958-59, the writer has imported *Amaryllis* for commercial purposes without loss or damage from cold in transit. The bulbs were packed in wood shavings in heavy paper bags. These in turn were in heavy wooden boxes which were lined with a double thickness of heavy felt. Thus protected it would have required a long exposure to very severe cold to have adversely affected the bulbs.

The two most serious difficulties are the complete loss of functioning roots and sweating of the bulbs while enroute.

Bulbs for the fall shipment are harvested in October and allowed to cure for a month before export in November. The average time lapse to destination is five weeks. It may be longer if the forwarding agent in the port of entry holds the bulbs in storage during a period of cold weather. Even if they move promptly through the port there is an average time lapse of nine weeks between harvest and receipt of the bulbs by the importer. No root system could survive such treatment. When the bulbs are potted and given moisture and warmth they often send up a bloom scape and flower before new roots appear. This so weakens the bulb that two or more growing seasons are required for the bulb to make sufficient growth to flower again. The first objective of those who acquire newly imported bulbs is to stimulate new root formation.

There is still considerable moisture in bulbs shipped in November, even though they have been cured for a month. When tightly packed for shipment the bulbs sweat heavily during the five weeks in transit. This sweating causes portions of the outer scales to slough off, giving the bulbs an unsightly appearance and causing many purchasers to fear that their bulbs have been frozen. Actually, the bulb is not seriously injured by this sweating, although the loss of any of the scales reduces the strength of the bulb.

Cold damage, the loss of functioning roots and sweating in transit all tend to cause dissatisfaction among the customers of importers, but unfortunately the named clones of the Dutch hybrids are not produced commercially in the United States and these are hazards which must be expected by the importers and their customers who wish to grow the Dutch clones.

GARDEN GLEANINGS FROM CINCINNATI

LEN WOELFLE, *Ohio*

After what seemed to be a record-breaking winter here in the Middle West, one of the wettest springs we have had for a long time, and then most definitely the hottest summer we have ever had with heat records being broken day after day, it is strange that we should have enjoyed better bloom from many bulbs than we had for years.

Winter settled down early and stayed late, with many mornings of zero temperatures, and days remained cold. Shelves in the basement of my home where most of the tender bulbs are stored over winter showed temperatures around fifty degrees where normally they were ten to fifteen degrees warmer.

When spring came, results were immediately apparent. Trees and shrubs seemed to grow beautifully, just loaded with foliage. Perhaps this was an illusion. Perhaps after the severity of the winter we were a little more appreciative of the niceties of spring. The spring bulbs seemed to bloom more beautifully because they were not forced too early from their winter's sleep.

Then the rains came. Fortunate indeed was the gardener who was able to get everything planted during that brief dry period in early May. It was nearly mid June before the ground was again tillable. *Amaryllis, Sprekelia, Zephyranthes,* tried in vain to bloom in their storage bags, only to have the buds blast as they pushed up out of the bulbs, starving for a lack of food and moisture. I just winced as bulb after bulb was taken out of the bags to be planted, with the dried buds hanging limply from the neck of the bulb.

But there were compensations. The hardy shrubs and trees of the area seemed to bloom more profusely than ever before. The red-buds and dog-woods just seemed to run rampant with bloom over the hills.

In the gardens the Magnolias, flowering crabs and cherries were virtually each plant a giant bloom.

Many of the *Hymenocallis (Ismene),* to which I particularly look forward each spring for bloom, pushed up weak watery blasted bud sheaths, delaying for a year perhaps the bloom so eagerly awaited. But once planted they seemed to try doubly hard to make up for the loss of bloom by producing beautiful, profuse foliage, and seemed to give promise of a better spring to come.

The summer was hot and dry, but the garden sprang to life with each shower with more than generous bloom from the *Zephyranthes.* There was hardly a day when there was not some one or more of these miniatures proudly holding its welcome bloom into the heat of the boiling sun. Outstanding among the *Zephyranthes* were *Z. clintiae,* Howard's *Z.* Valles spp., and an unidentified yellow collection by Mrs. Clint, bearing her accession number M-449. *Z. brazosensis* and *Z. smalli* did more than their share to brighten the garden.

Lycoris squamigera brightened the scene after not having bloomed for four or five years, and the genus *Lilium* although suffering from the heat did its share.

Now with summer fast growing to a close, *Rhodophiala bifida* and its varieties are giving superior blooms. The *Zephyranthes* on this the tenth day of September are still giving spasmodic bloom and I hope with favorable weather conditions they will still give one more burst of flowering before digging time in mid October.

Now it is time to get busy with the seed catalogs, to obtain seeds of perennials, and bulbs for spring bloom. With a bit of nostalgia we close the pages on another summer in the garden, and condition ourselves to the long winter wait for another year. What will the next season bring? A gardener always has something to look forward to.

MOVING DAY FOR AMARYLLIDS

JOSEPH C. SMITH, M. D.

In 1958 the author bought a new home, and it became necessary to move his large collection of amaryllids. Before the purchase much thought was given to the timing of the move in order to disturb to the least possible degree the growth cycle of the numerous genera of amaryllids being grown. Mid-winter was decided upon as being the time when the largest number of genera would be resting or dormant in this area. However, many genera are winter growers such as the *Brunsvigia, Lycoris, Cyrtanthus,* and many of the nerines. It is to be hoped that one never has to make such a move. It is disheartening to have to wait for amaryllids to reestablish themselves and to come into bloom again. How the move was accomplished may be of aid to some other unfortunate collector whose wife decided that the family needs a larger home, and he has to move his well rooted collection.

In mid winter the move for *Amaryllis* was no problem. They were all dug and dried, bagged and labeled in the late fall. Paper bags were used for storing the bulbs and the name was written on the bag so there would be no labels to get lost. Digging began in October as the bulbs began to go dormant. Thorough drying was accomplished before any quantity of bulbs was piled together. This is easily done in a few days in our drier type climate. The bags were not crowded together but left setting around a large garage with space between until near moving day when they were finally packed in heavy wooden boxes that would not allow the bulbs to be crushed by other things being piled on top of them. The curing process should include the removal of all soil and treating with insecticides to insure leaving all parasites behind if possible. This is the one big advantage of a move if one has to be made. The new location will probably be free of pests if no amaryllids have been grown there previously. The author was lucky in getting a place where nothing had ever been grown under cultivation before, desert land with not even a strand of Bermuda grass.

Many of the species *Amaryllis* were in pots in the greenhouse and these were moved along with the entire contents of the greenhouse by

crowding the pots as close together as possible on the truck floor and on racks made of two by fours and plywood. The greenhouse itself being of light weight construction, redwood and sheet plastic, was loaded on the bed of a large truck and transported that way. This method of transportation took care of all the genera of amaryllids that are normally growing in winter and had to be potted up to allow continued growth. This included most of the *Lycoris* with the exception of *L. squamigera* which had not put up leaves by January first and these were just dug and replanted again in a few days without drying off. It was found that *Lycoris* can be dug and potted up as they start growth with little harm if a good root system is preserved. Later the pot contents were emptied intact and planted in their new location with continued growth of the foliage. Even with this care no bloom occurred the next fall.

Due to a dry fall the *Brunsvigia* species and hybrids had been slow in starting growth. When they were dug with as much roots as possible a few days before the move on January 4th they had leaves only three or four inches long and were replanted as soon as possible in their new site with care not to dry them any more than possible. This caused a poor show of flowers the following August and September. The winter dormant nerines were dug and stored until convenient to replant. They flowered excellently the next summer. The winter growing nerines were potted up during the fall and many bloomed in the pots. The *Cyrtanthus* were dug early and held dormant until after the move when they were planted at once and flowered normally. The one *Ammocharis* bulb on hand had not finished its reversal of growing season for the northern hemisphere and had grown all summer. So it was dug and dried off. When replanted in March it did not begin growth until August. The same delay took place with *Amaryllis immaculata* and this is certainly a nerve wrecking experience wondering if they are ever coming out of dormancy.

The deciduous *Hymenocallis* were no problem in a winter move. The Ismene group rather enjoys a move to a new location and more fertile soil. The evergreen species of *Hymenocallis* were dug, dried, and stored. Some were held in storage as long as four or five months but have been slow to regain vigor. Actually they were dried out too much and would have been much better if held in a humidity controlled type storage to prevent shrinkage of the bulbs. *Pseudostenomesson, Urceolina,* and *Calostemma* were dried off though they are normally in growth at this season of the year.

Though many of the crinums grow through the winter here they were dug and dried and replanted as convenient during the rest of the winter. Most made good growth and bloomed satisfactorily in season. *Crinum* clone 'Cecil Houdyshel' really showed off by sending up three scapes in succession much earlier than it usually starts to bloom. *Crinum asiaticum* with its stiff upright evergreen foliage was wanted in the landscaping so it was dug and replanted quickly to avoid loosing the foliage. The x *Crinodonna* bulbs were dried off and replanted later although this was their growing season, and as a result they flowered

poorly the next summer. Something had to wait and these are vigorous plants here and could take it.

The *Clivia* plants were dug in clumps and replanted at once. By this method they flowered normally in February and March some repeating in July. The evergreen *Haemanthus* were also handled in this manner. The deciduous species were stored dry. The distance moved was only five miles making it possible to run back and forth frequently to transport quickly plants that were not to be dried out. Fortunately not many *Narcissus* were involved in the move as this would have been a very inopportune time to attempt to move them. A few 'February Gold' and jonquils were potted up and moved as the *Lycoris* were handled. The *Agapanthus* were moved in clumps some being replanted at once and others waited their turn until they were semi-dry. The *Tulbaghia* clumps were handled the same as the *Agapanthus.*

Rhodaphiala had been potted up in the fall as they started their growth and replanted from the pots. They performed beautifully the next September. All *Sprekelia, Habranthus,* and *Zephyranthes* were stored dry and replanted in the spring. *Chlidanthus* was handled like the Ismene. Pancratiums were handled as dry bulbs. *Eucharis* and *Eurycles* went as potted evergreen plants as did also *Vallota speciosa.* Most of the seedlings of the different species were being grown in the greenhouse as potted plants and went with the contents of the greenhouse. *Stenomesson* were dug and dried.

Some genera of amaryllids may be dried off and held in storage as long as three seasons before replanting if they are kept from drying out until nothing is left. Moving a collection is quite a chore and there is no one season best suited to all genera of amaryllids. It is hoped that the way the author solved the problem of when to move a collection of amaryllids will be of help to others faced with moving all genera in one season.

AMARYLLIS FOR BEGINNERS

ROBERT D. GOEDERT, *Florida*

One look at a well grown *Amaryllis* often makes an ardent fan. The beginners can hardly wait to try their hand at flowering one of these beautiful and fascinating bulbs.

The first season he gathers every catalog he can find and reads every article he can get his hands on about *Amaryllis.* Even with this information he often has poor luck at flowering his first bulb and more often it does not flower at all the second season for him. The new fan often is led to believe that flowering amaryllis year after year is a relatively easy matter. This is not true as they apparently have very exacting requirements for maximum performance. Most of the varieties on the market are hybrids. These hybrids were developed from several species with different cultural requirements. It is therefore very difficult to predict just what cultural conditions will give satisfactory results for a particular variety. The Dutch growers have possibly perfected the

culture of *Amaryllis* to the highest degree. From my dealings with them I often hear complaints that this variety or that variety just did not do well this season. Their prediction of the crop is often wrong. For instance, in 1958 I was told that the *Amaryllis* crop would possibly be poor due to cloudy weather in the Netherlands. However, at the end of the season one larger grower told me he was surprised as the *Amaryllis* had made exceptionally good growth and the bulbs would be extra large.

Many very successful *Amaryllis* fans who consistently win ribbons in the various shows find that they have extreme difficulty in growing a certain variety. I believe this indicates that some *Amaryllis* clones have more exacting cultural requirements than others. I find that a clone that often does well in the north does not perform as well in the south. This is particularly true with the clone 'American Express'. Undoubtedly the condition and composition of the soil, temperature, watering and other cultural factors play a large part in their performance. I find some clones generally appear to grow more satisfactorily under more varied conditions than others.

INFORMAL EVALUATION OF CLONES

I maintain a rather large collection of named hybrid Dutch *Amaryllis* clones. They are grown both outdoors in the border and in pots. My purpose is to pass on particularly to the new *Amaryllis* fan, a few comments on the different hybrid Dutch clones that have performed well for me and for others from whom I have heard in different parts of the country. I have tried to arrange my comments so that you may pick out a particular color shade easily. First I will comment on the whites, then progress through the pinks and whites to the pink or light rose shades. I will then comment on the rose colored clones as they get darker ending with the wine reds. After this I will take up the red clones starting with the very dark reds and continue as they get lighter to orange red and ending with the salmons.

