HERBERTIA

1938

HERBERTIA

VOLUME 5

DEDICATED TO

ERNST H. KRELAGE

EDITED BY

HAMILTON P. TRAUB

Mira Flores, Orlando, Florida

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INTRODUCTION

In the horticulture of the Netherlands, the name of Krelage has been for many years well established and renowned, especially in bulb growing.

As long ago as 1829, a member of the family, E. H. Krelage, pioneered in holding cut flower exhibitions of new hyacinths. His son, J. H. Krelage, gave the stimulus that led to the founding of the General Society for Bulb Growing, and he served as Chairman of this organization from 1860 until 1900, a period of forty years. Under his leadership, the Society developed into a powerful and very influential horticultural organization.

In 1907, the contemporary E. H. Krelage was elected Chairman of the General Society, and prior to this he had served as a member of the Main Council since 1904. He held the office of Chairman for twenty-eight years, and carried on his duties with forceful tact and great energy. In his official capacity his wide knowledge and talent were available not only to the circle of professional men but also to the Administration of the Municipality, the Chamber of Commerce, the Horticultural Council of the Netherlands, and Government committees.

At congresses and exhibitions at home and abroad, E. H. Krelage was an important spokesman and advocate for the bulb industry, and he has contributed vigorously and indefatigably to the upbuilding of the bulb industry in all parts of the world.

In the field of science, E. H. Krelage also made important contributions. Due to his efforts, the bulb growing profession came into possession of its own laboratory for bulb research, and many of his scientific papers are an inspiration to present day workers.

The General Society for Bulb Growing recognized his great merits by electing him its Honorary Chairman when he retired as Chairman. The Honorary Nicolaas Dames Medal was bestowed upon him for his scientific achievements, including the origination of the new race of Mendel tulips. The Government did not remain behind in recognizing his abilities and worth. As early as 1909, he was appointed by the Netherlands Government as an Officer in the Order of Orange-Nassau, and in 1925 he was elected to Knighthood in the Order of the Netherlands Lion.

J. J. WINTERMANS,
The Director-General of Agriculture.

The Hague,
Netherlands,
January 11, 1938.

VOORREDE

De naam Krelage heeft in den Tuinbouw in Nederland en in het bijzonder in de bloembollenteelt sinds lange jaren een gevestigde en roemvolle naam.

Reeds in 1829 was er een E. H. Krelage, van wien het initiatief uitging hot het houden van een tentoonstelling van afgesneden bloemen van nieuw gewonnen Hyacinthen. Diens zoon J. H. Krelage gaf den stoot tot de oprichting van de Algemeene Vereeniging voor Bloembollencultuur, welke hij van 1860-1900, dus veertig jaren, onafgebroken leidde als voorzitter en onder wiens leiding de Vereeniging zich ontwikkelde tot den machtige en zeer belangrijke tuinbouwvereeniging.

In 1907 werd de heer E. H. Krelage tot voorzitter der Algemeene Vereeniging gekozen nadat hij al in 1904 zitting had genomen in het Hoofdbestuur. Gedurende 28 jaar werd het voorzitterschap door hem bekleed en deed hij bij voortduring van een krachtig beleid en groote energie blijken. Niet alleen echter in den kring der vakgenooten, doch ook in het bestuur der gameente zijner inwoning alsmede in de Kamer van Koophandel, in den Nederlandschen Tuinbouwraad en in Regeeringscommissies werd hem gelegenheid gegeven zijn en gaven in dienst te stellen van het bedrijf dat hem zoo na aan het hart lag.

Ook op crongressen en tentoonstellinghen in het binnen- en buitenland is E. H. Krelage de groote woordvoerder en pleitbezorger van de bloembollenteelt geweest en heeft hij krachtig en onvermoeid bijedragen tot verbreiding van den roem van de bloembollenteelt tot in alle deelen der wereld.

Ook op het terrein der wetenschap bewoog Krelage zich gaarne. Zoo werd, dank zij vooral zijn streven, het bloembollenvak verrijkt met een eigen laboratorium voor bloembollenonderzoek en trekken talrijke publicaties van ziji hand nog dagelijks de aandacht.

De Algemeene Vereeniging erkende dan ook zijn groote verdiensten door hem bij zijn aftreden als voorzitter het Erevoorzitterschap der Vereeniging aan te bieden, terwijl hem op grond van zijn wetenschappelijke prestaties (o.m. het winnen der Mendel-tulpen) de gouden Eeremedaille Nicolaas Dames werd toegekend. De Regeering bleef in de erkenning zijner kwaliteiten niet achter.

Reeds in 1909 was hij door de Nederlandsche Regeering benoemd tot Officier in de Orde van Oranje-Nassau terwijl in 1925 zijn benoeming volgde tot Ridder in de Orde van den Nederlandschen Leeuw.

DE DIRECTEUR-GENERAAL VAN DEN LANDBOUW,

J. J. WINTERMANS.

11 Januari, 1938
Den Haag,
Nederland

PREFACE

With this volume of Herbertia the members of the American Amaryllis Society celebrate the 69th. anniversary of the birth of Ernst H. Krelage, one of the most outstanding horticulturists of our time. In honoring him as a typical son, we also honor the Netherlands Nation as a whole, a race that has contributed much to the stability and progress of the world.

The Krelage autobiography is the main feature of this issue, and it is of primary interest not only to the horticulturist but also to the student of political economy for it shows what can be accomplished by competent leadership in agriculture.

The history of amaryllid culture in Holland, also by Mr. Krelage, adds another interesting chapter to the history of horticulture. We are glad to have also the introduction to the contemporary amaryllid breeders in Holland that is included in the text.

It is a welcome coincidence that the results of the researches of Dr. Uphof, a Hollander by birth, on the nomenclature of "Hippeastrum and Amaryllis" are included in this volume. After more than one hundred and sixteen years, an unfortunate error in the nomenclature of the two genera has at last been corrected thanks to the scholarship and research of Dr. Uphof, Professor of Botany, Rollins College, Winter Park, Florida. Dr. Uphof's paper will put an end to the dual use of the word "Amaryllis" for he proves that the inelegant and unwanted name "Hippeastrum" has been a superfluous one all these years.

We are fortunate indeed to have the very important articles on forcing amaryllids by Dr. Grainger and Prof. Dr. van Slogteren. These articles have been awaited with much interest. They will be of immediate value and will also serve as a basis for further progress in developing better methods of forcing such difficult subjects as hybrid amaryllis. There seem to be no valid reasons for hesitancy in undertaking similar investigations with hybrid amaryllis.

The daylily is rapidly coming into its own as one of the important plant subjects in American gardens. This is especially true in such a subtropical climate as central Florida where the first blooms usually appear in the middle of February, and through recurrent blooming the same varieties flower from four to five times by autumn. This same statement is true of the Southern States generally, except that the number of recurrent blooming periods may be fewer. In the North, the daylily is also appreciated and this is indicated by the activity of such enthusiastic workers as Mrs. Dewey, Mrs. Nesmith, Mr. Kelso and Prof. Graves. Every one is familiar with the important work of Dr. Stout of the New York Botanical Garden who has done much to increase interest in daylilies. His most important contribution consists of an array of excellent daylily varieties that have set a standard for others. He is actively engaged in breeding and he will undoubtedly make still greater contributions to the advancement of the daylilies.

There was a time when too many yellow and orange varieties precluded the use of daylilies as major garden subjects, but this stage is

passing rapidly. Good collections should now contain varieties with a wide range of color from dark velvety red, bright red, rosy-pink to coppery-rose, and other pleasing shades. This advance was made possible primarily by the introduction of *Hemerocallis fulva rosea* by the New York Botanical Garden.

The progress achieved so far with daylilies is only a mere beginning since the number of possible combinations is infinite. There are five classes of daylilies on the basis of stature—dwarf, semi-dwarf, semi-robust, robust and giant—and the color combinations are legion. Other characters—blooming period, foliage habit, flower shape, etc.—offer attractive possibilities. There is one great danger in daylily breeding. As a rule there are very few really inferior seedlings and this constitutes a great temptation to the breeder. In addition to keeping the high standard of the Stout varieties before him, the breeder needs to have his varieties evaluated by an impartial jury. Luckily this latter need will soon be taken care of. Mr. Kelso and Prof. Graves have had the courage to pioneer in this field, and this kind of activity will be undertaken on a national basis in the very near future.

We are happy to report that Mr. Edward Steichen, of Ridgewood, Connecticut, has been appointed Chairman of the Daylily Committee which has the immediate task of evaluating the numerous varieties that have and will be introduced. For this purpose trial gardens are being organized in all sections of the country and in most cases in cooperation with the State Agricultural Experiment Stations. The new varieties will be tested out in these trial gardens as soon as practicable. This committee will also make annual recommendations for the award of the George Yeld Medal which will be awarded to daylily breeders on the basis of outstanding varieties introduced that have been tested out on a national basis.

Other plant subjects that are coming into their own are *Cyrtanthus, Alstroemeria,* and *Bomarea. Cyrtanthus* appear to be excellent for forcing, and some of the species at least are of the easiest culture. As pot plants they are unexcelled. *Alstroemeria* and *Bomarea* make excellen cut flowers. Flower spikes of *Alstroemeria* in the writers garden remain in prime condition for a very long time. It is reported that *Alstroemeria* is used extensively in the cut flower trade of Australia.

During the last season, Dr. Hughes resigned as Executive Secretary for business reasons after serving the Society faithfully and efficiently. The gratitude of the members is due Dr. Hughes for his unselfish service.

The Society was most fortunate in securing a worthy successor to Dr. Hughes in Mr. R. H. Gore, an outstanding newspaper publisher, and former Governor-General of Puerto Rico. Mr. Gore is genuinely interested in plants and his collection will rapidly become one of the major ones in the country.

We are very happy to report that Mr. Wyndham Hayward, the talented and hard working Secretary of the Society, has fully recovered from his illness. His stimulating presence is a distinct asset to the Society for it was through his efforts primarily that the Society was built up so rapidly.

Herbertia for 1939 will be dedicated to South Africa. The main features for this issue are in preparation by members of the Society resident in the Union of South Africa. It promises to be a most valuable issue. Other dedications for future issues of Herbertia are—1940, Latin America; 1941, Australia; 1942, Major Pam; and 1943, 10th Anniversary Number.

—HAMILTON P. TRAUB,
Editor.

June 15, 1938
Mira Flores,
Orlando, Florida.

I had an enjoyable visit with Dr. Stout at the New York Botanical Gardens to-day. He showed me some of his outstanding new daylily hybrids, and also the excellent color plates for his great monograph on *Hemerocallis* to be published soon.

To-morrow I will sail on the Swedish liner *Gripsholm* for Scandinavia.

New York City, July 22, 1938 —H. P. T.

This was a red letter day in my travels to date for I visited the Linnaeus Botanical Garden and Museum, and also the tombs of Carl von Linne, and Emmanuel Swedenborg in Uppsala Cathedral.

In 1918, the Linnaeus Botanical Garden was finally restored and opened to the public. It is in the original location and has been restored according to the plan published during Linnaeus' life time. Even the original iron gate to the Garden has been found and replaced.

In 1937, the Linnaeus Museum was opened to the public. It is housed in the building adjoining the Garden that was used by Linnaeus both as a home and laboratory. Many of the original furnishings have been restored to their former places.

Now that these attractions exist, Uppsala will surely become a Mecca for those interested in plants.

The dominant amaryllids observed in flower under cultivation up here—Hardangarfjiord at Norheimsund, Vik, and Fossle; the environs of Oslo; and in Stockholm and other parts of Northern Sweden—are various species of *Hosta.* The finest display was seen at Old Uppsala.

At Goteborg, the fine Horticultural Garden was visited. The collections of plants, outdoors and under glass, are noteworthy and include such amaryllids as *Crinums, Clivias,* etc.

Uppsala, Sweden, Sept. 7, 1938. —H. P. T.

The dominant amaryllids observed in flower under cultivation below Stockholm, in central and southern Sweden—Svalov, Almarp and Malmo; in Denmark—Copenhagen and Helsinore, were again species of *Hosta.* In Germany and Czechoslovakia, *Vallota purpurea* and *Haemanthus albiflos* were quite common as pot plants, and *Hosta* species were also in flower in the gardens.

Praha, Czechoslovakia, Sept. 7, 1938. —H. P. T.

Hosta species are still the dominant amaryllids, and were observed in flower at Brno, Bratislava, Buda-Pesth, Vienna, and southward to Venice, Milan, Florence, Rome and Naples. In southern Italy one also meets with an abundance of *Callicore*

rosea, including remarkable color variations from almost white to deep pink. These are much used as table decorations at Sorrento, Amalfi, Capri and elsewhere.

On the way down from Vienna to Venice one saw the valley fields covered with autum crocus.

Capri, Sept. 22, 1938. —H. P. T.

Still *Hosta* species—northern Italy up to the Simplon Tunnel, Switzerland, France, Belgium, Holland and England. It seems that an opportunity has been missed by those interested in plant breeding. This subject should prove stimulating to the members in Canada and the northern United States.

The valley fields in western Switzerland and northern France were covered with countless autumn crocus. This is also a neglected subject by the American landscape gardener.

It was inspiring to work at the Royal Botanic Garden, Kew. I am especially indebted to Sir Arthur W. Hill, Director, for extending the invitation to come to Kew, and to his brilliant and efficient staff for constructive criticism and inspiring guidance. I am particularly grateful to Dr. A. D. Cotton, Keeper of the Herbarium and Library, Dr. T. A. Sprague, Deputy Keeper of the Herbarium, Mr. J. R. Sealy, Botanist, Mr. E. Milne-Redhead, Botanist, Miss Ruth Taylor, Botanist, Mr. W. R. Campbell, Curator of the Garden, and Mr. L. Stenning, Assistant Curator, all of whom did much to make my stay at Kew both enjoyable and profitable.

I also had a most enjoyable visit with Major Albert Pam and his family, and on Oct. 11, I attended the Royal Horticultural Society Show in London, consisting of flowers, fruits and vegetables in season. There was a great variety of exhibits, and the attendance was large. On account of lack of space only the amaryllids will be mentioned here with one exception.

There was an outstanding display of *Lilium candidum* var. *Eximium,* grown by the Royal Botanic Garden, Kew, on behalf of the Department of Agriculture, St. Helena.

Amaryllids were shown by Hocker Edge Gardens: Nerines, including *filifolia, Fothergilli major,* and hybrids, *Sternbergia lutea;* Perry's, Enfield: *Amaryllis aulica, Brunsdonna* vars. *Hathor* and *Baptista alba, Argyropsis candida, Nerine Bowdeni major, Tulbaghia violacea;* Ernest Ladhams: *Hosta lanceolata, Nerine Bowdeni major;* The Corporation of Falmouth: *Callicore rosea.*

The visit to the fine Lindley Library at the Headquarters of the Royal Horticultural Society in London was very interesting, and there I had the pleasure of meeting Mr. William T. Stearn and Dr. A. Grove. On account of the recent international crisis, the manuscripts relating to William Herbert had been taken to the country for safe-keeping, and these could not be inspected.

To-morrow I sail for home on the R. M. S. Queen Mary.

Royal Botanic Gardens, Kew, England, —H. P. T.
October 12, 1938.

On my return after an absence of three months, the proofs of this issue of Herbertia were awaiting me. They had also traveled to Europe and back. I am very sorry that this has happened, but trust that the many fine contributions by the members will compensate for the delay.

Mira Flores, Orlando, Fla., —H. P. T.
October 23, 1938.

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Year Book Correspondence. Correspondence regarding articles and illustrations for **Herbertia,** the Year Book of the American Amaryllis Society, is cordially invited. The annual news-letter or articles from Corresponding Members and Regional Chairmen of Trial Collections should be forwarded, if at all possible, by April of each year, or earlier, depending upon the distance, so as to reach the editor in ample time for publication.

Manuscripts should be typewritten if at all possible and double spaced; photographs should have the **name of the owner** to whom credit should be given, and the **name and size of the subject,** written on the back.

LIST OF ILLUSTRATIONS

ERRATA

HERBERTIA, VOL. 4, 1937

Page 22; delete "azaleas, camellias" at the beginning of 15th. line from top (text).
Page 24; 2nd. column of table, 9th. entry from top, for "*C. augustifolium*" read "*C. angustifolium.*"
Page 63; 3rd. line from top, for "*Institute*" read "*Institution.*"
Page 63; 13th. line from top (text), for "are" read "is."
Page 63; 14th. line from top (text), for "most" read "more."
Page 64; 17th. line from bottom (text), for "immorality" read "immortality."
Page 79; 2nd. and 3rd. lines from top (text), delete "illustrated in Plate 48."
Page 157; Plate 66, credit line, for "Max Hoeber" read "Max Loebner."
Page 161; 2nd. line from top (text), for "Plate 56" read "Plate 60."
Page 177; 1st. line of table, following "GILLIESIEAE" insert "0" under "No. of species," and insert "—" under "Basic. Chrom. no." and "Range (2n)."
Page 177; 7th. line of table, for "GILLIESIEAE" read "GALANTHEAE", and delete "O" and two "—" following.
Page 189; 2nd. line from top (text), for "seeding" read "seeing."
Page 206; Plate 76, for Figs. "8a" and "8b" read "8" and "9" respectively.

This volume of Herbertia
is dedicated to Ernst H. Krelage
in celebration of the 69th Anniversary of his birth

From the painting by Oscar Mendlik. 1935

Ernest H. Krelage

Plate 90

ERNST H. KRELAGE

An autobiography

Ch. Binger & Co., Haarlem, 1872

Fig. 33. Ernst H. Krelage at the age of three years.

In the 18th Century my ancestors were peasants in the village Epe near Bramsche, in the neighborhood of the town of Osnabruck, Hanover. In 1804 the youngest son of Johann Franz Krelage (1739-1798) was sent to Holland after his father's death. The eldest son, being the only successor to his father as owner of the farm, could not offer a sufficient inducement to his brothers in those disturbed days of the Napoleonic troubles. So the youngest, Ernst Heinrich (1786-1855) arrived in Holland, and, after many difficulties, succeeded in settling himself in Haarlem as a florist in 1811. He soon specialized in bulbs and at his death in 1855 he was universally recognized to have become foremost in his profession.

His only son Jacob Heinrich (1824-1901) became his partner in 1851, and beginning in that year the business was continued under the style of E. H. Krelage & Son. He extended his firm's world wide reputation and did not confine himself to bulb growing, but also cultivated extensive collections of such varied subjects as conifers, Cactaceae, strawberries, peonies, dahlias, stove and greenhouse plants. He also had a seed trade. In 1889 he put the first Darwin tulips on the market, which have exercised a most remarkable influence on tulip growing in general. In 1860 he founded the General Society for Bulb Growing, and he remained its president during forty years. He also organized the (now Royal) Netherlands Horticultural and Botanic Society and the first Haarlem Bulb Exporters' Association. He very actively took part in manifold social, economic and political activities in his town and country. He worked more for the general welfare than for his own profit.

Jacob Heinrich had one son—from his second marriage with Albertina Dina Wilhelmina Schneither (1828-1917)—the author of this autobiography, Ernst Heinrich Krelage, born in 1869.

After having visited the Haarlem public and Latin schools, I entered the University of Amsterdam as a student of biology in 1887. I did not finish my studies because of my father's advanced age and bad state of health, which made my entrance into the firm urgent, and I became my father's cooperator and soon his partner. After my father's death in 1901 I remained the only leader of the firm. My career will be described in particular hereafter.

In 1910 I married Elisabeth Keppel Hesselink who gave me a son and two daughters. The elder daughter married and settled in Netherlands East Indies.

A few years after the World War I gradually discontinued business, devoting myself exclusively to work in horticultural organisations, and from which I definitely retired at the end of 1935. Being then free from all responsibilities, I traveled with my wife to Java (Netherlands East Indies) to visit our daughter and her family. We traveled not only through Java in all directions, but also visited the islands of Sumatra, Bali and Nias. We returned home in December 1936 and since then I have been collecting and studying documents on the history of the bulb trade.

When I started my activity in my father's firm, a young leader was urgently needed there. As a boy I had not shown special interest in bulb growing or gardening in general. My father, overwhelmed with his manifold occupations for the sake of community and horticulture, could not concentrate his energy on his own commercial interest and consequently the firm's former prosperous condition changed into stagnation. The uncertainty as to whether or not the son would in the future continue the firm, was the reason for delayed improvements and extensions. My father's advanced age made things even worse.

As a youth I became well aware of these facts during my university holidays at home. My father had never commanded me to carry on the business, but I now considered it my duty to do so. I liked this prospect the more because of the difficulties to conquer. With youthful impulse I felt happy in reorganising, renewing and reforming the old firm, and after a few years I had the satisfaction of complete success, with my father's hearty approval.

My father had always adhered to the old system of growing collections of a plant genus as complete as possible, keeping numerous obsolete varieties of historical interest only, which ought to have been replaced by newer, improved forms.

Successively the assortments were revised, older varieties discarded and the number of varieties reduced. New seedling and imported varieties were put on the market. A large efficient warehouse was erected to replace older buildings. New bulb grounds were put in cultivation.

An important task was the publication of a new series of descriptive catalogues, which started in 1892. As in the past they were issued in English, French, German and Dutch but from then on only twice a year, in spring and autumn. These catalogues which were very favorably received by the horticultural press, stimulated a highly increased sale, which continued until the year 1914, when the World War immediately

stopped the prosperous activity of the firm. Meanwhile separate editions had been issued in Swedish, Danish and Russian.

Special catalogues in three languages were published on Darwin tulips, Chinese peonies, German irises and *Gladiolus gandavensis.* These catalogues contained historical and other original records, which were often reprinted in horticultural periodicals.

Although the firm from its first start had always carried both wholesale and retail trade, the latter became the more important in the 20th Century. It was not a small parcel post trade for the average order was fairly large due to the many large orders from royal gardens, botanical institutes and private estates. This class of customers learned to appreciate correct naming and reliable quality of the goods ordered. As the firm grew, a great many less known bulbous plants were added and the true amateurs all over the world became our faithful customers.

The firm was officially appointed purveyors, with the right to print the royal coat-of-arms on its publications and letter heads, to King William III and Prince Henry of the Netherlands, the Kings of Italy and Greece, the Grand Dukes of Baden, Luxemburg and Mecklenburg-Schwerin and Prince Ludwig of Bavaria.

Ever since the first Krelage had established himself as a bulb grower, he became an exhibitor at the then very rare flower shows in Holland and abroad. His son continued the participation at international horticultural shows and world's fairs on a much larger scale. After the introduction of the Darwin tulips to the trade it was necessary to show them repeatedly to horticulturists and the public in general. There was a threat that this superior strain of breeder tulips would be seriously attacked by unscrupulous bulb merchants who did not hesitate to sell inferior late tulips under the name of Darwin tulips. The most efficient way to stop these unethical methods was to show the true Darwins in all their splendor and endless variety at the great horticultural gatherings. The result fully justified these efforts—everywhere in Holland, Germany, France, Belgium, England and elsewhere the Darwin tulips gained the highest honours and they were repeatedly described and figured in the leading horticultural papers in enthusiastic reports by experts. The reputation of the Darwin tulips was therefore fixed forever.

The firm often sent other exhibits of special interest to the leading shows, and its hyacinths, narcissi, amaryllis, gladioli, dahlias, kniphofias, peonies and numerous other bulbous and herbaceous plants achieved a justified success. The novelties were regularly submitted to the Floral Committees at Haarlem and Amsterdam, and from time to time to those of the Royal Horticultural Society at London and, in the course of about thirty years, over one thousand awards, and hundreds of first class certificates were obtained.

As soon as I had started in business, I made several trips to other European countries in order to introduce myself, to maintain old and to obtain new relations for the firm. I appreciated the value of bearing a universally respected name, which assured me of a hearty and friendly

reception everywhere. I visited the firm's customers among whom the Princess of Monaco was a very important one in 1892. There were however numerous changes among the head gardeners of the palace gardens in those days and this made the yearly renewal of the order doubtful. During my stay at Nice, I therefore decided to get in touch with the Princess herself and wrote from my hotel soliciting an audience. This was agreed to and the result was a big order, which was repeated during a series of years. My father was much impressed with this energetic effort of his son since he had in full confidence entrusted to him the leadership of the firm.

In 1894 for the first time I was presented to the young Queen Wilhelmina and her mother, the Queen Regent, who honored the parade beds of hyacinths in one of the firm's nurseries near Haarlem with a state visit.

In later years the Queen paid another visit to the firm's gardens in Haarlem (1912). The Prince-Consort Henry had already visited them in 1903. Numerous rulers of other countries had been visitors to the nurseries in the past. I will only mention those visits which took place after I entered the firm,—the Egyptian Prince Fouad, who later became King (1903); Prince Eugen of Sweden, the famous painter, who repeated an earlier visit of thirteen years ago (1907); Princess Lewis of Bavaria with five daughters (1908); the Princess of Thurn and Taxis, a born Archduchess of Austria, with four sons (1910), and the Archduke Franz Ferdinand of Austria with his wife (1911).

The unfortunate Austrian Crown Prince, who was murdered at Serajewo in 1914, was an enthusiastic flower lover. On his trip to Holland he studied all branches of horticulture with the object of fostering the cultivation of flowers and other crop plants in his own country. I showed him and his charming wife round the bulb district after their visit to the historical exhibition in my bulb gardens on the occasion of the firm's centenary. I afterward received a personal letter from the Archduke inviting me to a visit to Vienna and his gardens, but owing to the tragedy of Serajewo the opportunity was lost forever.

Novelty Raising

Before the year 1900 practically all of the innumerable varieties of bulbous plants which composed the assortments during more than three centuries had been obtained by producing seeds without artificial hybridization. Fertilization was left to the wind and the insects. The variability was so great that the opinion generally prevailed among growers that crossing on purpose would not have any better effect than accidental fertilization.

I probably was the first bulb grower who undertook the improvement of the existing assortments by systematic hybridization. I continued these efforts for over twenty years with the assistance of Mr. J. F. C. Dix, who later became editor of three horticultural periodicals in Holland. The raising of new bulbous plants takes a life's time. Five to six years is the shortest period before the first flower of a seedling may be expected

Wegner & Mottu, Amsterdam

Ernst H. Krelage in 1889

Plate 91

See page 44

Ernst H. Krelage in 1935

Plate 92

and it takes a longer period again before this seedling, if superior to the existing varieties, will have multiplied sufficiently to be offered to the trade. Thus one does not know the results of a cross before five or six years, and meanwhile other crosses must be performed without the advantage of the knowledge that might be gained from the one made previously.

Raising bulb novelties consequently is very trying but on the other hand it may give the greatest satisfaction if the results should correspond with the hybridiser's expectations. I have been very fortunate in this respect and have produced several series of varieties, even entirely new strains of bulbous plants which show every probability of becoming leading trade varieties of the future. Only the most remarkable of these seedlings will be referred to here.

TULIPS. The introduction of the Darwin tulips by my father, who showed them for the first time at the Paris World's Exposition of 1889, has revolutionized tulip culture. These stately flowers with their dazzling colours and their long stems soon proved to be far more suitable for cutting than the short stemmed early varieties. When repeated experiments had demonstrated the extraordinary forcing qualities of many varieties, they became serious rivals to the early tulips. Statistics have since proved that the export from Holland of late tulip bulbs nowadays surpasses that of the early varieties, and this is in accordance with the fact that the area devoted to late tulips in Holland is now larger than that occupied by early tulips.

The growing demand for May-flowering tall tulips led to the collecting of varieties of this character from old cottage gardens. Notwithstanding the very extensive list of varieties in the trade, there proved to be an opportunity for the hybridiser.

I first crossed Darwin varieties with other May-flowering tulips in order to combine the sturdy habit of the former with color shades of the latter, and to obtain pure white, and yellow Darwins, which were missing in the original collection.

The "Tentative List of Tulip Names" and its supplement, issued by the Royal Horticultural Society as the result of the work by a mixed Anglo-Dutch Tulip Committee, contains the names of the named seedlings raised by my firm. Most of them bear names given by the firm, but after the firm's public bulb sales in 1923 some seedlings came into other hands and were named and offered by others, without mentioning the raiser's name.

Among numerous others the following may be referred to as the most successful, all grouped in the section of Cottage tulips in the Tentative List. (A. M. means Award of Merit. F. C. C., First Class Certificate.)

Aegir, dark cochineal carmine.
Albino, pure white; F. C. C. Haarlem, and award for early forcing.
Alcmene, deep cochineal carmine; A. M. London and Haarlem.
Amber, buff, shot rose; A. M. London and Haarlem.
Ambrosia, fawn, shaded rosy lilac; A. M. Haarlem.

Argo, golden yellow spotted orange; forcing award Haarlem.
Aviso, salmon rose outside, red on yellow inside.
Bianca, heliotrope, flushed buff at margin.
Buff Beauty, salmon buff.
Caesar, deep scarlet; A. M. Haarlem.
Carrara, white; F. C. C. London, A. M. Haarlem.
Cecilia, coppery orange, outside amber; A. M. Haarlem.
Dido, fawn shot rose; F. C. C. Haarlem, A. M. London.
Dulcinea, deep rose outside, light scarlet inside; A. M. Haarlem.
Hellas, cerise.
Idyll, pale lilac; forcing award Haarlem.
Ilona Durigo, pale salmon tinged lilac rose.
Jupiter, pale cerise; A. M. Haarlem.
Leda, deep cerise; A. M. Haarlem.
Luna, yellow; A. M. Haarlem.
Marvel, amber, shot; A. M. Haarlem.
May Kiss, white edged violet.
Miami, geranium lake.
Mrs. F. E. Dixon, Sulphury white; A. M. Haarlem.
Mona Lisa, orange.
Nectar, carmine; A. M. Haarlem.
Novara, fawn shot rose.
Orient, carmine violet flushed fawn; A. M. Haarlem.
Pallieter, yellow shot bronze; A. M. Haarlem.
Pandora, fire red, carmine outside.
Papillon, rosy lilac flamed reddish purple.
Phryne, yellow shot dull purple.
Pierre Loti, violet purple.
Plato, deep lemon yellow.
Preludium, deep fire red, reddish apricot outside.
Prince Carol, purplish carmine.
Remus, old gold with golden edge; A. M. Haarlem.
Romulus, orange red with yellow edge; A. M. Haarlem.
Rosebud, pale carmine rose.
Ruby, currant red.
Scarletta, scarlet.
Solon, pale carmine rose; A. M. Haarlem.
Sunny, cochineal carmine.
Tamborah, creamy white.
Themis, white; A. M. Haarlem and London; forcing award Haarlem.
Triton, light crimson; A. M. Haarlem.
Tuscania, inside orange shot cochineal carmine, outside carmine.

A distinct section of the Cottage tulips is composed of the Lily-flowered varieties. It often struck me that lady visitors to our gardens were always much impressed by *Tulipa retroflexa,* the well known yellow tulips with reflexed petals. I therefore concluded that a series of similar varieties in various colours might be desirable, and that the crossing of *T. retroflexa* with various May-flowering tulips of other colors might

give the result wanted, and indeed it did. The first flower which opened, having kept the reflexed petals of *retroflexa,* was of a shining satiny pink. It created a sensation when shown for the first time at Haarlem and at London, and at once *Siren* received First Class Certificates, although the rules require that this high honor may only be given after an award of merit has been obtained the foregoing year. It was a cross of *retroflexa* with the pink Darwin, *Psyche,* and the first of a whole series of Lily-flowered tulips. My other contributions to this series were the following:

Actaea, lemon yellow.
Adonis, cerise red; A. M. Haarlem.
Alaska, yellow; A. M. Haarlem.
Apollo, salmon rose.
Artemis, carmine purple; A. M. Haarlem.
Daphne, Sulphury white.
Eclipse, amber flushed pink.
Reine de Suède, claret.
Ruby Queen, blood red, streaked black upon middle of outside.
White Cross, white.
White Duchess, white; A. M. Haarlem and London.

The group of the Dutch Breeder tulips, which included many brown, purple, red, sometimes bronze varieties of former days, was revived to increased importance by the addition of my seedlings, and this also led other hybridists to work along similar lines. The crosses were chiefly made between Darwins and Dutch Breeders, and the following were among my best results:

Amun Ra, amber flushed purple.
Brocade, yellowish bronze.
Brown Beech, dark brown.
David Copperfield, mauve, shot fawn.
Dreadnought, violet flushed white.
Edith Carter, orange, shot red purple.
Fairy Nymph, violet purple, shot and edged with yellow.
Fleur Parfaite, lilac.
Golden Chieftain, reddish chrome.
Henri Nonin, old gold and bronze, shaded violet outside.
Ilias, purple; A. M. Haarlem.
James A. MacDonald, sienna, shot terra cotta.
John Riding, old gold, flushed bronze.
Joy Mc. Arden, brownish orange; A. M. Haarlem.
Leonard Barron, orange red, flushed carmine outside.
Maryland, orange red with lighter edge.
Melva, pale fawn, flushed lilac.
Nevada, orange flushed red.
Parthenope, lilac and bronze.
Prairie Queen, sulphury white flushed yellow.
President Hoover, scarlet inside, flushed orange scarlet outside; A. M. London.

Rooda, brownish orange.
Sonate, orange, shaded red with carmine blush inside; A. M. Haarlem.
Sunbeam, old gold, shaded bronze.
Tantalus, dull yellow, flushed pale purple; A. M. Haarlem.
The Imp, dull orange, shot mahogany.
Vendetta, lilac and bronze.
Victor, fiery red.
Visor, fawn, shot lilac.

The Darwin group was also extended by new seedlings of my raising, of which the following may be mentioned:

Alice Keith, reddish chrome, passing to fiery red.
Baron de Stael, bright violet, paler outside.
Blue Bird, rosy lilac.
Alice Keith, reddish chrome, passing to fiery red.
Corot, lilac flaked reddish.
Delphi, purplish mauve.
Homère, scarlet; A. M. Haarlem.
Madame Butterfly, violet mauve edged white.
Marshal Field, old carmine red inside, buff outside.
Mary Garden, white tinged pink.
Mimosa, yellow.
Mrs. Harold Irving Pratt, vinous mauve; A. M. Haarlem.
Pulcinella, cochineal carmine.
Ronald Gunn, slaty lilac; A. M. Haarlem.
Saracen, old carmine red inside, buff outside.
Terra Cotta, dark old rose.
Toplight, primrose yellow.
Zev, bluish violet.

Repeated efforts were made to obtain new Parrot forms. Evidently the Parrot character cannot be produced by hybridizing since none of the seedlings from many combinations ever showed the fringed petals of the parrot tulips. In later years remarkably fine parrot tulips originated as sports from Darwin varieties, quite superior to the old forms on account of their tall stems and varied colors.

In the small section of late Double tulips two new seedlings were produced:—

Mirabeau, pale lilac.
Sinclair Lewis, red and yellow.

After the production of so many novelties in the existing groups I succeeded in adding an entirely new strain to the tulips of the trade. Although certain May-flowering varieties could be forced into bloom as early as January, I found that long stemmed tulips which could be relied upon for early forcing were urgently needed.

There were reliable early tulips for this purpose, but their stems as a rule were rather short and their color range limited. So I tried to combine the early-forcing qualities of the small, short stemmed, but ex-

ceedingly early Duc van Tol varieties with the long stems and the color variations of the Darwins. Therefore a systematic series of crosses was yearly performed from 1909 to 1918. The Duc van Tol varieties, planted in the open, were used as seed plants and the Darwins, forced so as to be in flower when needed, served as pollen plants. The results were watched with the keenest interest and it was a great joy to state in 1915 that the results of the very first crosses fully came up to my expectations. The first hybrids thus obtained, *April Queen* and *Early Beauty*, could easily be forced within a very short period, and had well shaped flowers on stems intermediate between those of the Darwins and the Early tulips. Similar crosses were made annually and these furnished hundreds of distinct seedlings, the qualities of which had to be studied carefully and repeatedly before their value could be definitely determined.

Of course, it was not sufficient to state that they were decorative garden plants. Their commercial future exclusively depended upon their early-forcing qualities. Many of the seedlings had inherited the rapid multiplying quality of many Darwin varieties, and consequently rather extensive stocks of some were successfully grown within a few years. I named the new strain *Mendel* tulips, in the same sense as my father had baptized the *Darwins*. The following selection is now considered to compose a standard collection. They are arranged according to crosses, thus showing that some of these furnished more good hybrids than others.

a. Duc van Tol, White Maximus X Darwin, Psyche.
Adinda, lilac pink.
Amidonette, rosy red edged white.
Delice, delicate rose and white; early-forcing award.
Her Grace, white, broadly edged rose; early-forcing award.
Mengelberg, rose with pure white edge.
Pink Gem, white and rosy, very early; F. C. early forcing award.
Weber, white edged lilac rose.
Zenith, satiny rose; A. M.

b. Duc van Tol, White Maximus X Darwin, White Queen.
White Sail, creamy white passing to pure white.

c. Duc van Tol, Cochineal X Darwin, Pride of Haarlem.
Brightling, salmon rose.
Fabiola, cherry rose; early forcing award.
Herald, vermilion; A. M.
Nansen, bright red; early forcing award.
Proof Zeeman, orange.
Scarlet Wonder, scarlet.

d. Duc van Tol, Cochineal X Darwin, Psyche.
Early Queen, rose, pointed petals.
Mrs. E. H. Krelage, deep rose; early forcing award.
Rose Marie, white passing to soft rose.

e. Duc van Tol, Crimson X Darwin, Bartigon
Fuga, deep scarlet red.

f. Duc van Tol, Crimson X Darwin, Farncombe Sander. Krelage's Triumph, dark brownish red.

g. Duc van Tol, Crimson X Darwin, Madame Krelage. Sultane, rosy red.

h. Duc van Tol, Violet X Darwin, La Tulipe Noire. Dodonaeus, maroon with golden yellow edge.

Apart from the Mendel tulips, crosses were also made between Duc van Tol varieties and single Early tulips. As a rule May-flowering varieties were secured which belong to sections already dealt with—"Cottage" and "Dutch Breeder" tulips.

NARCISSI. My work with the hybridizing of narcissi started in 1901 and the first flowers appeared five years later. The chief aim in the beginning was to obtain improved trumpet daffodils with long stems and with flowers well placed on the stem at a right angle. I did not care for giant or mammoth blooms, but preferred a well balanced flower with overlapping perianth. *King Alfred* proved to be an excellent parent plant. The first results were *Glory of Haarlem,* and *Hope of Holland,* both good yellow trumpets, that gained awards of merit in 1910 but have since been surpassed by newcomers. The same award was given to the yellow trumpets *Candlestick, Duke of York, Early Beauty, Faust, Floris, Frans Hals, Golden Lion, Geertruida Carelsen, March Glory, Odin, Pelleas, Phryne, Plato, Primrose, Perfection, Thackeray,* and *Versailles.*

All the seedlings came up to the desired qualifications, varying in color shades from pale primrose to deep, almost orange yellow.

Bicolor varieties which obtained awards of merit were: *Albertine, Capri, Palamedes, Prof. Westerdijk* and *Rosa Lynd.* The latter proved to be an excellent forcer and was faultless as a pot plant, all the flowers blooming at the same height in profusion.

The *White Trumpets* were very successful. In 1914 the firm gained the White Daffodil Trophy at the Birmingham Daffodil show for the six best White Trumpets. Owing to the war this effort could not be repeated during four years and the trophy, which had to be won three times, remained in Great Britain. The seedlings which received awards of merit at Haarlem were *Adelaide, Blanchefleur, Ismene, Josine, Medea, Melisande, Pegasus, Themis.* Best of all was *Mrs. Ernst H. Krelage* (Plate 95), first shown at the Haarlem Jubilee Flower Show of 1910 (Plate 93) and it was at once considered to be the coming variety. Not only were its flowers absolutely faultless in every respect, but the variety also had excellent forcing and breeding qualities. It first received awards of merit, then First Class Certificates in London, Haarlem and Amsterdam, and was awarded first prize as the best trumpet daffodil flower at the London Daffodil Show of 1912.