The white clones possibly, as a group, are the easiest to grow. This is due to two facts. One is that these clones stem from a more common ancestry and the different clones thrive under more nearly the same requirements. They also were given particular attention by early hybridizers and possibly better selection of seedlings has been made. Most of these are tried and proved clones having been on the market for a considerable time. I find 'Albino', to be exceptionally easy to grow. It can be maintained in a flowering condition year after year and often will give three spikes. Ludwig's 'Marie Goretti' is very fine and is delightfully fragrant. It has wavy tepalsegs. It is vigorous and very satisfactory. Warmenhoven's 'Mt. Tacoma' is easy to grow and is a very tall plain tepalseg clone that will grow larger than its normal 7″ under good culture. 'Ludwig's Dazzler' has less green in the throat than most others. It is an excellent show flower and is of easy culture. The new 'White Christmas' (Van Meeuwen) may turn out to be the giant of the whites. I received many fine comments on it last season. It appears to be most free flowering and surely will make itself known

at the shows this season. 'Nivalis' and 'Bridesmaid' are very popular in certain show areas.

In the white and pink class two are outstanding: Warmenhoven's 'Beacon' and Ludwig's 'Love Desire'. 'Beacon' is very flat and salmon pink with white mid-rib. It flowers very large consistently. It is in a color class all its own and has no rival. 'Love's Desire' is truly beautiful and is relatively easy to grow. It should become increasingly popular. 'Apple Blossom' is another good clone. It is flatter than 'Love's Desire' and a vigorous grower, but its color is not as refined in my opinion. It tends to a striped variety rather than a blended color. Van Meeuwen's two new ones, 'Zenith' and 'Volendam', are very interesting and deserve watching.

There are not many red and white two-toned or striped clones. 'Five Star General' is possibly the most outstanding. It should be in any good collection of *Amaryllis,* but it is a slow grower and only flowers well from large bulbs. It could not be recommended to the beginner. Ludwig's 'Silver Lining' is more of a striped clone than 'Five Star General'. It generally flowers larger and much easier. It is possibly the largest striped variety and is very outstanding. Bulbs of both of these have been scarce. 'Five Star General' will be more plentiful next season; however 'Silver Lining' will be scarce for several years until stocks are built up. 'Candy Cane' is an easy grower and has a good color pattern, but it is an orange red which some object to. The new 'Circus' is darker red and very much like 'Candy Cane'. It is too new to recommend to the beginner but may replace 'Candy Cane'. 'Clown' is a distinct striped clone that is a little "rassel dazzel" and appears to be a vigorous grower from one years experience. Men, generally, will like this variety as it is powerful and fiery.

The picotee clones seen so far possibly fall in the two-tone red and white class. This one is too new to evaluate properly but deserves comments. They have a rather airy form and are surely something new in *Amaryllis.* They are a group of selected seedlings rather than a clone. Some variation in flowers will be found in the different forms of it; however all are surely worth while. The margin of the tepalsegs have a narrow bright red border and the rest of the tepalsegs are often spotted and flushed red. They are exceptionally beautiful and interesting. They grow rather slowly, but the bulbs will normally make two spikes from rather small sizes. The size of the flower varies with the size of the bulb to a marked degree. This coming season, 1960-1961, only about 400 bulbs will be available. It will possibly be scarce for many years.

In the pink and rose shades 'Daintiness' is outstanding in the lighter shades. It grows easily and makes large flat blossoms. It is an exceptionally fine clone. 'Siren' is not quite as refined in color, but is possibly the most vigorous grower of all the Dutch Hybrid *Amaryllis.* It is surely one for the border in the south. It also appears to grow well in full sun as I have seen it growing well where there was no shade. 'Margaret Truman' which is a little darker in color grows well in my border and elsewhere. 'Pink Favorite' is a giant rose pink that grows easily. There are a number of new ones that fall in this class which

should be watched. Two are Van Meeuwen's 'Queen of the Pinks' and 'Queen of Sheba'. Van Meeuwen's pinks run somewhat to the salmon shades. Ludwig's new 'La Forest Morton', 'Spring Dream', 'Prima Donna' and 'Ludwig's Ace'' can be expected to give competition to the older ones and will surely prove to be worthy additions to this color class. In still a darker shade we find 'Doris Lilian' which grows flat and round. It is not an extremely large flower but very outstanding in performance. 'Diamond', still darker, is more of a rose red. It also is easy to grow. Warmenhoven's 'Moreno' and 'Mysterie' grow vigorously for me. They are more of a fuchsia or light wine red. These two have a lavender cast. Both 'Moreno' and 'Mysterie' will grow tall and large. They have more of a triangular shape than the others mentioned in this color class.

If we continue in the dark rose colors, Van Waveren's 'Modern Times' should be mentioned. This is relatively new in a semi-trumpet shape. Its deep rose red color is outstanding, and from one year's trial it appears very vigorous. In the dark wine color 'Tristan' is possibly the best all around clone. It grows easily. Warmenhoven's 'Red Master' is a similar color. It grows much larger and is considered to be one of the most outstanding *Amaryllis*. It however is somewhat temperamental. It usually flowers exceptionally well the first year, but it is hard to maintain in a flowering condition after the first year. The tepalsegs of 'Red Master' grow after the flower opens. It may look ragged when it first opens but after a day or so the tepalsegs broaden and the flower becomes very large and beautiful. Often it will grow to 11″ and larger. Before we leave this color class, Warmenhoven's new 'Purple Queen', should be mentioned. This may prove to be the darkest in this particular color class.

In the dark red, although new and not yet proved, 'Ludwig's It' must be mentioned as it surely was the sensation of the 1958-1959 season. 'Cardinal' and 'Fire Dance', both clones that I named, also received good reports last season. Of course one season can not determine a clone's worth but these three, I predict, will become leading reds. They will, however, be scarce for several years until stocks can be increased. Of the older tried clones, 'Peacefulness' is surely reliable. 'Queen Superior' is a classic old clone that is still one of the best dark reds and will be with us for many more years. 'Wyndham Hayward' is a reasonably good growing plant especially for late flowers. It and 'Ludwig's Dazzler' stay dormant in storage much longer than many others and apparently can be flowered successfully after the weather becomes warm and others do poorly.

'Brilliant' in the medium red color, grows strong in the border. 'Ludwig's Scarlet' is outstanding. 'Scarlet Beauty' and 'Scarlet Triumph' grow large easily. 'Faust' is a good old bright scarlet clone. Van Waveren's 'Red Champion', although new, appears to be very worth while. It will make a mass of blooms as both scapes often flower at once.

Before the orange clones are mentioned, 'Fabiola' should be touched on. This is a good bright red with a rosy shade in the throat. It is much like the old 'Imperator'.

'Attraction' is a good rusty orange red. The tepalsegs roll back in this variety which adds to its charm. 'Don Camillo', somewhat lighter, is a fine flat pansy faced variety that is exceptionally beautiful and grows satisfactorily.

In the bright orange or mandarin red shades, 'House of Orange' is outstanding. It is a beautiful ruffled variety of Van Waveren's and appears to be easy to grow. Still lighter in color is 'Delilah', a light orange or salmon orange. It flowers well after it is established but often poorly the first year. In the salmon orange to buff shades 'Queen's Page', 'Salmonette', and 'Pinksterflower' are very good. 'Camellia' (Van Meeuwen) is partially double and may prove to be very worthwhile.

Last I will mention one of the most unusual *Amaryllis*. This is Ludwig's 'Bouquet'. It is a most beautiful begonia pink with purple mid-rib. It grows easily in the border as well as in pots. It is surely recommended to all beginners.

In closing I would also like to mention the Gracilis group and other small clones and species. These are certainly worth your consideration. They usually make lots of offsets and are generally easier to maintain in flower than the larger ones. They are particularly good house plants. The scarlet-flowered species, *Amaryllis belladonna* L. (syn.-*A. equestris)* from the West Indies, Mexico, and South America, now cultivated in Florida, India and elsewhere has a small bulb and can be planted several to a pot. It gives a nice display of flowers and the pot of green foliage is also appealing. These and others in this class should have more of our attention.

BUD INJURY BY THRIPS

Although I did not intend to touch on the culture of *Amaryllis* I would like to mention one thing that is seldom found in cultural instructions and can surely result in great disappointment to the *Amaryllis* fancier when his flowers open scarred and mottled. Certain thrips are attracted by *Amaryllis,* they often winter over on stored bulbs. If you purchase new bulbs, a little D.D.T. dusted on them when they are received or at planting time will usually eliminate trouble from this insect (see also page 185, Traub—AMARYLLIS MANUAL, Macmillan. 1958, for further information). Do not take this advice lightly as this insect can surely ruin your flowers. Last year I visited a garden that was heavily infected and the good lady was frantic that the sun was burning her flowers. She had never heard of thrips and only after I had shown her this tiny insect did she realize fully what had happened. D.D.T. will usually give good control and normally in most areas of the south this insect does not become bothersome if the bulbs are not dug and stored.

EURYCLES CULTURE

WILLIAM MORRIS, *New South Wales*

Eurycles amboinensis is common to the tropical scrubs (jungle) of Australia between Cooktown and Townsville in Queensland. It grows during the autumn and winter and goes dormant in July or August. The flowers show in November. The bulbs are found in soil rich with leaf mold or straight humus. Since the plant is extremely tropical seeds are hard to come by unless conditions are near ideal.

Eurycles cunninghamii grows near Grafton, N. S. W., where conditions are a bit cooler. The bulbs are found in leaf mold amongst broken rock under jungle conditions. This species has a long summer dormant period and like *E. amboinensis* throws its foliage in mid January. In my garden here in Warner Bay the plant seeds occasionally. I would like to exchange *Eurycles* seeds for species *Amaryllis,* especially the recently described yellow forms. My address is—20 Mill Street, Warner Bay, N. S. W., Australia.

MINERAL DEFICIENCY AND MOSAIC DISEASE IN AMARYLLIDS

HAMILTON P. TRAUB, *California*

A number of inquiries have been received recently from growers asking about symptoms of *Amaryllis* mosaic disease. These symptoms, according to Brierley (1948) are recognizable by irregularly distributed light and darker green areas in the leaves, and in *Amaryllis* the "pattern is a coarse one, with large patches of yellowish-green appearing at random over the surface. The yellowish-green areas have irregular margins, and shade into the normal green areas without a well-defined line of demarcation. There is little distortion of the leaf in *Amaryllis,* and the affected plants are not conspicuously reduced in vigor."

In all cases, the leaf samples submitted to the writer were definitely not those of mosaic but showed irregular light green and somewhat deeper green areas. The writer has also observed similar symptoms on his *Amaryllis* at La Jolla when planted in one area at his home. It appears that in this portion of his yard there had been a fill-in of heavy clay. When *Amaryllis* bulbs were moved to a better location, the light-green and dark-green leaf symptoms disappeared. Thus it was shown that mosaic disease was not the cause.

Mr. Jack Scavia sprayed the soil around the *Amaryllis* of part of the filled-in area with diluted "Agra-Green", a liquid originally containing a 15-6-4 fertilizer solution, including also 0.1% each of copper, zinc and iron (added by the maker as sulfate). The dilution used was 2 tablespoonfuls per gallon of water. The new growth on the *Amaryllis* did not show the light-green and dark-green leaf symptoms in the sprayed area. However, since the rest of the field was not treated with

a similar diluted 15-6-4 fertilizer solution without the minerals, it is not possible to say positively that either the copper, zinc or iron applied cured the plants since the fertilizer may have been responsible.

At present it is not known what chemical element or elements are missing or locked-up in the filled-in location. Some of those submitting affected leaf samples assumed that the symptoms might be due to iron deficiency if mosaic were not present, but this has not been proved. Diseases of plants and animals are caused by adverse external and internal environmental conditions which include also the ravages of plant pathogens, viruses or animal parasites; or any combination of these. Proof of the cause or causes of any disease is established when the disease or diseases can be initiated by any particular condition or conditions as indicated above, and when the disease or diseases can be cured when the causal condition or conditions are removed. Amateur gardeners who write about diseases should keep this in mind when reporting their results.

The case for mosaic disease in *Amaryllis* and other amaryllids at present rests on the fact that the disease cannot be cured in the affected stock but it is not seed transmitted. Thus mosaic-free seedlings can be grown from mosaic-infested stock (Brierley, 1948). So far all attempts to cure infested stock has failed, and also it has not been possible to transfer the mosaic virus from diseased plants to other mosaic-free stock by experimental techniques in the laboratory (Brierley, 1948). Under natural conditions, it is assumed that the virus is spread by insects and mites, but how this actually happens is still unknown.

Further controlled experiments are needed to clarify the subject of mineral deficiency and mosaic diseases with reference to *Amaryllis* and other amaryllids. Colored illustrations are needed to show the actual leaf patterns for mosaic disease and for the various mineral deficiencies. Thus it will be possible to distinguish easily between mosaic disease and the mineral deficiencies.

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POSTSCRIPT.—Prof. Ira S. Nelson writes under date of December 3, 1959, that Dr. Kahn of the U. S. Department of Agriculture is investigating mosaic disease in *Amaryllis* and other amaryllids. This is good news indeed.

Anyone having *Amaryllis* or other amaryllids suspected of being infected with mosaic disease should send samples to: Plant Pathologist, Section of Mosaic Diseases, U. S. Plant Industry Station, Beltsville, Maryland.

AMARYLLIS AULICA FROM SANTA CATARINA, BRASIL

JOSEPH C. SMITH, *M. D.*

In 1958 Prof. P. Raulino Reitz of Itajai, Brasil sent bulbs of an *Amaryllis* species that grows on the trees of the rain forests of Santa Catarina Province. These bulbs did not look unusual in any way and were potted up in a soil mixture heavy in peatmoss mainly to provide as good drainage as they must get in the crotches of trees. Soon the leaves began to appear and these were noted to have a reddish cast to them. They were keeled all the way to the pointed tips. Growth continued from the July planting date throughout the winter to the next July when the foliage declined and the bulbs went completely dormant for two months. In September the new leaf tips started showing and when they were four inches high the bud tip also began to show. The foliage, eight leaves at once, grew steadily to full size but the scape lengthened slowly and opened slowly so that the plant was in full leaf by the time the flowers were out.

The flower was outstanding in that the petsegs were wider than the setsegs which is the reverse of the usual condition in *Amaryllis*. This reversal of parts will be valuable in breeding experiments if it transfers to the hybrids where it would tend to widen the lower petseg. The umbel was 2-flowered as usual and the flowers were lively aulica red with a dark red signet ring around a pronounced incurved paraperigone at the apex of the tepaltube.

This specimen was donated to the TRAUB HERBARIUM therefore no record of fertility and seed production was obtained this season. This species has proved easy to handle as a pot plant and should make an interesting addition to any *Amaryllis* collection. The writer wishes to thank Director Prof. Reitz for his kindness in donating this interesting *Amaryllis* species from his Country for our study and enjoyment. Other bulbs that he sent this year will be reported on as they bloom and are identified. We are particularly anxious to see the flower of an *Amaryllis* species he sent labeled "rose-colored".

CRINUMS FOR EXCHANGE

Mr. Mat Waltrip, 5406 Willow Bend Blvd., Houston 35, Texas, writes that his hobby is the collection and study of Crinums. His collection now contains over 50 items, and he wishes to exchange seeds and bulbs of *Crinum* and other amaryllids with others here and abroad.

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THE AMERICAN PLANT LIFE SOCIETY
Box 150, La Jolla, California

PREFACE

The Centenary of the publication of Darwin's *Origin of Species* (1859) was the occasion in 1959 of the publication of a number of important books on the development of the evolutionary concept before and since Darwin. One of the outstanding books in this class is *Forerunners of Darwin,* edited by Bentley Glass, et al, in which authorities present stimulating essays on the subject. In one of these essays by Bentley Glass, the forgotten fact that Michel Adanson is the true founder of the natural system of plant classification, and the foremost botanist that France has produced, is brought to light. It is pointed out that "The reasons for Adanson's eclipse and the neglect of his work appear to lie, like those relating to Maupertuis, in the machinations of an evil genius, in this instance his rival Antoine Laurent de Jussieu, who through nepotism succeeded his uncle as director of the Jardin des Plantes and successfully devoted himself throughout his life to the derogation of Adanson and the enhancement of the reputation of his uncle."

To remedy this neglect in part, THE AMERICAN PLANT LIFE SOCIETY will sponsor the publication of English translations of Adanson's works so that the English readers generally may read about the facts themselves. Thus, the Bicentenary of the publication of Adanson's *Familles des Plantes* (1763) will be celebrated in 1963 as indicated in this issue.

In addition, Dr. Corliss reports on his European trip in 1959, and Dr. Uphoff completes the review of the genus *Gagea* in the present issue.

January 15, 1960
5804 Camino de la Costa,
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[**PLANT LIFE LIBRARY,** continued from page 74.]

recent advances in the field. The subject matter ranges from atoms, light quanta, and ionic solutions, through biological macromolecules, tissues, and ultrastructures, to sensory mechanisms and signal processing by high neural centers. The emphasis is on the all-over unity of biophysical science, the interrelations of its many aspects, and the essential role of biological specificity, organization, and mutual interaction at all levels of biological organization. This is required reading for all biologists.

SYNTHESIS AND ORGANIZATION IN THE BACTERIAL CELL, by E. F. Gale. John Wiley & Sons, 440 4th Av., New York 16, N. Y. 1959. pp. 110. illus. $3.50. These 1959 CIBA Lectures in microbial Biochemistry were presented by Dr. Gale at the Institute of Microbiology, Rutgers University. The theme of the lectures is biosynthesis with emphasis on the synthesis of proteins and nucleic acid. The first part is concerned with the bacterial cell, its structure and organization; the second part, with the mechanism of protein and nucleic acid synthesis, one of the few remaining problems in biochemistry. Highly recommended.

[**PLANT LIFE LIBRARY,** continued on page 162.]

ADANSON BICENTENARY, 1763—1963

The year 1963 will mark the Bicentenary of the publication of Adanson's "Familles des Plantes" (1763). Émil Guyénot (1941) has pointed out that Adanson is to be recognized as the founder of the natural system of plant classification and that he ranks as the greatest plant scientist France ever produced—a man at least the equal of Linnaeus in genius. According to Glass (1959), Adanson is one of the forerunners of Darwin: ". . . we are scarcely in error if we grant that his [Adanson's] achievement of a truly natural classification based on real affinities, his emphasis on the variability of species and the analysis of mutant forms, his suggestion of the causes of hereditary variation, and his emphasis on fossils as indicating the demise of species which once filled the plenum of Nature, were all more in the true direction of the ultimate evolutionary theory than Linnaeus' theory of the origin of new species by hybridization. What irony in the fact that the tested 'new species' of Linnaeus were all demonstrably mere mutants, although in principle he was right, since new species of plants can and do arise by hybridization upon occasion!"

Thus the time has arrived when Adanson has to be accorded his true stature in the history of science, a stature that has been unfortunately obscured due to erroneous statements in the classic "History of Botany, 1530-1860" of J. von Sachs (1875; 1890).

In celebration of the Bicentenary of "Familles des Plantes" (1763), The American Plant Life Society is undertaking the sponsorship for the publication of English translations of the first parts of significant works of Michel Adanson (1727-1806) in 1963. The other parts will be published as soon as possible thereafter. During 1963, lectures on the contributions of Michel Adanson to science, and the development of the natural system of classification since Adanson will also be sponsored by The American Plant Life Society.—*Hamilton P. Traub.*

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1959 EUROPEAN TOUR REPORT

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

The months of July, August, and September were spent by the writer in extensive travels in England and on the Continent, with visits to flower exhibitions and gardens from Bergen to Rome, London to Austria. The season was everywhere unusually hot and dry, with resultant rather poor quality of flowers and increase in pestilence. The prophecy of a cycle of twenty or thirty years of warmer weather all over the world, due to shrinking polar caps and other phenomena, makes it likely that this summer will be followed by even more disastrous ones, especially with regard to the increase of diseases and insects.

It seems proper to avoid specific names and places, but I feel bound to state that the presence and indeed the ravages of disease and insects was not even recognized in most regions. However, I saw rose bushes "tented" by red spiders in many famous gardens, and it was actually shocking to see the diseased condition of the foliage of many plants at the great flower exhibitions.

My own horticultural interests, although perhaps concentrated in the Amaryllis and Iris families and the genus *Hemerocallis,* do extend to other fields, and I shall touch briefly on what seemed to be the outstanding developments, if any, of what I saw.

There seem to be no world-rocking developments in the *Amaryllis* world, since my previous European reports. The lesser amaryllids are more widely known and grown in England than in the United States or on the Continent. I have not yet seen improved *Nerine* hybrids such as we have on the West Coast. The Cape Belladonna, *Brunsvigia rosea,* called "Amaryllis Belladonna" in England, are common, but seem smaller and inferior in color to ours. x *Crinodonna corsii* clone 'Fred Howard' is still a great rarity.

Interest in modern *Hemerocallis* is picking up, especially among the iris fanciers of England and on the Continent, but none of the great commercial nurseries is offering new varieties, and there are as yet no specialist nurseries to my knowledge. There is still a lag of five to ten years in the appearance of the greatly improved colors, forms, and size of *Hemerocallis,* as our members know them, in the gardens across the Atlantic.

Gladiolus have lost much favor among gardeners in the past decade or two. The emergence of a young group of English hybridizers who have organized a Syndicate may correct this trend. They made their first show appearances in England this year. One of their members won Best New Variety and another won Best Seedling in the annual exhibition of The British Gladiolus Society.

Dahlias continue to be of major importance everywhere. Wonderful new hybrids from Dutch and English breeders are legion, and they are joined by a great number from Australia and the United States. There is a tendency away from the giant types and also from the formal decoratives. This is good, as the giants are of little use save for exhibi-

tion, and the cactus type makes a more useful and pleasing home arrangement than the heavier decorative flower. Pompons are favored, and ball-type. I cannot explain the relative low favor of the collarettes, considering the strikingly beautiful new ones which are now available. There is an handful of anemone-type dahlias to be seen. They are a novelty, but otherwise of little improvement, if any, over the balls and small decoratives.

The iris breeders of England have quite caught up with the Americans. As always, the species hybrids demand more attention than they do with us. I was somewhat surprised to find a new and great interest in the Louisiana and Japanese types, heretofore much neglected in favor of Siberians and bulbous iris. I am hoping that the coming cycle of warm years will permit the English as well as the Continental gardeners to use more spurias.

I could easily write chapters on the rose. Much as we may love other flowers, it cannot reasonably be denied that the rose is the favorite flower of most people in the temperate zones. The new hybrids from breeders all over the world are crossing oceans in increasing numbers, and while you will be seeing many of the new roses bred in Denmark, France, Italy, Spain, England, Ireland, and Germany in America soon, it is nice to be able to report that many of our American introductions are in great favor in England. Two of the most popular are 'Montezuma' and 'Queen Elizabeth'. The latter is an especially good garden clone for England, achieving a vigor, height, and floriferousness in the public parks unexcelled by any clone, 'Montezuma', of course, is the best clone for cutting purposes that I have ever known.

I noted many unusual plants, but will mention only the one that impressed me the most: *Chrysanthemum parthenicum,* var. WHITE BONNET. This was exhibited by the well-known rosarian, Mr. G. S. Thomas, at the stand of his Sunningdale Nurseries at The Great Autumn Show of The Royal Horticultural Society. Lost for many years, this species was found growing in a war-damaged area recently. Its growth habits are like that of the aster species, I would say, and the lovely white flowers, just under one inch in size, are like miniature anemone chrysanthemums, with a single row of white ray petals and a pure white anemone center.

The paragraph above brings me to a closing plea for more consideration at flower shows in the United States for commercial exhibits. The principal purpose of a flower show is to stimulate and interest people in growing flowers, especially improved varieties. I have found over the past two decades that people object to reading about, or seeing pictures of, new varieties if they do not know where they can obtain them. I believe that in our flower shows we should make it possible for them to obtain these improved varieties, and that we also should be obligated to support the honest nurserymen who are endeavoring to supply them to gardeners. There are some commercial exhibits permitted in some of our flower shows, especially the great seasonal ones. I think that national shows of special plant societies, and even local shows by local gardening groups, should provide space for commercial

exhibits where catalogs may be distributed and salesmen may actively solicit or accept orders for plants, etc.

Such a program depends on a revision of present policy, especially by such influential bodies as The National Council of Federated Garden Clubs. I believe it is a sound idea. The amount of commercialism must be determined by the character, size, scope, and attendance, just as must policies of exhibits and admittance fees. Far too often, in America, commercial growers are asked to contribute flowers and equipment which may enhance the exhibition, but they are denied the right to advertise, even if they pay for the privilege, and even if their advertising exhibits may also contribute much to the show.

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HANDBOOK OF TOXICOLOGY. VOL. III. 1959. INSECTICIDES, A COMPENDIUM, by Wm. O. Negherbon. pp. 854. illus. VOL. V. 1959. FUNGICIDES, by E. F. Davis, B. L. Tuma, and L. C. Lee; edited by Dorothy S. Dittmer. pp. 242. illus. W. B. Saunders Co., West Washington Square, Philadelphia 5, Penna.

These volumes were prepared under the direction of the Committee on the Handbook of Biological Data, of the National Academy of Sciences and the National Research Council. Volume III deals in detail with the properties and toxicity of insecticides and such ancillary substances as acaricides (miticides), insecticide synergists, repellents, and so on. Volume V. is concerned with the properties and toxicity of fungicides. Implicit in the subjects of insecticide and fungicide toxicity is the topic of hazard to man, to domestic animals and plants, and to plants and animals in nature. These comprehensive volumes are essential to all who are interested in biology.