When this novelty was shown in London at a two days' floral meeting of the Royal Horticultural Society I found that two flowers were missing in the early morning of the second day. It was obvious that

they were taken away by someone interested in the pollen of the winning flower. This incident was very serious and on my returning home I told it to an American reporter, who came to interview me for other purposes. He wrote a fascinating article under the heading "The Mystery of the Pollen Theft" and this served as a very effective and inexpensive advertisement for my new daffodil.

In the *Incomparabilis* section a few seedlings that received awards were raised. Two varieties have conspicuous orange red cups—*Imperium* and *Helen Wills*, and *Debora* has a white perianth with orange yellow cup.

Some good *Barrii* varieties should also be recorded. These obtained awards of Merit—*Graziella*, a charming flower with undulating apricot crown on a pure white perianth, and *Pygmalion* with a flat orange crown on a round, pure white perianth.

Successes in the Leedsii section were *Calypso, Clio, Genève Miramar*, and *Sigrid*, mostly of the giant Leedsii type on long stout stems and with perfectly shaped flowers. Those mentioned all received awards of merit.

The only *Poeticus* varieties to be mentioned are *Aglavaine* and *Anitra*, both with orange red cups.

The above is only a selection of the many hundreds of Narcissi seedlings raised.

GLADIOLI were one of the firm's specialties from the beginning. About 1845 a series of *ramosus* seedlings was put on the market and very favorably received by the horticultural press.

In the early flowering section some good novelties were produced shortly before the World War—*Abundance, Bloemhof* (two Awards of Merit), *Bridesmaid* (A. M.), *Centenary, Darling, Sunset* and *Sweetheart*.

Since the introduction of the first *gandavensis* varieties, the firm had grown extensive collections of all known varieties, later including also the *Lemoinei* and *nanceianus* varieties. In 1910 I introduced seedlings of my own raising, including the following which received award of merit or awards for garden merit—*Cajanus, Comet, Frithjof, Harold, Mercator, Regina, Triumphator, Vesta Tilley* and *Victor*. Besides I may refer to *Papillon, Prometheus, Sultane* and *Zephir*, which were very favorably described in a report of the Department of Floriculture, New York State College of Agriculture in 1915.

More extensive is the list of *primulinus* hybrids. In obtaining these I wanted to keep the charming character of this species, the loose arrangement of the medium sized flowers on the stem. Any attempt to produce large-flowering varieties was intentionally avoided. The varieties put on the market were incorporated in many collections and they each obtained one or more awards, first class certificates or awards for garden merit—*Adonis, Aglaja, Alaska, Argus, Atalanta, Athalia, Citronella, Daphne, Eurydice, Hermione, Hesperia, Icarus, Juno, Laetitia, Latonia, Medea, Medusa, Niobe, Papilio, Psyche, Puella, Salmonea, Satyr, Scarletta, Sibylla, Sphinx, Thecla, Vanessa, Vinula* and *Xanthia*.

All these varieties covered a very large range of colors including very soft pink, pure yellow, deep orange and dazzling scarlet.

HIPPEASTRUM. The Hippeastrum collection of the firm was one of its glories in the middle of the 19th. Century. About 40 years ago it was renewed by the addition of the well known Van Eeden collection. It was greatly improved when the raising of hybrids was systematically carried on after the acquisition of superior forms from other sources. In 1919 the collection gained the highest award at a Haarlem show—the large medal offered by Queen Wilhelmina. The strain distinguished itself by large round upright flowers of glowing colors and also included faultless pure white hybrids, without any trace of green. These have later become familiar in several trade and private collections, but in 1919 they were still exceedingly scarce.

CRINUMS. I was fortunate enough to obtain two hybrids which proved to be of the highest decorative value for the garden, in a protected position. Both were the result of crossing *C. longifolium* with *C. Moorei* —*Harlemense,* soft rose, and *Krelagei* (Plate 111), soft pink passing to white, (Award of Merit). Both varieties were highly praised by specialists.

DAHLIAS were another specialty for over a century. Often the firm issued special dahlia catalogues in the days when the old-fashioned full double show varieties were popular. In the period of the Cactus dahlias, extensive collections were grown and the tubers sent all over the world. The firm yearly won high prizes at horticultural shows including the Queen's Medal in 1917, and the special prize for the best novelty in 1916. Although a single-flowered variety raised by the firm had obtained an Award of Merit at Amsterdam in 1891, the regular raising of seedlings did not start until the year 1900. The first success was a series of strong-stemmed, large-flowering Peony dahlias, of which the following varieties may be mentioned:

The 1913 series included *Borneo, Celebes* (A. M.), *Centenary, Java, Malvine, Moonlight, Orange Queen,* (F. C. C.), *Pink Beauty* (A. M.), *Rosy Morn* (F. C. C.), *Snow White* (F. C. C.), *Sumatra* (F. C. C.) and *White Lady* (A. M.).

The 1914 series was dedicated to five Bavarian Princesses who had visited the firm's nurseries a few years previously—*Princess Adelgunde, Princess Gundelinde, Princess Helmtrud, Princess Hildegard* and *Princess Wiltrud.*

In 1916 two other newcomers were added to the list—*Cunera* (A. M.) and *Inca* (A. M.), and in 1917, *Amboina, Moor* (A. M.), and *Surinam* (A. M.). The last additions were *Orient* and *Orange Sun* (A. M.).

Meanwhile the *Collarette* dahlias had been successfully improved and a series of novelties, all distinguished by long, rigid stems and perfect flowers of various shades, was offered in 1917. The chief varieties were *Aria* (A. M. and awards for garden merit), *Barcarolle* (F. C. C. and A. M.), *Gavotte* (A. M.), *Melody* (A. M. and award for garden merit), *Minuet, Rhapsody* (A. M.), *Sonata* (two A. M. and award for garden merit), *Tarantella* (A. M.). In 1919 the following were added—*Adagio* (A. M.), *Largo, Symphony* (A. M. and award for garden merit), and in 1920 *Andante* and *Presto.* Last, but not least, were the three latest

additions (1921) *Fuga* (F. C. C. and award for garden merit), *Preludium* (A. M. and award for garden merit) and *Trio* (two A. M.).

Apart from the Single dahlias produced many years ago and referred to above, two distinct novelties should be added to the introductions of 1918, which were very favorably received—*Dictator* (A. M.) and *Velours d'Utrecht* (two F. C. C.).

Meanwhile also some good Decorative varieties were raised, of which I mention *Golden Rain, Dove of Peace* (A. M. and award for garden merit) and the superior novelty for 1921, *King Harold,* which obtained three awards. At the same time the garden Cactus dahlia *Mrs. Krelage,* a very free-blooming pure white on long stems, was a great success. It obtained two F. C. C., the award of garden merit, and was generally recognized to be the best white Cactus up to that date.

Long stemmed dahlias are hard to exhibit far from home, because they quickly wither when cut. I therefore sent the flowers by aeroplane to London when I showed them there in September 1920. The flowers were exhibited in first rate condition and the British colleagues asked me how I had managed this. "Well, of course by sending the flowers by aeroplane," I replied. Although the daily air service between England and Holland had existed several months, this seemed not to have been sufficiently advertised; at least the fact proved to be unknown, not only to my British friends, who were greatly surprised, but also to *The Times.* In its columns the next morning the arrival of the flowers by air was related under the important events of the day.

BEGONIAS. The only novelties in Tuberous begonias raised in our nurseries belong to the strain of varieties with slender, gracefully drooping flower heads for hanging baskets. The double flowers are small and loose with pointed petals. They were first offered in 1917 in separated colors, red, orange, yellow, white, pink and salmon.

GLOXINIA. In 1916 the firm offered a set of gloxinias of its own raising, distinguished by large, well-shaped flowers of pure colors. Their names were *Amalthea, Cassiopea, Eurynome, Olympia, Pandora* and *Persephone.*

CANNAS. Four canna hybrids were offered in 1914 which were then improvements on the existing varieties. One of the series, *Willem I,* obtained an Award of Merit at Haarlem, the others were named: *Vander Duyn, Van Hogendorp* and *Van Limburg Stirum.*

I have still to refer to a lot of hybrids in the class of herbaceous plants.

ASTILBE. In 1920 four novelties were offered which were considered valuable additions to the assortment of the then existing white and pink astilbes—*Artemis,* rose; *Astarte,* soft lilac, and *Cassandra,* deep red. Each variety gained an award of merit at Haarlem. The fourth variety, *Virgo,* was pure white and a good forcer.

IRIS. I have always felt a predilection for this genus of plants that is so varied in shape and character and fills almost the whole year, starting with the earliest bulbous species in winter.

The firm had always grown very complete collections of all sections, and had introduced new species and varieties from everywhere. The collection of German irises, or *Iris barbata,* furnished me with the material on which to base the historical review of the section in Bulletin No. 2, of the American Iris Society, published in 1921.

Hybridizing did not start before the year 1910, as far as the *barbata* section was concerned. A few good results were obtained—*Queen of the Blues* (A. M.), *Phyllis* (F. C. C.), *Insulinde* (A. M.) and *Semiramis.*

KNIPHOFIA. Most of the older Red Hot Poker plants have very thick stout stems bearing large flower heads. Decorative as they are as garden plants, they lack the appropriate qualities for cutting purposes. Species imported later from South Africa had slender but firm stems and graceful flower heads. This led me to the production of a series of small, elegant varieties in the whole color range, already known in the genus. The varieties were first offered under the collective name of *K. gracilis,* which however proved to be an objectionable name, because there was a distinct species of that name. In 1916 the first series was offered, including the following varieties which have become very popular—*Golden Spire, Goldfinch, Goldflake, Jaune Suprême, La Citronnière, Orange Queen* (two Awards of Merit), *Prince of Orange* (two Awards of Merit), *Solferino* and *Sovereign.* In 1917 *Luna* (A. M.), *Nymph* and *Prince of the Netherlands* were added to the assortment. The latter was distinguished by an Award of Merit from the Royal Horticultural Society of London in 1921.

LUPINUS POLYPHYLLUS. The firm offered in 1918 and following years a few varieties of its own raising—*Ariadne, Diana, Isis, Juno, Mauve Queen, Minerva, Sky Blue* (A. M.) and *Venus,* the colors ranging from delicate pink to deep indigo blue.

PEONIES. The peony collections of the firm were very complete. Special catalogues were issued from time to time, and the edition of 1892 is a source of information for the history of the genus. In this catalogue I attempted to mention the raisers' names and the year of introduction of all of the varieties offered. These dates had never been published in such a complete manner before.

Novelty raising was not attempted until 1900. Only a few new varieties were added to the already very extensive assortments, but their quality was up to the standard. The following obtained awards.

Graziosa, single flowering, fiery carmine rose, golden yellow anthers (A. M.).

Niobe, rose with silver reflections (A. M.).

Koningin Emma, rosy pink, fading to pure white.

Prince of the Netherlands, bright carmine rose, with silver sheen.

Princess Juliana, an improvement on Eugénie Verdier; very strong stems (A. M.).

See pages 26 and 42.

President Theodore Roosevelt at the Jubilee Flower Show, Haarlem, 1910

Plate 93

Photobureau Stevens, Haarlem

See page 44.

Queen Wilhelmina and Princess Juliana of Holland at the "Flora" Flower Show, Heemstede, Holland, 1935

(The Queen is in white mourning dress on account of the death of the Prince-Consort Henry.)

Plate 94

Queen Wilhelmina, a first rate novelty in the style of the old *Reine Hortense,* but superior (two F. C. C.).
Sylvia, pure white shaded pale pink (two A. M.).

PHLOX DECUSSATA. A few phloxes were produced, which were included in the assortments of several firms. In 1914 I offered *Alphons Diepenbrock* (A. M.), *Bernard Zweers* (A. M.), *Mevrouw Noordewier* and *Mevrouw de Haan Manifarges.* These were additions to my former seedlings—*Clio, Feé, Mengelberg, St. Moritz, Viola, Viotta* and *Zenith* (A. M.).

The above is only a selection of the most important hybrids and seedlings obtained from many thousands of others. The raising of novelties has been a great delight to me, not only because of the fascinating expectation of the results, but more so on account of the satisfaction given by the production and distribution of new varieties, fit to beautify the gardens all over the world. Of course, many of these varieties have since been replaced by newer and better ones, but others are still among the leading trade varieties, or may become popular garden plants or forcing varieties.

PUBLICATIONS

During my stay at the Haarlem Latin School, I had the great advantage of a teacher of the Netherlands language who made much of exercises in composition and there I acquired the ease in writing which was of immense value to me later. In my student years I contributed articles to the students' weekly and their almanac.

Soon after entering business life, I started with papers on actual subjects in the bulb world, which were published in the Dutch Bulb Growers' Weekly. One of the leading features of those days was the publication of an Album with colored plates representing the best varieties for the general trade. Many years ago similar work had been sponsored by the late bulb firm of A. C. van Eeden & Co. at Haarlem. The new work was published by the firm of De Erven Loosjes under the auspices of the General Bulb Growers' Society. For trade reasons the names of the editors were not mentioned on the title. During the five years of publication there were four editors. However, of the four I was the only one who functioned during the whole publication of the work. The plates were all pictured by the Belgian flower painter Goossens, and lithographed by Severeyns of Brussel which was then the only special house for such work. The painter came to Haarlem during the flowering season and every flower to be figured was posed for him by the editors, who also prepared the text in four languages.

About the same time I was one of the five editors of the Tijdschrift voor Tuinbouw (Horticultural Magazine), a monthly in the Netherlands language, which was described as a scientific horticultural periodical. It contained elaborate studies and essays that were too extensive for the weekly periodicals, and it kept its high standard during five years. Unfortunately it did not meet sufficient appreciation and it died from

"solidity." In this monthly I published studies on irises, dahlias, peonies, *Eucharis* and wrote various references on amaryllids—crinums, *Haemanthus, Hippeastrums,* nerines, etc.

I was also the editor of another monthly, "Krelage's Bloemhof", that was published for the purpose of maintaining the firm's relations with its retail customers in Holland. It contained not only practical hints on the cultivation of bulbous and herbaceous plants but also longer articles.

In 1910 I wrote "The History of the Bulb Growers' Society of Haarlem," covering the first half-century of its existence, as a jubilee present to the members of this Society. It is a quarto volume with many illustrations, and contains reproductions of many documents on the development of bulb culture and trade during the period 1860-1910. In the last chapter I characterized the development of bulb culture in this period in the following terms,—

"The area devoted to bulbs increased from 600 to 8000 acres, and the yearly export from one to twelve millions of florins. The number of growers, not exceeding 300 in 1860 increased to 3000, and instead of 40 export firms, there were 170 in 1910. The average price for land suitable for hyacinth culture mounted from 7000 to 15000 florins per 2 acres, the yearly costs for labor from 150,000 to 2,000,000 florins, the number of laborers from 500 to 4000. Materials also considerably increased in price.

"This steady progress is chiefly due to the enterprise and tenacity of the bulb growers and exporters themselves. Intensively devoted to his profession many a modest laborer worked himself up to foreman, and after struggling under hard circumstances, has gained independence and prosperity. The sons, better instructed than their fathers, have elevated the standard and increased the reputation of the firms they now lead. Older firms, of well established fame, extended their working sphere, in proportion to the number of sons available for leadership or to the owner's intelligence and perseverance. Old names, famous in the 18th and early 19th centuries, disappeared in the struggle for life. How many of these, who were then foremost, are now forgotten."

The Society's history of the next 25 years should have been written for the occasion of the 75th anniversary, but the finances did not permit the publication of an appropriate memorial book. This should have been far more extensive than the first volume because of the many important facts and economic crisises that characterize this period. I therefore confined myself to a speech at the memorial day exercises in which I gave a brief review of this period in the Society's history, and this oration was printed in the Society's weekly.

In the next year the firm's centenary was commemorated. At this occasion I distributed a volume to all connected with the firm and friends, entitled: "A Century of Bulb Growing," in which I described the history of the firm, paying a tribute of thankfulness to my predecessors and my coöperators.

The third book that I published had nothing to do with horticulture. It contains a lecture held before a Haarlem club on "The History of a Debating Society, 1852 to 1899."

My other publications were printed in various periodicals. It would be of no use to refer to these in detail here, in as much as they were written in the Dutch language. Partly these were notes on bulbous plants and their history, partly longer articles on horticultural subjects, such as the organisation of societies, economic questions, import and export interests, etc. I was often asked to write articles on the importance of bulb culture in economic periodicals or special issues of weekly and monthly reviews.

I contributed articles on bulbous plants to various horticultural periodicals of other countries, such as The Garden, Gardeners' Chronicle, Revue Horticole, Gartenflora, Moellers deutsche Gartenzeitung, Gartenwelt, etc. I mention here only the principal articles that appeared in English, French and German, and a few in Dutch, and that refer to plant genera or varieties.

On bulb culture in general:

Bulb Culture and Export. (Commercial Holland, April 1919).
Dutch Bulb Culture. (Holland Import & Export Trader, Oct. 1921).
The Garden of Europe. (The Times, Holland Supplement, Dec. 6, 1921).
Bulb Culture in Holland. (The World's Markets. R. G. Dun & Co., February 1923).
The World's Garden. (Horticultural Supplement Algemeen Handelsblad, April 15, 1925).
The Dutch Bulb Export. (Hollands Import & Export Trader, May 1926).
Notes from Tulip Land. (Tercentenary Supplement Algemeen Handelsblad, Oct. 5, 1926).
Bulb Cultivation and Trade in Holland. (Financial and Economic Review, Amsterdam Bank, April, 1929).
Bloembollen voorheen en thans. (Old Times and Present Day Bulbs) (Floralia, October 3, 1930).

On Hyacinths:

Uit de geschiedenis der Hyacinth. (From the Hyacinth's History) (Floralia, August 17, 1923.).

On Tulips:

Breeder Forms of *T. Gesneriana.* (The Garden, December 9, 1893).
Darwin Tulpen. (Gartenflora 1894 page 481-2).
Les Tulipes Dragonnes. (La Revue Horticole, June 16, 1894).
Darwin Tulips versus English Breeders. (American Gardening, July 21, 1900).
Darwin Tulpen. (Die Gartenwelt, October 5, 1901).
May-flowering Cottage and Species Tulips. (Journal Royal Horticultural Society London 1902).
Hollandsche Eenkleuren. (Dutch Breeder Tulips) (Weekblad voor Bloembollencultuur, May 3, 1913).

The Darwins. (The Garden, November 24, 1917).
Nouvelles tulipes hybrides. (La Revue Horticole, Nov. 16, 1920).
Vielblűtige Tulpen. (Moellers deutsche Gaertnerzeitung, Aug. 21, 1932.
Het gouden jubileum der Darwintulp. (The Darwin Tulips' Golden Jubilee) (Weekblad voor Bloembollencultuur, July 19, 26 and Aug. 2, 1935).

On Narcissi:

Narcissus semipartitus plenus. (Tijdschrift voor Tuinbouw, 1896).
Narcissus General Gordon. (The Gardeners' Magazine, Oct. 1, 1910).

On Irises:

Irissen (Irises). (Tijdschrift voor Tuinbouw, 1899).
The Development of Tall Bearded Irises in the 19th Century. (Bulletin No. 2 American Iris Society, January 1921).
Histoire et development des Iris des Jardins. (Les Iris cultivés. Conférence de Paris 1922).
Les races horticoles des Iris bulbeux: sections Xiphium et Juno. (Les Iris Cultivés, Conférence de Paris 1922).
Iris germanica. (Floralia, August 18, 1922).

On Lilies:

Dutch Lilies. (Journal R. H. S. 1901).
Lilium philippinense. (Die Gartenwelt, Febr. 15, 1908).
Lilium regale und *L. myriophyllum.* (Moellers deutsche Gaertnerzeitung, Nov. 20, 1920).
Some Lilies First Distributed on or from the Continent of Europe. (Lily Yearbook R. H. S. 1933).

On Gladioli:

Hybrid Gladioli. (The Garden, February 27, 1892).
The Origin of Garden Gladioli. (Garden and Forest, November 4, 1896).
Vroegbloeiende (early) Gladiolus Koningin Wilhelmina. (Tijdschrift voor Tuinbouw, 1896).
Frűher Gladiolus Koningin Wilhelmina. (Gartenflora 1897 p. 169-170).

On Dahlias:

Dahlias. (Tijdschrift voor Tuinbouw, 1897).
Kraagdahlias. (Collarette Dahlias). (Floralia, April 30, 1920).
Nieuwe Kraagdahlias (New Collarette Dahlias). (Floralia, November 11, 1921).
The Development of the Dahlia. (Report International Congress of Horticulture, Amsterdam, 1923).

On various plant genera:

Drei schaenblűhende, mexicanische Zwiebelgewaechse. (Three charming, mexican bulbousplants) (Wiener ill. Gartenzeitung, 1891).
Crinum augustum (Tijdschrift voor Tuinbouw, 1897).
Het geslacht Eucharis (The genus Eucharis). (Tijdschrift voor Tuinbouw, 1896).
The Hardiness of Flame Flowers (Kniphofia). (The Garden, January 23, 1892).
Hardy Hybrid Kniphofias. (The Garden, 1892 II page 206).
Bransvigia Josephinae. (Gardeners' Chronicle London January 22, 1938).
Mexican Calochorti. (The Garden, 1892, II page 146).
Calochortus. (Tijdschrift voor Tuinbouw 1898).

Organizing and Leading Horticultural Societies

I evidently inherited my father's aptitude for organisation. Immediately after the latter's retirement from the presidency of the Bulb Growers' Society, I was invited to succeed him. I refused, however, in order to concentrate all my energy on my firm, but this did not prevent me from occupying the honorary secretariat of the floral committee of the Netherlands Horticultural and Botanic Society.

After six years, when I had reorganized and firmly established the firm, I no longer hesitated to accept the leadership of the General Bulb Growers' Society, and I also became a member of the board of directors of the Netherlands Horticultural and Botanic Society. The latter Society is composed of horticulturists and amateurs and it is the only national horticultural organization in the country and I was therefore often in touch with the Government and had to advise on many subjects. As a member of the board of directors I soon felt that this body was not properly constituted. As a rule only floriculture and arboriculture were more or less sufficiently represented on the board, while the interests of vegetable and fruit growing were neglected. I therefore planned the organization of a federation, comprising all horticultural societies, local, provincial, or national, and grouped in accordance with their objects into the sections—vegetable growing, fruit breeding, arboriculture, floriculture, bulb growing, and horticultural seed growing.

It took five years to accomplish this task. There was a rather strong opposition from various sides, until the Director-General of Agriculture declared that the Government urgently wanted the organization of one central horticultural federation, authorized to advise it on all horticultural interests. A government subsidy to further the purpose was also proposed.

The Netherland Horticultural Federation started in 1908 under the presidency of Director-General Lovink himself. I soon became acting vice-president and later served a few years as president, resigning in 1929. The federation did good work in its first period, but after the war it had to reduce its activity owing to lack of finances and the changed conditions.

Apart from manifold economic and social interests, the federation took care of the representation of Netherlands Horticulture at shows abroad. The system of collective exhibits, without firm names, but advertising the products of the bulb region, Aalsmeer, Boskoop and other centres as a whole, was adopted from the beginning and proved a perpetual success.

As a rule I was appointed president of the exhibition committees for this participation abroad, and served as such in Berlin (1909), London (1912), San Francisco (1915), St. Petersburg (1914), at the Ghent "Floralies" in 1923, and 1928, at Paris in 1927, at Madrid in 1929 and at the World's Exhibitions of Antwerp and Liège in 1930. The Aalsmeer florists asked me to be their representative leader at Turin in 1929.

Careful preparation was needed to secure the success of the Holland sections at these international gatherings. Negotiations had to be carried on and concluded with the Government in order to obtain a modest subsidy, with the show committees abroad in order to guarantee the needed space in a convenient corner of the exhibition, and with railway, water or air transportation companies to secure the most favourable freight terms, etc. It was mostly a difficult, but a fascinating task, and the success which happily was always achieved served as the best reward to all those concerned. The collective participation of all branches of Dutch Horticulture at these shows in so many countries mightily stimulated the export of her products.

I may add that the exhibitions referred to above formed only a part of those with which I was connected as a member of the Jury. Since my father had acted as a Judge of Awards at all the leading international horticultural shows of his period, I automatically became his successor in these functions, when he resigned his activity on account of his advanced age. I started at The Chicago World's Fair in 1893, and acted as a juror in 1897 at Berlin and Hamburg, in 1898 at Ghent, in 1899 at St. Petersburgh and Mont St. Amand, in 1902 at Birmingham, in 1903 at Ghent, in 1903 at Luxemburg, in 1904 at Dusseldorf, in 1905 at Paris, in 1907 at Mannheim and Dresden, in 1908 at Ghent, in 1909 at Berlin, in 1910 at Paris and Brussels, in 1911 at Florence, in 1912 at London, in 1913 at Breslau and Ghent, in 1914 at St. Petersburg. The World War stopped the horticultural show activity for many years. Since the resumption of this activity I was a member of the jury in 1923, 1928 and 1933 at Ghent, in 1929 and 1927 at Paris, in 1925 at Brussels, in 1928 and 1930 at Antwerp, in 1930 at Liège, and this year I hope to attend the Ghent "Floralies" for the 8th time as a juror during a period of 40 years.

It is always a great pleasure to welcome old friends from various countries at these gatherings, but alas, how many of them have passed away!

Before the World War the Kingdom of the Netherlands had adhered to the free trade principle, which was responsible for a long series of prosperous years. Nevertheless certain industrial centres in the country pleaded for protection, and from time to time bills were proposed in

Parliament to satisfy them, but without success. Such a bill was also proposed in 1911 and the president of the Horticultural Federation, an ex-leader of a Department was in favour of it and tried to convince the board of directors that the Federation ought to declare in favor of the protection bill. As vice-president of the Council, I led the opposition and won out. The majority of the board voted against protection and I presented the petition to Parliament, which with many efforts from other sides, served to hold off, at least for the near future, the threatening protective tariff. The president of the Federation resigned and was succeeded by a freetrade member of Parliament.

Although in our days free trade seems to belong to history, I still consider it to be the ideal economic system. The free trade period in Europe was a happy and prosperous one, which is not likely to return, although many political leaders in various countries declare that they would like to have the system back, if only their neighbours could be prevailed upon to do the same. The neighbours express the same wish, but no country seems to take the initiative in stopping autocracy, protective tariffs, and quotas, that all are war instruments and serve to maintain the contrasts and conflicts between nations instead of restoring peaceful, friendly, and unlimited commercial relations all over the world.

At the beginning of the World War the Netherlands Government solemnly declared its neutrality and urgently requested its subjects to act accordingly. Repeatedly however travelers for horticultural export firms did not live up to this ideal when representing their firms abroad. They criticized the belligerents of one side or another, and gave the false impression that their country did not maintain its neutrality.

The council of the Netherlands Horticultural Federation invited me to make an appeal to the horticultural interests of Holland and to point out the necessity of remaining neutral in all circumstances, especially so, since Holland after the war would have the task of reconciling the former belligerents by offering them her good services for restoring commercial and friendly relations. I did so in a general assembly of the Federation on March 4, 1915. The speech, published in the daily papers, was translated and printed in the Gardeners' Chronicle of London and so became known in France, where the reaction was quite unexpected. "How dares Mr. Krelage, who is an old friend of so many French horticulturists, defend neutrality?" asked the leading horticultural trades paper of France. "One should be with us or against us, there is no other choice." Such statements left no room for any discussion. Fortunately a few years later the same paper behaved very kindly to me, all being forgiven and forgotten.

International Horticultural Trade's Associations

In 1910 during the Jubilee Flower Show at Haarlem, the horticultural trade's associations of Belgium, England, France, Germany, Holland and Luxemburg sent representatives to a meeting in Haarlem,

where they founded the International Horticultural Trade's Association. The object was to foster the mutual interests of the horticultural trade, to register new varieties, to reduce or remove trade barriers, to promote uniform trade terms etc.

Every year a meeting or conference was held, and the board of directors changed yearly. I was elected president for the year 1911/12 and presided during the conference in London in 1912. It was then decided to have a permanent secretary's office in Holland and the secretary of the Netherlands Horticultural Federation was appointed as secretary. This outcome was due to my success in obtaining a yearly subsidy from the Government of Holland in case the Union would establish its secretariat at the Hague. Without any doubt the Union would have become very influential, if these conditions could have been realised. Holland, being the most important producing horticultural country in Europe, would have been justly entitled to this position, and it would have fulfilled it seriously and actively. Unfortunately the World War interfered with this project. The relations were thoroughly disturbed, and after the war the old position could not be maintained. The French Horticultural Trade Association started a new international federation with England and Belgium, excluding all the other former adhering countries. Informal negotiations between the British organization and myself led to Holland's entry into the federation, and at the conference held in 1925 in Haarlem, the German Horticultural Association was admitted on Holland's proposal. I was chairman of the conference at the Hague in 1922, occupying the presidency of the federation for the year 1921/22.

Although the yearly meetings of the leaders of the horticultural trade in various countries were a decided advantage, it soon became clear that satisfactory results could only be expected in comparatively normal times.

As soon as the world depression, beginning in 1929, introduced an ever increasing series of manifold international trade barriers, the federation appeared to be powerless and useless. Every country looked only after its own interests—exactly the same regulations were proposed for which the neighbour was blamed. One country after the other severed her connections with the federation and all activity practically ceased.

Leading Bulb Growers' Organizations

In 1903 I accepted a seat in the Council of the Bulb Growers' Society. I was made vice-president the next year, and in 1906 was elected president of the Society. I served in this capacity until 1920 when I decided to devote myself more intensively to my firm. I was again elected president in 1922. After two periodical re-elections by unanimous vote, I retired in December 1935 in my 67th year.

A membership in the Society is practically indispensable to every bulb grower or exporter. On the weekly bulb exchanges, open to the members only, the mutual transactions between growers and exporters are settled. They are obliged to submit their differences to a court of arbitration, appointed by the Council of the Society, which provides

Jan de Graaff, Sandy, Oregon *See pages 26 and 195*

White Trumpet Narcissus—Mrs. Ernst H. Krelage

Plate 95

cheap, quick and expert justice. They may show their novelties every week during the whole year in the Society's building at Haarlem to all their fellow-growers and exporters. They profit by the nomenclature-work of experts carried on in the trial garden of the Society where thousands of tulip varieties and other bulbs, correctly named, are flowered under ideal conditions. They receive gratis the Society's valuable weekly containing a profusion of technical and other information.

During the 28 years of my presidency, the Society went through periods of great prosperity and deep depression. In 1910, 1925 and 1935 glorious flower shows were held of ever increasing importance, the semi-centenary and the three-quarter centenary were celebrated under favorable auspices, but the periods of the World War and the world depression caused serious difficulties to the bulb industry, and added to the Society's problems.

When I started as president, the Society had 2400 members in 30 local sections, in 1931 this number had increased to 6000 members in 65 sections, but at the end of 1935 it was again reduced to 4000 in 60 sections owing to the crisis which was responsible for the reduction of the cultivated area and the number of growers.

The flower show of 1910 introduced a new type of floral exposition. Since its beginning in 1860 the Society had held yearly shows, especially of Hyacinths in pots in March. From 1875 to 1905 these shows, on a larger scale, were held every five years. The best of this series took place in 1885 commemorating the Society's 25th birthday. After that year the exhibits diminished and it became obvious that the type of show no longer met the requirements. Having visited the open ground exhibitions of Hamburg (1897) and Dusseldorf (1904), I suggested the idea of a spring show in the open air during the flowering period of the bulbs from middle of March to the middle of May combined with a temporary show in a building. In this I was supported by other younger growers. A proposal to this effect was rejected by the Society and the old type of show was staged in 1905. When, however, the visitors from overseas, who acted as jurors, expressed themselves in favor of the new type of show proposed, the Society's general meeting did not hesitate any longer and accepted the open air show of two months, to be held in 1910 at the semi-centenary of the Society.

The well known horticultural centres of Aalsmeer and Boskoop coöperated and their exhibits contributed to the decorative character of the show. It was very instructive to bulb growers. They could observe the right and the wrong color combinations, the decorative use of their bulbs, and receive other valuable suggestions of importance to them. The show stimulated the sale of bulbs abroad and at home. Visitors came from everywhere, and the jury was truly international. The Royal Family paid repeated visits and past-president Theodore Roosevelt was received by an enthusiastic gathering (Plate 93).

The World War affected the Dutch bulb trade seriously. The first years were relatively normal but in 1918 the export was reduced to less

than half the normal value and it appeared that the bulb growers might lose their means of subsistence. The whole bulb district was in danger. It was then decided to grow vegetables in huge quantities on the bulb farms and to try to salt these in a cooperative factory. The Government allowed the exportation of these products in exchange for the collective furnishing of large quantities of potatoes, beans, carrots, etc., at low figures for the food supply of the country. The Government requested that the factory to be put under the management of the already existing semi-official war committee for the bulb district of which I was chairman, and so to my own amazement I became leader of a vegetable conserving industry. The quality of the products of this factory was so superior that it could command the highest market prices from the belligerent countries. This system saved the bulb district from ruin. In one year two millions of florins could be distributed among the growers who had furnished their products to the factory. When peace was reestablished, the bulb export soon revived.

The consequence of the World War prevented the organization of the next show until the year 1925. The exhibition was held in the beautiful park of Heemstede near Haarlem and it was twice as large as the first show. The effect of the hundreds of thousands of flowering bulbs in the grounds was marvellous and the horticultural press of the world unanimously expressed its satisfaction. Special ambassadors were sent from the U. S. A.—Mrs. Francis King officially represented the Garden Club of America, and the American Rose Society—Mr. John T. Scheepers, the Horticultural Society of New York and the Society of American Florists and Ornamental Horticulturists. Mrs. King acted as president of one of the international Juries. As president both of the Show Committee and of the Bulb Growers' Society, I organized several dinners and receptions to which ambassadors of foreign countries, state ministers and other high officials were invited. I tried to give these festivities the character of social functions, and I was sometimes blamed for it by bulb growers, who evidently did not understand that my aim was to place the bulb growing industry, in the appreciation of officials, on the same level as that of other industries. I was convinced that by doing so, the influence of the bulb growers with the authorities would be increased, and their standing raised in the eyes of the public.

In 1924 the Society held a memorial assembly to celebrate the centenary of its founder's birthday. In an oration I sketched my fathers life and career. For many years it had been planned to erect a large hall for the Society and its institutions and offices as a memorial tribute to its founder, but the necessary financial support failed and it was not until 1928 that the plan was realized. In that year the

Krelage Building was completed and dedicated by the Dutch Minister of the Interior and Agriculture.

The new building, situated near the centre of Haarlem, occupies a surface of 2 acres, and affords an ideal home for the society. A spacious hall, the largest in town, was built for the weekly bulb exchange, where as a rule every Monday 800 to 1000 members mutually deal in bulbs and allied products. Another hall is devoted to the weekly shows of new and interesting varieties of bulbs all the year round, judged by expert committees, which are entitled to award certificates and medals. On the ground floor are also the room for the Court Arbitration, the secretary's offices and the president's room. On the first floor are the council and committee rooms, and the extensive library, for the greatest part presented by me on my retirement as president. It contains remarkably complete sets of such valuable horticultural periodicals as The Gardeners' Chronicle (of 1841), The Garden, Gartenflora, Flore des Serres, Belgique Horticole, Illustration Horticole, Revue Horticole, etc.

A trial garden, in which numerous trials and nomenclature tests are under way, surrounds the building.

The acquisition of this splendid society building was a great satisfaction for me. For years there had been differences in the Society as to its location. Haarlem, Heemstede and Hillegom were rivals. Although my secret wish was that the building should be erected in Haarlem, it has always been stated that I was impartial in leading the debates in several general meetings of the Society, where the matter was discussed. If I succeeded in obtaining the realization of my wishes, this result may be attributed to my fixing and pushing forward the decisive vote at a moment, when a majority in favor of Haarlem was assured.

The third great show was held in 1935 in connection with the 75th birthday of the Bulb Growers' Society. It was again much larger than the former show and was visited by 750,000 visitors within two months, which was a record for floral fêtes in Holland. The grounds were open also evenings when they were phantastically illuminated. Queen Wilhelmina consented to be Patron of the Show, a favour Her Majesty had never granted before to any exhibition. The Queen twice visited the show, accompanied by Princess Juliana (Plate 94), and the German Ex-Kaiser also paid a visit. Aalsmeer and Boskoop again coöperated, and the various horticultural societies all postponed their own shows in favor of the great "Flora" exhibition. From U. S. A. again came Mr. John T. Scheepers, this time as official representative of the Governor of the State of New York, the Horticultural Society of New York, and the Society of American Florists. He offered the gold medal of the Horticultural Society of New York to the landscape architect of the show, Mr. H. J. Voors, the Society's secretary, for his grand achievements. Ten years before I had the honor of receiving the same distinction in connection with the 1925 show.

As a rule the society held two general meetings yearly. I never failed in preparing an elaborate opening address, in which I treated actual economic questions, the society organization or other matters. Many of these speeches, which were printed in full in all the daily papers, contained advice or remarks on government regulations. In this way a useful influence on public opinion was exercised and the interest in the bulb growing industry increased.

I have always endeavoured to centralize all interests of the bulb district as much as possible, but since one of the most characteristic qualities of the Hollander is his untamable spirit of independence, I have not succeeded in realizing this ideal in full.

I started by organizing the representatives of the Bulb Exporters Association, a smaller growers' society, and the special groups of hyacinth, tulip, narcissus and gladiolus growers, into a Central Committee under the leadership of my own Society. I thus obtained periodical gatherings where unified opinion could be formed on the principal items of actual interest in order to avoid contradictory action or advice to authorities.

This committee also administrated the extra contributions, which all members of bulb societies have to pay in proportion to the land area they cultivate, for the promotion of collective propaganda abroad and for phytopathological research.

More than ten years previously I submitted a reorganisation scheme, which would bring all bulb growers and exporters together under one neutral council, leaving all groups and sections as intact as possible, but concentrating all vital decisions to the central council.

The time however was not ripe for this program, which could not be pushed forward. Then came the crisis and the inevitable Government regulations that reduced production and fixed minimum prices. These regulations had been solicited by the combined bulb societies, but the way they were executed by the Government officials caused great disappointment, and things doubtless would have been managed better if my concentration scheme had become effective in due course.

Notwithstanding the many drawbacks peculiar to the Governmental system of control, the results as a whole are satisfactory, but in my opinion they are only acceptable if temporary. I served in several official "crisis-functions," but these occupations ended when I resigned as president of the Bulb Growers' Society in December 1935.

I had already announced my intention to resign when I began my last five years' term. I thought it wise to leave the post to the younger generation, although my fitness had not diminished.

The Society gave me an impressive farewell in the last general meeting over which I presided. The Government was represented by a high official of the Department of Agriculture, and the Society, of which I was already a honorary member, offered me the honorary presidency. The members presented me with my portrait painted by the Hungarian artist Mendlik (Plate 90), and at a reception after the meeting a long file of authorities, representatives of horticultural societies, friends and others came to shake hands with the departing president.

The bulb exporters had been organized by my father in 1868 in an association which in the beginning met the requirements of the period, but did not satisfy the younger generation thirty years later. As soon as I had been accepted as a young member, I tried to reorganize the association into a more active and efficient body, but the older members refused their consent. With ten other firms I then left the old association and in 1901 was one of the founders of the Bulb Exporters' Association which has since developed into a most influential corporation. It has its own intelligence and collecting department, a bureau administered by a lawyer as secretary, a forwarding office in Holland, and a branch office at New York. It serves the export interests in the best possible manner.

My organising tendencies also led me to organize the horticultural trade in other branches, especially floriculture and arboriculture, into an inland association, on the same, but of course a more modest basis, than the Bulb Exporters' Association for the export trade. This Netherlands Horticultural Trades' Association still continues its work to the benefit of the members. I was the first president and on my retirement, was appointed honorary member.

Public Service

Apart from my horticultural activity, I was often called to perform other duties. In 1908 the citizens of Haarlem elected me as a member of the Town Council. It was characteristic for those days that I was the candidate of six political parties who accepted me without asking any previous declarations or promises. My only opponent was a socialist. I resigned in 1915 when I could no longer spare the necessary time for this work.