SYMBOLISM IN FLOWER ARRANGEMENT, by Ervin S. Ferry. Macmillan Co., 60 5th Av., New York 11, N. Y. 1958. pp. 149. illus. $4.95. The purpose of this stimulating book on the symbolism of flower arrangement is to reveal the conditions under which a plant or flower composition may evoke an idea, convey a message or arouse an emotion in the mind of the viewer, that is, the effect on the mind caused by aspect, habit of growth and arrangement of plant material in a composition. The traditions, myths and folk tales from the West and East in which certain plants have suggested emotions or moral attributes, etc., are also discussed. Highly recommended to all who are interested in flower arrangement.

SUCCESSFUL TRUCK FARMING, by G. J. Stout. Macmillan Co., 60 5th Av., New York 11, N. Y. 1958. pp. 270. illus. $6.25. In this stimulating volume, Dr. Stout explores the fundamentals of truck crop production irrespective of any particular location, giving the history of each phase of crop production, the present practices, and the future outlook. Among the topics discussed are irrigation, soils, root systems, the temperature factor, insects and diseases as ecological factors, labor, transportation, refrigeration, and marketing. This well written text should appeal to all who are interested in truck crop production.

THE ART OF FLOWER AND FOLIAGE ARRANGEMENT, by Anna H. Rutt. Macmillan Co., 60 5th Av., New York 11, N. Y. 1959. This stimulating book concerning the established principles and practice of flower arrangement has been written as a guide not only for beginners, but also to enlarge the understanding of advanced practitioners. The first three chapters are concerned with art principles and elements, and expressiveness or themes. The remaining chapters deal with Western and Eastern styles, types of arrangements, some appropriate arrangements, making of flower arrangements, and exhibiting and judging. Highly recommended to all who are interested in flower arrangement.

[**PLANT LIFE LIBRARY,** continued on page 179.]

A REVIEW OF THE GENUS **GAGEA** SALISB.

J. C. Th. Uphof, *Florida*

[Continued from page 161, **Plant Life**, Vol. 15, 1959.]

SECTION 3. **Holobolbos** Koch, in Linnaea **22**: 226. 1849. First foliage leaf free, carrying in its axil an erect bulb; the second foliage leaf usually surrounding the peduncle, without developing axillary bulbs; the third leaf protecting the young inflorescence; the fourth leaf is usually rudimentary.

40. G. LUTEA (L.) Ker.-Gawl. Bot. Mag. Tab. 1200; *G. fascicularis* Salisb. in Kon. et Sims, Ann. Bot. 2: 555, 1806; *G. transilvanica* Schur. in Verh. Siebenb. Naturw. Ver. 4:75, 1853; *Ornithogalum luteum* Linn. Spec. Plant, 306; *O. Persoonii* Hoppe, bot. Zeit. Regensb. 6:138, 1807; *O. majus* Gilib. Exercit. 2:467.

DESCRIPTION.—Stem forming at the base of bulb, resembling that of *G. pratensis*. Plants 10 to 30 cm. high. Basal leaf broad-linear, 7 to 8 mm. drawn together abruptly toward the apex, after which it becomes acute. The cauline leaves are close to the inflorescence, lanceolate, the upper ones being spider web-like ciliate along the edge. Bracts usually small, seldom having the appearance of a foliage leaf. Inflorescence and umbel, 1 to 7, occasionally 10-flowered. Segments of the perigone long, 10 to 16 mm. long, obtuse toward the apex. Pedicels relatively long, glaborous. Stamen about half the length of the flower. Var. *tenuis* Fr. Leeder is very slender, var. *Brentae* Evans has linear basal leaves, hardly half as wide as the species, var. *glauca* Blockii has bluish leaves.

NOTES.—The individuals are found on grassy places, meadows, forests and vineyards, under shrubs and hedges, along streams and creeks, dune valleys from sea level to the sub alpine region, occasionally to an alt. of 1700 m. This species is distributed in most parts of Europe, is absent in Ireland, northern Scandinavia and Russia, as well as Spain, Corsica and Sardinia. It occurs also in Caucasia and Siberia.

41. G. ELEGANS Wall. Cat. 5063.

DESCRIPTION.—Differs from *G. lutea* especially that the basal leaves become gradually attenuate; the lower cauline leaves are broad ovate, gradually being attenuate-acute toward the base. Inflorescence is few flowered. Segments of the perigone are oblong, acute.

NOTES.—Native to Northern India and the Himalaya region.

42. G. INDICA Pasch. Bull. Soc. Imp. Nat. Moscou 364, 1905.

DESCRIPTION.—Differs from *G. elegans* mainly in that basal leaves are 1.5 to 2 cm. long, cucullate. Inflorescence is few flowered. Perigone segments are subovate-oblong, acute.

NOTES.—Native to Northern India.

43. G. LOWARIENSIS Pasch. in Fedde Repert. 2: 1906.

DESCRIPTION.—Basal leaves broad linear, 22 mm. wide, toward the upper part cucullate, attenuate. Cauline leaves broad elliptic, clasping at the base, gradually attenuate. Flowers 16 mm. long, 3 to 4 times shorter than the pedicels. Segments of the perigone oblong, obtuse.

NOTES.—Native to Northern India: Chitral relief expedition 1895, nr. 11699; Lowari Pass at 3000 to 3500 m. alt.

44. G. PUSILLA (Schmidt) Roem. et Schult. Syst. 7; 543; *G. clusiana* Roem. et Schult. Syst. 7:543; *Ornithogalum pusillum* Schmidt, Flor. Boem, Cent. 4:41; *O. tunicatum* Presl. Delic. Prag 216: *O. Clusii* Tausch. Flora 11:431, 1828.

DESCRIPTION.—Stem forming a bulb at the base. Plants 3 to 5 cm. high. Basal leaf one, narrow-linear to almost filiform, hardly 2 mm. wide, concave, narrowing toward the apex. Cauline leaves two, approaching each other, almost opposite, seldom alternate, margin glabrous; the lower leaf narrow-lanceolate, usually lower than the inflorescence; the upper leaf usually narrow-linear, mostly absent on one-flowered plants. Bracts very small or absent. Inflorescence umbellate, 1 to 3-flowered, occasionally with 6 flowers. Pedicels erect, glabrous, usually not much longer than the flowers. Segments of the perigone long-lanceolate, 10 to 13 mm. long; narrow, obtuse at the apex. Stamens two thirds the length of the flower. Capsule ovate, half the length of the flower. Var. *reflexa* Czerniajef having leaves producing bulblets in their axil, var. *obovata* Becker, segments of the perigone obovate to elongate. Leaves to 3.5 mm. wide.

NOTES.—The individuals occupy mainly sandy hills, fields, wooded and stony places. It is a pontic-illyric species, distributed in South and Eastern Europe, Caucasia, Asia Minor, Turkestan, Dsungaria and Altai. Is absent in Germany and Switzerland.

45. G. TURKESTANICA Pasch.; *G. pusilla* var. *turkestanica* Pasch. in sched.; *G. divaricata* Regel, Act. Hort. Petrop. 6: 510.

DESCRIPTION.—Differs from *G. pusilla* by its elongated stem, broader basal leaves. The cauline leaf is oblong-linear, at the base gradually attenuate. Inflorescence many flowered. Flowers are larger, 19 mm. long. Segments of the perigone are broader.

NOTES.—Native to Turkestan.

46. G. FEDTSCHENKOANA Pasch. in Fedde Repert. 1:190, 1906.

DESCRIPTION.—Plants slender, 3 to 9 cm. high. Basal leaves one, reaching the inflorescence, narrow-seldom broad-linear, at the base long attenuate, the apex being acute, flexuose, 1 to 3 mm. wide, 5 to 10 cm. long, glabrous. Flowers small, usually 6 to 9 mm. long, seldom longer, glabrous. Outer segments of the perigone oblong, obtuse, seldom more or less acute, 7-veined, 2 to 3 mm. wide, yellow; inner segments seldom narrower than the outer ones, 1.5 to 2.5 mm. wide. Filaments at the base dilatate, about one third shorter than the perigone. Ovary obovoid, obtuse, 3-sided; style double as long; stigma 3-lobed.

NOTES.—Native to the steppes and mountains of Siberia, especially Gajunktal and Karakalig Mountains. This species is related to *G. erubescens*.

47. G. ERUBESCENS (Besser) Schult. Syst. 7:545, 1829; *Ornithogalum erubescens* Besser, Enum. 45 nr. 1390, 1822; G. *reflexa* Czernajef, Consp. Plant. Charcov 64, 1859; *G. cretacea* Sukatscher in sched.

DESCRIPTION.—Bulbs brownish. Basal leaves distinctly 3-veined, undulate or revolute. Cauline leaves opposite, lanceolate-linear, at the

base more or less a sheath forming, toward the apex slightly convolute, reaching the flowers. Scape erect, slender, angulate-marginate, striate. Inflorescence umbellate, sessile. Pedicels glabrous, simple, seldom dichotome, slender, erect or nodding. Segments of the perigone lanceolate, acute at the apex, glabrous; inner ones yellow; outer ones reddish. Filaments more or less of the same length, one quarter that of the perigone. Ovary oblong, 3-sided; style short. Capsule roundish.

NOTES.—Native to Southern Russia and the Urals.

48. G. REVERCHONI Degen, Magyar Botanikai Lapuk 2:37-38, 1903.

This species is apparently related to *G. pusilla* from which it differs through the smaller perigone, the black-brown tunics of the bulbs and the nodding pedicels.

NOTES.—It approaches *G. erubescens* by these same three characteristics. Native to Spain, prefering calcarous soils, at 1400 m. alt.

49. G. LONGICAPA Grossh. in Komarov, Flora U. S. S. R. 4:735, 1935.

DESCRIPTION.—Bulbs solitary, ovate. Tunic brownish or gray-brownish. Stem 15 to 25 cm. long, slender. Basal leaf solitary, flat, 3 to 4 mm. wide, reaching above the inflorescence, apex attenuate, cuculate, sometimes glaucescent. Cauline leaves opposite, often unequal, shorter than the flower cluster, narrow linear-lanceolate, 3 to 4 mm. wide, the upper ones linear. Inflorescence 3 to 7-flowered. Pedicels unequal, thin, many times longer than the flowers, erect after anthesis. Segments of the perigone narrow lanceolate-linear, 10 to 12 mm. long, somewhat acute or obtuse, inside yellow, outside green. Anthers shorter than the segments, ovate-rotundate. Capsule obovate, half the length of the perigone.

NOTES.—In fields in Siberia. Type specimen from distr. Minussinsk. Is related to *G. erubescens* from which it differs by its shorter stem and the pedicels becoming erect after anthesis.

50. G. COREANA Nakai, in Bot. Magaz. Tokyo 36:605, 1932; *G. Nakaiana* Kitagawa in Rep. Inst. Sci. Research Manchuokua III. App. I, 136, 1939.

DESCRIPTION.—Bulbs ovoid, 10 to 17 mm. long, 7 to 12 mm. thick. Basal leaves one, 5 to 7 cm. long, 5 to 12-veined. Scape slender, 1 to 2 mm. thick. Inflorescence 1 to 6-flowered. Pedicels 15 to 30 mm. long. Segments of the perigone lanceolate or linear-lanceolate or oblong-linear, acute or acuminate, 8 to 12 mm. long, 1.5 to 2.5 mm. wide, yellowish green, with hyaline margins. Stamens 6 to 7 mm. long; anthers elliptic, yellow, 1 mm. long. Ovary ellipsoid, 2 to 3 mm. long; style slender, 3 to 4 mm. long; stigma punctate.

NOTES.—Native to Korea, mountains of Otsumitsudai, H'eijyo, prov. Keivan; and Japan, Hindo, Mountain Tsukuba, prov. Hitachi. Japanese name is Kôrai-amana.

51. G. JAPONICA Pasch. in Fedde Repert. 2:57, 1906.

DESCRIPTION.—Plants slender. Bulbs single, small. Tunics concealed, fibres absent. Basal leaves single, broad ovate toward the base ovate-oblong, attenuate. Stem erect or flexuose. Inflorescence umbellate.

Pedicels thin, 3 to 5 times longer than the flowers. Segments of the perigone obvate-oblong, 3 mm. wide and 9 mm. long. Stamen about one third of the length of the perigone. Filaments at the base dilatate. Ovary obovoid, 3-sided, scarcely with a shallow notch a rounded apex.

NOTES.—Native to Japan. The plants resemble *G. erubescens.*

52. G. PSEUDOERUBESCENS Pasch. in Fedde Repert. 2:67, 1906.

DESCRIPTION.—Lower cauline leaves ovate toward the base, 11 mm. wide and 9 cm. long. Inflorescence many flowered. Pedicels slender, 8 to 11 mm. long. Outer segments of the perigone somewhat obovate-oblong, acute; the inner ones more or less obtuse.