In 1915 I was appointed by the Government as a member of the Court of Appeal for State Contributions at Haarlem, a responsible and trustworthy task which I occupied until the year 1930.

During my stay at Amsterdam University one of my fellow-students in biology, William Commelin Scholten, died. His parents, whose only son he was, wishing to found some memorial, consulted me, who had known their son well. After consulting with my father I advised the foundation of an institute for genetics, because I knew that young Scholten's ambition had been to devote himself later to applied botany in relation to horticulture. Purposely I did not advise the founding of a laboratory for phytopathology because I considered this to be a task for the state. It was so urgently needed that it would come as a matter of course. The parents, however, accepted the advice of Professor Hugo de Vries in favor of a phytopathological institute. It was put under the direction of Dr. Ritzema Bos, and inaugurated in 1895. I was invited to become a member of the board of directors and served as secretary from 1906-1935. In 1906 the Government organized a State Phytopathological Institute at Wageningen, under the direction of Prof. Ritzema Bos, and at the same time withdrew the subsidy from

the Amsterdam Institute. The Scholten Institute, under the genial leadership of Professor Johanna Westerdijk, and now situated in Baarn near Utrecht, has become one of the most important centres of this science, and is regularly visited by numerous students from other countries.

Already in 1902 I was elected as a member of the Haarlem Chamber of Commerce and a few years later I became its vice-president. Institutions of this kind were not of special importance in those days for they had an exclusively advisory task and did not hold their meetings publicly. My proposal to change this system in order to revive public interest was rejected. I resigned in 1912, but after the reorganization of the Chambers of Commerce which increased their influence and gave them certain rights and faculties, I was chosen as one of the representatives of the bulb organisations. I was at once elected general president of the Haarlem Chamber, and served for ten years (1922-1932).

Every year in the first session of the Chamber I read an address giving a review of the previous year and my view on the economic conditions of the moment.

My function as president of one of the five most important Chambers of Commerce in the Netherlands led to my election as a member of the board of directors of the Netherlands section of the International Chamber of Commerce. I also became a member of some special international committees, such as that on trade barriers, in which I always tried to foster the free trade principle.

Owing to my experience in exhibition matters the Netherlands Government appointed me as its delegate to the Diplomatic Conference on International Exhibitions held in Paris in 1928, where the rules for the organisation of world's fairs and other international exhibitions were fixed.

A similar official function was accorded to me by the Government as its representative at one of the assemblies of the International Agricultural Institute in Rome in 1928 in connection with an International Conference on Plant Diseases.

My economic conviction in matters of international trade relations made me during a long period of years an active member of the board of directors of the Netherlands organisation for free trade. In this capacity I became honorary member of the London Cobden Club.

During the World War the Netherlands' Government organized a semi-official organisation for the control of exports in which all economic groups were represented. I was appointed as one of the horticultural representatives in the council.

In my own town I was often invited to serve as member or chairman of committees organized for various purposes.

A few years after the Rotary movement started in Holland, a club was organized in Haarlem, of which I was a charter member. I soon became president for one year, and acted as governor of the 59th District of Rotary International in the year 1930-1931. I visited the Great Chicago Jubilee Rotary Conference in 1930 and during two years was a member of the European Advisory Committee.

Connections With The United States of America

The firm of E. H. Krelage & Son had relations with the United States since the first years of the 19th. Century when bulbs were yearly sent to public auctions in various cities of America. Later, during a series of years, the bulbs were sent directly to such firms as John Milton Earle, Worcester (1831); William Prince & Sons, Flushing (1835); Henry A. Dreer, Philadelphia (1844); Ellwanger & Barry, Rochester (1841); R. Buist, Philadelphia (1850); Geo. C. Thorburn, Newark (1852), etc., and in 1859 the first special American edition of the wholesale bulb catalogue was issued.

In 1893 my father was invited by the Netherlands Government to act as a Judge of Awards for horticulture at the Chicago World's Fair, but he did not accept on account of his advanced age. The Government then appointed me, although, at the age of 24, I seemed rather too young for this responsible post. I acted as a judge during a month in Chicago together with Geo. Nicholson of Kew and Professor Wittmack of Berlin. After completing my work, I made a round trip over Yellowstone Park, Van Couver, California, Utah and Colorado back to Chicago and from there to Niagara, Boston, Philadelphia, Washington and New York.

Not until 1922 did I visit the States for the second time. The bulb exporters sent me with Mr. Warnaar as delegates to Washington in connection with the hearing which preceded the embargo on narcissi three years later.

The announcement made in 1922 by the United States authorities, concerning the proposed embargo on narcissi bulbs to begin in 1925, caused great embarrassment among the daffodil growers of Holland. Their stocks were practically free from diseases and insects and they feared that the bulbs might suffer from an embargo based on the health condition of narcissi bulbs grown in other European countries. In order to secure information on the state of health of the totus albus narcissi grown in the important centre of Southern France, the Society asked Prof. van Slogteren (Plate 96), the renowned phytopathologist, of the Lisse Laboratory, and myself to visit the farms in that district. As we found the presence of the eelworm disease in certain places, we gave information and instructions to the growers on how to fight the pest. In this way we won the confidence of the bulb growers in the district, who were ready to loyally coöperate to free the farms from pests. The American embargo however could not be avoided and it came into force on the announced date.

My third visit to the States took place in 1930 when I was present at the Jubilee Convention of Rotary International in Chicago as governor nominee of the district of Holland. It was a sensation for me to compare the Chicago of 40 years ago without any skyscrapers or autocars with the Chicago of today.

My interest in peony and iris culture and my historical studies on the development of the garden varieties, brought me in contact with Mr. Wister, the enthusiastic founder of the American Iris Society. He solicited from me an elaborate article on the "History of Bearded

Irises'' for one of the first Bulletins of the Society. The historical notes published in my firm's special Peony Catalogue (1892) were reproduced in the publications of the American Peony Society.

Epilogue

Reviewing my life I cannot be thankful enough for the many privileges I enjoyed. I know my failures and my shortcomings. I succeeded only partially in realizing my objects and so I am not quite satisfied with the result of my work. The prevailing feeling however is that of gratitude and contentment.

Decorations, Honorary Memberships, and Personal Medals

DECORATIONS

Knight of the Netherlands Lion Order.
Officer of the Orange Nassau Order.
Knight first class of the House of Orange-Order.
Knight Commander of the Leopold II Order of Belgium.
Officer of the Belgian Crown Order.
Knight of the French Legion of Honor Order.
Officer of the French Order for Agricultural Merits.
Officer of the Italian Crown Order.
Knight 3rd class of the Imperial Russian St. Stanislas-Order.

HONORARY MEMBERSHIPS

Honorary president, General Bulb Cultural Society of Holland.
Royal Netherlands Horticultural and Botanic Society.
Netherlands Horticultural Trade's Association.
Royal Agricultural and Botanic Society of Ghent (Belgium).
Syndical Chamber of Belgian Horticulturists.
Chrysanthemum Club of Belgium.
National Horticultural Society of France.
Royal Horticultural Society (London).
Iris Society (London).
American Iris Society.
American Amaryllis Society.

PERSONAL MEDALS

Horticultural Society of New York (1925).
Haarlem Chamber of Commerce (1931).
Large Nicolaas Dames—Medal (1935).
William Herbert Medal, American Amaryllis Society (1938).

Miss Ida Luyten (Photo, H Berssenberger, Den Haag), upper left; Prof. Dr. E. van Slogteren (Photo, Truus Knopper, Heemstede), upper right; the late C. Ludwig (Photo, de Graaff, Sassenheim, Hillegom), lower left; Th. M. Hoog (Photo, Weijert van Zanen, Haarlem), lower right. *See pages 48, 56 and 59.*

Plate 96

AMARYLLID CULTURE IN HOLLAND

ERNST H. KRELAGE, *Holland*

In giving a review of amaryllid culture in Holland, attention will be mainly centered on *Hippeastrum* and closely allied genera, for which the Dutch bulb nurseries have been renowned over a long period of years. Narcissi are one of the three most important items in the Holland bulb market and a record of their cultivation would require an entire volume of Herbertia.

All other genera of the family, including those now transferred from the Liliaceae to the Amaryllidaceae, which are known as cultivated plants, have long been specialties with some Dutch bulb growers, who export them to their customers abroad and also furnish them to their colleagues, who do not grow these items themselves. In this paper however these genera will not be dealt with and these will be left for later treatment. I will confine myself to the most characteristic representatives of the family—the *Hippeastrums* and closely allied genera.

All of these amaryllids, with a few exceptions, had to be introduced from other parts of the world. The Hollanders often received new plants before anyone else, owing to their early regular navigation to their colonies all over the world—the Malayan Archipelago, which they still occupy, Ceylon, Tasmania, and New Zealand, Cape of Good Hope, Brazil, New-Amsterdam (New York) and many other areas of minor importance.

We often find in old Dutch horticultural books figures and descriptions of newly introduced plants that were never described before and were soon lost because their cultural requirements were unknown.

Haemanthus multiflorus was figured as early as 1612 by Emmanuel Sweerts in his *Florilegium,* under the name *Satyrium* from Guinea. This book was the first illustrated bulb catalog, for the author announced at the back of the title page that the bulbs figured may be purchased from him either at the yearly fair at Frankfurt am Main or in his shop at Amsterdam. *H. multiflorus* was reintroduced in 1878 under the name of *H. Kalbreyeri* by James Veitch & Sons who had received it from their collector Kalbreyer.

Hippeastrum equestre was figured and described by Paul Hermann, Professor of Medicine and Botany and Director of the Botanic Garden at Leyden, in 1698 under the name of *Lilium Bella Donna.* The engraving gives a perfectly exact and charming impression of the species figured.

I possess a fine drawing in water color of the same species, by the flower painter Laurens Van der Vinne (1712-1742), made in 1737 at Leyden. As to whether or not this picture was made from a plant of the original stock is unknown. The species was repeatedly lost to cultivation to reappear as many times. In 1710 it became known in England, and it may then have been reintroduced in Holland. After periods, when it was lost sight of, it was considered a novelty and was newly named and described. It is not surprising that it has more than half a dozen synonyms in botanical literature.

Sometimes, in the early literature, only a huge bulb is figured with the remark that it has not as yet flowered. Some of these plants can easily be recognized, others not with certainty. This is not a serious loss however for the regular cultivation and trade in tropical and similar bulbs did not begin until the latter part of the 18th Century.

As far as amaryllids are concerned, the Haarlem bulb firms had splendid opportunities of securing good stocks of valuable species in 1789 for in that year a French officer, La Brousse, returned from the Cape of Good Hope and settled at the Lankhorst estate, Heemstede near Haarlem. He brought a large stock of bulbs from South Africa with him which he planted in the estate garden, and there he showed them to the Haarlem bulb growers. He succeeded in getting exceedingly good prices for his merchandise. Among these bulbs were several amaryllids and these doubtless formed the original stock of species offered in the Haarlem bulb catalogues of the period.

The amaryllids of La Brousse included a giant bulb which did not flower until the year 1805. It was described as *Amaryllis gigantea* by Van Marum, later sold to the French Empress Josephine, and dedicated to her as *Brunsvigia Josephinae* by Redouté, who had not seen the first description of the plant.[1]

Catalogues issued by Haarlem firms in the early years of the 19th. Century, and previously, are extremely scarce. A few copies from various firms are in my possession. Amaryllids were offered by the firms of Voorhelm & Schneevoogt, Joh. Rosenkrantz & Sons, A. C. Van Eeden & Co., Hendrik van Eeden & Co., Groenewoud & Voorhelm, H. Polman Mooy and E. H. Krelage.

The species offered were often the same and it may be supposed that they did not all grow these themselves, but obtained the bulbs, if wanted, from another colleague who had them in stock. The amaryllids were not a very important article, until the advent of the Hippeastrum hybrids.

Early Amaryllis Breeders

Since the appearance of the remarkable *Hippeastrum Johnsonii* and *Ackermannii,* the raising of hybrids was taken up in several countries and Holland had a large share in it. The firms that had collections with international reputations were De Graaff Brothers at Leyden, V. Schertzer & Sons, A. C. Van Eeden & Co. and E. H. Krelage & Son, at Haarlem.

They all had special warmhouses built for amaryllis exclusively and their flowers were almost yearly the pride of the flower shows in Holland. The collections were often visited during the flowering period by representatives of British and other amaryllis growers who often purchased the best hybrids at high prices.

De Graaff Brothers (at Leyden). The predecessors of this firm (thus named from 1863 until its amalgamation with S. A. van Konijnenburg & Co.) cultivated Hippeastrums since the year 1790. The first

[1]See page 132.

species known in Holland were *vittatum* and *equestre*. After the introduction of *H. fulgidum* and *crocatum* (both closely allied to *H. rutilum)* in the first decade of the 19th. Century, these species were intercrossed with *vittatum* and *Johnsonii,* the hybrid between *Reginae* and *vittatum* raised by the Lancashire watchmaker Johnson in the same period. The seedlings obtained excelled in dark colors, but the flowers were small. A hybrid which later proved to be of great importance in the further development of Hippeastrums was *Graveanum* (the right spelling evidently ought to be *Graaffeanum).* This was probably obtained by crossing *Johnsonii* with *fulgidum* or an allied form.

Simon A. de Graaff (1840-1911) who, with his brother, succeeded their father Jan de Graaff in 1863, started hybridizing about the same time, using the larger flowering species and hybrids, then known, inincluding *psittacinum.* By crossing the latter with *Graveanum,* he raised the famous *Empress of India* which afterwards became an important factor in the production of some of the best types by the British firm of James Veitch & Sons. Many others of De Graaff's seedlings were purchased by British firms to improve their stocks of Hippeastrum.

The Leyden nurseries, which half a century ago had partly the character of a botanical garden, have been reorganized into one of the largest bulb farms of Holland with branch farms in England and U. S. A. Hippeastrum culture has been entirely dropped.

Valentine Schertzer & Sons, at Haarlem, were already established as bulb growers and exporters in 1730. In the middle of the 19th Century, when their firm was owned by H. D. Kruseman (1814-1879), one of their specialties was amaryllis culture including the raising of hybrids. The firm's collection had a high reputation and gained many high prizes at flower shows between 1860 and 1880. Their bulb catalogues of that period do not mention variety names, and the hybrids were offered only with colour descriptions. In later years they abandoned amaryllis culture and only kept the seed trade section of the business.

A. C. van Eeden & Co., at Haarlem. The van Eedens were known as florists since the beginning of the 17th. Century. A hundred years later there were four firms of the name, all descendants of a common ancestor who had acquired fame as a florist. In 1812 Arie Cornelis van Eeden, after having been associated with Hendrik van Eeden, started business on his own account. He had an excellent reputation as a grower and for his general knowledge of everything connected with gardening in Holland. A later owner of the firm was A. C. Groenewegen, (1844-1892) who established the firm's renown for amaryllis growing. Their collection competed successfully at shows between 1865 and 1890 and many of their hybrids were among the best of the period. After Groenewegen's death the collection was sold and partly came in the possession of E. H. Krelage & Son.

E. H. Krelage & Son, at Haarlem, started Hippeastrum growing during the first quarter of the 19th Century. They had an extensive collection and issued a descriptive catalogue of Hippeastrum in 1863 in which over 350 hybrids were described and offered including the best seedlings of the late F. Boon.

The Haarlem bulb show of 1895 proved that the collections of the Dutch firms were far from up to date. A brilliant collection sent by Messrs R. P. Ker & Sons of Liverpool topped them all. These fine plants were retained in Holland and contributed greatly toward the improvement of the Dutch Hippeastrum collections.

Henry Nehrling in an article in Garden & Forest of May 19, 1897 enthusiastically praised the Krelage hybrids—"A large number of gigantic hybrids of the finest form and beautiful colors have recently been introduced by Mr. E. H. Krelage of Haarlem, Holland. Just now (April 10th.) the following are in flower with me." After detailed description of some hybrids he concluded: "These hybrids compare well with the others now in flower with me. They are vigorous growers and easily managed. The scapes are usually three feet high. The form of the flowers, the narrow channeled leaves and color of the bulbs show that Mr. Krelage has had a way of his own in producing these grand hybrids."

Since the 90's Krelage Hippeastrums could therefore again claim to be the foremost in quality. In 1919 they obtained the highest prize of honor, the Queen's Large Medal at the Haarlem show. The strain then contained faultless brilliant scarlets and crimsons, pure whites and pinks, and the last traces of the objectionable green in the throat had disappeared. Shortly afterwards the firm sold its collections.

In the years 1880-1900 the firm grew an extensive collection of *Clivias,* containing practically all the hybrids of the period raised by Reimers of Hamburg and the Belgian firms. A hybrid raised by the firm with large round erect flowers of orange salmon color with light yellow centre, named *Natura Artis Magistra,* received a First Class Certificate by the Netherlands Horticultural and Botanic Society in 1891.

Other firms. About 1890 three other Dutch firms cultivated amaryllis—A. H. Ingenhousz van Schaik at Voorschoten, J. W. Daudey at Haarlem and J. Kouwenhoven at Warmond, but their collections remained in existence for comparatively short periods only.

Before referring to present day Hippeastrum culture in Holland, it seems appropriate to describe the methods of growing in use half a century ago. The large sized flowering bulbs were grown in low "spanroof" show houses and the smaller sized ones in brick pits, where they remained until they flowered; the best ones were then removed to the show houses.

Tan bark could then be easily and plentifully obtained in Holland. This is the crushed bark of the oak tree and is used for tanning cow hides. When tan bark is put on a heap it slowly decomposes and gives off a steady heat. It was used in plant houses to provide a cheap plunging material which kept a steady bottom heat for a long time. The pots in which the Hippeastrum bulbs were planted, were plunged in this material. It was also used for covering the pots with a layer of about ten inches thick.

W. S. Warmenhoven, upper left; J. M. C. Hoog, upper right; the late C. Ludwig and some of his white amaryllis (Photo, de Graaff, Sassenheim, Hillegom), lower, note that Mr. Ludwig is to the right. *See pages 56 and 59.*
Plate 97

As the methods of heating by warm water pipes gradually became more popular, the growers abandoned the use of tan bark and laid hot water pipes in the beds thus producing bottom heat that could be regulated at will. Other growers however, preferred to use the fallen leaves of oak and beech trees, which, if brought on a heap, also give off a steady and gentle heat for several months.

The bulbs were wintered in a hot, dry place and were potted about the end of March. Since the bulbs were grown for export in October, they had scarcely seven months in which they were expected to complete their growth.

The seeds were sown in pans and left undisturbed for two or three seasons. After that period the seedling bulbs were potted separately and grown in the way indicated above.

Amaryllid Culture Today

At present amaryllid culture in Holland is carried on chiefly by three firms and the managers (Plates 96 and 97) in each case have kindly furnished me with particulars about their achievements.

C. G. van Tubergen, Jun., at Haarlem not only grows a famous collection of *Hippeastrums,* but also is a successful raiser of amaryllid hybrids (See portraits of the Messrs. Hoog, Plates 96 and 97). This firm also pays attention to *Hippeastrum* species and varieties requiring a minimum of artificial heat and which with due care and attention in mild climates may be grown outside. The old hybrid *H. Ackermannii* is one of the best in this class. In English gardens not far from London large, very free-flowering clumps of this *Hippeastrum* hybrid grown on narrow borders in front of warm walls, often form a very striking subject in summer, with their tall spikes, crowned with two to three or four crimson-red flowers of tubular form. In Van Tubergen's nursery it grows and increases with great freedom. Here it is planted in a deep sandy soil in beds in a house devoted to the culture of Cape and Chilian bulbs, and is kept in winter just above the freezing point. This house which is never shaded, but well ventilated, receives much solar heat in summer.

The winter-flowering *H. aulicum* is one of the easiest Hippeastrums to grow. It requires but little heat, is more or less evergreen and it flowers during the dull winter months. The blooms are of a good size, scarlet with greenish base. It is one of the few *Hippeastrums* that can permanently be grown in the dwelling-room, where with a little care and attention it produces every winter its bright colored flowers. This species has been hybridized with *H. reticulatum striatifolium.* The latter is a tender hot-house species. The hybrid however proved to be a plant easy to grow, with luxurious deep green silvery white striped leaves and attractive flowers of carmine-rose. The hybrid does not require much heat.

The new *H. candidum* is described and figured, in the Botanical Magazine, and it is supposed to require much heat, but in Van Tubergen's nursery it grows vigorously in the cool-house described above; unfortunately it flowers but very sparsely and it makes few or no offsets.

Hippeastrum rutilum is easily grown and free-flowering. This species is very attractive in spring with its elegant, slender flower spikes that grow about a foot high and bear four orange colored flowers, marked with green in the center. If in the course of time it will be possible to raise different colored varieties of it, retaining the elegant habit and small sized flowers, it will no doubt become very popular. Unlike most other Hippeastrums this species increases rapidly by offsets that adhere to the mother bulb.

Last summer in Van Tubergen's nursery much attention was centered on *H. (Phycella) phycelloides.* Bulbs of this species had been received in the previous year from their collector in Argentina. This species which grows and increases with great freedom produces numerous flowerspikes in succession throughout the summer months. The flowers are of small size, funnel shaped, bright red with protruding yellow stamens. If this can be hybridized with the allied *Habranthus pratensis,* quite a novel race of highly attractive and uncommon summer-flowering bulbs for the warm bulb border will be obtained.

Amaryllis Belladonna (Ait.) and Brunsvigia. Most of the beautiful autumn-flowering *Amaryllis Belladonna* (Ait.) varieties are tender. Although, they may be grown outside, in northern climates, if care is taken to protect them during severe winters, the amount of flowering usually leaves much to be desired. There is however one exception and that is the variety, which for a long time has been cultivated in Dutch nurseries under the name of *Amaryllis Belladonna* (Ait.) *purpurea major,* a variety which in French gardens goes under the name of *rosea perfecta.* If the bulbs of this variety become well established, they form big clumps and always push up their flowers spikes in the autumn. These bear several rosy flowers that are tinged with purple after ageing.

This variety on account of its free-flowering character and robust constitution has been used as a starting point for improvements. From an Australian grower, the firm sixteen years ago received a consignment of bulbs of a hybrid between *Amaryllis belladonna* (Ait.) and *Brunsvigia Josephinae.* This hybrid was formerly also raised by another grower and was named *A. belladonna* (Ait.) *Parkeri,* after the raiser. This hybrid produces very tall spikes, crowned with a very great number of large, bright rosy flowers with a yellowish-white center, and it is very beautiful. Unfortunately, owing to the influence of *Brunsvigia Josephinae,* although it will live in our gardens, it will only produce its flower spikes after an exceptionally warm and dry summer. The variety *purpurea major,* crossed with this bigeneric hybrid, gave a number of varieties, all great improvements on the original form, four or five percent being pure white. The latter are especially notable for exquisite beauty and charm. Among *Amaryllis belladonna* (Ait.) varieties grown in Van Tubergen's nurseries, is also a very large-flowered form with flowers of deep crimson-rose. This was received a good many years ago from the late J. H. Elwes, the author of the magnificent publication "Monograph of the Genus Lilium". The above named hybrids, out of the old *purpurea major* X *Parkeri,* again crossed with Elwes' *belladonna,* which received the name of *rubra major,* constitute a strain of very tall,

many-flowered belladonnas, some of which owing to the influence of Elwes' *rubra major* produce many-flowered umbels with large flowers, of a warm, rich rosy-carmine with a yellowish throat. All of these however require a very warm, sheltered situation, for the foliage develops during the winter months. In Van Tubergen's nurseries they are planted in beds in a lofty, well-ventilated, sunny house, where frost can be excluded during the winter. In the autumn, when the *belladonna* hybrids are in flower, this house presents a really magnificent sight.

In the same nurseries about 25 years ago, a cross was effected between *Brunsvigia Josephinae* (mother parent) and a good variety of *A. Belladonna* (Ait.). A few seeds were harvested and whereas under good cultivation *A. belladonna* (Ait.) X *Brunsvigia* will flower in five or six years if raised from seed, the reverse cross *Brunsvigia Josephinae* X *A. belladonna* (Ait.) cannot be expected to flower until the bulbs are some twelve to fifteen years old. This hybrid which was called *Brunsdonna Tubergeni,* has been figured and described in the Gardeners' Chronicle and has created much interest for it is one of the very few bi-generic hybrids in bulbous plants. Owing to the influence of the mother parent, *Brunsvigia Josephinae,* these hybrids are of slow growth and do not increase freely, but they are very beautiful when in flower. This hybrid produces a stem with a very large umbel of flowers in which clearly the influence of *Brunsvigia* can be traced. One of the varieties bears flowers that are colored exactly like *Passiflora kermesina.*

According to the rules adopted to name plants, both hybrids, the *A. belladonna* (Ait.) X *Brunsvigia* and the reverse cross, *Brunsvigia* X *A. belladonna* (Ait.), should bear the name given to the latter hybrid —*Brunsdonna.* Horticulturally however there is such a great dissimilarity between these two groups of hybrids, that Messrs. Van Tubergen, as soon as the available stocks are large enough, intend to offer them under two headings, calling the hybrids out of *A. belladonna* (Ait.) X *Brunsvigia, Amar-Brunsvigia*[2] and the reverse group, *Brunsdonna,* giving varietal names to the numerous varieties in each group.

Ismene. Another group of amaryllids to which great attention is being paid are the *Ismenes.* Baker in 1888 made *Ismene* a subgenus of the Genus *Hymenocallis,* to which they are very closely related, but horticulturally, and apparently also botanically, they form such a distinct group by themselves, that it is certainly correct to retain the name *Ismene* (founded by Salisbury) for them. One of the best known species no doubt is *I. calathina,* but its drawback is that it is not free-flowering. Out of a series of crosses effected between *I. calathina* with the free-flowering hybrid raised by Mr. A. Worsley, which he called *I. festalis (I. calathina* X *Elisena longipetala),* one specimen was selected which in all points closely resembles the old *I. calathina* but bears a larger flower, is of a much more vigourous constitution, increases rapidly and is very free-blooming. This has been called *Ismene Advance.*

[2]Since Dr. Uphof, page 101, of this volume, has shown that the valid name for **Amaryllis belladonna** (Ait.) is **Callicore rosea Link,** the editor suggests **Corevigia,** or **Callivigia** as more appropriate names for the bigeneric hybrid. The name **Amar-Brunsvigia** is also somewhat clumsy.—Ed.

The above mentioned *I. festalis* no doubt is one of the choicest bulbous plants that have lately been raised. Owing to the influence of *Elisena longipetala,* this hybrid produces highly refined pure white flowers. The cup is somewhat deflexed and the petals are rather curiously twisted. In favored localities, when planted in a border in front of a heated plant-house, this hybrid will live out of doors, and will grow into handsome clumps which never fail to produce tall spikes in the summer, crowned with fantastically shaped, pure white flowers, that are highly fragrant. The Peruvian golden-flowered *Ismene (I. Amancaes),* with its magnificent clear yellow flowers, striped with green, has been known for a long time, but is rarely seen in gardens for its constitution is delicate. *Ismene calathina* crossed with *I. Amancaes* gave birth to a vigorous growing hybrid with sulphur-yellow flowers which Van Tubergen raised and called *I. Sulphur Queen.* Other crosses are still in course of observation.

All the *Ismenes* from a horticultural point of view are exceedingly valuable, not only because they are really beautiful plants, but also because the list of bulbs that can be offered during the winter and spring months in shops and in seed-warehouses is somewhat restricted. The *Ismene* bulbs however are of handsome appearance and will keep in good condition for several months, provided the temperature does not fall below 50 degrees F.

Ludwig & Co., at Hillegom specializes in pure white *Hippeastrum* seedlings and possesses a superior strain of pure whites. The late partner of the firm, C. Ludwig (Plates 96 and 97), who worked twenty years in hybridising amaryllis, is responsible for this result.

W. S. Warmenhoven (Plate 97). The name Warmenhoven has been associated with Hippeastrums for the last twenty years. The firm of W. Warmenhoven & Sons of Hillegom owned a superior collection and was a regular and successful exhibitor in Holland and Belgium and the new concern of W. S. Warmenhoven, "Zonnewende", Hillegom, deserves attention because it sponsors the application of the vegetative method[3] (by means of cutting and scooping the bulbs similar to the method used to increase hyacinth bulbs) of propagating stocks of superior hybrids. These are characterized by large flowers of round, ideal shape and dazzling pure colours of every shade, including pure whites, clear violet shades, light Havana brown with dark bases, delicate pinks and many others. From these various hybrids only the very best individual plants are carefully selected for vegetative reproduction. In this way the superiority of the coming stocks is fully guaranteed. At the "Winterflora" show held at Haarlem during last February, the firm exhibited an outstanding group of their hybrids, and demonstrated the value of vegetative reproduction of amaryllis in a most convincing manner. The group was superior in every respect and probably contained the very best Hippeastrums now in existence.

[3]The Scientific research on which these practical results are based was most successfully performed by Miss Ida Luyten in the laboratory of Prof. Blaauw in Wageningen in 1926. I need not refer to these achievements, because they have been treated in detail in an article by Miss Luyten herself (Plate 96) in Volume 2 of this Year Book (pages 115-122).

Growing Bulbs from Seeds. The modern methods of growing Hippeastrums from seeds differ greatly from those used in the 19th Century. Instead of leaving the young plants in seed pans, they are put into small pots about two months after the seeds have been sown, which is generally done early in May. These seedlings after eight or nine months of careful cultivation in a moderately warm house, develop into nice young plants with bulbs of the size of a hazelnut and in January are again repotted into 2½ to 3 inch pots. If these plants are grown in a suitable structure with ample solar heat and good feeding, they will have become strong young bulbs, 1¾ to 2¼ inch diameter, at the age of twenty months by the next autumn. Sometimes however, the young seedlings are not potted separately, but are planted out in benches in the houses, in order to save labor.

Formerly it was the aim of *Hippeastrum* growers, to produce a product as varied as possible, since *Hippeastrums* were then generally sold in small collections of various colors. Now that the cultivation of Hippeastrums has become better understood, and it is now possible to produce, large, flowering-sized *Hippeastrum* bulbs within a period of only three years, *Hippeastrums* are being raised in large quantities in order to meet the trade demands. The trade now distinctly wants large quantities of bulbs of self colors—deep scarlet, orange-salmon and pure whites being preferred.

By judiciously selecting seed parents that closely resemble each other in growth, habit and flower color it is possible in many instances to secure seedlings fairly true to type.

H. Boegschoten. To complete these notes, mention should be made of a distinct strain of *Hippeastrums,* raised about 1920 by Mr. H. Boegschoten, head gardener on a private estate near Haarlem. He made use of the small-flowering species *H. rutilum* and obtained a strain of hybrids with medium sized flowers in dark red shades, and which is remarkably free-flowering. These hybrids have never been distributed to the trade.

IN MEMORIAM—GEORGE YELD

Early in April of this year the news spread in horticultural circles that Mr. George Yeld had died April 2, 1938, at Orleton, England, at the age of ninety-five years. Mr. Yeld's profession was that of a master in private schools for boys in England. In his earlier days he was an alpine climber of some note. Since about 1890 his avocational interest in garden plants was keen. During the last half of his life his service and contributions to horticulture were of special merit.

Mr. Yeld was apparently the first person to obtain seedlings of daylilies *(Hemerocallis)* by deliberate pollination. He states (Rep. Third Conference Genetics, 1906) that his interest in hybridizing daylilies was aroused when he first saw plants of *Hemerocallis Middendorffii* in bloom and considered the possibility of hybridizing plants of this species with plants of the Lemon Daylily *(H. flava)*. The first of his seedling daylilies was exhibited in 1892. This plant was propagated and named the *Apricot Daylily*. Today this clone is in culture and is to be ranked as an excellent plant in the class of semi-robust stature, early flowering, and cadmium-yellow flowers. In 1906 Mr. Yeld summarized the early history of the development of horticultural daylilies and listed nine of his own seedlings that had been named for propagation. Other daylilies obtained as seedlings by Mr. Yeld continued to appear, the last shortly before his death.

The list of all daylilies produced and named for culture by Mr. Yeld, of which the writer has record, is as follows:—*Ambler, Apricot, Aurelia, Beauty, Bretwelda, Chrysolite, Corona, Estmere, Flame, Francis, Gelasma, Halo, J. S. Gaynor, Magnifica, Meg, Miniken, Miranda, Moidore, Moonlight, Omphale, Orange Vase, Pyrrha, Radiant, Sayda, Sica, Sirius, Tangerine, William Dean* and *Winsome*. Several of these clones, especially *Estmere, Tangerine* and *Apricot*, will long be regarded as plants of outstanding merit in their respective classes.

Mr. Yeld was also concerned with breeding bearded irises and of his seedlings mention may be made of *Asia, Memory, Neptune, Sunshine*, and the highly rated, *Lord of June*.

For many years Mr. Yeld was identified with the activities of the Royal Horticultural Society. He served on the Floral Committee and on the Joint Iris Committee of this society. In 1925 he was awarded the Victoria Medal of Honor in Horticulture by the Royal Horticultural Society.

A. B. Stout,

ANNOUNCEMENT—GEORGE YELD MEDAL FOR DAYLILY VARIETIES

The American Amaryllis Society has founded the George Yeld Medal, named in honor of the late George Yeld, which is to be awarded each year to the most outstanding and valuable daylily observed by a committee composed of the Chairman of the Daylily Committee, and the Chairmen of the Regional Daylily Trial Collections. The medal will be awarded for the first time in 1939, or 1940.

BETTER PLANTS AND ANIMALS[4]

S. H. Yarnell,

Texas Agricultural Experiment Station
A. & M. College of Texas

To the laymen interested in plant and animal improvement the 1936 and 1937 Yearbooks of the United States Department of Agriculture are a happy departure from the established procedure.[5] The bulk of both volumes is devoted to progress in the development of "Better Plants and Animals" and to an insight of the scientific principles involved. While the 1937 volume is of particular interest to horticulturists, there are two chapters in the 1936 Yearbook that should by no means be overlooked. They are "A Glossary of Genetic Terms," and "Heredity Under the Microscope" by J. H. Kempton.

Every crop and domestic animal of importance to American agriculture has received attention, and the improvement of each is discussed by one or more specialists of the Department. An immense amount of information of value to the breeder is gathered together. The treatment is based on a survey of the genetic or germ plasm resources of our varieties of fruit, ornamental, and crop plants and breeds of animals. The comparatively recent organization of breeding work on a scientific basis permits a rather full account of early progress along this line in America. Present activities are recorded in detail, including their location, personnel, lists of varieties and breeding stocks, methods employed, and results being obtained. In addition there is a surprising amount of supplementary information such as chromosome lists, wild species of possible value, bibliographies, and the status of breeding work in other parts of the world.

Of especial interest to flower lovers is the chapter in the 1937 volume "Improvement of Flowers by Breeding" by S. L. Emsweller, Philip Brierley, D. V. Lumsden, and F. L. Mulford. This, in itself, is an enormous field. As an introduction to the subject, the scientific aspects of flower breeding are discussed. Attention is called to the value of disease resistant strains, to the effect of length of day on flowering, to the possibility of increasing the cold resistance of winter-hardy perennials, and to the desirability of supplementing the germ plasm resources of our present stocks with introductions from other parts of the world. The section on the technique of breeding is illustrated by drawings of the different types of flowers, and includes mention of special methods such as grafting a style from the pollen parent onto that of the seed parent where a cross is especially difficult. Mass selection is compared with line breeding. Then come discussions of hybridization, mutations as a source of new types, artificial methods of obtaining the different kinds of mutations, and "What the study of cells contributes to flower breeding." Figure 14 gives an excellent idea of what chromosomes look like when dividing, during the formation of pollen grains.

[4]Contribution No. 938, Popular Series, Texas Agricultural Experiment Station, approved by the Director March 28, 1938.

[5]Year Book of Agriculture, 1936 and 1937. Government Printing Office, Washington, D. C.

Amaryllis is the first flower group considered as such. The development of interest in the different species of *Amaryllis* (syn. *Hippeastrum)* is followed and interspecific hybridization considered. Attention is called to the work of the American Amaryllis Society in collecting and distributing information on this whole group of plants and in sponsoring national shows. The Bureau of Plant Industry has been breeding amaryllis since 1909, producing varieties of superior size, form, and color.

Daylily breeding began in the early nineties with the introduction of "Apricot" by George Yeld in England. A. B. Stout of the New York Botanical Garden has led in recent years, both in the production of new varieties and in a scientific study of the breeding problems, such as self-sterility and inter-compatibility, and the large number of genetic factors contributing to the production of desirable types.

Unfortunately it is impossible to more than list the other flower groups receiving special attention in the chapter on flower improvement. They are china-aster, canna, carnation, chrysanthemums, dahlia, gladiolus, iris, lily, nasturtium, rose, snapdragon, stock, and sweet pea. In the appendix there is a 14-page account of "Genetic studies on ornamental plants" which refers to no less than 111 genera. A bibliography of 564 titles that does not appear in the Yearbook itself has been published in the Separate of this chapter (No. 1591). For this reason it might be better for those whose interest is limited to flower improvement to secure this, together with the Separate entitled "Fundamentals of Heredity for Breeders" (No. 1605) rather than the complete yearbooks. They are for sale by the Superintendent of Documents, Washington, D. C. for fifteen cents each. The latter publication is a complete reference book in itself and contains the following articles: "Fundamentals of heredity for breeders" by E. N. Bressman, "Vegetative reproduction" by J. R. Magness, "A chronology of genetics" by Robert Cook, Editor of the Journal of Heredity, and "Studies in the behavior of chromosomes" by A. F. Blakeslee of the Department of Genetics, Carnegie Institution of Washington. With such information at hand the production of improved varieties both as a vocation and as a pastime should receive permanent stimulation.

WILDER'S "THE GARDEN IN COLOR"[6]

The publishers of this book were fortunate in securing the services of the late Louise Beebe Wilder in the preparation of the text and the arrangement of the color plates. However, it is unfortunate that no mention is made of the fact that the originals had previously appeared in Camillo Schneider's Gartenschoenheit (Berlin).

The plan of the book is excellent. There are four sections corresponding to the seasons, and outstanding plant subjects are grouped under each of these. The natural color reproductions in most cases are

[6]Louise Beebe Wilder, The Garden in Color, The Macmillan Company. New York. 1937.

satisfactory, but occasionally there is a plate that is somewhat "off-color." On the whole the attempt is successful, and we are grateful for this unified treatment of color in the garden covering the entire year.

The amaryllids are given due attention. In the spring section, *Narcissus, Golden Spur* and *Allium narcissiflorum* are illustrated, and *Galanthus* is referred to in the text. *Hemerocallis aurantiaca major* and *Agapanthus africanus* are pictured in the summer section, but *Lycoris squamigera* is an outstanding omission in the autumn section. However, *Leucojum*, *Sternbergia*, and *Brodiaea* are mentioned in the text.

In the winter section, *Clivia*, narcissi and hybrid amaryllis (formerly called *Hippeastrum)*[7] are illustrated. Although the South American *Amaryllis* (formerly called *Hippeastrum)* appear in plates 282 and 283, the text states that "Amaryllis is a South African bulb," and the rest of the discussion is devoted to the South African species, which is not pictured, and is in fact a late summer and fall blooming species that is not cultivated under glass in winter. The reader is referred to Dr. Uphof's article[7] for a clearer understanding of this classic "mix-up" in nomenclature.

Such minor discrepancies as pointed out should not detract from the work as a whole for the color values are the important consideration. From this standpoint, the book will find a warm reception from every garden enthusiast.

—*Hamilton P. Traub.*

[7]See Dr. Uphof's article on pages 101 to 109 of this volume.

IMPRESSIONS OF FLORIDA DAYLILIES— WINTER 1937-38

Ethel P. Dewey, *New York*

Florida offers the winter visitor some blossoms of hemerocallis as late as November and early December. These are not as might be supposed late-flowering plants blossoming for the first time but rather such favorites as *Soudan, Cinnabar* and others which are producing their fourth group of flowers. In response to the warm weather of peninsular Florida daylilies when properly cared for generously give four times more pleasure to the lover of hemerocallis than they do in the North.

Florida however has not become daylily conscious as yet and it was not until February that a search for plants was finally rewarded in the extreme south portion of the State. A lone plant raised its' lovely flowers to the sunshine from the bottom of an artificial sunk-hole south of Cocoanut Grove on the estate of Col. Robert Montgomery, and two weeks later a small planting was located at "Four Ways" the home of Arthur Curtiss James. The flowers in bloom were of light yellow shades only.

A few miles further South on the old Homestead Road a very good display of daylilies was seen in the gardens of Mrs. C. C. Cole. The plants were strong and healthy with good foliage and plenty of flowers although the range of color was limited to shades of yellow and light orange.

(Continued on p. 69)

The William Herbert Medal; first awarded in 1937 to Arthington Worsley

Plate 98

Frasher's, Inc., Pomona, California

See pages 69 and 83.

Presentation of the first Herbert Medal to Arthington Worsley by proxy—(from left to right) Mrs. Leonard Swetts, Mrs. Hugh Evans, Hugh Evans, Cecil Houdyshel, Mrs. Cecil Houdyshel and W. M. James. (Pomona, Calif., Sept. 23, 1937)
Plate 99

PRESENTATION OF THE WILLIAM HERBERT MEDAL TO ARTHINGTON WORSLEY—1937

The ceremony of presenting the first William Herbert Medal to Arthington Worsley of England occurred at 2 p. m., September 23, 1937. This was the opening day of the Fourth National Amaryllis Show, at Pomona, California.

This ceremony was succinct and brief, and took place on the stage of the great Agricultural and Horticultural Hall, before the thousand or more people in the hall. It was one of considerable historical importance. The recipient, Arthington Worsley, is everywhere known and revered by amaryllis lovers.

The following named members of American Amaryllis Society were called to the stage by Cecil Houdyshel: Mrs. Leonard Swetts, Mrs. Hugh Evans and W. M. James. Mr. Hugh Evans, born, educated and reared in England, English to the core, yet thoroughly Californian and an outstanding figure in Southern California horticulture had been chosen to represent Mr. Worsley, who could not be present.

Cecil Houdyshel then delivered the following presentation address:

> Mr. Evans, Members of the American Amaryllis Society and Flower Lovers.
>
> It is a satisfaction to feel that we are addressing not only the few members of the Amaryllis Society here present, but also through the next issue of Herbertia, the entire membership.
>
> For the information of those present who are not members of our organization we will explain that the American Amaryllis Society is a group of flower lovers who have specialised in collecting and studying the group of bulbous plants known as the Amaryllidaceae. Our membership is scattered thruout the entire world and includes many great names. Names of famous plant breeders like that of Richard Diener and Fred Howard who are present today; Lord Aberconway, President of the Royal Horticultural Society, the greatest of all plant societies, and several of its distinguished members; the du Ponts whose Amaryllis collections are famous.
>
> It is our pleasure and honor today to represent the American Amaryllis Society and to confer a worthy award upon an outstanding, devoted worker.
>
> In the realm of human efforts those who have added most to knowledge, to culture and even to our general well being and comfort have often gone unrewarded. Indeed, the world's most valuable members work for the love of that which they do. They do not go on a sit down strike. Often they receive no wages.
>
> We are today paying tribute to one of these voluntary workers, Mr. Arthington Worsley, of Isleworth, England. Regarding the nature of his work with Amaryllids we can best paraphrase the tribute paid him by Lord Aberconway in the 1936 Herbertia, the Year Book of the American Amaryllis Society:—

"As long ago as the beginning of this century when a discussion of Amaryllids took place the name of Arthington Worsley at once occurred to the mind. So well had he become known for the large number of wild species he had accumulated, for his knowledge of them and his skill in their culture that he was, about that time, elected one of the small body of honorary members of the Royal Horticultural Society—an honor bestowed on only a very few distinguished horticulturists, and was appointed a member of its Scientific Committee."

Mr. Arthington Worsley was educated as a Civil Engineer and has followed that profession through most of his long life. Naturally his profession carried him into many parts of the world. In most parts of the world various genera of the Amaryllidaceae are found indigenous, and Mr. Worsley had ample opportunity to carry on his avocation.

Mr. Worsley, explaining what first drew his attention and devotion to the Amaryllids, says that one idle day he strolled into a neighbor's greenhouse and saw there a *Hippeastrum* in full glory. This led inevitably to a life time of study and devotion to them. In all the countries he visited he studied the plant life and collected among other things a great many bulbs of this group. His travels and his collections placed him in a most favorable position to study amaryllids. He became the authority on their culture, botanical classification and relationships. In the pursuit of this interest he grew many hybrids, among them a splendid red flowered *Crinum,* and also nerines, *Brunsviga, Amaryllis, Zephyranthes* etc. Some of these are intergeneric, some are interspecific hybrids. One of these, *Ismene festalis,* founded a new race of hybrids. We are proud to have growing in our garden not only the original *festalis* but some of its later improvements.

I regret that time does not permit more than a very brief reference to Mr. Worsley's accomplishments. In addition it must suffice to say that Mr. Worsley has been chosen by the American Amaryllis Society to be the most worthy recipient of this, the first Herbert Medal.

This is a beautiful bronze medal. On one side is a likeness of the revered Dean Herbert. On the other side is a *Hippeastrum* and the inscription "Awarded to Arthington Worsley, 1937, for eminent service."

Mr. Evans, you have been chosen to receive this medal and to see that it is transmitted to Mr. Worsley, because you are yourself a distinguished English gentleman and an outstanding figure in the horticultural interests of Southern California. Therefore accept and transmit it with the admiration, the acknowledgement of our debt to him and all good wishes for many more years of life and happiness to Arthington Worsley.

Mr. Houdyshel then handed the medal to Mr. Evans who in accepting it replied briefly and suitably.

He complimented the American Amaryllis Society on the very excellent work it is doing in popularizing the plants of this large group; in promoting research of cultural methods, propagation methods, breeding, discovery and dispersal of new or rare species.

The adoption of this policy of the American Amaryllis Society, said Mr. Evans, of giving an award in the form of a medal bearing the name and the likeness of Dean Herbert, is a most happy and significant one.

Many times those who create, explore, discover, contribute to and dispense knowledge go unrewarded. Emoluments could not sufficiently reward them. This beautiful medal is an emblem of a thought held in the minds of the members of this society. In a way the Society is vicar to all who love flowers. Only this could be a real reward for work such as that accomplished by Mr. Worsley.

Mr. Evans in accepting the medal for Mr. Worsley expressed the belief that in the nature of things it would meet his highest appreciation.

In the photograph of the "Medal Presentation," (Plate 99) from the left of the picture to right are Mrs. Leonard Swetts, Mrs. Hugh Evans, Hugh Evans, Cecil Houdyshel, Mrs. Cecil Houdyshel and W. M. James.

IMPRESSIONS OF FLORIDA DAYLILIES—WINTER 1937-38

(Continued from p. 64)

Mentioning definitely the locations of these gardens is with the idea of showing that daylilies may be raised successfully even as far South as tropical Florida.

Neither along the East Coast nor in south central Florida were any plants of daylilies in evidence. Therefore it came as a surprise to find near Orlando in central Florida a garden with a large section devoted to the raising of hemerocallis species and hybrid seedlings. There at Mira Flores were fine plants having a wide range of color, and year old seedlings were beginning to show blooms of pale fulvous very definitely tending to approach good shades of pink. Also very noticeable were such deeper reds as *Vulcan* which had blossoms several shades lighter in color than in the North.

At Lakemont Gardens in Winter Park, the new variety *Araby,* introduced last year, was in blossom. The planting of daylilies on the muck-land in this section last year resulted in a greater change in *Soudan* than in any of the other hybrids used in the experiment. Those who saw the results report this daylily grew to a height of five feet with blossoms at least half as large again as it normally shows.

The trial garden at the Florida Agricultural Experiment Station, at Gainesville, contained the largest collection seen in Florida. Here in early April was found *Aurantiaca* in full bloom with beautiful apricot colored flowers, and *Emily Hume* was lovely with "pinched" petals and light yellow coloring.

(Continued on p. 82)

WILLIAM HERBERT MEDALISTS—1938

As announced in Herbertia 1937, it is the policy of the Society to award the William Herbert Medal to several outstanding horticulturists each year for a short period in order to take care of overdue honors. When this object has been accomplished, the Herbert Medal will again be awarded to only one person each year.

The awards for 1938—Ernst H. Krelage, Cecil Houdyshel, Major Albert Pam, Pierre S. du Pont, and Jan de Graaff—will surely appeal to all. Each one has made outstanding contributions toward the advancement of the amaryllids, and it is fitting and proper that honor be given where honor is due. In order to have a permanent record of the achievements of Herbert Medalists, biographical notices of the recipients are included in this volume. Herbertia 1938 is dedicated to Ernst H. Krelage and his autobiography is the main feature of this issue. Brief biographies of Cecil Houdyshel, Major Albert Pam, Pierre S. du Pont, and Jan de Graaff follow this brief introduction.

—*Hamilton P. Traub.*

CECIL HOUDYSHEL—EDUCATOR, PLANT BREEDER, AND PROFESSIONAL PLANTSMAN

An Autobiography

Let it be admitted at once that I have never before written an autobiography, and that this is purely the work of an amateur.

The most outstanding event of my life, that upon which all my future depended, occurred October 5, 1873, near Ottumwa, Iowa. The happy parents were Skillman and Priscilla Houdyshel. When I was four my parents emigrated to the Kansas prairies, but returned in two years to Iowa. There I attended a country school for three years until at about 11 we moved to Nebraska. Later we moved to Kansas, Missouri and back to Kansas. We lived all over Kansas.

Although I was not taught by Aristotle, my education was indeed peripatetic. My revered father used to say that he was born "in the sign of the feet" and liked to travel. At 19 I was graduated from the high school at Beloit, Kansas. Altho a slow, lazy pupil I loved to read. I had read much of Shakespeare, Dryden, other English poets, Humboldt's *Cosmos,* and scientific works on geology and biology. Therefore the high school scientific course was so easy that I was able also to finish the German and half of the Latin courses.

Then I alternated between teaching and going to college, and graduated from Campbell College at 22, with the degrees of B. S. and M. S. This was a small college, but inspiring. Later I graduated (at 29) from Kansas University and did nearly three years of graduate work there and at Berkeley, California.

It was a satisfaction to me that at about 21 my ambition for a thorough education, and perhaps physiological changes enabled me to

overcome my former indolence. It became very easy to study, learn and remember. I could always make at least 1½ years credit in one; or surprise the Professor by collecting and classifying 2000 plant specimens instead of the required 50.

At Campbell College and later at Kansas University I was a student instructor. For one term I did the work of an associate professor. At Kansas there was the opportunity to remain on the faculty but California, the land of perpetual flowers and of Luther Burbank, called louder.

We arrived in Pomona, California in 1905. I taught in several California high schools. My last six years were at Polytechnic High School, Los Angeles. Although I loved my profession, and still hold the years of teaching in delightful reminiscence, the breeding of bulbous plants, begun 40 years ago as a hobby, gradually claimed an ever increasing interest. Several times I had quit for a year or two to follow a commercial venture, but in each case, lack of financial resources forced a choice between teaching and its assured income, and the years of denial and hardship required for my family should I remain in a commercial profession. The popularity of my origination, the hybrid gladiolus *Los Angeles,* on the flower market, enabled me finally to quit teaching and to devote my entire time to the breeding and growing of bulbous plants.

This love for flowers may have been inherited. My mother and her father devoted much time to their culture. My grandfather Cowger was an early Iowa pioneer. He must have been a versatile man as he was the lawyer, doctor of medicine, school director, singing teacher, church deacon and later, Master of the Masonic Lodge in his settlement. By the time I arrived in Iowa he had a wonderful garden of flowers, a fine orchard and farm.

At the age of 12 I asked to be allowed to take care of Mother's flowers. I became an amaryllis enthusiast in my early 20's when I first owned an *Amaryllis Johnsonii.* It decided my future. I began growing seedlings of bulbous plants about that time. During the teaching years my boarding-house bedroom was "cluttered" with cans and boxes of them. In California, collecting bulbs of the Amaryllis Family and breeding them remained my hobby. From 1910 to 1912 I was Vice-Principal at Carson City, Nevada, and then Principal at Virginia City, the famous mining town. On trips back to my home, I usually visited Luther Burbank at Santa Rosa. I was drawn there by his gracious personality and wonderful collection of hybrid amaryllis and other plants.

Sometimes I remained a week, and spent entire days at his side. He treated me as a companion and friend. He was most distinguished in appearance and an eloquent and charming conversationalist. We discussed Religion, Politics, Art, Philosophy, Flowers, Breeding,—everything. He gave freely of his knowledge and experience, and encouraged my ambitions. He has so many successors that I am sure he did as much for any one who was interested.

Mr. Burbank advised me that growing and breeding amaryllis, which he did because he loved them, would not earn any profit. He advised me to breed hybrid gladiolus, and sold and gave me the foundation stock. He truly prophesied that it was the coming florists' flower.

I purchased many thousand amaryllis seeds and bulbs from Luther Burbank, the Aigberth Nurseries, Liverpool, England and a few from other sources. Mr. Burbank had developed a strain of "multipliers". The Aigberth amaryllis were the world's best in form and color. I crossed them and produced a strain I thought very good. Lack of popular appreciation restricted the care I was able to give them and most of the many thousands of bulbs are gone. Several varieties were introduced but these were of the pure Burbank strain. Only one remains in the trade,—*Sibly Houdyshel.* Altho almost white it has rugged vegetative functions and is a rapid multiplier. A dozen bulbs sold to a friend a little over 20 years ago have multiplied to 400 or 500. Credit for this origination was attributed to Luther Burbank when introduced, but later others gave me the credit. I only selected, increased and introduced it.

About 1914 I raised 600 seedling crinums from *longifolium-Moorei* crosses. The best one became *Cecil Houdyshel.* It is a fine deep pink and the most amazing bloomer I have ever seen. I have been very lucky in that feature which is also possessed by the hybrid gladiolus *Los Angeles,* and an unintroduced hybrid iris of the *Plicata* type that blooms months on end. I once raised a seedling *Wisteria* that bloomed occasionally all summer.

Crinum hybrids are mostly sterile, which heretofore had stopped improvement with the first hybrid generation. But *Cecil Houdyshel* bears a few seed and a cross with *J. C. Harvey* was finally accomplished which gave rise to the first second-generation hybrid—*Virginia Lee.* It is unique among hybrid crinums in that it produces seeds freely. It apparently accepts the pollen from any crinum, even the scanty, slightly viable pollen of other hybrids.

Hybrid crinum *Gordon Wayne* is a chance seedling of *Virginia Lee.* It is pure white, larger; has broader foliage, and is a good seed producer, and multiplies by offsets faster than the parent variety. I have seedlings, from *Virginia Lee* and several of its descendants including *Gordon Wayne* crossed with the beautiful *Ellen Bosanquet,* that will bloom in a year or two. I have raised a great many crinum hybrids. Hundreds have been thrown away, and more of them sold in the trade as "assorted". A few are still under observation. I have a large, wider-petaled type of *Crinum asiaticum,* but it has made only 4 bulbs in over 20 years. The cuttage method is required to increase it.

Seedlings of *Callicore rosea* and some hybrids have been grown. A pretty, deep rose variety was introduced and then withdrawn as possibly not distinctive enough to warrant introduction. I am now growing thousands of seedlings of amaryllids. I hope to introduce a few more desirable varieties. I believe that the standard of quality should be so high that the market will not be overstocked with inferior varieties.

At 64 I am still looking forward to the future with confidence. My body, like that of any living thing subject to my care, is a bio-chemical laboratory and I watch the reactions from dietary and other habits. The main consideration is ability to work, to be happy, and to make others happy. To live and work until 100 is my ambition. My physician, a

See Page 75

Cecil Houdyshel—Herbert Medalist, 1938

Plate 100

Elliott & Fry, Ltd., London *See page 76*

Major Albert Pam—Herbert Medalist, 1938

Plate 101

wise, able and noted scientist, aged 80, says that it is possible. *Quien sabe?* At least I am still working, loving, living and happy withal. I may add,—so is my mother. But she is a smarter old lady than I can ever hope to be.

EDITORIAL NOTE.—Mr. Houdyshel is an idealist who has given his life to serving his fellow men, and he represents all that is noble and fine. It was fortunate that the amaryllid disease got him for it would have been a great loss to our gardens if he had not given us the highest ranking hybrid crinums—*Cecil Houdyshel* and *Virginia Lee.* There are only a very few crinum breeders in the whole world, and they deserve all honor for theirs is one of the most difficult fields of plant breeding. Mr. Houdyshel, however, is not one to leave a difficult task undone, and we can expect still greater contributions in this field from him in the future.

Mr. Houdyshel is a charter member of the American Amaryllis Society and has been a leader in the advancement of the amaryllids. His collection is one of the finest in the country, and he is constantly adding to it.

In awarding the William Herbert Medal to Mr. Houdyshel (Plate 100), the American Amaryllis Society honors one of the outstanding professional horticulturalists whose achievements are known to all. Those of us who have worked with him appreciate his ability, and his kindly, radiant personality that helps us over the difficult places.

Mira Flores,
Orlando, Florida,
April 15, 1938

—HAMILTON P. TRAUB.

MAJOR ALBERT PAM, O. B. E.

"Major Albert Pam, O. B. E., was born in London on June 26th, 1875, and was educated in England, Germany and Switzerland. He has been interested all his life in Zoology and Horticulture. He is Senior Member of the council, Zoological Society of London, silver Medallist 1914, Treasurer since 1932; F. R. H. S., Member of Iris, Alpine Garden and other horticultural Societies. He has established a large collection of amaryllids in his gardens at Wormley Bury, Broxbaurne, Herts, consisting mainly of true species with very few hybrids. At present the collection under glass consists of many hundreds of plants belonging to 37 genera and representing over 140 different species.

"In addition to the above, a certain number of amaryllids are grown in the open, according to their hardiness, either at the foot of sunny walls or in more exposed positions. Among these hardy or semi-hardy amaryllids are several species of *Crinum* and *Habranthus, Hippeastrum Ackermanni, Beschorneria yuccoides, Lycoris, Leucojum,* etc., etc.

"The pride of the collection is a large group of *Pamianthe peruviana,* a new genus allied to *Ismene* introduced by Major Pam from Peru and named after him in the original description of the plant published

in the Botanical Magazine tab. 9315. This plant was figured in our 1936 Year Book. Another plant, *Leptochiton quitoensis,* was also first flowered and seeded in the Wormley Bury collection, and its true botanical position could thus be established. A new genus *Leptochiton* was formed to accommodate this plant for the seeds of this species differed from that of any other member of the family. A picture of this plant in flower was also reproduced in our 1936 Year Book, under its old name of *Hymenocallis quitoensis.*

"In addition the collection contains a number of new species introduced by Major Pam, many of which commemorate this in their specific names. Apart from the horticultural interest of these plants, Major Pam does not disregard the scientific side and is in constant touch with the Royal Botanic Gardens, Kew, and other Botanical Gardens to which he supplies plants or material in the form of flowers, leaves and fruit for the Herbarium. Botanists are thus often able to check their records concerning the plant in question and obtain fresh and complete material of every kind. Such cooperation between horticulturists and botanists is most useful to both, and should be encouraged in every way.

"Although he specialises in amaryllids, Major Pam is also interested in all other plants. He has a large collection of hardy flowering trees and shrubs. On his lake of 8 acres he grows a number of the best water lilies and in addition to these he has a large collection of ornamental waterfowl, pheasants and other birds.

"Major Pam is a frequent visitor to the United States, where he has been invited to see some of the most noteworthy gardens, with whose owners he has exchanged many interesting plants. He has also supplied the American Amaryllis Society at different times with bulbs and seeds of amaryllids from his own collection for the Society's experimental nursery."

For many years Major Pam has served as unofficial ambassador of good will between England and America, a function which is appreciated in both countries. His interest in the amaryllids and other plants is that of the true scientist, and is entirely unselfish. In this capacity he has been of genuine service in determining phylogenetic relationships in the Amaryllidaceae, and he has also made available many new species to the plant breeder. It is therefore natural that Major Pam (Plate 101) should be among the first to receive the William Herbert Medal award. We hand him this medal with a feeling of admiration for service well done.

Mira Flores,
Orlando, Florida,
April 25, 1938

—Hamilton P. Traub.

PIERRE S. DU PONT—OUTSTANDING MANUFACTURER, PHILANTHROPIST, AND HORTICULTURIST

"Pierre Samuel du Pont, was born near Wilmington, Del., Jan. 15, 1870, son of Lammot and Mary (Belin) du Pont. His family was founded in America by the first Pierre Samuel du Pont, his great-great-grandfather, a French statesman and economist, who emigrated in 1799 and landed at Newport, R. I., with the younger of his two sons, Eleuthere Irenne du Pont who founded the du Pont de Nemours Powder Co. at Wilmington, Del., in 1802. Pierre was educated at the William Penn Charter School in Philadelphia and at the Massachusetts Institute of Technology, where he was graduated with the degree of Bachelor of Science in 1890. Mr. du Pont was married, October 6, 1915, to Alice, daughter of Henry Belin of Scranton, Pennsylvania."

Career as Manufacturer

"Mr. du Pont's first experience of powder manufacturing was acquired in the du Pont de Nemours powder plant in Wilmington, which he entered after graduation. In 1892 he became assistant superintendent of the company's factory at Carney's Point, N. J., where smokeless powder and gun-cotton were produced and where, with Francis G. du Pont, he developed the "du Pont Smokeless", a sporting powder for which patents were granted to them jointly.

"In 1899 Mr. du Pont became president of the Johnson Co. of Johnstown, Pa., and Lorain, O., a steel manufacturing concern which was in liquidation after disposing of its business. He spent three years in developing for advantageous sale this company's other interests, which consisted of street railway properties and large realty holdings in Lorain. He returned to the du Pont de Nemours Co. in 1902 as treasurer upon its reorganization as a great consolidation by the absorption into one company of about a hundred different corporations which had been operating the explosive manufactories of the company as separate units.

In 1915-19 Mr. du Pont was president of the company and since the former year has been chairman of the board of directors. Most of the company's enormous munitions production for various governments in the World War period was undertaken during Mr. du Pont's presidency. The war's requirements caused enormous additions to be made to the company's plants. At Hopewell, Va., on the James river, the company established on a corn field a group of factories for producing gun cotton, transforming the site into a city of 45,000 inhabitants in a few months. It was daily producing 1,500,000 pounds of gun cotton for smokeless powder when the armistice came and stopped the work. The company also constructed for the government the Old Hickory smokeless powder plant on the Cumberland river, near Nashville, Tenn., many times larger in area and capacity than the largest powder works hitherto built anywhere. For building the plant which cost $85,000,000, the company received the sum of one dollar from the government. As in the case of

Hopewell, the war's close, just as the plants were reaching their full capacity, caused the entire property to be abandoned. During the entire war period the du Pont plants supplied the allies and the United States with more than fourteen million pounds of military explosives. The company sold its products to the government at prices that were ten to sixteen per cent lower than pre-war prices for munitions, in spite of a great advance in the cost of raw materials. It invested $121,700,000 in Liberty bonds and other government securities and $111,000,000 in the securities of allied countries, besides contributing more than $2,000,000 to the welfare war work of the American Red Cross and the Y. M. C. A.

"Since the war the great resources of the du Ponts have been applied in a variety of fields outside powder production. In 1920 the company entered the automobile field by acquiring a large interest in the General Motors Corporation, of which Pierre S. du Pont was president and chairman of its executive committee until 1923, when he became chairman of the board of directors. He resigned as Chairman February 7th, 1929. The company has auxiliary companies that produce "Pyralin", paints, varnishes and colors, substitutes for leather, ivory and shell in the manufacture of many useful articles. It is part owner in the du Pont-Pathe Film Manufacturing Corporation. Other allied activities of the company include the du Pont-National Ammonia Co., General Explosives Co., du Pont Engineering Co., du Pont Rayon (fiber silk) Co., and du Pont Cellophane Co. Besides being chairman of the board of the E. I. du Pont de Nemours & Co., Mr. du Pont is a director of the American International Corp., Bankers Trust Co. of New York City, Philadelphia National Bank and of the Wilmington Trust Co., (also vice-president)."

Philanthropy and Public Service

"Mr. du Pont is a member of the corporation of the Massachusetts Institute of Technology and of the American Philosophical Society. He has taken a great interest in education in Delaware as a member of the state board of education and as state school tax commissioner. Has expended approximately $6,000,000 remodeling and modernizing part of the state's public schools outside Wilmington. He also gave $1,000,000 for developing the University of Delaware at Newark, Del., and in 1927 made a further donation of $400,000 towards bettering educational facilities in the State. In 1925 he was appointed state collector of income taxes in Delaware. Mr. du Pont holds the honorary degrees of LL.D. of Lafayette College and the University of Delaware, both conferred in 1922, and was made an officer of the French Legion of Honor in 1928. He has been a Republican in politics, but as an anti-prohibitionist in the presidential campaign of 1928 supported Gov. Alfred E. Smith, the Democratic candidate, and subscribed $50,000 to the party's campaign fund."

Wm. Shewell Ellis, Wilmington, Delaware

See page 81

Pierre S. du Pont—Herbert Medalist, 1938

Plate 102

Columbia Studio, Portland, Oregon

See page 82

Jan de Graaff—Herbert Medalist, 1938

Plate 103

Horticultural Activities

Mr. du Pont's favorite pursuit is horticulture, especially the cultivation of rare exotic plants, which he grows at his spacious estate outside Wilmington. The amaryllids have been a large part of his plant collection for many years, and this was fortunate for the future of the hybrid amaryllis. During the first three decades of the present Century, when interest in this group, for various reasons, declined, he cherished the finest hybrids and thus tided them over a period when most stocks were lost forever.

With this fine foundation stock as a basis, systematic breeding operations were undertaken and as a direct result his amaryllis collection is today one of the World's finest. The breeding method almost universally followed by others consisted of crossing varieties of similar color values, and this gave races of very "obvious" reds as a rule. Mr. du Pont was apparently the first to demonstrate the breeding method which gives subtle, delicate, orchidaceous shades of color in hybrid amaryllis. He accomplished this by crossing white, or light colored varieties on the darker ones. The results are so outstanding that all of the amaryllis breeders who have seen these hybrids, are now using the same breeding method, and in this way the influence of his work has had a profound effect on the improvement of the World's amaryllis stocks. The large numbers of light pink varieties shown at the amaryllis shows of the past season, bear out this statement.

Mr. du Pont is a charter member of the American Amaryllis Society, and is Chairman of the Trial Collections Committee for the Southeast. He is keenly interested in the advancement of the amaryllids as a whole. The presentation of the William Herbert Medal to Pierre S. du Pont (Plate 102) is a fitting tribute to his sterling character, his devotion to the highest ideals in business, in public service, in education and science, as well as his service in preserving and improving plant germ plasm, particularly that of Hybrid amaryllis.

Mira Flores,
Orlando, Florida,
May 10, 1938.

—Hamilton P. Traub.

JAN DE GRAAFF, A BIOGRAPHICAL SKETCH

Jan de Graaff was born in Leiden, Holland, in 1903, and is the son of Willem Hendrick de Graaff, and a grandson of Simon Adrian de Graaff, who were both renowned Dutch narcissus growers. The name of de Graaff has been associated with the bulb business in Holland for more than a century, and Jan de Graaff is the only member of the present generation of the Family who is following in that tradition.

He was educated in Holland and England, and his education was supplemented by an apprenticeship in England with J. R. Pearson & Son, Lowham, near Nottingham. In 1921 he entered the firm of de Graaff Bros., of Noordwyk, Holland, and devoted himself to the hybridizing of narcissi. In the same year he made his first trip to the United States.

During the following decade he visited the United States annually until he took up permanent residence in Oregon in 1931. He became a director of the Oregon Bulb Farms, Sandy, Oregon (Wholesale Narcissus Growers), and subsequently he became sole proprietor of that firm.

His work with amaryllis has been confined principally to the Genus *Narcissus,* and his collection of hybrid varieties and species is unusually complete. The portrait, (Plate 103), shows him at work in the large fields of narcissi at Sandy, Oregon, where his breeding experiments are carried on. Many of the seedlings introduced by Jan de Graaff have become favorites with the American public, and among his latest introductions, displayed recently at the spring flower shows by leading retailers, there are several of special merit.

As a member of the board of directors of the Northwest Bulb Growers' Association, he has worked unceasingly for the popularization of narcissi in the United States, not only as a lecturer and writer but also by means of exhibits featuring narcissi which are sent to the various shows throughout the country. With his sterling character and pleasing personality, the success of his efforts are a foregone conclusion.

The award of the William Herbert Medal to Jan de Graaff, in 1938, comes as a partial reward at least for consistent work and outstanding achievement in his chosen profession. The American Amaryllis Society is honored to have him as a distinguished member, and America is proud to claim him as an adopted son.

Mira Flores,
Orlando, Florida,
May 1, 1938

—Hamilton P. Traub.

IMPRESSIONS OF FLORIDA DAYLILIES—WINTER 1937-38

(Continued from p. 69)

A noticeable change was noted in *Waw-Bun* as there was practically no trace of the fine fulvous coloring which makes it so attractive in the North.

Outstanding were the plants of *Brownie* which had the appearance of miniature multiflora hybrids. It was only about fifteen to eighteen inches tall, and the branching scapes produced quantities of small two and a half inch flowers of a dark brownish-red color with an eyezone of madder brown. The sepals were only a shade lighter giving the entire flower a very decidedly brownish cast.

Brownie was in existence before the *H. multiflora* was introduced in America. It is a seedling developed at the New York Botanical Garden, and one of the first obtained by hybridizing a fulvous daylily.

When raised in the North *Brownie* grows about three feet tall but the blossoms remain the same size and this makes an unbalanced plant.

Florida is a veritable Wonderland for daylilies and *Brownie* reminds you of "Alice" for Dame Nature has said "grow small, grow small, you are too tall," and a perfect plant results. If planted with the late George Yelds' hybrid *Winsome,* whose pale yellow sweet-scented blossoms grow to about the same height, you will have two perfect little border or rockery plants for Florida.

(Continued on p. 93)

1. REGIONAL ACTIVITIES AND EXHIBITIONS

THE 4TH. NATIONAL AMARYLLIS SHOW, POMONA, LOS ANGELES COUNTY, CALIFORNIA

CECIL HOUDYSHEL, *California*

The California freeze of January 1937 caused the postponement of the Fourth Annual Amaryllis Show scheduled for spring at Montbello, California. It was rather late for much publicity or preparation but plans were made to hold the show in the fall in conjunction with the annual flower show of the Los Angeles County Fair, at Pomona, California. The Fair grounds are located only about two miles from the nursery and home of the writer.

We would like to present briefly the setting in which the show was held. The Los Angeles County Fair is an annual event. The buildings are extensive and permanent as this is probably the greatest county fair in America, greater than most state fairs. This county's agricultural and horticultural products according to government statistics, rank highest in value in the country. The Fair's attendance in 1937 was 635,383. Probably a major portion of them visited the Flower Show and hence saw the Amaryllis Show.

The Flower Show was staged in the center of the Agricultural and Horticultural Hall. This is a concrete and steel structure 800 feet long and 135 feet wide with a curved roof. There is not a post nor support between the outside walls.

The building is equipped with the very best indirect lighting system, and a system of public address which was of use for the medal ceremony.

Along the side walls were arranged the orange and lemon exhibits of the various Association units. In the middle were the exhibits from other counties, various community and commercial exhibits. In the photograph of the Medal Presentation (Plate 99), the La Verne exhibit can be seen in the background.

At the center of the building the floral exhibits were staged around a pool of water lilies. One low platform was occupied by the Amaryllis Show.

In spite of the short time for preparation and the lack of publicity, a very creditable showing was made, largely through the hearty cooperation of Richard Diener of Oxnard and Las Positas Nursery of Santa Barbara. The flowers were judged by Mr. A. Pieters of Germain Seed Co., Los Angeles and Mrs. Leonard Swetts of Riverside, California both members of the Amaryllis Society. The exhibits were staged on September 23 and most of them remained in place and in good condition for nearly a week.

The display of Richard Diener would have been an outstanding one in any flower show in the world. Probably no other grower north of the tropics could exhibit flowers of Hippeastrum hybrids in large quantity in September. There were 50 or more stems of cut flowers. Ordinarily we would call them "out of season" but the term does not seem to apply to his strain. His flowers are noted too for their immense size.

We have measured one that was 10 inches across the face in the natural position of the petals. A First Prize was awarded for the display.

The credit for displaying the rarest amaryllids belonged to Las Positas Nursery of Santa Barbara. Among their exhibits were rare species and hybrids of nerines, *Milla biflora, Bessera elegans, Amaryllis belladonna* (Ait.) and Brunsviga. Especially interesting was an *Amaryllis belladonna* (Ait.)—*Brunsviga* hybrid, *Brunsdonna baptisti alba.* Several blue ribbons were awarded to their exhibits.

Las Positas Nursery located on the famous Hope Ranch at Santa Barbara, among beautiful groves and bountiful orchards deserves commendation for a progressive spirit in building up stocks of many bulbs including many amaryllids that are rarely offered in the American trade. They do a wholesale business only.

The Special American Amaryllis Society Certificate for exhibiting the largest number of species was awarded to Cecil Houdyshel of La Verne. Nearly twenty species were shown. Several blue ribbons were awarded to individual species shown by him.

Not all fall-blooming amaryllids can be had for exhibition at one time. Unfortunately some of our best, such as *Lycoris aurea, L. incarnata* and *L. squamigera* were not flowering. Few nerines were blooming. *Vallotas* were just gone. Many bulbs were injured or made erratic in behavior by the January freeze. This may account for the fact that several noted growers did not exhibit.

A few amateurs said they could have brought a flower or two but thought it not worth while to exhibit so few.

It is hoped that next year's show will represent the combined efforts of every commercial grower within the limits of distance. Amateur growers are especially invited to show even a few specimens, either rare or common.

For a Premium List write to Ernest Middleton, Los Angeles County Fair, Pomona, California.

THE 5TH. NATIONAL AMARYLLIS SHOW, PASADENA, CALIFORNIA APRIL 3 AND 4, 1938

Cecil Houdyshel, *California*

The 5th. National Amaryllis Show was held in conjunction with the Pasadena Flower Show, and this event took place in the large Civic Auditorium where many commercial growers exhibited their flowers in ideal landscape arrangements. The amaryllid exhibits were not segregated from the others, but were mingled with other plants. The writer and Mrs. Houdyshel attended not with the intention of writing a description of the show, and the following notes are therefore somewhat sketchy.

The Pasadena Flower Show is held annually in the large Civic Auditorium. Many commercial growers exhibit their flowers in ideal landscape arrangements.

Just at this time Clivias are at their best. But only a few were shown. The best were probably those of Mr. Zimmerman who exhibited

only cut stems. Our own had been recently moved, bare rooted, into our new Clivia house and were not in condition.

A species formerly classed with the amaryllids attracted our attention, *Anigozanthos manglesii.* Its oddity is more noteworthy than its beauty as it reverses the usual habit by displaying small green flowers on a gaudy red scape.

Howard and Smith showed Hippeastrum hybrids of the highest quality. Fred Howard has produced for this firm the outstanding American strain. He has bred them for at least 20 years. The fine form and rich color variations compare favorably with the best European strains.

An equally noteworthy exhibit of hybrid Hippeastrums was that of Richard Diener. His flowers are probably the largest in existence. We measured one flower that was 10 inches in diameter. The colors are various, often vittate, the form, that of *equestre.* His strain has the added distinction of producing a good crop of flowers in the fall with many in between.

We were especially pleased to see so many daffodils, old and new. The best Barri daffodil was *Effie,* which has a yellow perianth. *Firetail,* a white perianth Barri, with brilliant cup, was striking. *Whitley Gem* and *Fortune,* both yellow perianth Incomparabilis were exquisite.

White Trumpets were represented by *Alice Knight, Beersheba, President Carnot* and *White Conqueror,* all fine. Of the yellow Trumpets, *Aerolite, Warwick* and *Hector Treub,* we considered the last named as best.

Her Grace, an extra fine large crowned Leedsi, was shown, and also *Silver Star.*

We noted with interest the Triandrus hybrid *Pearly Queen,* with white perianth and light lemon trumpet, and *Glorius,* a very well named Poetaz.

SOME NOTES ON THE SOUTHEASTERN REGIONAL AMARYLLIS SHOW AT ORLANDO, FLORIDA, MARCH 23-24, 1938

Russell S. Wolfe, *South Carolina*

The 1938 Show was the first exhibition of the American Amaryllis Society that we[1] attended since the 1935 Spring Show at Orlando. We had a few blossoms and decided to make a quick trip to enter them in the Show. As none of our amaryllis had ever been entered in any of the shows, we were anxious to find out how they would stand up under severe competition. The officials of the Society, and those in charge of the Show were exceptionally nice to our flowers and to us. The show was neatly and tastefully staged.

The outstanding thing about the event was the marked improvement in the quality of flowers as contrasted with former exhibitions. In the lighter colors, especially, the average has improved considerably.

[1]Mr. Wolfe was accompanied by his charming wife.—**Ed.**

The tendency seems to be more and more towards improving quality and increasing the color range and not to grow any sort of amaryllis to obtain a quantity of bulbs with "obvious" colors.

The knowledge of better cultural methods and the ability to apply them was well shown by the better appearance of the entire plants. The flowers shown were as good as those seen in the shows in Holland and England in the spring of 1935, and those seen at the International Flower Show, New York City, in the spring of 1937.

The display of Doctors Traub and Hughes was not entered in competition for Dr. Traub was chairman of the committee of judges. It was especially educational and interesting, clearly demonstrating the improvements mentioned above. It was in three sections—almost whites, light pinks, and medium reds. The light pink section consisted of 28 potted plants mostly flowering in eighteen months from time of planting seeds.

As evidence that the method of vegetative propagation is a practical success, there was a notable increase in named varieties. The variety singled out as the "best bloom" in the Show, was named *Helen Heaton* for the wife of Mr. I. W. Heaton. This was a deserved honor for I am told that Mrs. Heaton is a very great help to Mr. Heaton in his bulb business. Mr. Heaton's exhibit was the largest in the Show, and took away most of the honors.

Another variety that received much favorable comment was in the display of Doctors Traub and Hughes. It was named *Katherine Auchter* for the wife of the Chief of the U. S. Bureau of Plant Industry, Washington, D. C. It is a beautiful shade of pink with an orchid sheen in the throat. The only white amaryllis in the show was entered by Mr. Wyndham Hayward, of Lakemont Gardens, Winter Park.

There was a steady stream of visitors during the entire time of the show, and the great interest shown by them was very noticeable. Of the visitors to this show, the men seemed to greatly outnumber the women, more so than at any other flower show of any kind that I have ever visited. The men showed more interest in the individual flowers, and were more inquisitive as to details.

This show proved to be very successful, and was of much interest and value to us, and really, a pleasure well worth the trip and more.