NOTES.—Native to Turkestan. This species resembles *G. erubescens* though the flowers are smaller.

53. G. CAPUSII Terracc. in Bull. Herb. Boiss. 5:1115, 1905.

DESCRIPTION.—Bulbs small, oblong. Basal leaves solitary, linear-lancolate, narrow, flat. Lower cauline leaves oblong-lanceolate, concave, reaching or passing the flowers, obtuse with ciliate margins. Upper cauline leaves narrow linear, ciliate, reaching below the flowers. Inflorescence few flowered, umbellate. Peduncles of unequal length, villose to pubescent. Segments of the perigone oblong-lanceolate, obtuse, distinctly veined, greenish on the outside, glabrous on the inside or partly pilose, broad white marginate. Filaments dilatate at the base, one third the length of the perigone. Anthers oblong. Ovary ovate-oblong, 3-sided; style thick, cylindric.

NOTES.—Native to Turkestan.

SECTION 4. **Tribolbos** Kock, in Syn. ed. I, 711. 1837; Boiss. Flor. Orient. **5:** 203. 1881. The first foliage leaf free, basal; margins of the second leaf more or less surrounding the peduncle as far as the inflorescence; each one carrying a bulb in its axil; the third and fourth leaves serve to protect the inflorescence; the fourth leaf is sometimes reduced.

54. G. PRATENSIS (Pers.) Roem. et Schult Syst. 7:536; *G. bracteolaris* Salisb. in Kon. et Sims Ann. Bot. 2:566, 1806; *G. stenopetala* Reichb. Flor. Germ. Exc. 107; *G. polymorpha* F. Schultz, Arch. Flor. Fr. Allem. 17; *Ornithogalum pratense* Pers. in Usteri, Ann. Bot. 11:8, 1794.

DESCRIPTION.—Two side bulbs at the base of the flowering stem develop besides the main bulb. Basal leaves one seldom two, linear, narrowed, slightly ciliate. Cauline leaves strongly drawn toward each other, ciliate; the lower leaf more or less united with the flowering stem; the upper one sometimes developing a bulb in its axil. Bracts glabrous. Infloresens umbellate, 1 to seldom 5-flowered. Pedicels long and glabrous. Segments of the perigone narrow long, 10 to 16 mm. long, somewhat obtuse. Plants grown in dry places develop larger flowers. Fruit long, becoming wider toward the upper part. Var. *simplex* Becker develops a short stem, therefore all leaves appear to be basal; var. *ciliata* Becker plants with ciliate bracts, subsp. *pomeranica* R. Ruthe develops light green plants, side bulbs often absent. Lower cauline leaves spatulate. Segments of the perigone wider, with a short obtuse apex. Fruit distinctly 3-sided. This form is sometimes considered a hybrid of *G. pratensis* x *lutea.*

NOTES.—Along fields, hills, grassy places, under hedges and vineyards, usually in flat country. It is sometimes a troublesome weed. It is distributed over a large part of Europe. Is absent in Northern Russia, Scandinavia, British Islands and a considerable part of France. It is also found in Asia Minor.

55. G. GUSSONI Terracc. Boll. Soc. Arg. 4:232, 1905; *G. stenopetala* Boiss. Flor. Orient. 5:205; *Ornithogalum pratense* Bieberst. Flor. Tauric. Caucas. 1:272.

DESCRIPTION.—Basal leaves solitary, lanceolate, subequaling the flowers, cauline leaves opposite. Scape short, slender, angulate. Inflorescence umbellate, few flowered. Peduncles short, of unequal length, glabrous. Flowers small, yellowish-green. Segments of the perigone linear-oblong, or linear-lanceolate, obtuse. Filaments subulate, toward the base dilatate; anthers more or less roundish. Ovary ovate-oblong or obovate-oblong; style short.

NOTES.—Native to Greece and Moldavia. This species resembles *G. transversalis.*

56. G. TRANSVERSALIS (Pallas) Steven, Bull. Soc. Imp. Nat. Moscou 267, 1856; *G. pratensis* forma *minor* Kunth MSS. in herb. berolinensis; *G. stenopetala* Lindem. Suppl. Bull. Soc. Imp. Nat. Moscou 100, 1875; *Ornithogalum transversale* Pallas Ind. Taur. in Nov. Act. Petrop. 10:309.

DESCRIPTION.—Bulbs small, round to ellistic. Basal leaves solitary, linear or narrow lanceolate-linear, as long as the flowers or longer. Scape short, slender, striate. Inflorescence few flowered. Pedicels short. Segments of the perigone yellow, on the outside greenish, ovate, oblong or lanceolate. Stamens one third the length of the perigone. Filaments dilatate; anthers large, round. Ovary oblong. Capsule ovate.

NOTES.—Native to Tauria and Caucasia.

SUBGENUS II. **HORNUNGIA** Pascher, in Lotos, n. ser. **14:** 110. 1904. Seeds flat, thin.

SECTION 1. **Platyspermum** Boiss., in Flor. Orient. **5:** 204. 1881. Stigma retuse or very obscurely 3-cleft.

Subsection 1. **Reticulatae** Pascher, in Lotos, n. ser. **14:** 115. 1904. Ovary prismatic, attenuate.

57. G. RETICULATA (Pall.) Salisb. Ann. Bot. 2:553, 1806; Roem. et Schult. Syst. Reg. Syst. 7:542; Boiss. Flor. Orient. 5:208; Regel, Flor. Turk. Tab. 19, fig. 1-4; Pasch. Bull. Soc. Imp. Nat. Moscou 366, 1905.

DESCRIPTION.—Tunic of various length, fibres few to numerous. Basal leaves variable as to width. Cauline leaves more or less vertical, gradually attenuate. Inflorescence umbellate. Pedicels 3 to 5 times longer than the flower. Flowers 15 to 32 mm. long. Outer segments of the perigone oblong, acuminate toward the apex; interior ones oblong, attenuate. Capsule about one third the length of the perigone. Here belong var. *circinata* (Loud.) Pasch. Bull. Soc. Imp. Nat. Moscou 364, 1905 (syn. *G. circinatum* Loud. Hort. Brit. 134; *G. reticulata* var. *tenuifolia* Boiss. Flor. Or. 10:208; *Ornithogalum circinatum* L. f., Suppl. 119; *Hornungia circinata* Bernh. Flor. 10:390, 1840), with somewhat

hairy or bristly leaves. Stem and inflorescence are often somewhat pubescent. Var. *eureticulata* Pasch. Bull. Soc. Imp. Nat. Moscou 364, 1905. Fibres around the tunic few. Leaves 2 to 4mm. wide. Var. *rigida* (Boiss.) Pasch. Bull. Soc. Imp. Nat. Moscou 364, 1905. (syn. *G. rigida* Boiss. Sprung. Diagn. Ser. I. 7,108) *G. reticulata* var. *fibrosa* Boiss. Flor. Orient. 5; 208) Plants strong, often abbreviate. Cauline leaves broad toward the base, 3 to 5 mm. wide. Flowers large, 24 to 32 mm. long. Segments of the perigone lanceolate, attenuate-acute.

NOTES.—Native to Caucasia, Armenia, Iran, Afghanistan, Beludchistan, Turkestan, Southern Siberia, Cyprus, Asia Minor and Northern India. This is a very polymorphic species.

58. G. DAYANA Chodat et Beauverd in Dinson, Plant. Port Fasc. 1:8, 1932; Dinson in Fedde Repert. 33:107-108, 1933.

This species is related to *G. alexandrinae* Boiss. (in herb.), *G. reticulata* var. *fibrosa* Boiss. and *G. damascena* Boiss. It is known from the environments of Beirut where it grows in sandy soils.

59. G. TAURICA Steven Bull. Soc. Imp. Nat. Moscou 30:2,83.

This species differs but very little from *G. reticulata*. Here belongs var. *conjungens* Pasch. in sched., having longer perigone segments. Native to Afghanistan, Iran and Tauria.

60. G. PAMIRICA Grossh. in Komarov, Flora U. S. S. R. 4:738, 1935.

DESCRIPTION.—Bulbs solitary, ovate. Tunic more or less leathery. Stem 4 to 9 cm. long. Basal leaf slightly longer than the inflorescence, narrow linear. Cauline leaves very much reduced, small, very narrow, producing bulblets in the axils. Flowers frequently solitary. Segments of the perigone 9 to 10 mm. long, lanceolate, obtuse toward the apex, yellow, on the outside green. Anthers oblong.

NOTES.—Native to the alpine regions in the Mountains of Pamiro-Alaj and Tjan-Shan, U. S. S. R. to an alt. of 4350 m.

61. G. TEHERANICA Gandoger, Bull. Soc. Bot. France 66:201, 1920.

DESCRIPTION.—Bulbs 2.5 cm. diameter. Leaves broad arcuate, deflexed. Scape short, villose. Segments of the perigone thin, dry and membraneous, 15 to 16 mm. long. Stamen two thirds the length of the perigone.

NOTES.—Has been reported from the environments of Teheran, Iran.

62. G. DIVARICATA Regel, Act. Hort. Petrop. 6, 510.

DESCRIPTION.—Bulbs solitary, ovate. Tunic reticulate, short acuminate. Basal leaves solitary, linear-filiform. Cauline leaves two or three, passing beyond the flowers. Inflorescence one to many flowered. Peduncles glabrous, divaricate. Segments of the perigone glabrous, linear-lanceolate, attenuate-acute. Anthers long.

NOTES.—This species has been considered to stand close to *G. reticulata*. The stem is more elongate and the pedicels are shorter. Native to Turkestan.

63. G. BULBIFERA (L.) Salisb. Kon. et Sims, Ann. Bot. 536, 1806; Ledeb. Flor. Rossica 4:142; Regel, Flor. Turkest. 1:111; Boiss. Flor. Orient. 5:210; *Ornithogalum bulbiferum* L. Suppl. 199.

DESCRIPTION.—Basal leaves linear. Cauline leaves passing into bracts gradually, forming bulblets in their axils. Inflorescence few

flowered. Flowers 7 to 18 mm. long. Outer segments of the perigone oblong, acute; inner ones with broad margines, obovate, oblong, acuminate or acute. Var. *nuda* Regel, Desc. Plant. Nov. 7:223 is a small slender form with smaller flowers, apparently not forming axillary bulblets.

NOTES.—Native to Turkestan, Northern Iran, Western and Southern Siberia, Northern Mongolia. The inflorescence of this species is a little more pronounced than in *G. setifolia.*

64. G. PERPUSILLA Pasch. Lotos N. F. 14.125-127, 1904.

DESCRIPTION.—Plants small, slender. Bulbs one, upright, ovoid. Tunic somewhat membranaceous, ash-colored to brown, fibres fine. Stem 2 to 6 cm. high, at the base slightly attenuate, obtuse angulose, glabrous, seldom slightly hairy. Basal leaves solitary, narrow linear, faintly attenuate at the base, slightly grooved, somewhat reddish, ¾ to 1¼ mm. wide, 10 to 15 cm. long. Cauline leaves two, nearly opposite, seldom alternate; lower leaf ovate-oblong, grooved at the base; upper leaf somewhat concave to grooved at the base, slightly reddish, 3 to 4 mm. wide, 5 to 7 cm. long. Inflorescence few flowered. Pedicels of various length. Bracts narrowly linear, somewhat grooved. Pedicels and bracts slightly hairy and at some places glabrous. Flowers 8 to 9 mm. long. Outer segments of the perigone subovate-oblong or oblong, slightly acuminate, acute at the apex; interior ones oblong, attenuate at the base, subacute toward the apex. Segments greenish on the outside, yellow on the inside. Stamens one quarter the length of the perigone; filaments subulate and dilatate at the base; anthers long. Pistil slightly longer than the stamens, at the base a little attenuate, 3-sides, at the top somewhat retuse or emarginate; style double the length of the ovary; stigma slightly capitate or 3-lobed.

NOTES.—The relationship of this species within the genus is imperfectly understood. There are indications that it may belong to the section *Platyspermum* which is also the view of Boissier. Native to the Orient. Exsiccatae: Haussknecht, Iter Orientale 1068.

65. G. HISSARICA Lipsky, Act. Hort. Petrop. 23:4, 241.

DESCRIPTION.—Plants very small. Bulbs single, small. Tunic thin, dry, membranaceous. Basal leaves single, linear to narrow-linear. Cauline leaves 1 to 3, notably small, the base surrounding the stem, subequaling the flower, more or less filiform, opposite, attenuate at the base, acuminate toward the apex. Flowers single, seldom 2, small. Pedicels thin, as long or longer than the perigone. Segments of the perigone glabrous, oblong-lanceolate or linear-oblong, acute, seldom obtuse, with whitish scariose margins. Stamens one third the length of the perigone.