THE 5TH. SOUTHEASTERN REGIONAL AMARYLLIS SHOW, ORLANDO, FLORIDA, MARCH 23 AND 24, 1938

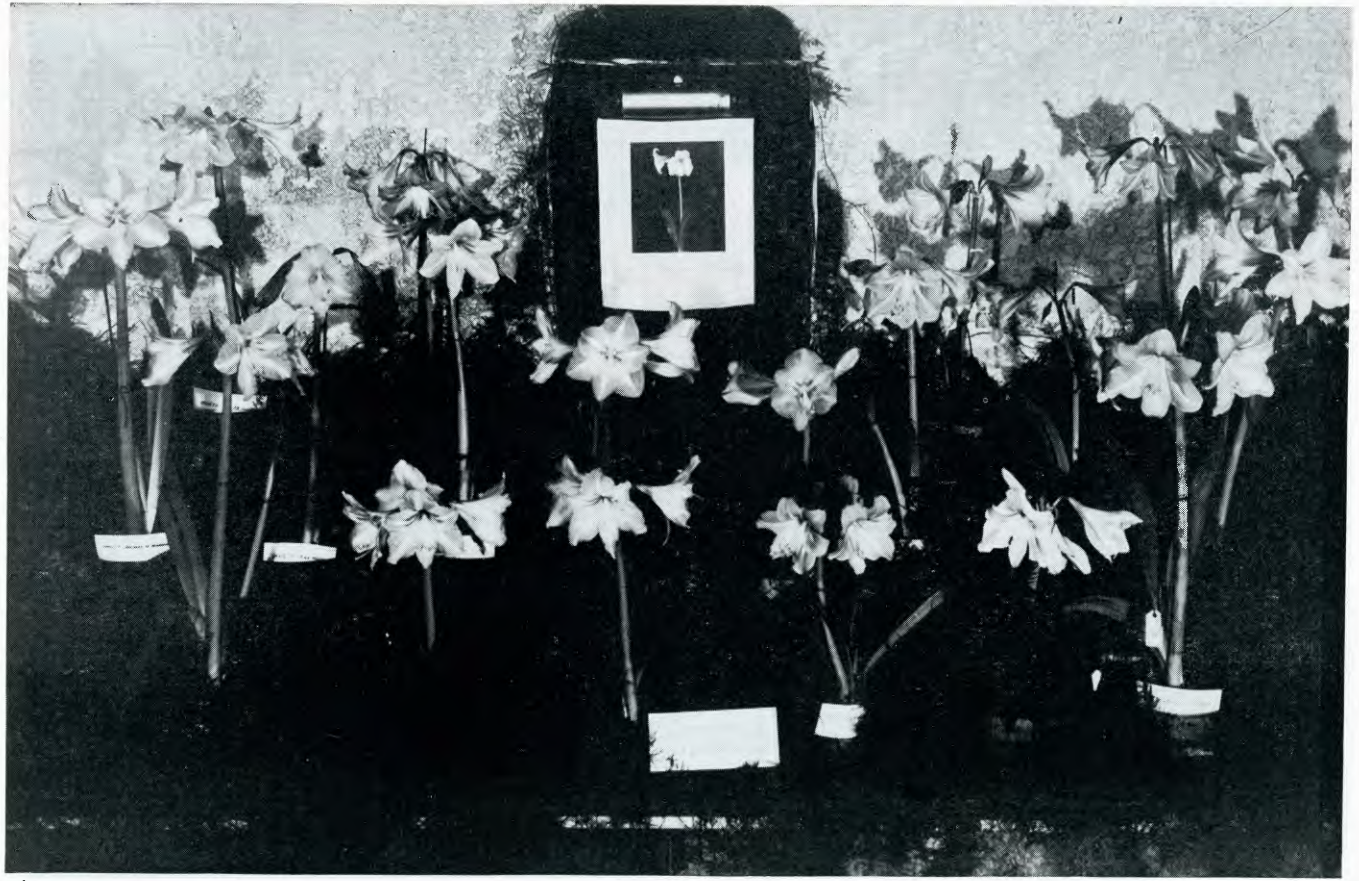
The 5th. Southeastern Regional Amaryllis Show held at Orlando, Florida, March 23 and 24, was outstanding for the most varied amaryllid exhibits brought together up to the present, the improvement in quality of amaryllis flowers, and the greater number of exhibitors who cooperated. The show was managed by Mr. R. W. Wheeler, Chairman of the Exhibitions Committee for the Southeast, and he was ably assisted by Dr. and Mrs. A. E. Hughes, Mr. and Mrs. I. W. Heaton, Mrs. Paul Harding, and Mrs. E. L. Lord.

The following exhibitors were represented at the show:—I. W. Heaton, Orlando; Wyndham Hayward, Winter Park; J. J. McCann,

American Amaryllis Society

See pages 89 and 91

Some of Russell S. Wolfe's hybrid Amaryllis at the Southeastern Amaryllis Show, Orlando, Fla., 1938
Plate 104



American Amaryllis Society

See page 89

Partial view of Traub & Hughes Exhibit (light pink amaryllis) at the Southeastern Amaryllis Show, Orlando, Fla., 1938

Plate 105

Punta Gorda; E. A. Peterson, Orlando; John R. Heist, St. Augustine; E. L. Lord, Orlando; Mrs. Della Harper, Orlando; Frank Vasku, Winter Park; M. C. Varnier, Fort Pierce; H. P. Traub, Orlando; A. H. Smith, Orlando; Mrs. R. E. Kline, Windermere; Mr. J. R. Ballentine; Orlando; Russell S. Wolfe, Orangeburg, South Carolina; and the joint exhibits of H. P. Traub and A. E. Hughes, Orlando (see Plate 105).

The exhibits included Amaryllis species, very fine and varied hybrid Amaryllis, narcissi, Cyranthus, Cooperia, Crinum species and hybrids, and exceedingly fine Hemerocallis (Daylilies).

Among hybrid Amaryllis the following named varieties received awards:—Salmon Queen (Heaton) FFC; Pres. Roosevelt (Heaton), 1st. prize; Mrs. Lamberton, (Heaton), 1st. prize; Cardinal (Heaton), FFC; Orchid (Heaton), FFC; Theodore Mead (Heaton), 1st. prize; Berengaria (Heaton), 1st. prize; Red Wing (Heaton), 1st. prize. Many awards were made to unnamed varieties including exhibits by Frank Vasku, E. A. Peterson, Wyndham Hayward, Mrs. R. E. Kline, J. R. Ballentine, M. V. Varnier, Russell S. Wolfe (See Plate 104), and J. J. McCann.

First prizes were awarded for Cooperia Drummondii (to Hayward); Amaryllis Johnsonii (to Vasku); Amaryllis rutilum crocatum (to Hayward); Crinum Powellii album (to Hayward); Crinum Krelagei (to Hayward); Crinum Cecil Houdyshel (to Hayward). Crinum Louis Bosanquet (to Heist) was awarded both a first prize and a First Class Certificate. Cyrtanthus McKenii and Crinum pedunculatum were exhibited by Traub, but not in competition.

Seedling daylilies, not named, were exhibited by E. L. Lord and Wyndham Hayward. Prof. Lord received the first prize for the best collection of daylilies. Other varieties exhibited by Prof. Lord and which received first prizes were:—Oriole, Canary Bird, Harvest Moon, Semperflorens, Aureole, Florham. Parthenope exhibited by him received a First Class Certificate. Mr. Hayward exhibited Waubun, Mikado and Chrome Orange. The first two received first class certificates, and the third, a first prize.

The variety, Helen Heaton (Heaton), was singled out as the best hybrid amaryllis flower in the show, and it also received a first class certificate.

Mr. Heaton received the award for the best hybrid Amaryllis bloom in the show *(Helen Heaton)*, and first prize for the best exhibit (Plate 106). He also received the most points, and was awarded the Grand Prize.

One of the outstanding exhibits at the show was a photoprint of a hybrid amaryllis in color by Mr. Edward Steichen. This is shown in the center top of Plate 105. It was the subject of many favorable comments, and Mr. Steichen is to be congratulated on the success he has achieved.

Mr. Russell S. Wolfe's exhibit of a fine group of large-flowered nearly white hybrid amaryllis (Plate 104) illustrates the feasibility of transporting amaryllis while in flower for considerable distances since

they were brought down from Orangeburg, South Carolina in an automobile.

On the whole the show was successful in every way, and every one connected with it had the feeling that the time and effort expended yielded ample dividends.

Committee of Judges
HAMILTON P. TRAUB
MRS. W. L. TILDEN
A. T. COITH

March 24, 1938

THE 1938 AMARYLLIS SHOW OF THE BUREAU OF PLANT INDUSTRY U. S. DEPARTMENT OF AGRICULTURE

The twenty-fifth annual Amaryllis Show of the U. S. Department of Agriculture was held at the Department Greenhouses, Fourteenth Street and Constitution Avenue, N. W., Washington, D. C., from March 26 to April 3, 1938, inclusive. It was open each day from 9:00 a. m. to 9:00 p. m. and was viewed by 37,391 people.

The exhibition comprised 1,260 amaryllis bulbs, each bearing two or three flower stems with two to seven flowers on each stem. Thus there were displayed several thousand flowers ranging in color from dark velvety red through various shades of red, pink, orange, yellow-orange and striped types to pure white. The plants were arranged in the exhibition house on two side benches and on a center elongated pyramidal staging. Small pots of *Vinca major* with rounded grey-green leaves edged with white were placed between the pots of amaryllis to form a pleasing combination with the pointed dark green leaves, thick silvery green flower stems and clear bright blossoms of the amaryllis. Baskets of Trailing Fuchsias were hung from the roof of the greenhouse. Several large pots, each containing a group of bulbs in flower, were placed along the ridge of the center staging to provide accent notes.

The bulbs in the Department's collection of amaryllis are hybrids resulting from many years of breeding work carried on by Department of Agriculture experimenters since 1909 when twelve varieties were imported from England. The Amaryllis Shows are exhibitions of the results achieved by the Department in one of the many phases of its work to produce improved plant forms. Department workers with amaryllis have successfully endeavored to obtain longer stems, new shades and larger flowers. The white amaryllis was produced through successive selection and cross-pollination of striped flowers showing the most white. A group of seedlings, flowering for the first time this spring, revealed new subtleties of color, particularly in the lighter shades.

IMPRESSIONS OF THE SOUTHEASTERN REGIONAL AMARYLLIS SHOW, ORLANDO, FLORIDA, MARCH 23 and 24, 1938

Mrs. E. L. Lord, *Florida*

The 1938 Southeastern Regional Amaryllis Exhibition was held at Orlando, Florida, March 23rd. and 24th., in the Chamber of Commerce Building. Staging, draped in Spanish moss and Asparagus fern, had been erected down the long arcades on each side of the lobby and here the main competitive classes made a spectacular array of white, pink, and red—the orange shades were strangely lacking. Around the fountain in the center were baskets and jars of the Decorative classes showing the use of amaryllis in home decoration. Here, also were the Crinums, which appear to be enjoying a revival of interest among Florida gardeners, and quite a number of rarer exotics that were worth showing altho not amaryllids. Across each end were the stands for the collections and the double classes, which included both species and a group of the new hybrids. Facing the fountain were the other amaryllids, *Zephyranthes, Cooperia, Narcissus, Crinum, Hemerocallis,* etc.

A highly educational feature was a group of seedlings staged by Drs. Traub and Hughes, which showed the results of a special breeding experiment with the object of producing true pink varieties. The pink varieties exhibited consisted of twenty-eight potted plants, including the named varieties, *Katherine Auchter, Kay Harding, Reba Cooper, Duchess of Windsor, Princess Elizabeth, Mrs. T. R. Robinson; Etta McNeel;* and *Sara Cole.* Among the reds, the named varieties, *Mrs. R. W. Wheeler,* and *Fire,* were outstanding. If these blooms had been in competition the judging awards would undoubtedly have been very different.

The high light of the whole Exhibition for me was a new white amaryllis seedling shown by Russell S. Wolfe of Orangeburg, South Carolina. It was as near a perfect white as I have ever seen. Of perfect form, not stiff, but delicately ruffled and reflexed, with just enough of a greenish tint to give life and sparkle to the whiteness. It would make a splendid garden picture and would be unsurpassed for indoor decoration. One exhibit was a single specimen with 6 or 7 blooms at the same stage of maturity, making a plinth of sparkling purity. The other, 6 plants, uniformly and perfectly grown, in an ornamental box, looked like a sculptured group in alabaster and jade.

Altho the exhibitors were almost entirely local growers, a very creditable showing was made over a wide range of classes and the Show Manager, Mr. R. W. Wheeler, and his Committee, are to be congratulated on a very successful performance. Success in any exhibition can be judged by the interest manifested. Both local people and winter visitors circled the room in a constant stream and certainly three-fourths of them asked me questions, ranging from "What are Amaryllis?" to "Can I grow these bulbs in Maine-or Wisconsin-or Idaho?" One of the crying needs of our flower shows seems to be an Information Committee with badges.

NEW YORK SPRING FLOWER SHOW, 1938

T. A. Weston, *New York*

The competition at this famous International Flower Show, March 14-19, was not quite so strong in Amaryllis on this occasion as in 1937, and as in former years, the exhibitors were mostly private individuals.

The group for 50 sq. feet attracted four entries, the leading one shown by Mrs. W. Jennings, Cold Spring Harbor, Long Island, Gardener John Lee; this showed some good examples, although to our own way of thinking the two runners-up had finer types and in one instance even larger flowers.

Mrs. Jennings also won first with six plants in that class, against two other entries, while in the 12 plant class, Mr. S. A. Savage, Glen Head, Long Island, Gardener T. Chadburn had no opposition. His plants were superb.

The competition in the Narcissus classes, private, is always very keen in New York, and to my knowledge nowhere else are such fine forced examples staged. The varieties include the best of the reasonably priced Trumpet, Incomparabilis, and Barri types. The schedule usually calls for six 8-inch pots or pans. The growers literally crowd the bulbs on top of each other and all the entries are invariably notable for high cultural skill.

On this occasion, Mr. S. A. Savage won first with Trumpet types, also with Incomparabilis, and any other types, distinct varieties; but with Poetaz types, Mr. Savage was second to Mrs. D. Suarez, Syosset, L. I.

With a 50-foot display of cut blooms, Mr. J. Pierpont Morgan, Glen Cove, L. I., Gardener J. Kelly, literally swamped two other rivals. Mr. Kelly, without doubt one of the most skillful gardeners in the country, is a past master at forcing Daffodils and his collection of 18 sorts, 6 to 10 of each, included *Beersheba* and even newer varieties, all of them of such superb quality that experts considered the blooms equal to the finest ever grown under natural conditions later in the season.

Clivias are not largely grown by the general run of private gardeners in the East. They require considerable room, and of course must be kept under glass during the winter. However, there are always a few entries competitively, and on this occasion, Mr. S. E. Mitchell, Oyster Bay, L. I., gardener A. Reoch, led with one fine specimen, a particularly grand plant while with six plants, Miss L. Constable, Mamaroneck, N. Y., gardener J. Stuart, was first with some splendid hybrids. The latter probably has the largest collection of Clivias in the New York section and on several occasions has shown a large group in conjunction with Acacias which are also largely grown.

The tall yellow acacias with the various shades of the Clivias make a most wonderful combination.

INTERNATIONAL S. A. F. FLOWER SHOW, TORONTO, 1938

T. A. Weston, *New York*

This exhibition, held under the auspices of the Society of American Florists, during the presidency of Mr. Arno Nehrling, son of the late Henry Nehrling of Florida, pioneer amaryllis breeder, took place March 24 to April 2, and was notable for one particularly outstanding group of fine hybrid amaryllis staged in bed fashion. This display was at the base of the large central fountain, and covered 100 sq. feet, containing some 50 plants in full bloom which were a credit to the exhibitor, Mr. Fred Adams, of Adams Florist, Toronto.

These were presumably imported Holland type bulbs, most of the flowers were of the so-called Leopoldi type, with widely expanded and rounded petals. Pure whites were absent, but the group showed a fine range of pink and red shades, some being a decided salmon shade, while rich crimsons were likewise noted among the reds. Numbers of the blooms were eight inches or more across and most of the stems carried four flowers.

IMPRESSIONS OF FLORIDA DAYLILIES—WINTER 1937-38

(Continued from p. 82)

Reviewing the situation in peninsular Florida as a whole we find daylilies may be grown to advantage from Homestead to Gainesville and surrounding sections. It appears that hybrids tend to change their normal characteristics, most of them becoming lower in growth, and that fulvous colorings in the blossoms become less pronounced and lighter.

The evergreen daylilies are preferable because of the luxuriant green ground cover they produce throughout the year. Here also four distinct flowering periods give prolonged garden beauty and three times more opportunity for hybridizing than in the sections where only a single flowering period exists. Seedling hybrids will begin to blossom at the end of the first year if given special attention.

It would seem therefore that Floridians must select their own daylilies according to the characteristics they display under the climate conditions. Evergreen varieties should undoubtedly be given the preference and probably many hybrids and hybrid seedlings which seem unsuited to Northern conditions might become of the utmost value to Florida.

April 1938

HEMEROCALLIS BROWNIE

What is that cute little daylily
There on the paths' further side
Holding on scapes growing sturdily
Blossoms which must be your pride.

Where did it get such a coloring
Red as deep kissed by the sun
Eyes that are brown like mahogany
Surely must please everyone.

Brownie you call it in Florida
Growing 'neath hot sunny skies.
Here it must stay where 'tis summery
Never to change in its size.

Sorry are we, living Northerly
Brownie grows up to be tall,
Losing the grace which is charmingly
Seen when it stays very small.

True that we cannot have everything,
Nature has played us a jest
Making us visit in Florida
Brownie to see at his best.

—Ethel P. Dewey

THE DAYLILY DISPLAY GARDEN AT THE FLORIDA AGRICULTURAL EXPERIMENT STATION

JOHN V. WATKINS, *Assistant Horticulturist*

From a very humble beginning in the late nineteen twenties when four plants of Daylilies comprised the Hemerocallis section at the University of Florida, the planting has grown until today there are one hundred named clones, nine species and several hundred seedlings that have been bred and selected for one character or another.

This public Display garden is situated to the west of the lath house of the Department of Horticulture, and is on soil of the type known as Norfolk fine sand. This soil has proven itself to be ideally suited to Daylily culture when it receives plant food and water in reasonable abundance. It has been the custom to apply a heavy mulch of cow manure each February and to supplement this twice thruout the growing season with applications of a balanced commercial fertilizer.

The photograph, Plate 115, shows the garden to be composed of four large rectangular beds encompassed by walks of Centipede grass. Within these beds plants are arranged in equilateral triangles of three of a kind with a permanent cypress and metal label supplying an easily read marker for each name. It seems to be the consensus of opinion among visitors to the garden that three clumps of one kind in a group will give each variety an excellent chance to show to the best advantage. Careful notes are taken every four days during the flowering season so that the beginning, peak, and end of bloom will be recorded for each variety each season. Records that cover five consecutive seasons of flowering are now on file and the present plans call for a continuation of this record taking. It is hoped that facts assembled in this work may be published in a Bulletin on Daylilies during 1940. These data display many interesting details. One of the most striking facts is that a given clone may vary as much as a month in its climax of flowering. Another interesting fact is that many varieties have a second definite blossoming season in late August or early September. In this connection the idea of an autumn flowering race developed especially for Florida conditions is a most attractive one. From observations on the behavior of many clones in North Florida, the writer is of the opinion that this race will be a reality in a few years. It may have a strong infusion of the blood of *Hemerocallis multiflora* and it may also have in its ancestry such excellent late clones as Semperflorens, Domestico and Cressida. As the new multiflora hybrids from the New York Botanical Garden reach the gardens of peninsular Florida, it is hoped that Daylily enthusiasts will find the season extending well into the autumn.

In regard to the other end of the season, the variety Domestico, (not one of the little grassy Dihemeras, but a big, upstanding, evergreen Daylily), will open its clear orange flowers so early in March that they are frozen in Gainesville almost every year. This clone was introduced into Florida from Mississippi by Mr. R. N. Lobdell of the Everglades Experiment Station Staff, and its habit of blossoming very early in the springtime and again very late in the autumn makes it a most welcome addition to any collection of Daylilies.

The public display garden at Gainesville has been developed entirely in the interests of Florida gardening and it is hoped that persons who admire Daylilies as good garden plants will avail themselves of the facilities of the garden, particularly during the height of the blooming season. Mimeographed check lists are handed to all visitors so that each person may take notes on the varieties that are particularly attractive to him. These lists should be of value when an order is to be made from a nursery catalog which might be guilty of painting a too-rosy picture of its offerings. No attempt will be made here to evaluate the varieties of Daylilies as to their relative merit as garden plants.

It is contrary to the policy of the Florida Agricultural Experiment Station to distribute plants of any kind in competition with the nurseries and so it is not possible for gardeners to acquire Daylilies here, but the staff of the Department of Horticulture is anxious to do all that it can to help visitors enjoy the garden and take notes on the outstanding plants.

It would have been impossible to build this garden to its present size had it not been for the kindness of Dr. A. B. Stout, of the New York Botanical Garden and for the splendid cooperation of the Fairmont Iris Gardens, Farr Nursery Company, George Ehrle, Hubert Fisher and other enthusiastic collectors of Hemerocallis.

DAYLILIES IN THE DISPLAY GARDEN AT THE FLORIDA AGRICULTURAL EXPERIMENT STATION, GAINESVILLE

Ajax
Amaryllis
Apricot*
Aureole*
Austin, Mrs. A. H.*
Bardsley
Baroni*
Bagdad*
Bay State*
Bijou*
Bowles, EA*
Brownie*
Burbank*
Burmah
Byng of Vimy
Calypso*
Chengtu*
Cinnabar
Citronella*
Crawford, JA*
Cressida
Curlypate
Dauntless
Dawn
Dazzler
Domestico
Dwarf Yellow
Eldorado*
Erica
Estmere*
Europa*
Flamid*
Flavinia*
Florham
Gem, The
Gloriana
Golconda
Gold Dust*
Gold Imperial*
Gold Standard
Golden Bell
Golden Dream
Golden Mantle
Golden West
Goldeni*
Gracilis*
Guiseppi, Cissy*
Gypsy
Harvest Moon
Hippeastrum*
Hume, Emily
Hybrida semperfl
Hyperion*
Imperator
Kwanso*
Ladhams, B.
Lady Fermoy Hesketh*
Lemon Queen*
Lemona
Linda*
Lovett's Lemon
Lovett's Orange
Luteola*
Luteola major
Luteola palens*
Mandarin*
Mann, Mrs. J. R.
May Morn
Midas*
Mikado
Miranda
Modesty
Mulleri*
Nocerensis
Ochroleuca*

Ophir*
Orange Gem
Orangeman*
Pale Moon
Parthenope
Patricia
Perry, Gladys*
Perry, Iris
Perry, Marg*
Perry, Mrs.*
Perry, Thelma*
Queen of May
Radiant
Rajah*
Regel, Dr.*
Royal
Salem
Seith, Mrs.
Shirley
Sir Micheal Foster
Sirius*
Serenade*
Sonny
Soudan
Sovereign*
Sunny West
Tangerine*
Taplow Yellow*
Vesta
Vulcan*
Virginica*
Wau Bun
Winsome*
Woodlot Gold*
Wyman, DD*
Yeld, George*
Yellow Hammer*

SPECIES

Hemerocallis	aurantiaca	Hemerocallis	fulva rosea*
"	citrina*	"	fulva wild type
"	flava*	"	middendorfii*
"	dumortierii*	"	minor No. 3*
"	fulva cypriana*	"	multiflora*
"	fulva maculata*	"	thunbergii*

NOTE: Those Daylilies marked with an asterisk, thus *, are deciduous. Most of the unmarked sorts are evergreen throughout the year in Peninsular Florida.

NEWS-LETTERS

To the members of the Society,—

We are having the best November and December rains that this District of Kenya has had in the last 25 years. The Crinums in particular are gorgeous. The Hippeastrums have again been in flower since August.

Dec. 18, 1937,
Kilima Kiu, Ulu,
Kenya Colony

MARY EARLY JOYCE
(MRS. FRANK JOYCE)

To the members of the Society,—

We wish to report that hybrid amaryllis blooms are sold in considerable quantities on the Berlin market as cut flowers. In addition to Mr. Ernst Winter's establishment, at Mahlow, near Berlin, Blankenfelder Chaussee, and not in Mariendorf (Berlin-Mariendorf), there is another famous German grower of amaryllis, Mr. Gustav Seifert, at Dueren, Rheinland. The periodical, Die Gartenwelt, has published illustrations of flowers in the Seifert collection, which contains 5000 flowering plants. Mr. Hahn also mentioned two other establishments that grow amaryllis—Villa Huegel near Essen, Rheinland, and Saxon Staatsgaertnerei, Pillnitz, near Dresden.

(Continued on page 205.)

2. COLOR DESCRIPTION

HAYTER COLOR CHART

Under date of June 18, 1937, Mr. Robert Sealy, of the Herbarium, Royal Botanic Gardens, Kew, writes as follows,—

> There is a matter connected with the Fischer Color Chart which may interest you since the American Amaryllis Society has adopted this chart. Did you know that a colour chart on exactly the same lines appeared so long ago as 1825? You will find it at the end of the book that bears the title "Hortus Ericaeus Woburnensis or A Catalogue of Heaths in the Collection of the Duke of Bedford at Woburn Abbey" and which was published in 1825. The chart was designed by George Hayter and differs from the Fischer chart in two ways. First the colours are arranged in a clockwise manner starting with "Purple" (equivalent to the violet of the spectrum) thus Purple, Blue, Green, Yellow, Orange, Red, whereas in the Fischer chart in a clockwise manner they read Red, Orange, Yellow, Green, Blue, Violet, and secondly Hayter has the dark colour outside (at the circumference) and the pale colour inside (at the centre) whereas in the Fischer chart the dark colour is inside and the pale colour outside.

Those who are using the Fischer Color Chart will be interested in this information. It is hoped that the Color Chart in preparation by the Royal Horticultural Society will soon be published for the American Amaryllis Society is planning to adopt this chart as soon as it is ready. The Fischer chart is excellent as a starting point, but is not adequate for advanced work in flower color description.

—*Hamilton P. Traub.*

COLOR PHOTOGRAPHY TODAY

Color photography today is a serious rival of the black and white photograph for methods have been vastly improved over former years. This is brought about by a simple method, the use of color film in a precision camera with highly corrected lenses like the Leica. This makes it an ideal color system for the flower photographer because the equipment is extremely compact and has many accessories adapting it for all types of photography. Not only can close-ups of the plant itself be made but of portions of the plant as well. The film (Kodachrome) is processed by the manufacturer and returned in the form of transparencies which may be projected or reproduced by any color separation method such as Trichrome Carbro, Eastman Wash Off Relief, Lithography, or Letter-press printing. Engravers and lithographers make their separation plates directly from the transparency, which makes the production of printed reproductions extremely simple.

May 7, 1938 —George W. Hesse.
E. Leitz, Inc.,
New York City.

IMPROVEMENTS IN COLOR PHOTOGRAPHY

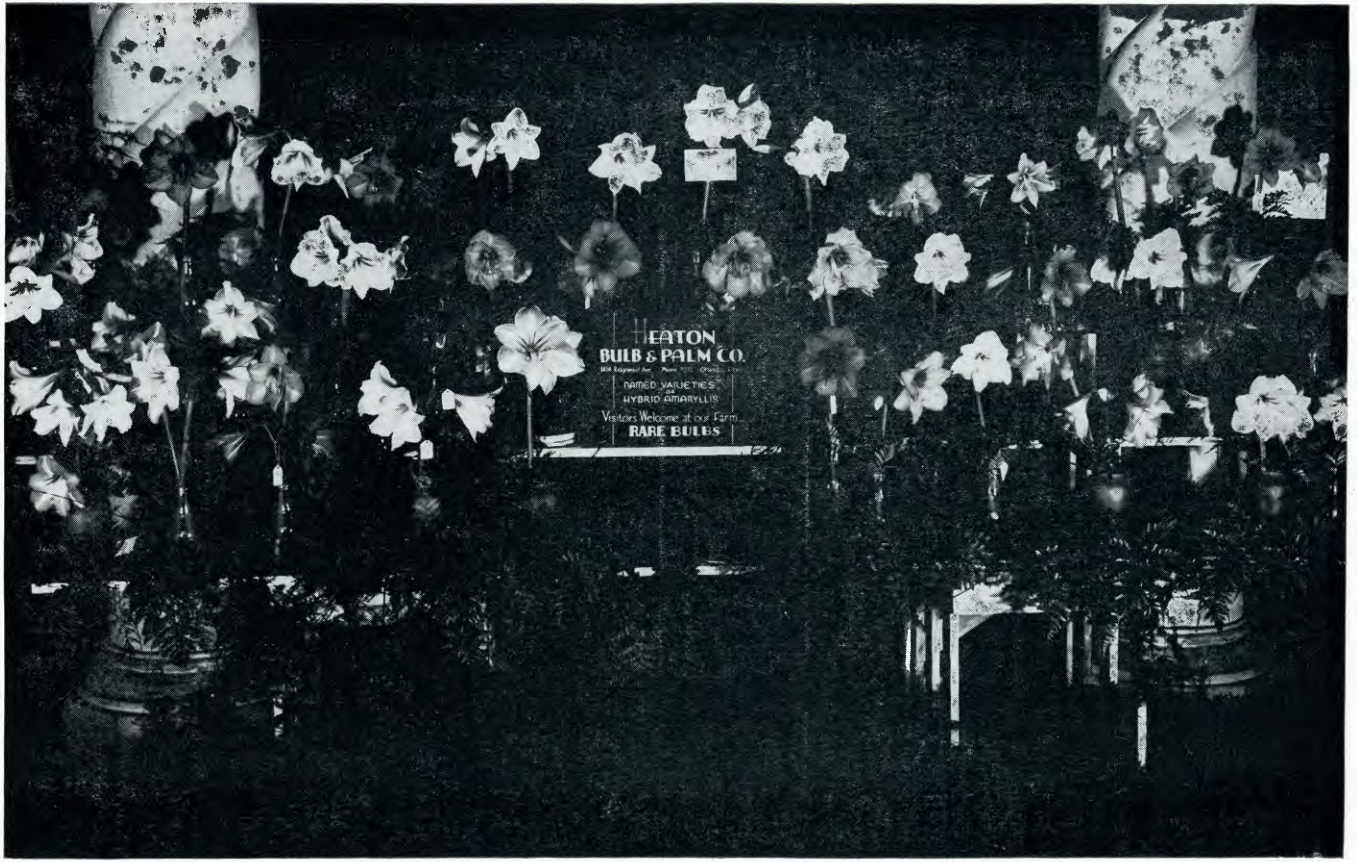
The use of Type A Kodachrome permits flower pictures to be taken indoors under artificial light conditions with no special equipment. Photoflood bulbs are used for the lighting and produce excellent color correction. Taking flower pictures indoors often permits the use of special effect lightings which heighten the impact and effectiveness of the pictures.

Type A Kodachrome is the latest development made by this company in natural color processes for the amateur. We are, of course, from time to time bringing out improved Kodaslide Projectors, improved means for mounting Kodachrome transparencies, and filing equipment which helps the flower lover keep his color picture collection in order.

April 26, 1938, —D. R. Brown.
Eastman Kodak Co.,
Rochester, N. Y.

COLOUR DESCRIPTIONS OF FLOWERS

"The only practicable solution of the problem of accurate colour description would appear to be the production of a reliable horticultural colour chart, suitable for general use," says the Gardeners' Chronicle editorially (London, March 21, 1937). "In order to ascertain whether this could be accomplished within reasonable limits, I have matched some 500 flowers of all types with some of the best charts at present available —Ridgway's and The Repertoire of Oberthur in particular—and from the results gained it does appear that flower colours can be gathered into a moderate number of colour groups, and that while it may be impossible to describe every tone and tint in such a variable flower as the rose, for instance, or even a lilac bloom, the 'general hue' can be ascertained with a marked degree of accuracy, thus eliminating the 'personal element,' which is the cause of so many pitfalls . . . It may be seen that a carefully graduated colour chart with which to match flowers accurately is not an impossibility. Minute description of every tone and hue is not possible or even feasible, but if the 'general hue' of the flower can be accurately described, it should be sufficient for catalogue purposes. Other factors for the success of such a chart would be that the price should be reasonable and the make-up easy to handle, and lastly, but certainly not the least important, that such a chart would be recognized as the standard work on the subject and used uniformly by all who have to do with flower description (Marguerite E. Bunyard)."

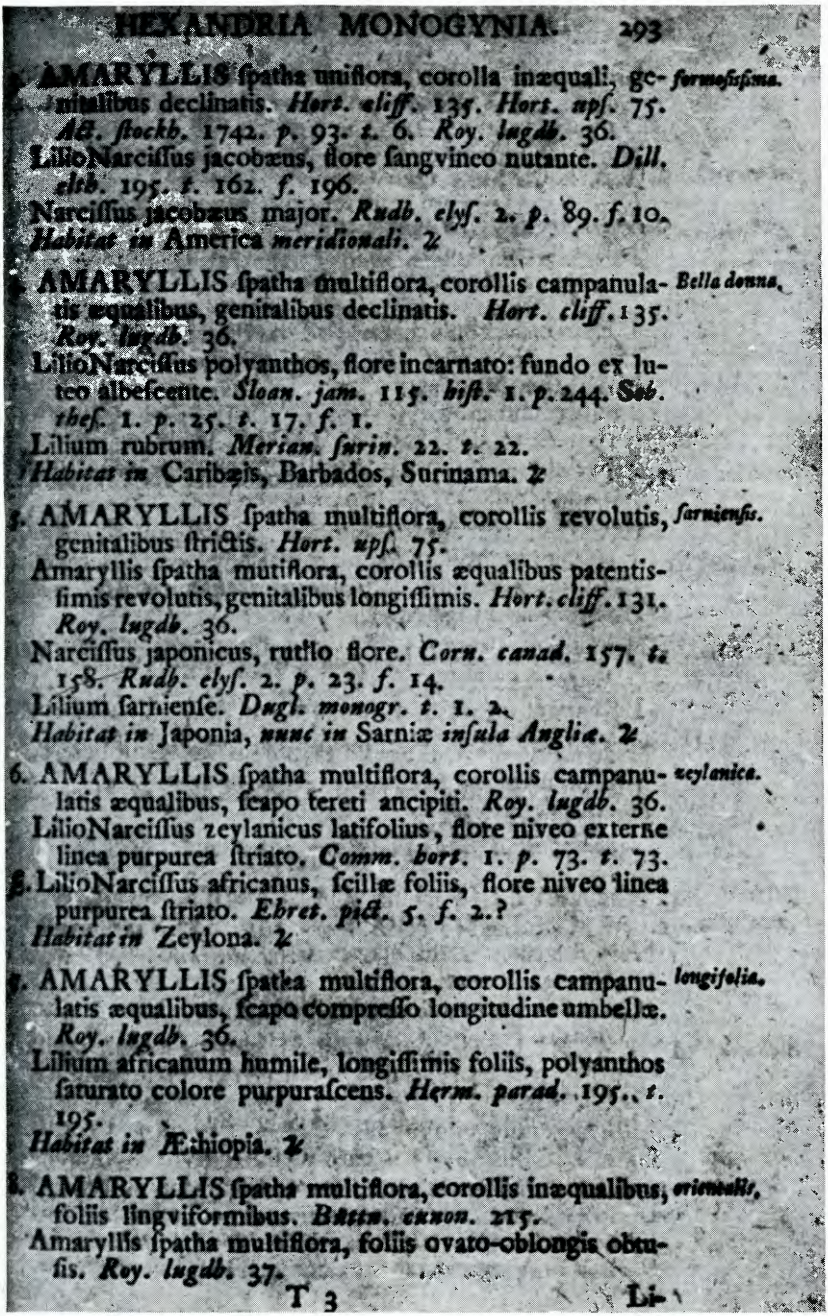


American Amaryllis Society

See page 89

I. W. Heaton Exhibit at the Southeastern Amaryllis Show, Orlando, Fla., 1938

Plate 106



HEXANDRIA MONOGYNIA. 293

1. AMARYLLIS ſpatha uniflora, corolla inæquali, genitalibus declinatis. *formoſiſſima.*
Hort. cliff. 135. *Hort. upſ.* 75. *Act. ſtockh.* 1742. *p.* 93. *t.* 6. *Roy. lugdb.* 36.
LilioNarciſſus jacobæus, flore ſangvineo nutante. *Dill. elth.* 195. *t.* 162. *f.* 196.
Narciſſus jacobæus major. *Rudb. elyſ.* 2. *p.* 89. *f.* 10.
Habitat in America *meridionali.* ♃

2. AMARYLLIS ſpatha multiflora, corollis campanulatis æqualibus, genitalibus declinatis. *Hort. cliff.* 135. *Roy. lugdb.* 36. *Bella donna.*
LilioNarciſſus polyanthos, flore incarnato: fundo ex luteo albeſcente. *Sloan. jam.* 115. *hiſt.* 1. *p.* 244. *Seb. theſ.* 1. *p.* 25. *t.* 17. *f.* 1.
Lilium rubrum. *Merian. ſurin.* 22. *t.* 22.
Habitat in Caribæis, Barbados, Surinama. ♃

3. AMARYLLIS ſpatha multiflora, corollis revolutis, genitalibus ſtrictis. *Hort. upſ.* 75. *ſarnienſis.*
Amaryllis ſpatha multiflora, corollis æqualibus patentiſſimis revolutis, genitalibus longiſſimis. *Hort. cliff.* 131. *Roy. lugdb.* 36.
Narciſſus japonicus, rutilo flore. *Corn. canad.* 157. *t.* 158. *Rudb. elyſ.* 2. *p.* 23. *f.* 14.
Lilium ſarnienſe. *Dugl. monogr. t.* 1. 2.
Habitat in Japonia, *nunc in* Sarniæ *inſula Angliæ.* ♃

6. AMARYLLIS ſpatha multiflora, corollis campanulatis æqualibus, ſcapo tereti ancipiti. *Roy. lugdb.* 36. *zeylanica.*
LilioNarciſſus zeylanicus latifolius, flore niveo externe linea purpurea ſtriato. *Comm. hort.* 1. *p.* 73. *t.* 73.
LilioNarciſſus africanus, ſcillæ foliis, flore niveo linea purpurea ſtriato. *Ehret. pict.* 5. *f.* 2.?
Habitat in Zeylona. ♃

7. AMARYLLIS ſpatha multiflora, corollis campanulatis æqualibus, ſcapo compreſſo longitudine umbellæ. *Roy. lugdb.* 36. *longifolia.*
Lilium africanum humile, longiſſimis foliis, polyanthos ſaturato colore purpuraſcens. *Herm. parad.* 195. *t.* 195.
Habitat in Æthiopia. ♃

8. AMARYLLIS ſpatha multiflora, corollis inæqualibus, foliis lingviformibus. *Burm. canon.* 215. *orientalis.*
Amaryllis ſpatha multiflora, foliis ovato-oblongis obtuſis. *Roy. lugdb.* 37.

T 3 Li-

See pages 101 and 135.

Page 293, Linnaeus' Species Plantarum, First Edition, 1753, the foundation of the Genus Amaryllis with A. belladonna as its present leading species which is clearly an American and not a South African species.

Plate 107

3. DESCRIPTION AND PHYLOGENY

THE HISTORY OF NOMENCLATURE—AMARYLLIS (LINN.) HERB., AND HIPPEASTRUM (HERB.)

J. C. Th. Uphof,

Professor of Botany, Rollins College, Winter Park, Florida

In the Family, *Amaryllidaceae,* there are two genera of great interest to us that have been known for over a century as *Amaryllis* (Linn.) Herb., and *Hippeastrum* Herb. However, a thorough search of the literature has yielded evidence that makes this nomenclature untenable. During the summer months of 1936, I studied in the Library of the Royal Botanical Garden at Kew, and again in 1937, in the Library of the United States Department of Agriculture and the Library of Congress at Washington, D. C. in order to examine the literature on these two genera from the earliest times up to the present in the hope of clearing up any inaccuracies in their nomenclature.

According to Pax and Hoffman[1], both genera belong to the subfamily *Amaryllidoideae* although each one is grouped under a different subtribe. *Amaryllis* (Linn.) Herb., together with some other genera, is grouped under *Amaryllidinae,* whereas *Hippeastrum* Herb., is classed with the *Hippeastrinae.* Phylogenetically, it is clear that they are at a distance from each other. It is not a question of relationship that is involved but a matter of incorrect naming of the genera. At the present it is understood that the Genus *Amaryllis* (Linn) Herb. is monotypic, namely, *A. Belladonna* (Linn.) Ait. which is found in South Africa. *Hippeastrum* (Herb.) is composed of about 74 species which are all found in the tropics and subtropics of America, namely from the West Indies to Chile and southern Brazil into a part of Argentina. Many beautiful garden hybrids originated from some of these species in which nurserymen were already interested at the beginning of last Century. Many growers still call them *Amaryllis* instead of *Hippeastrum* and apparently they may be right.