NOTES.—Native to Buchara, growing at an alt. of 3300 to 4000 m.

66. G. SETIFOLIA Baker, Journ. Linn. Soc. 18:101; Boiss. Flor. Orient. 5:212.

DESCRIPTION.—Bulbs small, globose. Tunic dry, surrounded by flexuose fibres. Basal leaves solitary, subulate, glabrous. Scape glabrous. Inflorescence 2 to 4-flowered, umbellate, surrounded by narrow-linear

bracts. Pedicels of various length, longer than the flower, glabrous or whitish puberulent. Segments of the perigone lanceolate, acute, yellow, greenish on the dorsal side. Stamens a little shorter than the perigone. Anthers linear-oblong.

NOTES.—Native to Afghanistan.

67. G. CHLORANTHA (Bieberst.) Schult. Syst. 7:264; Boiss. Flor. Orient. 5:209; *Ornithogalum chloranthum* Bierberst. Flor. Taur. Cauc. Suppl. 264; *G. bohemica* Regel Arct. Hort. Petrop. 3:291; Flor. Turk. 114, 115; *G. gracilis* (Welw) Reichb. Icon. Flor. Germ. Tab. 477.

DESCRIPTION.—Plants frequently short. Cauline leaves linear, long, attenuate, ciliate, alternate. Inflorescence 1 or 2-flowered. Pedicels elongate after anthesis. Flowers 12 to 16 mm. long. Outer segments of the perigone subovate oblong, obtuse; inner segments more oblong. Var. *cyprica* Pasch. in sched., is more slender, the flowers are smaller.

NOTES.—Native to Northern Iran, Cyprus and Asia Minor.

68. G. DAMASCENA Boiss. et Gaill. Diagn. Ser. 2:4, 105; Boiss. Flor. Orient. 5:209; *G. caespitosa* Hausskn. MSS.; *G. monticola* Payne. Palest. Exp. Soc. 124.

DESCRIPTION.—Plants tall to 20 cm. high. Bulbs solitary. Tunic fibrous toward the apex. Basal leaves elongate. Cauline leaves long, reaching above the flowers, narrow linear, opposite. Inflorescences 2 to 4-flowered, bracts pubescent, narrow linear. Pedicels longer than perigone. Segments of the perigone glabrous, linear-oblong, obtuse, 5 to 7-veined, marginate, on the outside greenish yellow. Filaments one third the length of the perigone. Anthers oblong. Capsule clavate-oblong, as long as the perigone.

NOTES.—Native to Central and Southern Iran, Asia Minor and Syria. In Mesopotamia it has been recorded from Mount Nimrud Dagh. By some it is considered a southern form of *G. chlorantha.*

70. G. CAUCASICA Stapf Denkschr. Akad. Wiss. Wien 15, 1885.

This species is more robust than *G. chlorantha.* Inflorescence is few flowered. Pedicels become much longer after flowering. Cauline leaves are broad, oblong-linear, somewhat vertical.

NOTES.—Native to Transcaucasia. *G. chlorantha, G. damascena* and *G. caucasica* have many forms that merge into each other.

71. G. ULIGONOSA Siehe et Pasch. Lotos N.F. 14:127-128, 1904.

DESCRIPTION.—Plants glabrous, slender, 10 to 18 cm. high. Bulbs one, erect, ovoid. Tunic dark brown, fibres few or absent. Stem terete. Basal leaves narrow linear, slightly grooved at the base, occasionally attenuate, about as long as the inflorescence, 1 to 1.5 mm. wide. Cauline leaves gradually passing into bracts, linear, scarcely attenuate, canaliculate, 4 cm. long. Inflorescence usually one flowered. Pedicels robust, sometimes slightly flexuouse. Flowers 15 to 18 mm. long. Outside segments of the perigone and pedicels reddish. Outer segments oblong, attenuate toward the apex, with narrow membranaceous margins; interior segments similar. Stamens one third the length of the perigone; filaments slightly dilatate toward the base; anthers oblong. Ovary obtuse, 3-sided, 5 to 7 times longer than wide; stigma slightly 3-lobed.

NOTES.—Native to Cilicia, was first found by Siehe in a bog meadow at 2600 m. alt. It was mentioned in 1896 by him under the above name.

Pascher was, however, unable to find a description of the species. He therefore described it for the first time in Lotos, 1904, considering himself and Siehe as the author of the name.

72. G. ALBERTII Regel Act. Hort. Petrop. 6:512.

DESCRIPTION.—Plants about 20 cm. high, caespitose. Bulbs ovate in clumps. Basal leaves about 3 mm. wide. Lower cauline leaf narrow linear, 5 mm. wide. Inflorescence densely leaved, stem short. Pedicels 1 to 1.5 times longer than the flowers, more or less robust. Flowers to 15 mm. long. Outer segments of the perigone subobovate-oblong, obtuse toward the apex; interior ones much more oblong, bright yellow. Anthers linear-oblong; stigma subcapitate or 3-lobed.

NOTES.—Native to Turkestan, at 1000 m. alt.

73. G. OLGAE Regel in Act. Hort. Petrop. 3:297.

DESCRIPTION.—Plants slender, sometimes caespitose. Bulbs ovate-oblong. Cauline leaves 1 to 2, linear to filiform, 1 mm. wide. Inflorescence loose, few flowered. Pedicels 7 mm. long, double as long as the bracts. Flowers 7 mm. long. Segments of the perigone oblong, obtuse, bright yellow. Stigma distinctly 3-lobed.

NOTES.—Native to Turkestan. Plants have also been reported from Afghanistan.

74. G. VVEDENSKYI Grossh. in Komarov, Flora U. S. S. R. 4:107,737, 1935.

DESCRIPTION.—Bulbs oblong-ovate. Tunic gray, toward the apex becoming reticulate fibrous. Stem 5 to 15 cm. high, glabrous. Basal leaf narrow lanceolate, 2 to 3 mm. wide, shorter than the inflorescence. Cauline leaves narrow linear. Inflorescence 2 to 3-flowered, frequently 1-flowered. Segments of the perigone oblong-oblanceolate, 12 to 16 mm. long, toward the apex acuminate, yellow on the inside to almost white; on the outside purplish. Stamens half the length of the perigone; anthers small, oblong.

NOTES.—This species is related to *G. Olgae*. It is a native in the mountains of Pamiro-Alaj and Tjan-Schan, U. S. S. R.

75. G. AFGHANICA Terrace. Boll. Soc. Ort. Pal. 2:3,4.

DESCRIPTION.—Differs on the whole by its bright yellow perigone. Outside segments are subobovate-oblong, apex acute; interior ones obovate-oblong, obtuse or subrotundiate-obtuse, 13 mm. long; the outside is often reddish.

NOTES.—Native to Afghanistan and Southern Turkestan. Is somewhat similar to *G. stipitata*.

76. G. JAESCHKEI Pasch. Lotos N.F. 14:128-130, 1904.

DESCRIPTION.—Plants small about 15 cm. high. Bulbs solitary, erect, ovoid. Tunic ash colored, fibres absent. Stem erect or more or less flexuose, often robust, for a considerable part hairy, above somewhat smooth, seldom glabrous, 5 to 8 cm. high. Basal leaves one, more or less stout, linear at the base, slightly attenuate, at the base somewhat attenuate, acute, grooved, slightly reddish, at the base with short hairs, 10 to 13 cm. long, 1 to 2.5 mm. wide. Cauline leaves gradually resembling the bracts, internodes conspicuous; lower cauline leaf much shorter than the inflorescence, 1 to 2 mm. wide, 4 to 6 cm. long, toward

the apex attenuate, acute or obtuse; upper cauline leaf smaller, narrow linear. Bracts short, linear, 1 to 1.5 mm. wide and 1 to 1.5 cm. long, seldom ciliate. Inflorescence 1-flowered, seldom furnished by 2 flowers. Pedicels more or less hairy, seldom glabrous. Flowers 12 to 15 mm. seldom to 18 mm. long. Outer segments of the perigone oblong, attenuate, obtuse, 4 to 6-veined; outside greenish and narrowly yellowish bordered; interior ones at the base more or less pilose or glabrous, 2 mm. wide, 13 to 15 mm. long; interior segments oblong, 3-veined with a wide margin. Outside segments at the apex sometimes reddish. Stamens 3/5 to 2/3 the length of the perigone; filaments dilatate at the base; anthers oblong. Pistil longer than the stamens; ovary oblong, obtuse, 3-sided, slightly attenuate; style robust; stigma retuse more or less 3-lobed.

NOTES.—Native to Northern India, among which the Kangra Valley, Himalaya; Kailang-Lahoul, Keylang. This species was discovered by Jaeschke.

77. G. KORSHINSKYI Grossh. in Komarov, Flora U. S. S. R. 4:735, 1935.

DESCRIPTION.—Bulbs small, solitary, oblong-ovate. Tunic light colored, grayish, more or less leathery, on the outside reticulate fibres. Stem 8 to 15 cm. long. Basal leaves solitary, as long as the inflorescence, narrow-linear, about 2 mm. wide, more or less grooved. Cauline leaves solitary, narrow linear, shorter than the inflorescence. Inflorescense 2 to 7-flowered. Pedicels erect, unequal, thin, crispulate-villose, about 2 to 3 times longer than the flowers. Segments of the perigone oblong-lanceolate, at the base attenuate, on the outside purplish.

NOTES.—Native to the mountains of prov. Darvas, Buchara. Is related to *G. kopetdagensi.*

78. G. BORNMUELLERIANA Pasch. Fedde Repert. 194, 1905.

DESCRIPTION.—Plants small, 3 to 7 cm. high, slender. Bulbs ash-gray. Basal leaves linear. Lowest cauline leaf 1 to 2 times as wide as the basal leaf. Inflorescence 1 to 3-flowered. Pedicels slender. Bracts filiform, ciliate-pilose. Flowers to 10 mm. long, glabrous. Segments of the perigone subovoid or obovate-oblong, obtuse.

NOTES.—Native to Iran. This is a very attractive species which resembles *G. damascena.* Its perigone segments are more rounded.

79. G. CHOMUTOWAE Pasch. sched. Fedde Repert. 194, 1904, bull. Soc. Imp. Nat. Moscou 372, 1905; *G. olgae* var. *chomutowae* Pasch. Fedde Repert. 2:67.

DESCRIPTION.—Plants large, 30 cm. high. Bulbs single. Tunic short. Basal leaves linear, as long as the inflorescence, 2 to 5 mm. wide, grooved. Cauline leaves half way clasping at the base of the stem, gradually attenuate; as wide as the basal leaves. Inflorescence many flowered. Peduncles very often elongate. Pedicels 2 to 5 times as long as the flowers. Flowers 18 mm. long. Outer segments of the perigone subovate-oblong; inner ones more obovate-oblong, obtuse or rotundate-obtuse. Ovary round, as long as the style.

NOTES.—Native to Turkestan. This species is closely related to

G. olgae of which it is also considered a variety.

80. G. ANISOPODA Pop. in Komarov, Flora U. S. S. R. 4:737, 1935.

DESCRIPTION.—Bulbs small, ovate. Tunic brownish, reticulate. Stems 6 to 10 cm. long, erect. Basal leaves solitary, narrow linear, about 1 to 1.5 mm. wide, above slightly grooved, glabrous, slightly longer than the inflorescence. Cauline leaves narrow linear. Flowers solitary, seldom in two's. Pedicels subflexuose. Perigone 8 to 9 mm. long, yellow, green on the outside. Segments linear-oblong, narrow, attenuate toward the apex, cuculate. Anthers oblong.

NOTES.—Native to the mountainous region of Turkomania. Type specimen from western Kopet-dagh.

81. G. IMPROVISIA Grossh. in Komarov, Flora U. S. S. R. 4:734, 1935.

DESCRIPTION.—Bulbs ovoid; bulblets numerous, black-brownish. Tunic leathery, brown or black brownish. Stem 10 to 25 cm. high, glabrous. Basal leaves longer than the stem, fistulose, 5 to 6 mm. wide. Cauline leaves 2 to 3, lanceolate-oblong; upper ones lanceolate often diminute. Inflorescence 2 to 3-flowered. Pedicels thin, somewhat nodding. Flowers 10 to 12 mm. long. Segments of the perigone oblong-elliptic, obtuse, yellow, greenish on the outside. Anthers oblong. Ovary oblong-elliptic, sessile; Style thick, short.

NOTES.—Native to Southern Transcaucasia in the Repl. Nachitschevan. Related to *G. chomutowae* from which it differs by its numerous bulblets.