The genus *Amaryllis* can be dated back to Linnaeus' Species Plantarum Ed. Prim.[2] Here he mentions 9 species (See Plate 107.) The great Swedish botanist expressly wished to supersede Tournefort's *Lilio-narcissus*[3] which he rejected as a compound word. These 9 original Linnean species are: *1. A. lutea* (=*Sternbergia lutea Ker.*—Grawl. ex. Schult. qq. Syst. VII, 795), *2. A. atamasco* (=*Atamasco atamasco* Herb. App. Bot. Reg. 36), *3. A. formosissima* (= *Sprekelia formosissima*

[1]**F. Pax und K. Hoffman,** Amaryllidaceae in **Engler and Prantl.** Die Natürlichen Pflanzenfamilien. Vol. 15 a: 404-406, 415-416, Leipzig, 1930.

[2]**Carolus Linnaeus.** Species Plantarum. Tom I: 292-294, Ed. Prim. Holmiae, 1753.

[3]**J. P. Tournefort.** Instituniones Rei Herbariae. Tom. I: 385, Pl. 207 Parisiis, 1700 as to the origin of the generic name Amaryllis see also:
Carolus Linnaeus. Generum Plantarum. 102. Lugduni Batavorum. 1737.
Carolus Linnaeus. Critica Botanica. 30 and 118. Lugduni Batavorum. 1737.
Carolus Linnaeus. Philosophia Botanica. 140 and 170. Stockhalmiae. 1751.
On page 170 of the latter work Linnaeus states: "Nomina generica Poetica, Deorum ficta, Regum consecrate, & Promotorum Botanices promerita, retineo." Then under the heading "Poetica in veterum eruditione trita": he mentions among other genera also **Amaryllis.**

Herb. App. Bot. Reg. 35), *4. A. Belladonna* which is the only name, though not the same plant that is left, *5. A. Sarniensis* (=*Nerine Sarniensis Herb.* amaryllidae 2073), *6. A. zeylanica* (=*Crinum zeylanicum Linn.* Syst. Ed. XII, 236), *7. A. longifolia* (=*Crinum longifolium Roxb.* Hort. Beng. 23 Fl. Ind. II, 130), *8. A. orientalis* (=*Brunsvigea gigantea Heist.* Bescreib. Brunsv. 3 cum LC fide Schoet. f. Syst. VII, 844.), *9. A. guttata* (=*Buphane guttata Herb.* Amaryllidae 240). In the second edition of the work of Linnaeus we find the addition of another species, namely of *Amaryllis reginae* which later became *Hippeastrum reginae Herbert.*[4]

At first our interest will be mainly centered on *Amaryllis Belladonna* (Ait.). Prior to his Species Plantarum, Linnaeus published his monumental work Hortus Cliffortianus[5]. Here he describes a plant which we can easily trace as *A. equestre Ait.* (=*Hippeastrum Equestre* Herb.) and which we will see later on is nothing more than *A. Belladonna* Ait. Linnaeus states: "Amaryllis spatha multiflora, corollis campanulatis, aequalibus, genitalibus declinatus." This statement he takes exactly over in his Species Plantarum Ed. Prim., where he uses for the first time the scientific system of giving plant species two names. It is to this description that he attaches the name of *Amaryllis Belladonna* and according to the rules of nomenclature this name is still valid.[6] In both works Linnaeus mentions that this *A. Belladonna* is native to the West Indies and Surinam—"Habitat in Caribaeis, Barbados, Surinama." Clearly he refers Hermann's "Lilium Americanum puniceo flore dictum"[7] in his Hortus Cliffortianus to this same species. I examined this work of Hermann and found opposite page 194 a very clear illustration of the plant. It is also this very particular description and illustration which is referred to by Aiton[8] when he named his *Amaryllis equestris* which became later on *Hippeastrum equestre.*

In all the three editions of Species Plantarum, Linnaeus is very clear as to what he understands about the country of origin of his *A. Belladonna* by citing also the description of other writers. We find namely: "Lilio Narcissus polyanthos, flore incarnato, fundo ex luteo albescente. Sloan. jam. 15, hist. 1 p. 244. Seb. thes. 1 p. 25 t. 17. f. 1. Lilium rubrum Meriam Surin. 22 t. 22." Inasmuch as the nomenclature of this plant group is so important I examined in various libraries the original works mentioned by Linnaeus. Sloane is especially concerned about the plants of Jamaica[9]. Seba[10] describes and illustrates in his beautiful large folio work the plant in question in Latin and also in Old-Dutch very clearly as "Leli, uit America, met bruin roode bloemen,

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[4]**Carolus Linnaeus.** Species Plantarum. Tom. I: 420-422, Ed. Sec. Holmiae, 1762.

[5]**Carolus Linnaeus.** Hortus Cliffortianus. 135, Amsterdam, 1737.

[6]**Carolus Linnaeus** who wrote his Plantae Africanae 77-112 and Flora Capensis 113-115 in Amoenitates Academicae, Tom. VI, 1789 mentions among the **Amaryllis** species only **A. capensis** which was later on referred to as **Hypoxis stellata** in Linn. fils Suppl.

[7]**Pauli Hermanni.** Paradisus Batavus seu descriptio rariorum plantarum. 194, Lugduni Batavorum (Leiden), 1707.

[8]**William Aiton.** Hortus Kewensis. Vol. 1, 417, London, 1789.

[9]**Hans Sloane.** Catalogus Plantarum quae in Insula Jamaica. 115, Londini, 1696.

[10]**Albertus Seba.** Locupletissimi Rerum Naturalium Thesauri. Tom. I: 25. Tab. XVII Amsterdam. 1734.

Bella-donna geheeten'' (meaning: ''lily from America with brownish red flowers, called Bella-donna.''). His Plate XVII is very exact and there is no doubt that Seba means the plant later described as *A. equestris* Ait., which is *A. Belladonna Linn.* from South America.

Of much value, as we will see later on is the account given by Marie Merian[11]. Her work contains, to a considerable extent, descriptions and illustrations of insects from Surinam or Dutch Guiana. She mentions also, several plant species (See Plate 108). About *Amaryllis* she writes: ''Une bulbe blanche porte ce lys que croit dans la campagne sans etre cultivé, ses feuilles qui sont vertes ont un lustre comme le satin, on eu ignore les qualités, j'en ai apporté quelques bulbes en Hollande, ou elles ont porte les fleurs avant les feuilles.''

I should also mention that Linnaeus cites in his Hortus Cliffortianus the work of Plunkenet[12] who gives this plant the name of ''*Lilio-narcissus Americanus punico flore Bella-donna dictus.*'' Thus there is not the slightest doubt from what continent this *Bella-donna* comes. We find the same description in Linnaeus' Species Plantarum. In this connection it is worth while to mention the book by van Roijen,[13] although this writer does not mention the country of origin. We find here mainly an enumeration and some descriptions of plants that were grown in the Botanical Garden of the University of Leiden. Willdenow who later edited the fourth edition of Species Plantarum[14] after Linnaeus' death, has made no alterations as to the country of origin of *Amaryllis Belladonna* Linn. In fact he adds to the descriptions its German name, namely that of ''West Indische Amaryllis'' which makes the matter still clearer. Thus far the matter is very clear, namely we have here to do with *Amaryllis Belladonna* Linn of American and certainly not from South African origin. On the other hand it should be remembered that Linnaeus' Species Plantarum, Ed. Prim. (1753) forms the foundation for our present nomenclature of plants and this is recognized by every botanist. It should also be mentioned that none of the authors, cited in the works of Linnaeus have ever been doubted as to the correctness of their descriptions.

In 1775 Linnaeus[15] published some plants from Surinam or Dutch Guiana. Among these is mentioned an ''Amaryllis 98 dubia Mer. surin. t. 22 Corolla basi laciniarum barbatum.'' This collection of plants was presented to Linnaeus by the King of Sweden. Among these plants were 30 new genera and 50 new species. They were later on fully described in the Supplementum Botanicum of Linnaeus the younger in 1781. Then, still later (1789), this Amaryllis species was described by Aiton[16] as *Amaryllis equestris.* In the same publication he gives the name *Amaryllis belladonna* to another plant but the habitat is not indicated.

[11]**Marie Sybille de Merian.** Historie Générale des Insectes de Surinam. Tom. I: 22. Tab. XXII, Paris 1772. There is an earlier edition: Dissertatio de Generatione et Metamorphosibus Insectorum Surinamensis.

[12]**Leonard Plukenet.** Almagestum Botanicum. Tom. II: 220 Londini, 1700.

[13]**Adriani van Roijen.** Florae Leydensis exhibens plantas quae in Horto Academicae. 36 Lugduni Batavorum, 1740.

[14]**C. W. Willdenow** in Carolus Linnaeus' Species Plantarum. Tom. II: 54-55, Ed. Quarte Berolini, 1799.

[15]**Carolus Linnaeus.** Plantae Surinamensis in Amoenitates Academicae. Tom. VIII: 254, 175.

[16]**William Aiton.** Hortus Kewensis. Vol. I: 417, London, 1789.

Later Herbert followed this up by indicating the habitat as South Africa. However, Pulle[17] who is at the present one of the best authorities on the flora of Dutch Guiana mentions but one species of Hippeastrum (=Amaryllis), namely *H. equestris*. This proves when examining and comparing the older publications critically that *A. Belladonna Linn.*, and *A. equestris* Ait. are *(Hippeastrum equestre* Herb.) two names for the same plant.

It is plain, therefore, that the beginning of the misconception regarding *Amaryllis belladonna* Linn. (Type: Caribbean Islands; Barbados; and Surinam: Hermanni, t. opp. p. 170; 1707; Seba, t. 17, 1734; Merian, p22, t. 22, 17—; Linn. Sp. Pl. 1753) dates from 1789 when, in the first edition of Hortus Kewensis, specific rank, *Amaryllis equestris,* was given to "Amaryllis 98 dubia, mer. surin. t. 22," described by Linn. patr. in 1775 and Linn. fil. in 1781. It is notable, that the country of origin (West Indies and Surinam) of *A. belladonna* Linn., is omitted in the first edition of Hortus Kewensis, but is restored in the second edition, 1810-13, as "West Indies" in general harmony with Linnaeus' original description in 1753, Species Plantarum, the two succeeding editions, and the fourth edition by Willdenow in 1799.

The publication by Savage, in Herbertia 1937, of a summary of "A manuscript by the Younger Linnaeus dealing with Certain Genera now included in the Amaryllidaceae," roughly dated 1782-83, and that remained unpublished until the recent summary appeared, throws some light on this subject. This manuscript of the Younger Linnaeus was authority for certain specific diagnoses in the first edition of Hortus Kewensis, 1789, including *A. equestris* (Merian. Surinam. p. 22, t. 22) and *A. belladonna* (Trew. Seligmann, t. 12). It is clear from reading the summary by Savage that when the second edition of Hortus Kewensis was published, 1810-13, the fourth edition of Species Plantarum by Willdenow, 1799, was used as authority for certain citations in place of the manuscript of the younger Linnaeus. It is natural, therefore, that in this second edition of Hortus Kewensis[16], the habitat of *A. belladonna* Linn., is indicated as "West Indies" in harmony with Willdenow (1799) in spite of the fact that a colored plate of a plant, by an anonymous artist, wrongly labeled "*A. belladonna* Linn.", had appeared in Curtis' Botanical Magazine in 1804.

Unfortunately, in 1821, the late great William Herbert, who undoubtedly was sincere in wanting to carry out the supposed wishes of Linnaeus patr., disregarded the authority of the first and the three succeeding editions of Species Plantarum, 1753, 1762, 1764, and 1799, and followed the first edition of Hortus Kewensis, instead of the second edition of the latter work, 1810-13, in which the error regarding *A. belladonna* Linn., based on the unpublished manuscript of the Younger Linnaeus, was corrected.

One of the earliest colored plates labeled "*Amaryllis Belladonna* (Linn.)" is found in Curtis Botanical Magazine.[18] Here, however, we

[17]**A. A. Pulle.** An Enumeration of the Vascular Plants known from Surinam. 100-101 Leiden, 1906.

[18]**Anonymous.** Amaryllis Belladonna. Curtis Botanical Magazine. Vol. XIX. Plate 733, 1804.

come to some mix-up as to the origin of this species. Two forms are here described; form (a) "was introduced into this country (namely England) from Portugal in 1712 but where native is yet doubtful. The older botanists call its country India which with them may mean East Indies, South America or even some parts of Africa," as to form (b) we read that it ". . . comes from the Cape of Good Hope where it was found by Sir Joseph Banks." Judging from the colored plate and from the description this is by no means the plant which Linnaeus had so clearly in mind. It is interesting to note that a few years later Aiton does not mention the country of origin of *A. Belladonna* in his Hortus Kewensis, first edition. In the second edition which was published in 1811[19] it is stated that the plant is from the West Indies in accordance with Linnaeus.

Soon afterward came Herbert[20] who changed the nomenclature of *Amaryllis* and *Hippeastrum* as already indicated. He was correct in separating the American species from the South African one from a morphological standpoint, because there are sufficient reasons to treat them as two different genera, but there was no foundation for the nomenclature that was followed, because *Amaryllis Belladonna* was based by Linnaeus distinctly on an American species and the name cannot be transferred to another species. Herbert states[21]: "Many years ago, when in a letter published in the Hort. Soc. Trans. I first distinguished this genus *(Hippeastrum)* from the plants with which it had been confounded, I retained for it the name Amaryllis, and proposed that of Coburghia for Belladonna and Blanda. I was not then aware that Linnaeus had given the name Amaryllis to Belladonna, with a playful reason assigned; but as soon as I learned it, I felt, besides the general law of priority, that the jeu d'esprit of a distinguished man ought not to be superseded and that no continental botanist would submit to the change. I therefore restored the name Amaryllis to Belladonna, and gave that of Hippeastrum or Equestrian Star to this genus following up the idea of Linnaeus when he named one of the original species equestre." There is no doubt that the reader will be aware of some inaccurate and doubtful statements.

Let us now look at the problem from another angle and let us trace the various statements found in the literature concerning the South African plant which Herbert erroneously calls *A. Belladonna.* As early as 1633, the well known Ferrari[22] describes a bulbous plant as "Narcissus Indicus, flore Liliaeceo, diluto colore purpurascens" together with an excellent illustration on page 121. It is very suggestive that Ferrari may have meant the disputed species from Cape of Good Hope. Let us go somewhat further. Herbert states: "Barrelius had previously, in the year 1714, described the pink and white belladonna, as cultivated by that name in the gardens of Italy, and to the plant of Barrelius both Merian and Linnaeus alluded. It was the exquisite blending of pink

[19]**William Aiton.** Hortus Kewensis. Sec. Ed. Vol. II: 225, 1811.
[20]**William Herbert** in App. Botanical Register. 31, 1821.
[21]**William Herbert.** Amaryllidaceae. 114-151, London, 1837. See also **J. G. Baker.** An Enumeration and classification of the Species of Hippeastrum, Journ. Bot. 7:79-85, 1878 and his Handbook of the Amaryllidaceae. London, 1888.
[22]**Bapt. Ferrarii.** Florvm Cvltvra. 117-118, Plate p. 121, Romae, 1633.

and white in the flower, as in the female complexion, that suggested the common name in Italy, and to those lovely tints Linnaeus referred, when he assigned to it the name of a beautiful woman." We notice that Herbert is quite fanciful in his statements which are not in harmony with those of previous botanical writers, including Barrelius, whom he mentioned. Barrelius[23] mentions only "Lilio narcissus indicus dilute purpurescens asceris Belladonna Italiorum vulgatior."

Herbert further says "It is equally clear, that this genius Hippeastrum is quite distinct from Amaryllis, and as belonging to a different section of the order, it has no proximate affinity to it." Then on page 275 of his work on the Amaryllidaceae, he described *A. Belladonna Linn.*, as a species from Cape of Good Hope, refering to Linnaeus work, Hortus Cliffortianus, in which the binary nomenclature was not used. And further, the works of Ferrari and Barrelius are not mentioned by Linnaeus. The idealistic and fanciful views of Herbert which have been cited above in order to switch *A. Belladonna Linn.*, from an American to a South African species can not be maintained. Herbert himself who realized that ". . . the general law of priority, the jeu d'esprit of a distinguished man ought not to be superseded" would not have objected to one of our principal rules of nomenclature, namely—"No one may change a name (or combination of names) without serious motives, based either on more profound knowledge of facts or on the necessity of giving up a nomenclature that is contrary to the Rules," and (Recommendation III.) "Changes in nomenclature should be made only after adequate taxonomic study".[24]

Perhaps we should not overlook the statement of Beaton[25], who knew Herbert personally—"When the late Dean of Manchester had split up into fragments the mass of bulbous plants which formerly passed as species of Amaryllis, and divided them into separate genera, which he distributed into different sections of the order, I well remember the discontent and heart-burnings which obtained among many of our best bulb growers with his arrangement, and these lamentations forced strongly upon the mind the different ideas of utility entertained by botanists and gardeners. The arrangement was certainly not very flattering to those who would let well alone, and yet it was so mysterious to the grumblers that they feared to show their opposition to it in public print."

As far as the plant from Cape of Good Hope is concerned, *Amaryllis belladonna* (Linn.) Herb., we must find a name for it. Since the date when Herbert proposed to segregate *Hippeastrum* from *Amaryllis* in 1921 the name of *Callicore* by Link[26] was published in 1829. The species here concerned is *Callicore rosea Link*, which was described as having reddish-white flowers and native to the Cape (am Cap), and this is identical with *A. Belladonna* (Linn.) Ait. The genus of *Belladonna*

[23]**Jacobo Barreliero.** Plantae per Galliam, Hispaniam et Italiam. p. 70, Obser. 787, Ic. 1040, Parisiis, 1714.

[24]**J. Briquet and H. Harms.** International Rules of Botanical Nomenclature. 3 Jena, 1935.

[25]**D. Beaton.** On Amaryllids, Jour. Hort. Soc. 5:132-136, 1850.

[26]**H. F. Link.** Handbuch zur Erkennung der Nutzbartsen und am haufigsten vorkommenden Gewachse. 193, Berlin, 1829.

See page 103.

One of the earliest illustrations of Amaryllis Belladonna from Marie Sybille de Merian, Histoire Générale des Insectes de Surinam. Tom. I:22. Tab. XXII, Paris 1772. There is an earlier edition of this work in Latin, with the same plates, to which Linnaeus refers.

Plate 108

F. Meyer, Hamburg, Germany

See page 157

Vallota purpurea major—two year old plant, grown in living room; height 2 feet

Plate 109

was soon afterward proposed by Sweet[27] and the name of *Belladonna purpurescens Sweet* is given to *A. Belladonna* (Linn.) Ait. This *Belladonna* is homonymous with *Belladonna* Tournefort, Rupp. Flora Jen. ed. Hall. 252 (1745), the present *Atropa Belladonna Linn.*, which belongs to the *Solanaceae* or Nightshade Family.

The name *Callicore rosea Link.*, is the only name that can be maintained for this species of the Cape of Good Hope and for which plate 911, in Flore des Serres, is an excellent example[28]. As far as the distribution of the species (under the name of *Amaryllis Belladonna* (Linn.) Ait., is concerned I refer to the works of Thiselton-Dyer[29] and of Levyns[30].

There is in the Herbarium of The Linnean Society of London no material from Linnaeus for comparison and therefore we have to rely upon the above publications.

Conclusions

(a) *Amaryllis belladonna* of Linnaeus is an American species and not South African; (b) The plant mentioned by Linnaeus as *Amaryllis 98 dubia* and which later on was named by Aiton as *Amaryllis equestris* is *Amaryllis belladonna* Linn. The latter name, the oldest, is to be maintained, and the former has to be rejected; (c) The generic name *Amaryllis* founded by Linnaeus in 1753 has to be maintained for the American group of plants, and this *Amaryllis belladonna* Linn. (syn. *Amaryllis equestris* Ait.) is the leading species with which all others of the genus have to be compared; (d) The name *Hippeastrum* suggested by Herbert in 1821, is superfluous and becomes a rejected name; and (e) The Herbertian *"Amaryllis belladonna"* from the Cape becomes automatically *Callicore* rosea Link.

Amaryllis belladonna Linn. et *Callicore rosea* Link

Amaryllis belladonna Linnaeus species americana, non africano-australis est. *Amaryllis 98 dubia* L. et *Amaryllis equestris* Aiton revera sunt *Amaryllis belladonna* L.; quare hoc ultimum nomen omnino conservandum, alia autem nomina rejicienda. Nomen deinde generis a Linnaeo anno 1753 propositum, quoad has plantas americanas, retineri debet et haec *Amaryllis belladonna* Linn. (syn. *Amaryllis equestris* Ait.) typica est species cui omnes aliae eiusdem generis species comparantur. Opus non est nomine Hippeastro, sicut a Herbert anno 1821 proposito, ideoque rejiciendum est hoc nomen; atque eo ipso *Amaryllis belladonna* Herbert, non L. ex cap. bonae spei designari debet *Callicore rosea* Link.

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[27]**Robert Sweet.** Hortus Britannicus. 2 ed. 506, London, 1830. See also:
C. G. De Della Torre et H. Harms. Genera Siphonogamarum. 74, Lipsiae, 1900-1907. Index Kewensis. Tom. I. 387, Oxoni, 1895.

[28]**J. E. P(lanchon)** Amaryllis Belladonna. Flore des Serres et des Jardins de l'Europe. Plate 911, 1853.

[29]**W. T. Thiselton-Dyer.** Flora Capensis. Vol. VI: 203, London, 1896-1897.

[30]**M. R. Levyns.** A Guide to the Flora of the Cape Peninsula. 73. Cape Town, 1929. N. B. When this manuscript was finished Dr. A. A. Pulle, Professor of Botany at the University of Utrecht, Netherlands, who is working on his extensive "Flora of Surinam" stated to me in a letter dated Sept. 7th, 1937 " . . . dat H. equestre de eenige soort van Hippeastrum is, die in Suriname is verzameld." (. . . that H. equestre is the only species of Hippeastrum which has been collected in Surinam.") This statement is very important in relation to the literature of the 18th Century.

THE TRIBES OF THE AMARYLLIDACEAE

HAMILTON P. TRAUB, *Florida*

The *Amaryllidaceae* have on the whole received scanty attention since the appearance of Herbert's classical text in 1837, and if we may borrow a phrase from Colonel Grey, the whole family is "crying out loud for a monograph." It is true that Baker in 1888, fifty years after Herbert, devoted a monograph to the family, following Herbert and Benthan & Hooker but it also is quite out of date after the lapse of another fifty years.

The classification of Pax and Hoffman deals with the genera only on the basis of an extensive poly-phyletic family grouping. Fortunately, Dr. Hutchinson in 1936 published his stimulating work, "Families of Flowering Plants, Monocotyledons." Following Jussieu (1789) the relative position of the ovary as a criterion in separating the *Liliaceae* and *Amaryllidaceae* from one another has been courageously abandoned, and the importance of the umbellate flowering habit and the presence of an involucre of bracts as the chief characteristics of the amaryllids, is emphasized. This is the first great advance toward a better understanding of this family since Herbert's time, a century ago.

It may be that Dr. Hutchinson has not gone far enough, however, since the Lily Family is still a very diverse aggregation. The *Hemerocallideae,* for instance, are indicated as showing further evolution toward the *Amaryllidaceae* and the Tribe *Tulipeae* of the *Liliaceae.* However, typical species of the *Tulipeae, Lilium, Tulipa,* etc., have a meristematic condition of the leafy scales of the bulb and are to be considered more primitive than typical species of the *Hemerocallideae* that lack this character. In this particular the *Hemerocallideae* are similar to the *Amaryllidaceae.* Dr. Hutchinson is apparently justified, on the basis of morphological characters, as well as such evidence as has just been mentioned, in considering the *Hemerocallideae* as a primitive ancestral stock from which the *Amaryllidaceae* may have originated. It is not apparent, however, that the *Tulipeae* should have regained the capacity to produce meristematic tissue in the leaf scales after evolving from the more highly specialized *Hemerocallideae* that do not possess this capacity.

We may therefore consider the *Hemerocallideae* as quite closely related to the *Amaryllidaceae* as a whole, but lacking the umbellate flowering habit. A truly phylogenetic classification of the *Amaryllidaceae* therefore would include the *Hemerocallideae* as the most primitive Tribe, a precedent set by Jussieu (Nat. deposito, etc. 1789), and Jaume-Saint Hilaire (Exp. fam. nat. 1805), who both classed *Hemerocallis* under the *Amaryllidaceae.* In the classification here proposed, the *Hemerocallideae* are considered from this standpoint.

The writer has studied living material of amaryllids for over a quarter century, and has taken notes with the object of preparing a phylogenetic and taxonomic monograph. It was his intention to delay publication for quite some time, but the need for this is now so very urgent that publication will take place within a year or so. The present

brief article was prepared to (a) provide an up-to-date classification of the Tribes for immediate use, (b) make the necessary changes in nomenclature due to the researches of Dr. Uphof, and (c) clear up the anomaly with reference to the Hutchinsonian Tribes *Crineae* and *Amaryllideae.*

In preparing the classification, an attempt has been made to do so on an evolutionary basis rather than that of an artificial key. It is recognized that evolution has apparently taken place from (1) rhizome to corm and bulb; (2) leafy scape to leafless scape; (3) many to two, or single spathe valves; (4) free to tubular spathe valves; (5) many to few or single flowered umbel; (6) actionmorphic to zygomorphic androecium; (7) absence to presence of the corona; (8) numerous to few or single ovules.

Such evolutionary developments have not taken place uniformly in the various branches of the Family and classification is therefore difficult, especially if an artificial key is desired. For the present the classification is presented along natural lines with an indication of the exceptions to be encountered. The basic chromozome numbers (n) are indicated, as far as known, for each of the tribes, but this data is still quite meager so that no definite conclusions can be based on this evidence.

Since *Hippeastrum* is now a rejected name, the use of the tribe name *Hippeastreae* based on it would be a source of confusion, and therefore the new tribe name *Amarylliseae*[1] is proposed for the group comprising the genera *Amaryllis* (Linn. ex parte) Uphof, *Placea, Sprekelia, Lycoris* and *Vagaria.* In the artificial key of Dr. Hutchinson, the tribes *Crineae* and *Amaryllideae* overlap. A convenient natural grouping can be secured by dividing the genera included in the two tribes on the basis of seed structure—seeds sub-globose to globose *(Stenolirion, Crinum, Ammocharis, Callicore, Brunsvigia* and *Nerine)* as contrasted with seeds flat, usually winged *(Chlidanthus, Anoiganthus, Cyrtanthus, Vallota* and *Ungernia).* Under this classification *Crinum* is transferred to the same tribe with *Callicore,* and the tribe name *Callicoreae*[2] is proposed for the tribe in place of *Amaryllideae.* For the tribe *Crineae,* which no longer contains the Genus *Crinum,* the name *Cyrtantheae*[3] is proposed, a precedent set by Herbert who used the name *Cyrtanthiformes* as a group name for the genera *Cyrtanthus, Gastronema,* and *Vallota.*

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[1]**Amarylliseae** Traub, **Tribus nov. (Amaryllidaceae), [Amaryllis** (Linn. ex parte) Uphof, **Placea, Sprekelia, Lycoris, Vagaria].**

[2]**Callicoreae** Traub, **Tribus nov. (Amaryllidaceae), (Stenolirion, Crinum, Ammocharis, Callicore, Brunsvigia, Nerine).**

[3]**Cyrtantheae** (Herb.) Traub, **Tribus nov. (Amaryllidaceae), (Chlidanthus, Anoiganthus, Cyrtanthus, Vallota, Ungernia).**

CLASSIFICATION OF THE TRIBES OF THE AMARYLLIDACEAE

A. Ovary superior
  B. Inflorescence racemose or paniculate (n=6, 11, 30) ---------- 1. HEMEROCALLIEAE
  BB. Inflorescence umbellate
    C. Rootstock a rhizome (n= 6, 8, 15) -- 2. AGAPANTHEAE
    CC. Rootstock a corm or bulb
      D. Androecium actinomorphic; corona absent (n=5, 6, 7, 8, 9, 20)-- 3. ALLIEAE
      DD. Andronecium more or less zygomorphic; the filaments connate; corona usually absent (n undetermined) ---------- 4. GILLIESIEAE

AA. Ovary inferior
  E. Corona usually absent
    F. Scape leafy in the lower part (n undetermined) ---------- 5. IXIOLIRIEAE

    FF. Scape leafless
      G. Spathe valves usually 2 or more and free from one another; or if monophyllous, split to the base on one side

        H. Ovules numerous
          I. Perianth actinomorphic; flowers few or solitary (n=7, 11, 12) -------- 6. GALANTHEAE
          II. Perianth usually zygomorphic, flowers many in the umbel
            J. Seeds sub-globose to globose (n=8, 9, 11, 12) ---------- 7. CALLICOREAE
            JJ. Seeds flat, winged (n=8, 12) --------- 8. CYRTANTHEAE
        HH. Ovules few (n=8, 9, 11, 12) ---------- 9. HAEMANTHEAE

      GG. Spathe monophyllous, tubular below, upwards free (n=6, 12, 19) ----------10. ZEPHYRANTHEAE

  EE. Corona usually present, separate from the filaments

    K. Corona of scales; sometimes united at the base (n=6, 9, 11, 12, 23) -11. AMARYLLISEAE

    KK. Corona of separate scales, or annular or tubular (n=7, 10) ------12. NARCISSEAE

EEE. Corona present, in connection with the filaments

L. Corona of separate teeth or scales between the filaments (n undetermined) ---------- 13. EUSTEPHIEAE

LL. Corona formed by expanded petaloid filaments (n=11, 40, 45) ---- 14. EUCHARIDEAE

KEY TO THE TRIBES CALLICOREAE AND CYRTANTHEAE

In order to make clear the basis on which the tribes Callicoreae and Cyrtantheae are here proposed, the following classification is given,—

A. Seeds sub-globose to globose (n 8, 9, 11, 12) TRIBE 7. CALLICOREAE

B. Filaments free and not swollen at the base

C. Ovules closely sessile on or sunk into the placentae

D. Flowers subsessile or very short

Seeds many (S. Afr.) -------- 1. *Stenolirion*

Seeds few (Trop. & Subtrop) -- 1a. *Crinum*

DD. Flowers long-stalked

Perianth straight (S. Afr.) -- 2. *Ammocharis*

Perianth declinate(tube short (S. Afr.) ---------- 3. *Callicore*

CC. Ovules more or less stalked on the placentae (S. Afr.) ---------- 4. *Brunsvigia*

BB. Filaments swollen at the base and continued beyond the point of inter-section down to the ovary; tepels narrow (S. Afr.) ---------- 5. *Nerine*

AA. Seeds flat, usually winged (n 8, 12) ------ TRIBE 8. CYRTANTHEAE

E. Anthers sub-basifixed, stigma trifid

Perianth tube long (S. Amer.) ---- 6. *Chlidanthus*

Perianth tube short (S. Afr.) ---- 7. *Anoiganthus*

EE. Anthers medianly dorsifixed

F. Flowers more or less curved, perianth lobes connected at base by a callus

Perianth limb much shorter than the tube (Trop. & S. Afr.) ---- 8. *Cyrtanthus*

FF. Flowers straight

G. Perianth lobes connected at the base by a callus (S. Afr.) ---- 9. *Vallota*

GG. Perianth lobes not connected at the base by a callus (Iran) --10. *Ungernia*

TENTATIVE REVISION OF THE GENUS AMARYLLIS (LINN. EX PARTE) UPHOF (SYN. HIPPEASTRUM HERB.)*

HAMILTON P. TRAUB AND J. C. TH. UPHOF

Since the publication of Baker's Handbook of the Amaryllideae in 1888, no less than 43 species of *Amaryllis* have been proposed under the now rejected name of *Hippeastrum*. As to the ultimate validity of these no one can be certain at present for many of them have been proposed without due comparison with the previously described species. In some cases also the descriptions are lacking in essential particulars. It is true that such careful comparisons would have been difficult to make for no attempt at a revision of the Genus was made for a half century. This makes it all the more necessary to bring all of this material together under one roof at this late date.

The purpose of the present paper is not to make final disposition of the numerous newly proposed species, but rather to bring together descriptions of all of these under a tentative classification so that the student as well as the amateur may make use of them It will help to guide the plant collector and taxonomist, and will also serve to put a damper on the indiscriminate making of new *Amaryllis* species on the very least provocation.

The paper is in two parts. The first concerns the characters of the Genus *Amaryllis,* and the second deals with the key to the subgenera and species and the detailed description of species proposed since 1888.

THE GENUS AMARYLLIS (LINN. EX PARTE) UPHOF

Sealy has recently published a very valuable paper concerning the generic characters of *Zephyranthes, Pyrolirion, Habranthus* and *Amaryllis* (Jour. Roy. Hort. Soc. May 1937), and we are greatly indebted to him for his excellent work. The Genus *Amaryllis* as here considered coincides with the description of Sealy.

AMARYLLIS (Linn. ex parte) Uphof
(Syn. *Hippeastrum* Herbert)

Spathe of two equal and opposite valves which are simple and quite free from one another to the base; *peduncle* two to several flowered, rarely one-flowered by reduction; *bracts* always present, each flower subtended by a bract; flowers declinate; perianth-segments of four different sizes; stamens declinate, fasciculate, unequal, of four different lengths; stigma trifid or capitate.

All of the species are native to South America, excepting *A. belladonna* (Linn.) Uphof, which is found in the West Indies in addition to Brazil, Guiana, Colombia, Venezuela, Bolivia and Peru.

*See also article on Subgenus **Sealyana** on page 131.

KEY TO SUBGENERA AND SPECIES AND DESCRIPTIONS OF SPECIES PROPOSED SINCE 1888.

The genus as delimited by Baker in 1888 included 35 species under the now rejected name of *Hippeastrum*. These 35 species were reprinted in full in Herbertia Vol. 1. 1934 (Year Book American Amaryllis Society), and it is therefore not necessary to repeat these descriptions here. However, the names and synonomy of 34 of the species admitted by Baker are given. Sealy (Jour. Roy. Hort. Soc. May 1937) has transferred *Hippeastrum brachyandrum* to the Genus *Habranthus,* and this leaves 34 species to be dealt with here.

Proposed New Species Since 1888 That Are Apparently Valid

1. *H. ananuca* Phil. Chile
2. *H. angustifolium* Phil. Chile
3. *H. angustifolium* Pax Argentina
4. *H. araucanum* Phil. Chile
5. *H. Bakeri* Phil. Chile
6. *H. Bonariense* O. Kuntze, Argentina
7. *H. candidum* Stapf, Argentina
8. *H. Canterai* Arech. Uruguay
9. *H. colonum* Phil. Chile
10. *H. consobrinum* Phil. Chile
11. *H. crociflorum* Rusby, Bolivia
12. *H. Damazianum* Beauvard, Brazil
13. *H. Elwesii* C. H. Wright, Argentina
14. *H. flammigerum* Holmb. Argentina
15. *H. Forgetii* Worsley, Peru
16. *H. fuscum* Kraenzl. Peru
17. *H. Gayanum* O. Kuntze, Brazil
18. *H. granatiflorum* Holmb. Uruguay
19. *H. iguapense* R. Wagner, Brazil. See article page 131.
20. *H. laetum* Phil. Chile
21. *H. marginatum* Fries, Argentina
22. *H. Moelleri* Phil. Chile
23. *H. Muesserianum* L. Linden,
24. *H. petiolatum* Pax, Argentina
25. *H. popetanum* Phil. Chile
26. *H. purpuratum* Phil. Chile
27. *H. Solisi* Phil. Chile
28. *H. soratense Rusby, Bolivia*
29. *H. splendens Renjifo, Chile*
30. *H. tenuiflorum* Phil. Chile
31. *H. tucumanum* Holmb. Argentina
32. *H. viridiflorum* Rusby, Bolivia

Revived Species and Species Transferred from Other Genera

33. *H. andicola* (Poepp.) Baker. Chile
34. *H. gladioloides* (Hieron) Pax. Argent.
35. *H. Harrisoni* (Bury) Hook f. Uruguay
36. *H. pallidum* (Herb.) Holmb. Argent.
37. *H. platense* (Herb.) Holmb. Argent.
38. *H. pulchrum* (Herb.) Holmb. Argent.

Species That Obviously Belong to Other Genera

39. *H. Holmbergii* Hicken. Argentina
40. *H. pedunculatum* (Herb.) Holmb. Argent.
41. *H. teretifolium* C. H. Wright. Uruguay
42. *H. tubispathum* (syn. *Zephyranthella tubispatha)* Pax. Argentina
43. *H. unifolium* (Arech.) Herter. Uruguay

In addition to the 34 Bakerian species, 43 species proposed since 1888 must be considered. For purposes of convenience, these latter have been grouped into three classes—(a) newly described species since 1888 that are apparently valid, (b) species revived or transferred from other genera, and (c) species that obviously belong to other genera.

Of the 32 species newly described since 1888, 12 species proposed by Philippi, and one species by Carlos Renjifo, are not described in full. The volume of the Anales University of Chile containing these descriptions arrived too late for translations to be made, and these species descriptions will be published in 1939 Herbertia—

Species described by Philippi

H. ananuca
H. angustifolium
H. araucanum
H. Bakeri
H. colonum
H. consobrinum
H. laetum
H. Moelleri
H. popetanum
H. purpuratum
H. Solisi
H. tenuiflorum

Species described by Renjifo

H. splendens

In addition, *H. Forgetii* Worsley also remains unclassified because an adequate description has not as yet been located.

H. pallidum (Herb.) Pax, is evidently a variety of *Amaryllis advena* with the following synonomy—*A. advena* Gawl.; *H. hesperius* Herb.; *H. mendocinus*. This variety differs from the type in having peduncles very much shorter.

Included in the 43 species proposed since 1888, there are 6 species that obviously belong to other genera.

The illustration of *H. Holmbergii* Hicken (page 236, Anal. Soc. Cien. Argent. LV 1903) clearly shows that the spathe is tubular below and the free parts consist of two opposite segments quite free from one another. In this particular it harmonizes with *Pyrolirion*, but the rest of the details do not fit. It may be necessary to create a new genus to accommodate this species, and if this should prove to be the case, the generic name *Holmbergia* is here proposed, in honor of the late Dr. Holmberg who recently passed away, and who had a life long interest in the amaryllids.

H. pedunculosum (Herb.) Holmb., has a "tubular spathe, bifid at the top" and therefore does not belong with the Genus *Amaryllis*.

H. teretifolium C. H. Wright, *H. tubispathum* Pax, and *H. unifolium* (Arech.) Herter,* also have tubular spathes and therefore must be transferred from *Amaryllis.* These four species most likely belong to *Habranthus.*

In the arrangement of the key of the subgenera and species of the Genus *Amaryllis,* an attempt has been made to come closer to a phylogenetic grouping. There are two great evolutionary lines. The linear-leaved species seem to be evolving in the dirction of the one-flowered umbel, whereas the lorate-leaved species show a tendency toward the development of the incurved corona that closes in the throat *(Amaryllis aulica)* and pronounced irregularity of the perianth segments *(Amaryllis Cybister).*

In general, evolution, in the Genus *Amaryllis,* seems to be from (a) linear to lorate leaves; (b) many- to few- or single-flowered umbel; (c) narrowly funnel-shaped to openly funnel-shaped perianth; (d) long to short tube; (e) obscure corona of scales to corona enclosing the neck of the throat of the perianth, and (f) trifid stigma to capitate stigma.

Sealy (Jour. Roy. Hort. Soc. May 1937) has raised the Subgenus *Habranthus* (Herb.) Baker to generic rank, and for valid reasons retained the name *Habranthus* for the revived genus. The species which had been erroneously placed under the former subgenus *Habranthus* (Herb.) Baker, and which belong to the Genus *Amaryllis* (Linn. ex parte) Uphof, are therefore without a subgeneric group name. Since most of the species included are native to Chile, the descriptive name *Chilanthe*** is proposed as the new name for the subgenus accommodating those species with linear leaves, short perianth-tube that is openly funnel-shaped, and trifid stigma.

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*The name of this species is evidently misprinted as **H. uniflorum** (Arech.) Herter, in Sealy's list (page 209, Jour. Roy. Hort. Soc. May, 1937).

__Chilanthe__ Traub &, Uphof, **subgenus nov., Genus **Amaryllis** (Linn. ex parte) Uphof, **Amaryllidaceae (Amaryllis Jamesonii, A. Berteroana, A. Bagnoldii, A. bifida, A. advena, A. pulchra, A. marginata, A. lineata, A. rosea, A. chilensis, A. soratensis, A. andicola).**

Tentative Key to the Subgenera and Species of the Genus Amaryllis (Linn. ex parte) Uphof (Syn. Hippeastrum)

A. Leaves linear, tube always short

B. Perianth narrowly funnel-shaped . . . . Subgenus 1. Phycella *(Lindl.)*

C. Stigma minutely tricuspidate

1. *gladioloides*
2. *granatiflora*
3. *bonariensis*
4. *Gayana*
5. *Herbertiana*
6. *Elwesii*

CC. Stigma capitate

7. *bicolor*
8. *phycelloides*

BB. Perianth openly funnel-shaped; stigma trifid

D. Umbel 3-10 flowered . . . . Subgenus 2. Chilanthe *(Traub & Uphof)*

9. *Jamesonii*
10. *Berteroana*
11. *Bagnoldii*
12. *bifida*
13. *advena*
14. *pulchra*
15. *marginata*

DD. Umbel 1-2 flowered

16. *lineata*
17. *rosea*
18. *chilensis*
19. *soratensis*
20. *andicola*

BBB. Perianth openly funnel-shaped; stigma capitate . . . . Subgenus 3. Rhodophiala *(Presl.)*

E. Umbel 2-6 flowered

21. *montana*
22. *pratensis*

EE. Umbel 1-flowered

23. *uniflora*
24. *rhodolirion*
25. *modesta*

AA. Leaves lorate, tube long or short

F. corona wanting or obscure; perianth tube long or short

G. Perianth-tube long . . . . Subgenus 4. Macropodastrum *(Baker)*

26. *solandriflora*
27. *candida*
28. *viridiflora*
28. *tucumana*
29. *tucumana*

GG. Perianth-tube short; stigma trifid . . . . Subgenus 5. Lais *(Salisb.)*

31. *Canteraii*
32. *breviflora*
33. *iguapensis*
34. *vittata*
35. *Harrisonii*
36. *petiolata*
37. *flammigera*
38. *rutila*
39. *Damaziana*
40. *angustifolia*

FF. Corona intermediate in development, usually of scales, but sometimes fimbriate; perianth-tube short . . . . Subgenus 6. Aschamia *(Salisb.)*

H. Perianth-tube very short, above an inch long; stigma trifid

41. *reticulata*
42. *belladonna*
43. *reginae*
44. *crociflora*

HH. Perianth-tube ½ to 1 inch long; stigma capitate

45. *stylosa*
46. *procera*
47. *Leopoldii*
48. *Mandonii*
49. *scopulorum*
50. *miniata*
51. *Andreana*
52. *Muesseriana*

FFF. Corona incurved, sometimes closing in the throat, perianth-tube short . . . . Subgenus 7. Omphalissa *(Salisb.)*

I. Stigma trifid

53. *calyptrata*
54. *psittacina*
55. *platensis*
56. *organensis*
57. *aulica*

II. Stigma capitate

58. *pardina*
59. *fusca*
60. *Cybister*

Unclassified Species

61. *ananuca*
62. *Philippiana*
63. *araucana*
64. *Bakerii*
65. *coloniana*
66. *consobriniana*
67. *Forgetii*
68. *laeta*
69. *Moellerii*
70. *popetana*
71. *purpurata*
72. *Solisii*
73. *splendens*
74. *tenuiflora*

SUBGENUS 1. PHYCELLA *(Lindl.)*

1. A. GLADIOLOIDES (Hieron.) Traub & Uphof, comb. nov.; *Habranthus gladioloides* Hieronymus in Bol. Acad. Nac. Cien. Cordoba, iv, p. 70; *Hippeastrum gladioloides* Pax in Beitr. Amaryll. Engl. & Prantl, Natruer. Pfl. Fam. II, 5.

Description.—Bulb unknown; leaves, 8 on the individual, 25 to 30 cm. long, lamina grooved, 2 to 3 mm. wide, linear, obtuse at the top; scape slighter shorter than the leaves, 2 mm. in diameter, flowers in January; umbel 2-5-flowered; spathe-valves 2, 4½ to 7 cm. long, 2 to 4 mm. wide, reddish on dried specimens, slightly united at the base; perianth declinate, pedicals 1½ to 3½ cm. long, frequently with bracts at the base; perianth with a short tube, appendiculate with triangular scales at the throat, these are ciliate-lacerate, 1½ to 2 mm. in length; perianth segments red, somewhat unequal, 3½ to 4 cm. long; stamens longer than the perianth, anthers oblong, 2½ mm. long, 1 mm. wide; style much longer than the stamens; stigma obscurely trifid; ovary 4 to 5 mm. long with ovules numerous, compressed in the cavities.

Habitat.—Argentina, San Juan, near Paramillos.

Notes.—Holmberg placed this species under the SUBGENUS PHYCELLA (Lindl.). It would be desirable to check the points concerning the slight union of the spathe-valves at the base, and the presence or absence of bracts. If the spathe is tubular below, and bracts are not always present, this species should be restored to the Genus *Habranthus.*

2. A. GRANATIFLORA (Holmb.) Traub & Uphof, comb. nov.; *Hippeastrum granatiflorum* Holmberg in Anal. Mus. Nac. Buenos Aires, 1903, pp. 79-80.

Description.—Bulb ovate, 3¼ to 3½ cm. in diameter, tunics black or brownish black, neck 3½ cm. long, ¾ to 1 cm. in diameter; leaves bright green, linear, about 2½ mm. wide; scape 25 cm. long, a little compressed, pale green, glaucous, slightly tinged with pink at the base; spathe valves 42 mm. long; pedicels from 21 mm. to 63 mm. long; perianth funnel-shaped, tinged with scarlet or pomegranate red, moderately zygomorphic; petaloid segments 47 mm. and sepaloid segments 45 mm. long; filaments to 30 mm. long, red to carmine above the base; anthers 2½ mm. long, 1¼ mm. wide, pollen orange-yellow; style 35 mm. long, stigma colored violet, obscurely tri-lobed.

Habitat.—Uruguay, Maldonado.

3. A. BONARIENSIS (O. Kuntze) Traub & Uphof, comb. nov.; *Hippeastrum Bonariense* O. Kuntze in Revis. gen. plant., III, pp. 310-311.

Description.—The leaves not contemporaneous with the flowers; lower segments extended horizontally, the upper ascending; flower purple, about ½ cm. wide; flowers declinate; pedicels more than 8 cm. long.

Habitat.—Argentina; Buenos Aires.

Notes.—The descriptions of O. Kuntze are lacking in important particulars, and it is necessary to consult the original material before the species are finally placed.

4. A. GAYANA (O. Kuntze) Traub & Uphof, comb. nov.; *Hippeastrum gayanum* O. Kuntze in Revis. gen. plant. III, pp. 310-311.

Description.—Lower segments or all segments bent back; segments pointed, tube constricted; flowers more or less erect, purple; style exerted.

Habitat.—Argentina.

Notes.—The description is lacking in important particulars.

5. A. HERBERTIANA (Lindl.) Traub & Uphof, comb. nov.; *Phycella Herbertiana* (Lindl.) in Bot. Reg. t. 1341; *Rhodophiala andina* Philippi; *Hippeastrum andina* Baker; *H. Herbertianum* Baker in Jour. Bot. 1878, 83. (See Herbertia Vol. 1).

6. A. ELWESII (C. W. Wright) Traub & Uphof, comb. nov.; *Hippeastrum Elwesii* C. W. Wright in Kew Bull. 1914: 330. 1914.

Description.—Leaves linear, contemporary with the flowers, 26 cm. long, 5 mm. wide; peduncle cylindric, 6 mm. in diameter, two-flowered; spathe valves two, 6 mm. long, 8 mm. wide; pedicels about 4 cm. long; perianth exterior clear yellow, interior blood-red, tube funnel-shaped, 1 cm. long, 6 mm. in diameter at the base, with short scales above the insertion of the filaments; segments elliptic, narrow, 4 cm. long, 1.8 cm. wide; stamens a little shorter than the perianth, style twice the length of the stamens; stigma trifid, lobes short.

Habitat.—Argentina; Rio Limay, near Lake Nahuel-Huapi.

Notes.—The perianth segments of this species are uniformly yellow on the exterior, and those of *A. ananuca* are yellow with a red midrib. Described by Wright from a plant which flowered in Sept. 1903, and again in July 1914, at Colesborne, England, from bulbs introduced from Argentina by H. J. Elwes.

7. A. BICOLOR R. & P.; *A. cyrtanthoides* Sims in Bot. Mag. t. 2399; *A. ignea* Lindl. in Bot. Reg. t. 809; *Phycella ignea, Crytanthoides, Magnifica, graciliflora, attenuata, brevituba, vicolor,* and *biflora* Herb. in bot. Reg. t. 1943; *P. angustifolia* Philippi; *Hippeastrum bicolor* Baker in Jour. Bot. 1878, 83 (See Herbertia Vol. 1.)

8. A. PHYCELLOIDES (Herb.) Traub & Uphof, comb. nov.; *Habranthus phycelloides* Herb. in Bot. Reg. t. 1417; *Hippeastrum phycelloides* Baker in Jour. Bot. 1878, 83. (See Herbertia Vol. 1.)

SUBGENUS 2. CHILANTHE* *(Traub & Uphof)*

9. A. JAMESONII (Baker) Traub & Uphof, comb. nov.; *Hippeastrum Jamesoni* Baker in Jour. Bot. 1878, 83. (See Herbertia Vol. 1.)

10. A. BERTEROANA (Baker) Traub & Uphof, comb. nov.; *Hippeastrum Berteroanum* Baker in Jour. Bot. 1878, 83; *H. Berteroanum* Philippi. (See Herbertia Vol. 1.)

11. A. BAGNOLDII (Herb.) Traub & Uphof, comb. nov.; *Habranthus Bagnoldi* Herb. in Bot. Reg. t. 1396; *Hippeastrum Bagnoldi* Baker in Jour. Bot. 1878, 83. (See Herbertia Vol. 1.)

*Since the **Genus Habranthus** has been revived, the **Subgenus Habranthus** is no longer appropriate. The name **Chilanthe** is proposed in honor of the Chilean Republic where most of linear-leaved **Amaryllis** are native.

12. A. BIFIDA (Herb.) Traub & Uphof, comb. nov.; *Habranthus bifidus* Herb. in Bot. Mag. t. 2599; *Hippeastrum bifidum* Baker in Jour. Bot. 1878, 83. (See Herbertia Vol. 1.)

13. A. ADVENA Gawl. in Bot. Reg. t. 849; bot. Mag. t. 1125; *Hippeastrum advenum* Herb. App. 31; *Habranthus hesperius* Herb.; *H. mendocinus* Philippi; *Eustephia Macleanica* Baker in Ref. Bot. t. 322, non Herb.; *Chlidanthus cumingii* Presl. (See Herbertia Vol. 1.)

14. A. PULCHRA (Herb.) Traub & Uphof, comb. nov.; *Habranthus pulcher* Herb. in Amaryll. 161, t. 26, f. 1; Roem. Amaryll. 96; Kunth. Enumer. Plant. v. p. 495, n. 10; *Hippeastrum pulchrum* Holmberg in Anal. Mus. Nac. Buenos Aires, 1905, XII, p. 145.

Description.—Scape 9 cm. long; spathe valves 5¾ cm. long; pedicels unequal, 2 to 8¼ cm. long; 5-flowered; ovary large, perianth 3 cm. long, stamens and style shorter than the perianth; stigma trifid.

Habitat.—Argentina; Buenos Aires.

15. A. MARGINATA (R. E. Fr.) Traub & Uphof, comb. nov.; *Hippeastrum marginatum* R. E. Fr. in Nova Reg. Sci. Upsal. MCMV-MCMVII, t. IX.

Description.—Bulb spherical, 6 cm. in diameter, neck 5 cm. long, tunics brown; leaves linear, 2 dm. long, 4 to 6 mm. wide, with microscopic hyline teeth on the edges; scape round, about 2 dm. long, 2 to 3 mm. wide; spathe-valves red, about 9 cm. long, somewhat united at the base, bracts 6 cm. long, white and red; umbel about 10-flowered, 4 to 6 cm. long; ovary 8 mm. long; perianth-tube 3 to 3.5 cm. long, 1.5 mm. wide at base, and broadened to 3 mm. at the top; perianth-limb funnel-shaped, segments 5 to 6 mm. wide, the three exterior ones about 15 to 20 mm. long, the outer ones somewhat shorter; stamens attached at the throat of the perianth tube, free from each other, three 10 to 11 mm. long, the other three 6 to 8 mm. long, flattened at the base, and membranous, toward the top, filiform; anthers long, yellow and shorter than the perianth; style filiform, as long as the perianth; stigma trifid, lobes 1 to 2 mm. long.

Habitat.—Argentina, Province of Jujuy, Santa Catalina, El Angosto, in sandy soils, elevation 3600 meters.

Notes.—The local name for this species is "Campanilla" according to Fr. Claren. The description was apparently made from a specimen (11559) collected by Kurtz, Febr. 1, 1901. Fr. Claren claims that this species may be related to *Amaryllis soratensis* Baker, but the union of the spathe-valves at the base might indicate that it belongs with *Habranthus*.

16. A. LINEATA (Philippi) Traub & Uphof, comb. nov.; *Habranthus lineatus* Philippi; *Hippeastrum lineatum* Baker in Jour. Bot. 1878, 82. (See Herbertia Vol. 1.)

17. A. ROSEA (Herb.) Traub & Uphof, comb. nov.; *Habranthus roseus* Herb.; Sweet in Brit. Flow. Gard. ser. 2, t. 107; *Hippeastrum pumilus* Lodd. Bot. Cab. t. 1771; *H. roseum* Baker in Jour. Bot. 1878, 82; *Zephyranthes purpurea* Phillipi. (See Herbertia Vol. 1.)

18. A. CHILENSIS R. & P.; *Habranthus chilensis* Herb. Amaryll.; *Hippeastrum chilense*, Baker in Jour. Bot. 1878, 82. (See Herbertia Vol. 1.)

19. A. SORATENSIS (Baker) Traub & Uphof, comb. nov.; *Hippeastrum soratense* Baker Amaryll. p. 42. (See Herbertia Vol. 1.)

20. A. ANDICOLA Poeppig; *Habranthus andicola* Herb.; Kunth. Enum. v., p. 500; *Hippeastrum andicolum* Peoppig in Jour. Bot. 16; 82. 1878; *Zephyranthes andicola* Baker Amaryll. 1888.

Description.—Leaves linear, glaucous; peduncle 6-7 in. long; spathe bifid, reaching half-way up the flower; perianth-limb bright violet, 2 in. long; tube ¼ to 1/3 in. long; stamens very short, deflexed.

Habitat.—Chile; Andes of Antuco; flowers in January.

SUBGENUS 3. RHODOPHIALA *(Baker)*

21. A. MONTANA (Philippi) Traub & Uphof, comb. nov.; *Habranthus montanus* Philippi; *Hippeastrum montanum* Baker in Jour. Bot. 1878, 83.

22. A. PRATENSIS (Herb.) Traub & Uphof, comb. nov.; *Habranthus pratensis* Herb.; Bot. Reg. 1842, t. 35; *Rhodophiala amarylloides* Presl.; *Placea pratensis* Poepp.; *Stephanoma elegans* Kuntze; *Habranthus speciosus* Herb.; *Hippeastrum pratensis* Baker in Jour. Bot. 1878, 84.

23. A. UNIFLORA (Baker) Traub & Uphof, comb. nov.; *Rhodophiala montanum* Philippi; *Hippeastrum uniflorum* Baker in Jour. Bot. 1878, 83. (See Herbertia Vol. 1.)

24. A. RHODOLIRION (Baker) Traub & Uphof, comb. nov.; *Rhodolirion andium* Philippi; *Hippeastrum Rhodolirion* Baker in Jour. Bot. 1878, 84. (See Herbertia Vol. 1.)

25. A. MODESTA (Philippi) Traub & Uphof, comb. nov.; Rhodophiala modesta Philippi; Hippeastrum modestum Baker in Jour. Bot. 1878, 83. (See Herbertia Vol. 1.)

SUBGENUS 4. MACROPODASTUM (BAKER)

26. A. SOLANDRIFLORA (Herb.) Traub & Uphof, comb. nov.; *Hippeastrum solandriflorum* Herb. App. 31; Bot. Mag. t. 3771; *var. chlorolecum* Lindl. Coll. Bot. t. 11. (See Herbertia Vol. 1.)

27. A. CANDIDA (Stapf) Traub & Uphof, comb. nov.; *H. candidum* Stapf in Bot. Mag. CLIII (1927), t. 9184.

Description.—Bulb globose, 7.5 cm. in diameter, with black-purple tunics. *Leaves appearing after flowering,* up to 7, strap-shaped, long tapering downwards, subacute, flatly channelled, *up to over 30 cm. by 2-2.5 cm.* where widest, somewhat glaucous. *Scape* 70 cm. high, 2-5 cm. thick at the base, dark-purple at the base, glaucous upwards. *Umbel* of 6 slightly sweet-scented flowers, supported by 2 lanceolate bracts, which are up to 6 cm. long and soon dry up, turning reddish, pedicels 4 cm. long. *Receptacle* 1½ cm. long. *Perianth* zygomorphous, more or less pendulous, in the mature bud about 20 cm. long; *tube slender, 9-10 cm. long, at the middle 4-5 mm. wide, greenish, loosely funnel-shaped, with the upper halves of the segments separated laterally, the lowermost rather distant from its neighbours,* outer segments *oblanceolate* with recurved tips *and crisped margins, 9-12 cm. by 2 cm., pure*

white except the base, which is slightly suffused with green, inner segments very similar, 1.5-1.6 cm. wide. *Stamens* inserted about 7.5 cm. above the base, the outer 7 cm., the inner 8 cm. long; anthers almost 2 cm. long before dehiscing, golden yellow. *Style* 16-18 cm. long; stigma 3-fid. whitish 2 mm. long.

Habitat.—Province of Tucuman, Argentine.

Notes.—Introduced by Maj. A. Pam in 1925 from Tucuman, Argentine and first described by O. Stapf in Curtis' Botanical Magazine (l.c.), 1927. *A. candida* differs from *A. solandriflora* by "its more graceful, somewhat shorter flowers, their narrower, exquisitely crisped segments and their color, which, apart from the greenish tube, is a pure white. In shape and size of the perianth it closely resembles *A. viridiflora,* which is, however, described as having green flowers. It also seems to have a relatively longer tube and perianth-segments with rather flat margins."

28. A. TUCUMANA (Holmberg) Traub & Uphof, comb. nov.; *Hippeastrum Tucumanum* Holmberg in Anal. Mus. Nac. Buenos Aires (1905), p. 153.

Description.—Bulb almost spherical, 6 cm. long, 7 cm. in diameter, with dark tunics; neck short, 3 cm. long; roots numerous, up to 5 mm. in diameter; leaves elongated, grooved, less at the lower end, 38 to 50 cm. long, 2½ cm. wide at the base, 4¾ cm at the middle, terminating in an obtuse apex; scape green, 40 to 50 cm. high, umbel many-flowered; perianth white, almost the size and form of *Hippeastrum ambigum* Herb. (var. *Tweediana);* stigma trifid.

Habitat.—Argentina, Tucuman, Salta.

Notes.—Holmberg states that he saw it in flower October 28, 1904, at Sur de Salta.

29. A. viridiflora (Rusby) Traub & Uphof, comb. nov.; *Hippeastrum viridiflorum* Rusby in Bull. N. Y. Bot. Gard. 6: 491-1910.

Description.—Bulb, leaves and fruit not seen, otherwise glabrous, about 6 dm. high; scape stout; bracts of spathe 2, distinct, 5-6 cm. long, nearly 2 cm. broad, acuminate, purple at the base; pedicels 3, about 7 cm. long, erect, the flowers slightly declined; ovary obovoid, about 1 cm. long, 4 mm. broad; flowers about 20 cm. long, 10 cm. broad, green; perianth at summit of ovary about two-thirds as broad as the latter, very gradually enlarging upward to the throat; perianth divided about two-fifths of the way to the base, the lobes oblanceolate, mucronate, about 3 cm. broad; filaments inserted at about the middle of the tube, moderately unequal, the longer nearly equaling the perianth, much thickened below, attenuate above; anthers 5-6 mm. long, oblong, attached at the middle of the back; style filiform, about equaling the stamens, nearly uniform throughout; stigma broader than long, of three rounded lobes.

Habitat.—Tropical rain forest, elevation of 3500 ft., eastern foot of Bolivian Andes.

Notes.—Collected by R. S. Williams, near Machichoriza, Bolivia, in 1902.

30. A. HAYWARDII Traub & Uphof, nom. nov.; *Hippeastrum soratense* Rusby (non Baker) in Bull. N. Y. Bot. Gard. 4: 319. 1907.

Description.—Bulb unknown; leaves minutely puberulent under lens, 3-4 dm. long, 2-3 cm. broad, linear, or a little broader above the middle, obtuse at the tip, strongly about 30-nerved, the nerves dark; scape very stout, 2-3 dm. long; spathe valves 4-5 cm. long, lanceolate, 1.25 to 1.5 cm. broad at the base; pedicels about 6 cm. long, strongly curved; ovary about 1 cm. long, 5 mm. broad, oblong; perianth nearly 1 dm. long, tube funnel-shaped, about 4 cm. long, 1 cm. broad at the summit, the base very slender; stamens and style about equalling the perianth, the anthers 6-7 mm. long; style obscurely trilobed, 1 mm. broad.

Habitat.—Bolivia.

Notes.—Rusby originally identified No. 1624 of the Bang collection as *H. Mandoni* Baker, but later described it as a new species as *H. soratense*, the name of an earlier valid species described by Baker. *H. soratense* Rusby non Baker is therefore an invalid name. The species has been renamed for Mr. Wyndham Hayward, the energetic Secretary of the American Amaryllis Society, who has done much toward the advancement of the amaryllids.

Subgenus 5. Lais (Salisb.)

31. A. Canterai (Arech.) Traub & Uphof, comb. nov.; *Hippeastrum Canterai* Arechavaleta in Acad. Mus. Nac. Montevideo. 2:285-286, 1901.

Description.—Bulb ovoid, 8 to 10 cm. long, 3 to 5 cm. wide, tunics membranous, dark reddish; leaves lorate, 40 to 50 cm. long, 2½ to 3 cm. wide; flowers in November; scape one meter or more in length, robust; spathe-valves about 4 cm. long, lanceolate, pointed at the tip, membranous, veined, light reddish at the base; bracts filiform; pedicels erect, 3 to 4 cm. long; perianth about 10 cm. long, red-carmine, drooping; perianth segments unequal, (narrowing toward the middle to 4 to 6 mm. in width, and gradually widening to an oblong shape in the apex); stamens uneven, much longer than the perianth, red in color, anthers linear-oblong, violet; style red, much longer than the stamens; stigma *trifid*, lobes spatulate, 2 mm. long.

Habitat.—Uruguay, Department of Rivera, Region of Tanqueras, in low humid land, in lagunes and shores near Cuchilla Negra.

Notes.—Named for C. B. Cantera, enthusiastic propagator of ornamental plants of Uruguay.

32. A. breviflora (Herb.) Traub & Uphof, comb. nov.; *Hippeastrum breviflorum* Herb. Amaryll. 137, t. 21, fig. 4; Bot. Mag. t. 3549. (See Herbertia Vol. 1.)

33. *A.* iguapensis (R. Wagner) Traub & Uphof, comb. nov.; *Hippeastrum iguapense* R. Wagner in Wiener Illus. Garten-Zeitng (1903) xxviii, t.

Description.—*Bulb* small, egg-shaped; *leaves* dark green, 150 to 200 mm. long, approximately 60 mm. wide, with somewhat rounded tips, and petiolate at the base. *Scape* about 9* inches high, with two to

*The text states "spanne" which translates as "span," the distance between the ends of the thumb and little finger when extended to fullest length.

three drooping flowers; *Perianth* small, segments white, the three upper with lilac and reddish stripes. *Style* almost equalling the segments; *filaments* shorter than the segments; stigma trifid.

Habitat.—Tropical south Brazil; the type material was collected at Iguape on the edge of the primeval forest in sandy, alluvial soil.

Notes.—Discovered by the Botanical Expedition (1901) under the leadership of Dr. v. Wettstein at Iguape, Brazil; bulbs first flowered in March 1902 at Vienna. This is a most graceful and beautiful species, and is distinctly of horticultural value and should be useful in breeding. Belongs to the sub-genus Lais, and is near to *Amaryllis breviflora.*

34. A. VITTATA Ait.; Bot. Mag. t. 129; *Hippeastrum vittatum* Herb. App. 31; L'Herit. Sert. t. 15; Red. Lil. t. 10; Bury Hexandr. Pl. t. 32 & 40. (See Herbertia Vol. 1.)

35. A. HARRISONII Lindl. in Bury, Hexandr. Pl. t. 27; *Hippeastrum Arechavaletae* Baker, in Kew Bull. 1898, p. 226; Gard. Chron. 1899, vol. 1. p. 332; *Hippeastrum (Habranthus) Harrisoni* Hooker. in Bot. Mag. cxxvi (1900) t. 7737.

Description.—Bulb about two inches in diameter, globose; scales dark brown; neck scarcely any. *Leaves* about six, a foot and a half long by one and a half to two inches broad, linear, but rather narrowed below, tip rounded, bright green above, with narrow, white margins, paler beneath, with a broad, low thickened costa towards the tip. *Scape* two feet high, stout, cylindric, dull glaucous green, three- or four-flowered. *Pedicels* sub-erect, stout, green, an inch to an inch and a half long. *Bracts* two, oblong-lanceolate, membranous, pale brown. *Ovary* short, green. *Perianth* four inches long, narrowly funnel-shaped; tube green; lobes oblong, sub-acute, spreading and recurved, pure white, with irregularly placed broad blood-red streaks below the middle. *Stamens* sub-declinate, much shorter than the perianth; anthers large, a third of an inch long, golden-yellow. *Style* much longer than the stamens, declinate; stigma trifid, linear, recurved.

Habitat.—Uruguay.

Notes.—According to Lindley in Bury, Hexandr. Pl., Mr. Harrison, of Aigburth, near Liverpool, England, imported this species from Peru, but Sir Joseph D. Hooker (i. c.) considered this an error for the material on which he based his description came from Uruguay. The bulbs of the specimens figured by him (l. c.) were received from Prof. Arechavaleta of Montevideo. Baker, in his Handbook, p. 53, reduced this species to the rank of a hybrid of *A. solandriflora.* Later (Kew Bull. 1898) Baker described a species, *Hippeastrum Arechavaletae,* from Uruguay, but W. Watson pointed out to Sir Joseph D. Hooker the similarity of this species with *A. Harrisoni* Lindl.

36. A. PETIOLATA (Pax) Traub & Uphof, comb. nov.; *Hippeastrum petiolatum* Pax. in Beitr. z. K. Amaryll., in Engl. bot. Jahrb. xi, iii, p. 321, n. 21 & p. 330; Niederlein, Result. bot. p. 333.

Description.—Bulb 3 to 4 cm. in diameter, brown, globose, not produced at the neck; leaves lanceolate, sharp-pointed, almost paper-like, 20 cm. long, 2 to 2½ cm. wide, narrow at the base; scape about the same length as the leaves; flowers in October; umbel 1-2-flowered, perianth 6 to 7 cm. long, with pedicels, 2 to 2½ cm. long, much shorter

than the spathe; perianth-tube short, appendiculate at the throat with minute scales; perianth segments oblong, purple, about 1 to 1½ cm. wide; filaments inserted in the throat, somewhat unequal, shorter than the perianth; anthers variable, linear, 12 mm. long; style filiform; stigma trifid, with straight lobes, 2 mm. long.

Habitat.—Argentina, Corrientes, Santo Tome, and Monte Juste.

Notes.—Holmberg classes it under the Subgenus Lais Salisbury.

37. A. FLAMMIGERA (Holmb.) Traub & Uphof, comb. nov.; *Hippeastrum flammigerum* Holmberg in Anal. Mus. Nac. Buenos Aires, 1902: 411-412.

Description.—Bulb globose, stoloniferous, 5 cm. in diameter, tunics black-brown, neck short, 1 cm. long; leaves, 3 to 5 in number, 8 to 10 cm. long; sublanceolate, 1½ cm. wide at the base, widening to 2¾ cm:; scapes two, seldom three, 12 to 20 cm. long or longer, green but often tinged with red, whitish at the base, 8 mm. in diameter; spathe valves 5 to 6 cm. long, 1½ cm. wide, blood red to red, 2-valved, bracts linear, thread-like; umbel 3 to 4 flowered, seldom 5-flowered, often all but two flowers are abortive; pedicels 2 to 2½ cm. long, 2½ mm. in diameter, obtuse, triangular, erect; perianth, including ovary, 7 cm. long, segments 6 cm. long spatulate-lanceolate, a very little undulate, flowers bright red with purple veins, greenish-yellow in the throat; ovary 8 to 9 mm. long, 4 mm. broad; stamens thread-like, unequal; style somewhat colored, stigma trifid, lobes short, 1½ to 2 mm. long.

Habitat.—Argentina, Misiones; Santa Ana.

38. A. RUTILA Gawl. in Bot. Reg. t. 23; *Hippeastrum rutilum* Herb. App. 31; Lodd. Bot. Cab. t. 1449; *Hippeastrum bulbulosum var. rutilum* Herb. (See Herbertia Vol. 1.)

39. A. DAMAZIANA (Beauvard) Traub & Uphof, comb. nov.; *Hippeastrum Damazianum* Beauvard in Bul. L'Herb. Boissier, 6:585-587. 1906, Fig. 3.

Description.—Type specimen in Herberium Barbey-Boissier. Bulb unknown; leaves lorate-linear, obtuse, 25 to 30 cm. long, 2 to 3 cm. wide; scape compressed, grayish, varigated with purple, 16 to 25 cm. long; spathe-valves lanceolate-obtuse, membranous, pink, spotted with purple, 6 to 7 cm. long, overtopping the pedicels; perianth campanulate, large, 10 to 11 cm. long, bright red, throat greenish, dotted with purple; perianth tube 0.7 to 0.9 cm. long; stamens 9 to 10 cm. long, filaments pink, dotted with purple, anthers 0.7 cm. long; style pink, 11 to 12 cm. long, excerted from the perianth tube, stigma trifid.

Habitat.—Brazil, Minas Geraes, sur les rochers plateau de l'Itaculumi.

Notes.—Specimen collected by L. Damazio, Oct. 1904, No. 1481. Beauvard states that the species differs from *A. rutila* in having the style excerted from the perianth, and in the campanulate shape of the perianth, and longer and wider perianth-segments, and pedicels being shorter than the spathe-valves.

40. A. ANGUSTIFOLIA (Pax) Traub & Uphof, comb. nov.; *Hippeastrum angustifolium* Pax in Engl. Bot. Jahrb. vol. 11, p. 321 and 331, 1889; Niederlein in Result. Bot. (Bol. Meusual del Mus. Prod. Agrent. vol. 3, 1890, p. 333.)

Description.—Bulb large with well developed neck, 13 cm. long; leaves glaucous, coriacious, linear, margined, 1 to 1½ cm. wide; scape, erect, 80 to 100 cm. high, 1 cm. in diameter in the middle and almost ½ cm. below the umbel, which is composed of 6 flowers; spathe with bracts that wither during flowering; flowers very declinate with pedicels 5 cm. long, much longer than the spathe; perianth 7 to 8 cm. long, with a short tube and a fimbriate corona in the throat; perianth segments unequal, narrowly lanceolate, the broadest 1 cm. wide; filaments uneven, the longer nearly as long as the perianth, the shorter inclosed; style filiform, 10 cm. long, much longer than the perianth, and the stamens; stigma trifid with straight lobes, 2 mm. long; ovary 8 mm. long; capsule 3-lobed, 3-parted, 1½ cm. in diameter; seeds aplanate, black, numerous; flowers in October.

Habitat.—Argentina; Misiones, Monte Agudo and San Pedro between Arroyos Leon and Las Islas.

Subgenus 6. Aschamia (Salisb.)

41. A. reticulata L'Herit. in Sert. Angl. 12, t. 14; Bot. Mag. t. 657; *Hippeastrum reticulatum* Herb. in Bot. Mag. sub. t. 2475; Andr. Bot. Rep. t. 179; Red. Lil. t. 424; *Coburgia reticulata* Herb.; Leopoldia *Leopoldia reticulata* Herb. (See Herbertia Vol. 1.)

42. A. belladonna Linn. in Species Plantarum, 1753; Uphof in Herbertia 5, 1938; *A. equistris* Ait.; *Hippeastrum equestre* Herb. App. 31; Jacq. Hort. Schoen. t. 63; Bot. Mag. t. 305; Red. Lil. t. 32; *A. punicea* Lam.; *Hippeastrum occidentale* Roem.; *A. belladonna* Schwartz non Linn. (See Herbertia Vol. 1.)

43. A. reginae Linn.; *Hippeastrum reginae* Herb. App. 31; *H. regium* Herb.; Miller, Ic. t. 24; Bot. Mag. t. 453; Red. Lil. t. 9; Bury, Hexandr. Pl. t. 24. (See Herbertia Vol. 1.)

44. A. crociflora (Rusby) Traub & Uphof, comb. nov.; *Hippeastrum crociflorum* Rusby in Bull. N. Y. Bot. Gard. 6: 492. 1910.

Description.—Specimens 3 dm. high, glabrous, the leaves not seen; the scape dilated upwards; bracts of the spathe 2, distinct, oblanceolate, obtuse, 4-5 cm. long, thickish, deep-purple; pedicels 2, slender, 1.5-2 cm. long; ovary 6 mm. long, 4 mm. broad, oblong; perianth tube about 15 mm. long, infundibular, the lobes 5 cm. long, 2 cm. wide, rose-purple; filaments much thickened below, moderately unequal, shorter than the corolla; style about equaling the corolla, the stigma shortly and broadly 3-lobed, the lobes rounded.

Habitat.—Bolivia.

Notes.—Collected by R. S. Williams on the banks of the Guerratuma River, elevation of 3500 ft., in 1902.

45. A. stylosa Bury Hexandr. Pl. t. 33; *A. maranensis* in Bot. Reg. t. 719; *A. staminea* Seub.; *Hippeastrum stylosum* Herb. in Bot. Mag. t. 2278. (See Herbertia Vol. 1.)

46. A. procera Duchartre, Flore des Serres t. 2077-8; *Hippeastrum procerum* Lemaire in Ill. Hort. xi, 408; *A. Rayneri* Hook f. in Bot. Mag. t. 5883). (See Herbertia Vol. 1.)

47. A. Leopoldii Moore in Gard. Chron. 1870, 733, fig. 140; *Hippeastrum Leopoldi* Dombrain in Floral Mag. t. 475-6. (See Herbertia Vol. 1.)

48. A. Mandonii (Baker) Traub & Uphof, comb. nov.; *Hippeastrum Mandoni* Baker Amaryll. 1888. (See Herbertia Vol. 1.)

49. A. scopulorum (Baker) Traub & Uphof, comb. nov.; *Hippeastrum scopulorum* Baker Amaryll. 1888. (See Herbertia Vol. 1.)

50. A. miniata Ruiz. & Pavon.; *Hippeastrum miniatum* Herb. App. 31. (See Herbertia Vol. 1.)

51. A. Andreana (Baker) Traub & Uphof, comb. nov.; *Hippeastrum Andreanum* Baker in Gard. Chron. 1880, ii, 424. (See Herbertia Vol. 1.)

52. A. Muesseriana (L. Linden) Traub & Uphof, comb. nov.; *Hippeastrum Muesserianum* L. Linden in Illus. Hort. 43: 376, t. 72. 1896.

Description.—Scape 2 to 3 flowered, perianth salmon colored, tinted with pink, perianth segments with broad band in center and vittate on sides; stamens and style about the same length and both longer than the perianth.

Habitat.—South Brazil.

Note.—This species was collected by Mr. Muesser and sent to L. Linden in France. The description consists of the mention of the color of the flower and an illustration. The incomplete description is based primarily on the plate in Illus. Hort. 1896. The species is placed here tentatively.

Subgenus 7. Omphalissa (Salisb.)

53. A. calyptrata Gawl. in Bot. Reg. t. 194; *Hippeastrum calyptratum* Herb. App. 31; Lodd. Bot. Cab. t. 864; *A. fulvovirens* Schott.; *A. unguiculata* Morren. (See Herbertia Vol. 1.)

54. A. psittacina Gawl. in Bot. Reg. t. 199; *Hippeastrum psittacinum* Herb. App. 31; Lodd. Bot. Cab. t. 1204; Bury, Hexandr. Pl. t. 23. (See Herbertia Vol. 1.)

55. A. platensis (Holmb.) Traub & Uphof, comb. nov.; *Habranthus spathaceus* Herb. in Bot. Mag. 2597; Amaryll. 160 (non Sims, non Roemer); Kunth. Enum. V. p. 494 n. 8.; *Hippeastrum platense* Holmberg in Amaryll. 1905, p. 155-156.

Description.—Tunics of bulb black; leaves narrow, obtuse; scape 2-flowered, tinged with red at the base; spathe valves flesh colored, 6 1/3 cm. long; peduncle 3¾ cm. long, tinged with red; ovary purplish, 3 mm. long; perianth tube short, obscured by the corona; perianth segments deep red, 2½ cm. long, about 6 mm. wide, the outer pointed, the inner obtuse; style, stigma and filaments rose colored, whitish at the base, anthers and pollen yellow; style much longer than the filaments and much shorter than the limb; stigma trifid.

Habitat.—Argentina, Buenos Aires.

56. A. organensis (Hook) Traub & Uphof, comb. nov.; *Amaryllis aulica var. glaucophylla* in Bot. Mag. t. 2983; *Hippeastrum organense* in Bot. Mag. sub. t. 3803; *A. Gardneri* Seubert; *A. correiensis* Bury, Hexandr. Pl. t. 9. (See Herbertia Vol. 1.)

57. A. AULICA Gawl. in Bot. Mag. t. 3311; *Hippeastrum aulicum* Herb. App. 31; Bury Hexandr. Pl. t. 19; Lindl. in Bot. Reg. t. 444, 1039. (See Herbertia Vol. 1.)

58. A. PARDINA Hook f. in Bot. Mag. t. 5645; *Hippeastrum pardinum* Dombrain in Floral Mag. t. 344. (See Herbertia Vol. 1.)

59. A. FUSCA (Kraenzl.) Traub & Uphof, comb. nov.; *Hippeastrum fuscum* Kraenzl. in Eng. Bot. Jahrb. 40: 237, 1908.

Description.—Bulb and leaves unknown; leafless during flowering season; scape 30 cm. high, sturdy; spathe valves 2, lanceolate, about 5 cm. long; 2-flowered, horizontal, somewhat drooping, bracts slender, filiform; pedicels 5 cm. long; ovary 1.2 to 1.5 cm. long, 5 mm. broad, perianth 8 cm. long, 2.5 to 3 cm. wide, segments lanceolate, pointed, practically equal, tube lacking; flowers in South-August, rust red dotted with black; stamens as long as the style, 9 to 10 cm.

Habitat.—Peru; found growing under shrubbery between Sandia and Curyocuyo at an elevation of 2500 meters.

Notes.—(Dr. Weberbauer n. 1506). It is very near *A. pardina,* but with *A. fusca,* according to Dr. Weberbauer, the plant is leafless during the flowering season. The perianth never opens more than half, and the segments have a very unusual color and are only half as broad as those of *A. pardina.* Otherwise these two species are quite similar in habit, and in the arrangement and shape of the spots on the segments.