82. G. CAROLI-KOCHII Grossh. in Komarov, Flora U. S. S. R. 4:736, 1935.

DESCRIPTION.—Bulbs ovate. Tunic gray with thin fibres. Scape 5 to 12 cm. long, thin. Basal leaf solitary, linear, about 2, seldom 1 to 0.5 mm. wide. Inflorescence 3 to 5, seldom 1-flowered. Pedicels pubescent, seldom glabrous. Segments of the perigone glabrous, 8 to 10 mm. long, yellow, greenish on the outside, long acuminate. Capsule obovate, half the length of the perigone.

NOTES.—Native to the mountainous regions of Southern Caucasia, Distr. Migry, Nachitschevan.

Subsection 2. **Stipitatae** Pascher, in Lotos, n. ser. **14:** 115. 1904. Bulbs often solitary; ovary stalked, obovate, becoming narrower toward the base.

83. G. PERSICA Boiss. Diagn. Ser. I. 7, 108; Flor. Orient. 5:210.

DESCRIPTION.—Bulbs small, ovate-conical. Basal leaves narrow linear, seldom wider. Lower cauline leaves broader than the basal leaves. Bracts small, producing bulblets in the axils. Inflorescence somewhat erect, few flowered, sometimes flowers are lacking. Pedicels slender. Segments of the perigone glabrous, oblong-lanceolate, obtuse. Stamens shorter than the perigone. Ovary clavate, 3-sided, attenuate toward the base. Seeds compressed. Var. *praecedens* Pasch. Bull. Soc. Imp. Nat. Moscou 373, 1905, has basal leaves that are much wider, 8 mm. broad, attenuate. Inflorescence without bulblets. Flowers are much larger.

NOTES.—Native to the mountains of Iran, Afghanistan, Southern Turkestan and Northern India to the alpine zone at 4300 m. alt.

84. G. KNEISSEA J. Thiebaut in Bull. Soc. Bot. France 8:119, 1934.

DESCRIPTION.—Plants 6 to 10 cm. high. Bulbs in two's. Tunic involute, deep brown. Basal leaves two, narrow oblanceolate, acute. Cauline leaves and bulblets absent. Inflorescence 3 to 7-flowered. Flowers small. Segments of the perigone acute or almost acute. Stamens longer than the perigone.

NOTES.—This species stands far apart from the others on account of its small flowers, though they are larger than those of *G. persica.* It is a native of Lebanon and accompanies often *G. reticulata.* It is found to an alt. of 1600 to 1900 m.

85. G. STIPITATA Merklin ex Bunge in Mem. Acad. Petersb. 7:512, 1851; *G. ova* Stapf, Botan. Ergebn. der Polakschen Exp. nach Persien 1:16, 1885; *G. persica* Kotchy in sched.; *G. persica* var. *ebulbosa* Boiss. Flor. Orient. 5:210.

DESCRIPTION.—Differs from *G. persica* through the absence of bulblets in the inflorescence. Flowers are larger, 8 to 14 mm. long. Ovary retuse, sometimes emarginate. Lower caulines leaves are larger and wider. Var. *ova* (Stapf) Pasch., Bull. Soc. Imp. Nat. Moscou 373, 1905 is more robust, its flowers are larger. It is considered as a species by Grossheim in Komarov, Flora U. S. S. R. Var. *merklini* Pasch. Bull. Soc. Imp. Nat. Moscou, 373, 1905, produces slender plants; flowers are smaller, 2 to 7 mm. long.

NOTES.—Native to Southern Turkestan, Iran, Afghanistan and Northern India.

86. G. MINUTIFLORA Regel Act. Hort. Petrop. 3:291-292, 1875.

DESCRIPTION.—Plants slender. Bulbs small, subglobose, solitary. Basal leaves solitary, filiform, shorter than the inflorescence, glabrous. Cauline leaves alternate, oblong, much smaller than the previous ones, elliptic-lanceolate, acuminate, glabrous, as long as the inflorescence or shorter. Inflorescence few to many flowered. Flowers small, 3 to 4 mm. long. Segments of the perigone oblong, obtuse, greenish-yellow, 2.5 to 3.5 mm. long; the outer ones conspicuously 3-veined; the inner ones somewhat wider. Anthers ovate, shorter than the perigone. Ovary ovate; style shorter than the stamens; stigma incarassate, truncate somewhat 3-lobed.

NOTES.—This species resembles *G. stipitata.* It is a native of the mountains of Turkestan.

87. G. TENERA Pasch. Lots N.F. 12:128, 1904; *G. amblyopetala* Vved 62, 1924; non Boiss. et Heldr.; *G. bithynica* Misaz, Flor. Caucas. Crit. 2:169, 1912.

DESCRIPTION.—Plants very small, slender, 8 to 10 cm. high. Bulb solitary, small ovoid. Tunic brown violet. Stem somewhat terete to slightly angulose, erect or somewhat flexuose. Basal leaves one, slightly grooved, narrow linear, about as long as the inflorescence. Cauline leaves small 3 to 4 mm. wide, about 5 cm. long, slightly clasping at the base, grooved, somewhat recurved at the apex. Upper cauline leaf similar though narrow and shorter attenuate. Inflorescence 1 to 2-flowered. Bracts much similar to the cauline leaves, attenuate-acute,

shorter than the pedicels. Pedicels slender, somewhat filiform, subflexuose, 1.5 to 2 times longer than the flowers. Flowers 8 to 9 mm. long. Exterior segments of the perigone yellow, oblong, subacute toward the apex; interior ones obovate-oblong, the apex being subacute to obtuse, with wide margins. Segments 1.5 to 2 mm. wide. Stamens one third of the length of the perigone; filaments dilatate, somewhat filiform. Ovary obovoid, attenuate at the base, retuse at the apex, slightly emarginate; stigma retuse, slightly 3-lobed.

NOTES.—Native to Turkestan and surrounding territory. Pascher is uncertain as to the relationship of this species. Considering the bulb, stem and segments of the perigone which are also found among the flat-seeded forms, it appears to show resemblance to *G. persica.*

SECTION 2. **Plectostigma** (Turcz.) Pascher, in Bull. Soc. Nat. Moscou **27:** 113. 1854. Pistil three-parted.

88. G. PROVISA Pasch. Fedde Repert. 1:195.

DESCRIPTION.—Plants varying from 3 to 17 cm. in height. Bulbs small. Tunic faintly developed, without fibres. Basal leaves single, narrow linear, as long or longer as the stem, 1 to 1.5 mm. wide, grooved. Inflorescence few flowered, becoming much elongated after anthesis. Pedicels erect, thin, often three times as long as the flowers. Flowers large, 12 to 17 mm. long, bright yellow; outer segments of the perigone oblong with narrow limb. Stamen one third the length of the flowers; filaments dilatate at the base; anthers elliptic. Ovary obtuse, 3-sided as long as the style.

NOTES.—This is a conspicuous species which Pascher found in the herbarium of Fedtschenko. It resembles somewhat *G. uliginosa.* Native to Eastern Siberia among which Jakutsk.

89. G. PAUCIFIORA Turcz. Bull. Soc. Nat. Moscou 28, 113; *Plecostigma pauciflorum* Turcz. l. cit.

DESCRIPTION.—Basal leaves solitary, narrow linear. Lower cauline leaves slightly wider than the basal ones, gradually changing into bracts. Inflorescence few flowered. Pedicels somewhat elongate. Flowers 12 to 18 mm. long, glabrous. Segments of the perigone oblong. Var. *Karoana* Pasch. Bull. Soc. Imp. Nat. Moscou 374, 1905, has a more dense inflorescence.

NOTES.—Native to Dahuria, Manschuria and Northern China.

90. G. LLOYDIOIDES Pasch. Lotos N. F. 14:118, 1904; *G. szechenyi* Kan. Ung. Akad. Wiss. 15:11 nomen; *Szechenya lloydioides* Kanitz, Kon. Ergebn. Reis. Szechenyi. Bot. Teil. 734.

DESCRIPTION.—Tunic wide, long. Pedicels as long as the flowers. Segments of the perigone toward the apex attenuate or acute.

NOTES.—Native to Northern China.

LITTLE KNOWN OR DOUBTFUL SPECIES

91. GAGEA ALEXEENKOANA Mischchenko, Flor. Caucas. Crit. 2:173, 1913. Caucasia.

92. G. ALTAICA Schischk. Sumner Animavers. Syst. Herb. Univ. Tomsk. Nr. 8:1, 1928. Altai Region.

93. G. CAPILLIFOLIA Vved. in Vved. et al, Key Flor. Taschk. 60, 1923, Turkestan.

94. G. CHANAE Grossh. in Grossh. et Schischk. Sched. Herb. Plant. Or. Exsicc. 16, 1924. Transcaucasia.

95. G. DUTOITTI Moire et Wilczek, Bull. Soc. Host. Nat. Agr. Nord. 23:318, 1931. Morocco.

96. G. ELLIPTICA Terracc. Boll. Soc. Arag. Spain.

97. G. GRAMINIFOLIA Vved. in Fedtsch. et al Flor. Turkm. 1:269, 1932. Turkestan.

98. G. KOPETDAGENSIS Vved. in Fedtsch et al Flor. Turkm. 1:260, 1932. Transcasp.

99. G. MAEOTICA Artentczuk nr. 23 (1) 61, 1940. Ukrainia.

100. G. POVOVII Vved. in Vved. et al, Key Flor. Taschkent. Pt. I, 62, 1923. Turkestan.

101. G. PAMPANINII Terracc. in Pamp., Pl. Trip. 53, 1914. Tripolis.

102 G. PSEUDORETICULATA Vved. in Fedtsch. et al, Flor. Turkm. 1:268, 1932. Transcasp.

103. G. SCYTHICA Artemczuk Journ. Bot. Inst. Acad. Sci. Ukraine. Nr. 23 (31): 62, 1940. Ukrainia.

104. G. TRIQUETRIA Vved. in Vved. et al, Key Flor. Taschkent. 59, 1923.

105. G. TURCOMANICA Popov in Fedtsch. et al Flor. Turkm. 1:269, 1932. Transcasp.

107 G. WILCZEKII Braun-Blanq. Mem. Soc. Sci. Maroc. No. 8, 175, 1924. Morocco.

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FORERUNNERS OF DARWIN, 1745-1859, edited by Bentley Glass, O. Temkin and W. L. Strauss, Jr. The Johns Hopkins Press, Baltimore, Md. 1959. pp. 471. illus. $6.50. This is among the outstanding books on the history of the evolutionary concept published on the occasion of the Centenary of Darwin's Origin of Species in 1859. The book includes *penetrating* essays by Arthur O. Lovejoy (6 essays), Bentley Glass (3 essays), Francis C. Haber (2 essays), and one essay each by Lester C. Crocker, Charles C. Gillespie, Jane Oppenhaimer and Owesi Remkin.

The subject matter is grouped under three headings—*The Introductory Background* is concerned with the status of geology and the biological species concept at the mid-Eighteenth century. In *The Eighteenth Century,* the contributions of Maupertuis, Buffon, Diderot, Linnaeus, Adanson, Koelreuter, Bonnet, Spallanzani, Kant and Herder toward the development of the evolutionary concept, are evaluated; the significance of fossils; and the idea of a process of time in natural history, are discussed. In *The Nineteenth Century,* the stature of Lamarck and Darwin in the history of science is considered: and the embryological enigma in the origin of species, the idea of descent in Post-Romantic German biology, the argument for organic evolution before the *Origin of Species,* 1830-1858, Schopenhauer as an evolutionist, and recent criticism of the Darwinian theory of recapitulation, are discussed. This is required reading for all biologists.—*Hamilton P. Traub.*

.....*THE FAMILIES OF FLOWERING PLANTS,* 2nd ed., by J. Hutchinson. Vol. I. Dicotyledons; Vol. II. Monocotyledons. Oxford University Press, 417 5th Ave., New York 16, N. Y. 1959. pp. 792. illus. $23.50. This revised edition of Dr. Hutchinson's important work after the passing of 33 years since the publication of the first volume of the first edition has been eagerly awaited. The principles, on which the first edition was based, have not been altered in this new edition. In the Dicotyledons, Dr. Hutchinson retains the subphylum *Lignosae* (fundamentally woody plants), and the subphylum *Herbaceae* (fundamentally herbaceous plants) with added emphasis. Such an artificial division is at variance with the facts of Nature, and is thus hardly tenable in an evolutionary system. *For instance,* the *new* family *Averrhoaceae* (low trees and arborescent shrubs), on page 356, is placed under *Rutales* among utter strangers! The *Averrhoaceae,* which are apparently closely related to the *Oxalidaceae* (herbaceous or suffrutescent=woody but very low, according to Hutchinson), on page 497, are separated by a large number of families that are unrelated to these two groups. The writer cultivated *Averrhoa carambola* L. in Florida for over a decade, and knows from actual experience that morphologically these two groups appear to be very closely related as a strict comparison of floral parts will show. This is pointed out in response to Dr. Hutchinson's invitation to anyone who would show relationship between any of the groups belonging to his contrasting subphyla. Adanson, the founder of the natural system of classification, stated the case in a nutshell *in 1752* when he explained why he placed the shipworm, *Teredo,* with the mollusks—"one must not judge by the shell, but by the nature of the animal itself." Similarly, in classifying *Averrhoa* one must *not* judge by the *low tree or arborescent shrub,* but by the nature of the plant itself as revealed particularly by its floral parts, and an ensemble of other criteria, which show undoubted resemblance to the other *Oxalidaceae.*

In contrast with the above disposition, the distribution of the *sympetalous* families amongst their apparent nearest relatives, with or without petals, is in harmony with a truly evolutionary system, and thus in the right direction.

In Volume II. Monocotyledons, with the exception of the new family *Cartonemataceae* Pinchon, and the addition of a number of new genera proposed since the first edition, few changes have been made. Dr. Hutchinson is a very modest man since he does not even mention that his great break-through—the removal of the artificial dictum of Robert Brown that the amaryllids are lilies with inferior ovaries —was confirmed in part with caryological (chromosome) data by McKelvey and Sax, Whitaker and others. This achievement of Dr. Hutchinson will stand as his lasting monument.

Among errors may be noted such misstatements as the following: under geographical distribution, *Hymenocallis* is indicated as ranging through "S. Amer." when some species reach as far north as Indiana in the United States; *Zephyranthes* through "Trop. & Subtrop. Amer.", when one species is native as far north as Virginia; *Cooperia* as "Mex. to Texas", when one species is found in Kansas; *Ungernia* (Persia), when most of the species range through Turkestan and central Asia. And so on.

Pseudostenomesson, which has large round, green, fleshy seeds is placed as a synonym of *Stenomesson,* which has flat seeds. The former is a valid genus related to *Hymenocallis. Chlidanthus,* with flat seeds, and clearly related to *Stenomesson,* is placed in the same group with *Crinum,* which has large fleshy seeds. There are numerous other similar misplacements, but those indicated will suffice to show what is needed to make such groupings more nearly phylogenetic. It is only hoped that he will cooperate with specialists and in a future edition iron out such inequalities.

However, the presence of such errors should not be interpreted as reflecting on the work as a whole which is monumental and a credit to Dr. Hutchinson. The two volumes are highly recommended to the reader.—*Hamilton P. Traub.*

DEVELOPMENTAL CYTOLOGY, edited by Dorothea Rudnick. Ronald Press Co., 15 E. 26th St., New York 10, N. Y. 1959. pp. 215. illus. $7.00.

CELL, ORGANISM AND MILLIEU, edited by Dorothea Rudnick. Ronald Press Co., 15 E. 26th St., New York 10, N. Y. 1959. pp. 326. illus. $8.00.

These outstanding volumes, edited by Dr. Rudnick, contain the papers delivered at the 16th and 17th symposiums, respectively, of the Society for the Study of Development and Growth, and include research papers by twenty-two outstanding authorities.

The first volume is concerned with the cell, both plant and animal, surveying advances in the understanding of cellular structure and function, particularly as pertaining to differentiation processes and their genetic control.

The second volume includes papers on the theme of "Differentiation and growth response to a changing chemical environment." The theme is developed with papers on the role of cell structures in cell movements, enzymatic role of topopherol in muscle tissue, regulation of the myometrium, the adaptations of alkaline and acid phosphatases in development, the chemistry and physiology of insect growth, experimental modification and development, fruit growth in relation to internal and external chemical stimuli, feedback control of growth, and physiology and biochemistry of the mammalian plastocyst.

These two volumes are indispensable to all who are interested in physiology. Highly recommended.

BLAKESLEE: THE GENUS DATURA, by Amos G. Avery, Sophie Satina and Jacob Rietsema. Ronald Press Co., 15 E. 26th St., New York 10, N. Y. 1959. pp. 289. illus. $8.75.

This outstanding book gives a complete account of the genetic investigations carried on by the late Dr. Albert Francis Blakeslee and his associates over a period of more than 40 years with several species of the genus *Datura.* This constitutes one of the most thorough and complete researches ever made of any plant group, including breeding, cytology, morphology, anatomy, physiology, embryology, geographical distribution and evolutionary history of ten *Datura* species. It represents a synthesis of a life's work. This book is required reading for all who are interested in biology.

SUBCELLULAR PARTICLES, edited by Teru Hayashi. Ronald Press Co., 15 E. 26th St., New York 10, N. Y. 1959. pp. 213. illus. $6.00. This volume includes papers by twenty authorities on cell inclusions presented at the 1958 Symposium sponsored by the Society of General Physiologists. The structural aspects of subcellular particles as related to their function are emphasized. The more definitive correlation between particles or parts thereof and their activities within the cell is made possible by improvements in techniques in ultracentrafugation, electron

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microscopy and biochemical analysis. These basic contributions to biochemical cytology are required reading for all biologists.

THE FLOWER ARRANGEMENT CALENDAR, 1960, by Helen Van Pelt Wilson. M. Barrows & Co., 425 4th Av., New York 16, N. Y. The publishers sponsor an annual flower arrangement calendar contest. In this little book some of the outstanding photographs of floral arrangements accepted by the publishers are reproduced in calendar form for 1960. This calendar will be useful to those interested in flower arranging.

THE BOOK OF LANDSCAPE DESIGN, by H. S. Ortloff and H. B. Raymore. M. Barrows & Co., 425 4th Av., New York 16, N. Y. 1959. pp. 316. This concisely and clearly written book on landscaping design for the non-professional, by two professionals, includes the information needed by the layman—the history of the art, the theory and its applications in all its details. Highly recommended.

GRASSLANDS, edited by H. B. Sprague. Amer. Assoc. Adv. Science, 1515 Massachusetts Av., N. W., Washington 5, D. C. 1959. pp. 406. illus. $9.00. This volume makes available the papers presented by forty-four authorities at the New York A.A.A. Meeting in 1956. The papers are grouped under seven headings—Sciences in support of grasslands research, forage production in temperate humid regions, engineering aspects of grassland agriculture, forage utilization and related animal nutrition problems, evaluation of the nutritive significance of forages, grasslands climatology, ecology of grasslands, and range management. Very highly recommended.

PHOTOPERIODISM AND RELATED PHENOMENA IN PLANTS AND ANIMALS, edited by R. B. Withrow et al, Amer. Assoc. Adv. Science, 1515 Massachusetts Av., N. W., Washington 5, D. C. 1959. pp. 903. illus. $14.75. These papers, presented by seventy-five authorities at the international symposium in 1957 and sponsored by the Committee on Photobiology of the National Academy of Science—National Research Council, and with support from the National Science Foundation, are made available in this outstanding volume. The subject matter is grouped into eleven sections—photochemical principles, photocontrol of seed germination by green light, role of chemical agents in photocontrol of vegetative growth, photoperiodic control of reproduction in plants, growth factors and flowering, analysis of plant photoperiodism. relation of light to rhythmic phenomena in plants and animals, photoperiodism in the invertebrates and vertebrates, photoperiodic control of reproduction and migration in birds, and control of periodic functions in mammals by light. This is required reading for all biologists.

HAMMOND'S PICTURE LIBRARY OF PETS, PLANTS AND ANIMALS, by E. L. Jordan. C. S. Hammond & Co., Maplewood, N. J. 1958. pp. 256. illus. $7.50. The objective of this profusely illustrated book (362 original paintings in color) is to cover domesticated animals and plants that have been adapted and improved by man to serve his own purposes. The subjects included are dogs, cats, birds, fishes, reptiles, fruit and nut crops, vegetable crops, field crops, and ornamental plants.

A GEOGRAPHY OF GHANA, by E. A. Boateng. Cambridge University Press, American Branch, 32 E. 57th St., New York 22, N. Y. 1959. pp. 205. $4.00. Although this scholarly treatise of the geography of Ghana is intended primarily for students, it is apparent that it will prove useful to many others with interest in commerce and the sciences. Parts I and II, "The Land" and "Human Response" are concerned with relief and structure, climate and weather, drainage, vegetation and soils, agriculture and fishing, forest products, mining and manufacturing, population and settlements, communications and ports, trade. Part III, "Regional Pattern" is concerned with twelve detailed regional studies. Highly recommended.

SPRING FLORA OF THE DALLAS-FORT WORTH AREA, TEXAS, by Lloyd H. Shinners, Publ. by the Author, Herbarium, Southern Methodist University, Dallas 5, Texas. 1958. pp. 514 illus. This attractive book represents an abstract from Dr. Shinners' manuscript "Flora of North Central Texas". The abstract includes all flowering plants known to grow within 50 miles of Dallas and Fort

Worth, Texas, that flower between January 1 and the first week in June. Most cultivated woody plants (except coniferous evergreens) and many herbaceous plants are also included. There is a general key to the families and genera, and useful keys to species under genera where needed. Among other useful information in the Appendices, there is a most interesting account of the background of the book. We believe that Dr. Shinners is correct in making this guide to a somewhat smaller area available at this time pending the publication of his larger work. Highly recommended.

THE GARDENER'S WORLD, edited by J. W. Krutch. G. P. Putnam's Sons, 210 Madison Av., New York 16, N. Y. 1959. pp. 476. illus. This most interesting book does not give gardening instructions but "tells the story of man's love of nature and plants, of the spirit which, through the ages, has moved man to investigate and use the natural world that surrounds him," including the fashions in gardening, plant exploration, myths, fantasies and hoaxes, as told by the great writers—Addison, Johnson, Melville, Lewis Carroll, H. G. Wells, Colette, and others; and also the modern nature and gardening writers. All of this material is introduced by Mr. Krutch.

THE PLANT KINGDOM, A LABORATORY MANUAL, by P. C. Lemon and N. H. Russell. C. V. Mosby Co., 3207 Washington Blvd., St. Louis 3, Mo. 1959. pp. 176. illus. $3.25. Although this laboratory manual is correlated to be used with the text, "An Introduction to the Plant Kingdom" (1958), see Plant Life 1959, p. 168, for review, it may also be used with other recent texts which follow the evolutionary approach. The manual includes a rather comprehensive survey of the structural types and reproductive methods found in the plant kingdom.

DICTIONARY OF ECONOMIC PLANTS, by J. C. Th. Uphof. Published by H. R. Engelmann (J. Cramer), Wienheim, Germany; Hafner Publ. Co., New York. 1959. pp. 400. The objective of this comprehensive reference work, listing over 6000 different species, is to present alphabetically brief descriptions of economic plants (not including ornamental plants), with their geographical distribution, their products and principal uses. The plants included are important to agriculture, forestry, fruit and vegetable culture, and pharmacognosy, which are important in regional and international trade. However, plants that are strictly of local value are also included. This rich mine of information about economic plants will be welcomed by all who are interested in growing, marketing, and the use of plant products. Highly recommended.

THE GREEK HERBAL OF DIOSCORIDES, translated by John Goodyear, and edited by R. T. Gunther. Reprinted from the first English edition of 1933. Hafner Publishing Co., 31 E. 10th St., New York 3, N. Y. 1959. pp. 701. illus. $15.00.

The famous work compiled by Dioscorides in the first century A. D. in Asia Minor was one of the sources of the herbalists for fifteen centuries, but until recently it was not available to English readers. Although John Goodyear made an English translation of this important work during 1652 to 1655, this was not published until 1933 in an edition that has long been out of print. It is this 1933 edition which has now been reprinted so that it may be generally available. The text is illustrated by a Byzantine of about A. D. 512 for presentation to Juliana Anicia, daughter of Anicius Olybrius, Emperor of the West in 472. At the end of the present edition is a catalogue of the plants in the text which have been determined with some degree of probability by Sibthorp, Lindley and others.

This is an excellent opportunity to add this valuable historical document to your library.

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For the roster of the general officers of the Society, the reader is referred to the inside front cover of this volume.

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[AMERICAN AMARYLLIS SOCIETY, continued from page 2.]

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MELCHIOR TREUB, by H. H. Zeijlstra. Published by Koninklijk Instituut voor de Tropen, Amsterdam, Netherlands. 1959. pp. 128. illus. This biography, subtitled "Pioneer of a New Era in the History of the Malay Archipeligo", is published in English so that it will be serviceable to the many friends and admirers of Melchior Treub (1851-1910), and to all interested in research with topical plants, and agriculture. Dr. Treub was appointed Director of 's Lands Plantentuin at Buitenzorg in the Netherlands Indies in 1880 and served in the Colony until 1909. In 1903 he was instrumental in founding the Department of Agriculture in the colony and served as its first Director. The author gives a detailed report on the work carried out by Dr. Treub in basic plant research and the impact of his promotion of basic research on the development of agriculture in the colony. The volume closes with an estimate of Dr. Treub's personality. Highly recommended to all interested in plant science and tropical agriculture.—*Hamilton P. Traub.*

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