60. A. CYBISTER (Herb.) Traub & Uphof, comb. nov.; *Sprekelia Cybister* Herb. in Bot. Reg. 1840, t. 33; Bot. Mag. t. 3872; *Hippeastrum Cybister* Benth. in Gen. Plant. iii. 725; Flore des Serres t. 455-6. (See Herbertia Vol. 1.)

UNCLASSIFIED SPECIES

61. A. ANANUCA. (Phil.) Traub & Uphof, comb. nov.; *Hippeastrum ananucae* Philippi in Anal. Univ. Chile, 1890. Habitat.—Chile.

62. A. PHILIPPIANA Traub & Uphof, nom. nov.; *Hippeastrum angustifolium Philippi* (non Pax) in Anal. Univ. Chile, 1890. Habitat. —Chile.

Notes.—*Hippeastrum angustifolium* Pax was described in 1889, and a year later, in 1890, Philippi proposed another species under the same name. *Hippeastrum angustifolium* Philippi non Pax is an invalid name and the species is unnamed. The name *Amaryllis Philippiana* is here proposed in honor of Philippi who described a large number of *Amaryllis* species.

63. A. ARAUCANA (Phil.) Traub & Uphof, comb. nov.; *Hippeastrum araucanum* Philippi, in Anal. Univ. Chile, 1890. Habitat.— Chile.

64. A. BAKERII (Phil.) Traub & Uphof, comb. nov.; *Hippeastrum Bakeri* Philippi in Anal. Univ. Chile, 1890. Habitat.—Chile.

65. A. COLONIANA (Phil.) Traub & Uphof, comb. nov.; *Hippeastrum colonum* Philippi in Anal. Univ. Chile, 1890. Habitat.—Chile.

66. A. CONSOBRINIANA (Phil.) Traub & Uphof, comb. nov.; *Hippeastrum consobrinum* Philippi in Anal. Univ. Chile, 1890. Habitat.—Chile.

67. A. FORGETII (Worsley) Traub & Uphof, comb. nov.; *Hippeastrum Forgetii* Worsley. Habitat.—Peru.

68. A. LAETA (Phil.) Traub & Uphof, comb. nov.; *Hippeastrum laetum* Philippi in Anal. Univ. Chile, 1890. Habitat.—Chile.

69. A. MOELLERII (Phil.) Traub & Uphof, comb. nov.; *Hippeastrum Moelleri* Philippi in Anal. Univ. Chile, 1890. Habitat.—Chile.

70. A. POPETANA (Phil.) Traub & Uphof, comb. nov.; *Hippeastrum popetanum* Philippi in Anal. Univ. Chile, 1890. Habitat.—Chile.

71. A. PURPURATA (Phil.) Traub & Uphof, comb. nov.; *Hippeastrum purpuratum* Philippi in Anal. Univ. Chile, 1890. Habitat.—Chile.

72. A. SOLISII (Phil.) Traub & Uphof, comb. nov.; *Hippeastrum Solisi* Philippi in Anal. Univ. Chile, 1890. Habitat.—Chile.

73. A. SPLENDENS (Renj.) Traub & Uphof, comb. nov.; *Hippeastrum splendens* Renjifo in Anal. Univ. Chile, 1884. Habitat.—Chile.

74. A. TENUIFLORA (Phil.) Traub & Uphof, comb. nov.; *Hippeastrum tenuiflorum* Philippi in Anal. Univ. Chile, 1890. Habitat.—Chile.

SUBGENUS SEALYANA, GENUS AMARYLLIS (LINN. EX PARTE) UPHOF, AMARYLLIDACEAE

HAMILTON P. TRAUB, **Florida**

After the preceding article was already set up and major changes could no longer be made, the writer's attention was drawn to the recent researches of Sealy in Curtis's Botanical Magazine, tab. 9504, Oct. 1937, on the subject of **Hippeastrum Blumenavia** (C. Koch et Bouche ex Carr.) Sealy.

Sealy has shown that **Griffinia Blumenavia** C. Koch et Bouche ex Carr., belongs in the Genus formerly known as **Hippeastrum,** but now recognized as **Amaryllis** (Linn. ex parte) Uphof. His work also proves that the species **Amaryllis iguapensis** (R. Wagner) Traub and Uphof, described in the preceding article, is identical with the species just mentioned. The new combination **Amaryllis Blumenavia**[1] is therefore proposed.

Sealy points out that the seeds in **Amaryllis Blumenavia** are few and fleshy, and that in **Amaryllis reticulata** (Subgenus **Aschamia**), the seeds are also few and fleshy and the plant shows an approach to the former. Apparently these two species form a natural group worthy of subgeneric rank, and are related to the other species of **Amaryllis** through **A. breviflora,** and **A. vittata** (Subgenus **Lais**). It may be that when the seed character of **A. breviflora** is known that this too may be similar in this respect to the others.

In recognition of the brilliant researches of Mr. Sealy in the phylogeny of amaryllids, the name **Sealyana**[2] is proposed for the new subgenus with **Amaryllis Blumenavia** as the type, and with **A. reticulata** as the second species.

Abridged Key to the Subgenera of Amaryllis

A. Seeds many, compressed . . . . . Subgenera **Phycella, Chilanthe, Rhodophiala, Macropodastrum, Lais, Aschamia, Omphalissa**

AA. Seeds few, fleshy . . . . . Subgenus **Sealyana** (**Amaryllis Blumenavia,** type; and **A. reticulata**)

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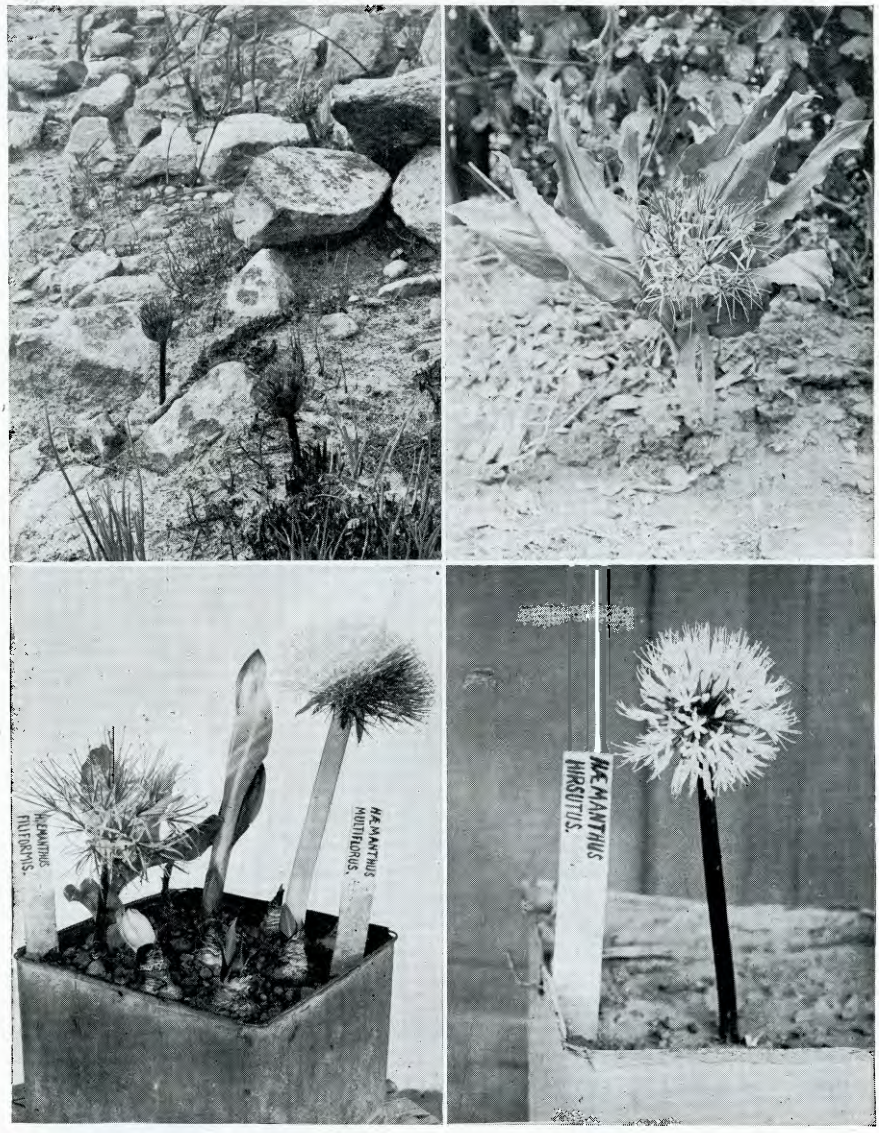
[1] **Amaryllis Blumenavia** (C. Koch et Bouche ex Carr.), **Comb. nov. Hippeastrum Blumenavia (C. Koch** et Bouche ex Carr) Sealy in Bot. Mag. t. 9504; **Amaryllis iguapensis (R. Wagner) Traub & Uphof.**

[2] **Sealyana** Traub, **Subgenus nov., (Amaryllis Blumenavia, A. breviflora)** Genus **Amaryllis** (Linn. ex parte) Uphof, **Amaryllidaceae.**

BRUNSVIGIA GIGANTEA (VAN MARUM) COMB. NOV.

In Gardeners' Chronicle (Vol. CIII: 60. 1938), Ernst H. Krelage reports some researches on the nomenclature of the plant which has been known for many years as *Brunsvigia Josephine* (Redouté) Gawl.

> "It is well-known that this imposing Amaryllid was dedicated to the French Empress Josephine, Napoleon's first wife. Indeed, it was named in her honour by Redouté, who described and figured the plant under the name of *Amaryllis Josephinae* in the seventh volume of his sumptuous *Les Liliacées* published in 1812.
>
> "He had never seen any description of this new introduction, which had flowered twice in the gardens at Malmaison, the Empress's residence. There was only one bulb of it, imported from Holland.
>
> "Redouté evidently did not know that the plant had been described before by Martinus van Marum, a remarkably many-sided Dutch scientist. Foremost as a natural philosopher, he was also a learned botanist, astronomer and palaeontologist. He was Director of the Physical Institute founded by Teyler at Haarlem in the eighteenth century, and owned an extensive, private garden. His plant collections were very complete and varied; a printed catalogue in French, was issued in 1810. He lived from 1750 to 1837—hence this tribute to his memory.
>
> "Van Marum was in continued contact with the bulb-growers of Haarlem. These had obtained numerous Cape bulbs, imported by a French officer, who in 1789 had returned from the Cape of Good Hope to Holland. The latter planted these bulbs in a garden at Heemstede, near Haarlem, in order to show the flowers to the bulb-growers, who might like to purchase them. Mr. Rosenkrantz, a well-known bulb merchant of that period, who lived near this garden, bought several of the bulbs, including one very large one, which the Frenchman had obtained from a merchant, without ever having seen it in flower. Notwithstanding many serious efforts he had never succeeded in getting more than that one bulb of this kind.
>
> "Not before the year 1805 did the bulb flower for the first time in the Rosenkrantz nursery, where it created a sensation. It was first considered to be the plant which was then called *Amaryllis orientalis,* now known as *Brunsvigia gigantea.*
>
> "Van Marum, however, rightly stated important specific differences from the former and described the new species under the name of *Amaryllis gigantea* in the *Natuurkundige Verhandelingen der Bataafsche Maatschappy der Weetenschappen,* Vol. III, 1, p. 345, (1805), accompanied by a coloured plate in reduced size.
>
> "G. Voorhelm Schneevoogt, a Haarlem bulb and plant grower of European repute, author of the excellent *Icones*



John Martley, Stellenbosch *See page 159*

Haemanthus species—H. coccineus, upper left; H. Katherinae, upper right; H. filiformis, and H. Lynesii (H. multiflorus on label), lower left; H. hirsutus, lower right.

Plate 110

Leon A. Page, Winter Park, Florida

See pages 28 and 161

Hybrid Crinum—Krelagei

Plate 111

Plantarum Rariorum (1793), wrote an article on the new species in the *Allgemeines Deutsches Gartenmagazin,* Vol. III (1806), to which a reproduction of Van Marum's coloured plate was added. He fully recognized the exactness of Van Marum's observations.

"Evidently both these descriptions remained unknown not only to Redouté, but also to Gawler, who published an original coloured plate in the *Botanical Register,* Vol. III (1817), tab. 197-198, from a plant in "Mr. Griffin's collection at South Lambeth, very lately imported by that gentleman from Cape of Good Hope, where it was collected in the district of Hantam."

"Baker, in his *Handbook of the Amaryllideae* (1888) commits the same omission, mentioning Redouté as the original describer of the species.

"Let us return to the only bulb known in Europe before the fresh importation by Griffin.

"The bulb which had flowered in the Rosenkrantz nursery was acquired by the Empress Josephine and planted in the Malmaison Gardens near Paris. Here, according to Redouté, it flowered twice, which must have taken place between the years 1806 and 1813, and it was figured for *Les Liliacées.*

"According to the *Botanical Register,* Messrs. Lee and Kennedy became the possessors of an offset from the plant which flowered at La Malmaison.

"It seems appropriate to honour Martinus van Marum as the original authority of *Brunsviga Josephinae*—be it under the now synonymous name of *Amaryllis gigantea*—in the year in which the centenary of his death is being commemorated in several meetings of learned societies in Holland."

Although it is not possible to restore the name *Amaryllis gigantea* van Marum, since *Brunsvigia* is a valid genus, it is proper to use the name proposed by van Marum as the basis of a valid new combination. We therefore propose the following,—

Brunsvigia gigantea (van Marum) Traub com. nov.; *Amaryllis gigantea* van Marum in Natur. verh. bat. maat. weetensch. vol. iii, 1, p. 345, 1805; *Amaryllis Josephinae* Red. Lil. t. 370-372. 1812; *A. Josephiniana* Herb.; *A. Griffiniana* Herb.; *Brunsvigia Josephinae* Gawl. in Bot. Reg. t. 192-193.

Now that the above new combination has been made it is necessary to find a valid name for the species that has been known up to the present as *Brunsvigia gigantea* Heist. However, it appears that this latter species was named *Amaryllis orientalis* by Linnaeus (See Plate 107), under the assumption that the species was native to the orient, and it will be necessary to carry on additional research before any attempt is made to give it a valid name.

—Hamilton P. Traub.

THE DAYLILY DISPLAY GARDEN AT ROGER WILLIAMS PARK, PROVIDENCE, R. I.

GEORGE DEWITT KELSO, *Rhode Island*

My interest in *Hemerocallis* began with the gift of a clump of daylilies in bloom by a neighbor. He did not know the name so we had to hunt it up and found it to be *Hemerocallis flava,* the common Lemon Lily. Then we discovered that we already had the old tawny daylily, *Fulva Eurora,* growing on our place. Later we added Kwanso, the old double form, and this constituted our foundation stock. We had previous to this time made a planting of various lilies, sand pocket and all and not one came up while the daylilies kept right on growing.

We got the idea somewhere of starting a public display garden of daylilies so that one could see them in bloom and decide what was most desirable for ones own garden. Five years ago last January we put this idea up to the R. I. Horticultural Society, and it was favorably received. Our society secretary was also Superintendent of the Park and he offered us land for the planting, and $10.00 was voted for expenses but never called for. We first asked our members for contributions. Only two besides myself responded with one plant each and one of these was unnamed. Then I tackled the Nurseries and the N. Y. Botanical Garden. The following responded very generously:—Farr Nursery, Lovett Nursery, N. Y. Botanical Garden, Bay State Nursery, and William N. Craig. I aimed for the first season to collect 25 varieties and secured 54. Later contributions have been added with the passing years so that our donors now total 20. All of our plants have been donated.

Notable among the lists are 11 varieties direct from Amos Perry and paid for by Mr. A. Donald Kelso of England, also a nice collection from Mr. B. Y. Morrison. We now have about 125 varieties and expect to add about 25 more during the season of 1938.

With growth of numbers new problems arose. Our first planting was in an unfrequented corner of the Park but with the advent of a new Park Superintendent, it was moved to a very accessible spot with plenty of room for development.

The average gardener would not want more than 3, 5 or at most 10 varieties of daylilies in his garden so we asked some friends to help us select a few varieties for a recommended list and this developed the next year into a general scoring plan and now after two years of this scoring work it seems advisable to have the work directed under better auspices. We have asked Prof. George Graves to continue the job and he has consented. He is well equipped in experience and facilities for he is connected with the Massachusetts State College at its Waltham Field Station as Assistant Research Professor of Nursery Culture.

We aim to score for garden value and the present plan will take from three to five years and then new developments will call for further discrimination so the work will go on indefinitely. Our work will be regional in extent, embracing New England, New York, New Jersey and possibly Pennsylvania and Ohio. Co-operation is invited.

As an aid for the present day I have kept records of first blooming dates under the crude color classifications, yellow, orange, and fulvous and the all yellow night bloomers. These lists will greatly aid one in selecting varieties, particularly as to color and date of bloom. Looking at the flowers in bloom or consulting a non-commercial grower is a safe plan and it is fortunate for all of us that our very best varieties are offered at reasonable prices with a $3.00 limit.

PRELIMINARY STUDIES ON DAYLILY SCORING FOR GARDEN VALUE

GEORGE DEWITT KELSO, *Rhode Island*

Editorial Note. The following table has been adapted by the editor from data (1936 and 1937) furnished by Mr. Kelso, and it is apparently the first attempt to rate daylily varieties on a numerical basis. These preliminary studies led to the enlarged project for 1938 conducted by George DeWitt Kelso and George Graves. (See the announcement following this article). Such studies are urgently needed and these gentlemen are to be commended for their pioneer efforts.—*H. P. T.*

		1936 Rating	Votes
No. 1.	Mikado (Stout)	9.4	(7a, 1b)
2.	Hyperion (F. B. Mead)	9.4	(7a, 1b)
3.	Ophir (Farr)	9.3	(6a, 1b)
4.	Golden Dream (Betscher)	9.3	(6a, 1b)
5.	George Yeld (Perry)	9.1	(5a, 1b, 1c)
6.	Goldeni, (Betscher)	9.0	(4a, 1b, 1c)
7.	Wau-Bun (Stout)	8.9	(5a, 3b, 1c)
8.	Cressida (Betscher)	8.9	(4a, 2b, 1c)
9.	Radiant (Yeld)	8.7	(2a, 2b, 1c)
10.	Soudan (Stout)	8.5	(1a, 4b, 1c)

		1937 Rating	Votes
No. 1.	Bijou (Stout)	9.5	(4a)
2.	Mikado (Stout)	9.3	(6a, 1b)
3.	Ophir (Farr)	9.1	(6a, 1b, 1c)
4.	Pale Moon (Cleveland)	8.9	(3a, 1b, 1c)
5.	George Yeld (Perry)	8.8	(5a, 2b, 1d)
6.	Cressida (Betscher)	8.7	(4a, 2b, 2c)
7.	Wau-Bun (Stout)	8.6	(1a, 5b)
8.	Hyperion (Mead)	8.6	(5a, 2b, 1d)
9.	Golden Dream (Betscher)	8.6	(3a, 2b, 2c)
10.	Mrs. A. H. Austin (Betscher)	8.6	(4a, 1b, 3c)

Notes by Mr. Kelso.—

1936 covers 91 varieties, 9 persons participating. 1937 covers 163 varieties, 8 persons participating.

Only the ten highest scoring varieties for each year are included and only those varieties receiving 4 or more votes. Goldeni, 8.3, Radiant, 8.2, Soudan, 8.1 failed to place in the 1937 list.

The scale of rating is as follows: *a*, 9-10, *b*, 8-9, *c*, 7-8, *d*, 6-7. In arriving at the numerical ratings, *a* was counted as 9.5, *b* as 8.5, *c* as 7.5 and *d* as 6.5. Below 7 is regarded as a discard.

One can readily see that these ratings are inconclusive for lack of uniformity, few varieties considered and small number participating; yet they show the preferences fairly consistently for the two year period as seven names are in both lists.

DAYLILY COLOR CLASSIFICATION CHART AND DATES OF FIRST BLOOM. SEASON OF 1937

George DeWitt Kelso, *Providence, R. I.*

The Classification and dates of first bloom were compiled from records at Roger Williams, Park, Providence, R. I.

Looking at these lists what do I see? Evidently a lot of patient work for the flowers were inspected mornings, late afternoon and often at 10 p. m. Look sharp and you will notice that the four lists are quite alike in the number of varieties:—yellow, 33, orange 29, fulvous 24, and night bloomers 21, a total of 107.

Now the night bloomers are all yellow and these added to the day yellow list makes 54, which is one over one half the list. Remember also that the night bloomers are also in open flower during the next day of their opening and you will see that yellow predominates at the present time.

1937 Classification Chart and Dates of First Bloom

YELLOW		ORANGE	
Flava	May 25	*Olif*	June 1
Gracilis	May 28	*Dr. Regel*	June 2
		Sieboldi	June 2
Minor	June 3	*Tangerine*	June 2
Nocerensis	June 4	*Ajax*	June 3
Burbank	June 22	*Middendorffii*	June 4
Miranda	June 22	*Orangeman*	June 5
The Gem	June 25	*Flamid*	June 6
D. D. Wyman	June 26	*Gold Dust*	June 6
Pollyanna	June 26	*Dover*	June 9
Modesty	June 28	*May Queen*	June 18
Royal	June 29	*Queen Mary*	June 22
		Radiant	June 22
Florham	July 1	*Mehami*	June 24
Lemon King	July 1	*Vesta*	June 26
Thunbergii	July 1	*Lovett Orange*	June 27

Mrs. A. H. Austin	July 4
Soudan	July 5
J. R. Mann	July 8
Wau-Bun	July 8
J. A. Crawford	July 10
Lemon Queen	July 10
Estmere	July 12
Hyperion	July 12
Ophir	July 12
Sir M. Foster	July 12
Anna Betscher	July 13
Mrs. Perry	July 13
Royal	July 13
Shirley	July 13
Luteola grandiflora	July 14
Luteola pallens	July 18
Luteola major	July 16
Curlypate	July 26
Chrysolora	July 29
Dorothy McDade,	Late Sept.Oct.

FULVOUS

Mikado	June 22
Fulva Europa	June 26
Fulva Maculata	June 28
Bagdad	July 2
Gladys Perry	July 8
Bardeley	July 10
Aurantiaca	July 11
Fulva (Chinese)	July 12
Cinnabar	July 14
Imperator	July 14
Margaret Perry	July 14
Flora pleno	July 15
Kwanso	July 15
Sunset	July 16
George Yeld	July 17
Kwanso	July 18
Viscountess Byng	July 19
Fulva Cypriana	July 21
Mary Stoker	July 22
May Sadlier	July 22
Cissie Guiseppe	July 24
Sunkist	July 24
Fulva (Japanese)	July 27
Fulva rosea	July 29
Sirius	June 28
Amaryllis	June 29
Goldeni	July 4
Iris Perry	July 5
Harvest Moon	July 6
Midas	July 8
Mrs. W. H. Wyman	July 8
Bay State	July 13
Cressida	July 14
Gypsy	July 18
Golden Dream	July 26
Multiflora	July 29

NIGHT BLOOMERS

Luteola	July 2
Lemona	July 5
Calypso	July 7
Parthenope	July 7
Sovereign	July 8
Golconda	July 9
Gold Standard	July 9
Citronella	July 11
Mandarin	July 11
Flava major	July 12
Lovett Lemon	July 12
Pale Moon	July 13
Yellow Hammer	July 13
Thelma Perry	July 16
Woodlot Gold	July 19
Baroni	July 20
Gold Imperial (Perry)	July 21
Gold Imperial	July 21
Citrina	July 22
Sunny West	July 23
Ochroleuca	July 26

Our yellow list starts with *Hemerocallis flava* which was described and named by Linnaeus and that places it among the venerated flowers of many generations back and in its class is not excelled by any of the modern upstarts.

Look again at these lists. Only two, both yellow, bloomed in May. In June we had 9 yellows, 18 oranges, and 3 fulvous. July is the banner month with 21 yellows, 11 oranges, 21 fulvous and 21 night bloomers. From some of these July bloomers the season extended well into the end of August. *Dorothy McDade,* a beautiful yellow, smiled at us in mid-September and some stalks were cut in October just before frost and opened up nicely in the house.

Warning. These dates are only tentative. Much of this data was from newly set or reset plants and with different weather conditions during the season of 1938 may show variations but they do give one a picture of the comparative blooming periods.

I have a predeliction for the fulvous list. Here is a class that is undergoing rapid development and in a few years will require subdivisions. This list will include varieties with stripes and spots, zones and eyes, bi-colors, pinks, browns, very dark shades, pastel shades—a bewildering variety.

Don't wait for these new creations. Get some of the best in the market today and enjoy them. When you look at a list of 100 varieties, and have room for only ten or a dozen, what are you going to do about it? If you have room for ten plants set them 3 feet apart to allow for mature development and defer the day of resetting. Finally let me suggest this modest list,—*Flava, Ophir, Goldeni, Gypsy, Mikado, Kwanso, George Yeld, Fulva rosea, Calypso* and *Pale Moon.*

ANNOUNCEMENT—1938 EVALUATION OF DAYLILIES FOR GARDEN VALUE

Under date of May 12, we have received a circular letter from Prof. George Graves, Assistant Research Professor of Nurseryculture, Massachusetts State College, Field Station, Cedar Hill, Waltham, outlining the plans for the cooperative garden evaluation of named daylilies in the Southeastern climatic region for 1938.

Since the Daylily Committee of the Society has not as yet prepared forms for the evaluation of daylilies on a national basis, it is suggested that those interested, from other climatic regions, write to Prof. Graves for the necessary forms to be filled out and returned to him at the end of the season. The complete results for 1938 should serve as a preliminary valuation of the daylilies now being grown in each of the regions. The results of the preliminary survey will be published in 1939 Herbertia.

—*Hamilton P. Traub.*

CLASSIFICATION OF HYBRID AMARYLLIS FLOWER TYPES

Revised for 1938, 1939 and 1940 shows: Hybrid amaryllis shall be subdivided tentatively into the following types on the basis of the characters indicated below,—

FLOWER TYPES

A. Flowers distinctly drooping, tube long (over 3 inches long)
  B. Tube very long (over 4 inches) *Solandriflorum Type A*
  BB. Tube shorter (3 to 4 inches) *Solandriflorum Type B*
AA. Flowers slightly upright, horizontal or slightly drooping, tube short
  C. Tube narrow, (1 to 3 inches)
    D. flower compact, *Reginae Type A*
    DD. flower pointed, *Reginae Type B*
  CC. Tube open (to 1 inch)
    E. flower compact, *Leopoldi Type A*
    EE. flower pointed, *Leopoldi Type B*

EXHIBITION GROUPS

For exhibition purposes there shall be three major groups, (1) Grandiflora classes in which flower form and size standards are the important considerations; (2) Decorative classes in which the use of the plant—landscape, rock garden, forcing, etc., shall be the important considerations, and (3) Double flowering classes.

CLASSES AND AWARDS (PRIZE SCHEDULE)

At the annual National Amaryllis Show, and at other exhibitions, as voted by the Board of Directors, the Society will award its First Class Certificate for meritorious new and standard varieties; its award of merit; and its first, second, third and fourth prize ribbons, in the classes indicated below. Any money prizes offered shall be authorized by action of the Board of Directors.

Each species or varied exhibit shall consist of one or more potted flowering plants, or one or more flower scapes up to and including 1945; after which date three potted flowering plants or three flower scapes shall be required in each case.

SECTION A. GENUS AMARYLLIS

Class 1. Single entries of Amaryllis species.
Class 2. Best collection of botanical species and varieties.
Class 3. Best collection of 10 or more Grandiflora varieties.
Class 4. Best collection of 5 to 10 Grandiflora varieties.
Class 5. Best collection of 10 or more Decorative varieties.
Class 6. Best collection of 5 to 10 Decorative varieties.
Class 7. Best hybrid amaryllis floral arrangement.
Class 8. Best amaryllid floral arrangement.
Class 9. Best display.

Standard Grandiflora and Decorative Varieties

The *score card,* and *prize schedule* are reproduced on the two following pages.

Classes of Grandiflora, Decorative and Double Varieties (Prize Schedule)
Section A. Genus Amaryllis (continued) Classes 101 to 499, inclusive.

COLOR CLASSIFICATION (Fischer Color Chart)	Grandiflora Group						Decorative Group	Double Group
	Leopoldi Type A	Leopoldi Type B	Reginae Type A	Reginae Type B	Solandriflorum Type A	Solandriflorum Type B		
White without markings	101	151	201	251	301	351	401	451
White with slight pale red markings	102	152	202	252	302	352	402	452
White with lighter red markings	103	153	203	253	303	353	403	453
White with lighter red stripes, keels, stars, tips, etc.	104	154	204	254	304	354	404	454
White with red stripes, keels, stars, tips, etc.	105	155	205	255	305	355	405	455
Yellow without markings	106	156	206	256	306	356	406	456
Yellow with markings	107	157	207	257	307	357	407	457
Bronze without markings	108	158	208	258	308	358	408	458
Bronze with slight markings	109	159	209	259	309	359	409	459
Bronze with distinct markings	110	160	210	260	310	360	410	460
Orange without markings	111	161	211	261	311	361	411	461
Orange with slight markings	112	162	212	262	312	362	412	462
Orange with distinct markings	113	163	213	263	313	363	413	463
Pale red without markings	114	164	214	264	314	364	414	464
Pale red with slight markings	115	165	215	265	315	365	415	465
Pale red with distinct markings	116	166	216	266	316	366	416	466
Lighter red to light red without markings	117	167	217	267	317	367	417	467
Lighter red to light red with slight markings	118	168	218	268	318	368	418	468
Lighter red to light red with distinct markings	119	169	219	269	319	369	419	469
Red without markings	120	170	220	270	320	370	420	470
Red with slight markings	121	171	221	271	321	371	421	471
Red with distinct markings	122	172	222	272	322	372	422	472
Dark red	123	173	223	273	323	373	423	473
Darker red	124	174	224	274	324	374	424	474
Violet red	125	175	225	275	325	375	425	475
Rainbow and tri-color types, excluding green	126	176	226	276	326	376	426	476
Blue, and lilac	127	177	227	277	327	377	427	477
Any other color	149	199	249	299	349	399	449	499

Score Card—Grandiflora group[1] *Hybrid Amaryllis*

All flowers to be expanded in ½ or more direct sunlight.

Color Class No..... Exhibitor's No.....

Flower Type.....

Character to be Scored	Method of Rating	Possible Score
Color and texture	No flower of inferior color to be considered; the full 50 points to be deducted for major color defects; dark green in combination with medium and dark red is especially objectionable.	50
Form	Rating should be based on conformity to type.	15
Size	Except in the case of Solandriflorum types, the following shall rule (diameter across face): 6″ to 7″, allow 10 points; 7″ to 9″, allow 13 points; 9″ and above, allow 15 points.	15
Habit	For Solandriflorum types the drooping habit is normal; but for Reginae and Leopoldi types, horizontal and slightly erect carriage are to be favored, although slight drooping is allowable.	5
Number of flowers to scape	For less than 3 or more than 5 allow 2 points; for 3 to 5 allow 5 points.	
Length of scape	The length should be considered in relation to size of flower; scapes too short to too long should be penalized.	5
Character of Scape	Scapes should not be so coarse as to be conspicuous, but should be sturdy enough to hold up flower well.	3
Fragrance	Should not be too faint or too strong	2

[1]NOTE: No entry is to receive first prize unless a rating of at least 86 points is merited; second and third prizes may be awarded to entries rating from 76 points up. A Score Card for the Decorative group is in preparation.

SECTION B. AMARYLLIDS (EXCEPT GENUS AMARYLLIS; SEE SECTION A, ABOVE)

Class 601 Best collection of *HEMEROCALLIS* species (Daylilies).
Class 602 Best collection of hybrid Hemerocallis varieties.
Class 603 Best Display of hybrid Hemerocallis varieties.
Class 610 Best Coll., unnamed seedlings.
Class 621 Single entries, hybrids, dwarf (below 1 ft.).
Class 622 Single entries, hybrids, semi-dwarf (1 to 2 ft.).
Class 623 Single entries, hybrids, semi-robust (2 to 3 ft.)
Class 624 Single entries, hybrids, robust (3 to 5 ft.).
Class 625 Single entries, hybrids, giant (over 5 ft.).

Class 651 *HOSTA* (Plantain Lilies)

Class 661 *LEUCOCRINUM*

Class 671 *HESPEROCALLIS*

Class 701 Best collection of *AGAPANTHEAE*
Class 702 Agapanthus
Class 703 Tulbaghia

Class 751 Best collection of *ALLIEAE*
Class 752 Bloomeria
Class 753 Muilla
Class 754 Allium
Class 755 Nothoscordum
Class 756 Tristagma
Class 757 Steinmannia
Class 758 Brodiaea
Class 759 Diphalangium
Class 760 Milla
Class 761 Androstephium
Class 762 Behria
Class 763 Bessera
Class 764 Leucocoryne
Class 765 Stropholirion
Class 766 Brevoortia

Class 801 Best collection of *GILLESIEAE*
Class 802 Erinna
Class 803 Solaria
Class 804 Speea
Class 805 Trichlora
Class 806 Miersia
Class 807 Gilliesia
Class 808 Gethyum
Class 809 Ancrumia

Class 901 Best collection of *IXIOLIRION* species

Class 1051 Best collection of *GALANTHEAE*
Class 1052 Galanthus
Class 1053 Lapiedra
Class 1054 Leucojum

Class 1101 Best collection of *CALLICOREAE*
Class 1102 Crinum
Class 1103 Ammocharis
Class 1104 Callicore
Class 1105 Brunsvigia
Class 1106 Nerine
Class 1107 Stenolirion

Class 1251 Best collection of *CYRTANTHEAE*
Class 1252 Chlidanthus
Class 1253 Anoiganthus
Class 1254 Cyrtanthus
Class 1256 Vallota
Class 1257 Ungernia

Class 1351 Best collection of *HAEMANTHEAE*
Class 1352 Hessea
Class 1353 Carpolyza
Class 1354 Strumaria
Class 1355 Buphane
Class 1356 Griffinia
Class 1357 Clivia
Class 1358 Haemanthus
Class 1359 Choananthus

Class 1401 Best collection of *ZEPHYRANTHEAE*
Class 1402 Argyropsis
Class 1403 Zephyranthes
Class 1404 Cooperia
Class 1405 Haylockia
Class 1406 Crocopsis
Class 1407 Apodolirion
Class 1408 Sternbergia
Class 1409 Gethyllis
Class 1410 Pyrolirion
Class 1411 Habranthus

Class 1551 Best collection of *AMARYLLIEAE* (Except Genus Amaryllis, for which see above classes 1 to 499)
Class 1552 Placea
Class 1553 Sprekelia
Class 1554 Lycoris
Class 1555 Vagaria

Class 1401 Best collection of *NARCISSEAE*
Class 1402 Cryptostephanus
Class 1403 Tapeinanthus
Class 1404 Best collection of Narcissus species
Class 1405 Trumpet Narcissi
Class 1406 Incomparabilis Narcissi
Class 1407 Barrii (also Burbridgi) Narcissi
Class 1608 Leedsii Narcissi
Class 1609 Triandrus Narcissi
Class 1610 Cyclamineus Narcissi
Class 1611 Jonquilla Narcissi
Class 1612 Tazetta and Tazetta Hybrid Narcissi
Class 1613 Poeticus Narcissi
Class 1614 Double Narcissi
Class 1615 Cleft-corona Narcissi

Class 1751 Best collection of *EUCHARIDEAE*
Class 1752 Hyline
Class 1753 Stenomesson
Class 1754 Pamianthe
Class 1755 Pancratium
Class 1756 Elisena
Class 1757 Ismene
Class 1758 Hymenocallis
Class 1759 Calostemma
Class 1760 Calliphruria
Class 1761 Eucharis
Class 1762 Stricklandia
Class 1763 Eurycles
Class 1764 Klingia
Class 1765 Leptochiton

Class 1801 Best collection of *EUSTEPHIEAE*
Class 1802 Urceolina
Class 1803 Hieronymiella
Class 1804 Eustephia
Class 1805 Eustephiopsis
Class 1806 Callipsyche
Class 1807 Eucrosia
Class 1808 Phaedranassa

SECTION C. ALSTROEMERIDS

Class 1901 Best collection of *ALSTROEMERIACEAE*
Class 1902 Alstroemeria
Class 1903 Bomarea
Class 1904 Leontochir
Class 1905 Schickendantzia

Class 2051 *PETERMANNIA*
Class 2101 Best Collection of *PHILESIACEAE*
Class 2102 Luzuriaga
Class 2103 Philesia
Class 2104 Lapageria
Class 2105 Eustrephus
Class 2106 Elachanthera
Class 2107 Geitonoplesium
Class 2108 Behnia

REGISTRATION OF NEW VARIETIES

Descriptions of new varieties of hybrid amaryllids, hemerocallids, and alstroemerids for this section must reach the editor not later than June 1 to be included in the current issue of Herbertia. This information is published to avoid duplication of names, and to provide a place for the authentic recording of descriptions. Names should be as short as possible—one word is sufficient. It is suggested that in no case should more than two words be used.

Hybrid Amaryllis Varieties

Introduced by Heaton Bulb Company, Orlando, Fla.

HELEN L. HEATON (No. 1007); compact Leopoldi type pure white except violet feathering on upper petals, lower petals pure white. Seedling—U. S. D. A. x Heaton strain. F. F. C.; Best Bloom 1938 Orlando Amaryllis Show.

BRITANNIA (No. 1003); very flat light salmon round petals, slight keel to tips, upper petals slight red veins along keel, Lower petals shaded white at throat to pink at tips. General color light salmon. A new color in Amaryllis. F. F. C. 1938 Seedling—U. S. D. A. x Heaton.

AMERICA (No. 1004); compact leopoldi type; slight cream base indefinate white keel, shaded pink, few dark pink veins. Minutely dotted and speckled except for keel. General color golden pink. 1938 seedling—U. S. D. A. x Heaton.

BERENGARIA (No. 924); compact leopoldi type, Soft dark pink with large white star. F. F. C. 1936. Seedling—Heaton x Heaton.

GLORIA (No. 1410); Reginae type. Lighter violet with darker veining shaded to light pink at tips of petals. F. F. C. 1938. Seedling—*Serapic 11 x. Peace.*

Introduced by Lakemont Gardens, Wyndham Hayward, Prop., Winter Park, Florida.

CELESTINE (No. C54); 8 inch flower, four to stem, medium vigorous type, salmon coppery-pink with white keels to within one inch of outer end of petals; full flaring Leopoldi type.

MARCELLE (No. C154); 8 inch flower, deep red self, compact Leopoldi type, semi-rounded petals, throat 100% red; four blooms to scape, flaring, open petals. Vigorous. Outstanding handsome petal texture. Blue Ribbon and Second best bloom in Leopoldi class at 1938 Regional Amaryllis Show, Orlando, Fla., 1938.

SEMINOLA (No. C156); 7 to 8 inch flower, 100% deep to darker red self, wide flaring rounded petals, three flowers to scape, medium vigorous. Outstanding shape and color as well as texture of petals. Medium vigorous.

FLORIDA MAID (No. C172); 7 to 8 inch pointed petal flower, Leopoldi type, rose-pink flushed and veined on white. Distinctive, flaring open type of flower. Four blooms to scape. Vigorous.

Hybrid Daylily (Hemerocallis) Varieties

Introduced by Lakemont Gardens, Wyndham Hayward, Prop., Winter Park, Florida.

CLEO (No. HC170); large spreading petals, 6-7 inches fully expanded, color a light fulvous coppery-rose-pink with bright golden yellow throat and darker eye zones; faint lighter keel; edges of petals slightly wavy and crinkled; medium compact type.

ALGERIA (No. HC102); open type of flower, semi-compact, petals Algerian red, (7-L-5), eye zones dark maroon (7-L-7), throat Florida gold to saffron (10-K-9) Maerz & Paul.

CARMEN (No. HC153); large open flower, petals between Mosque and Nasturtium (4-H-12); eye zones darker maroon, (7-L-7), throat, sunburst, (10-K-9); general effect a warm, rich rosy brown tone.

MRS. H. H. DEWEY (No. HC104); (H. fulva rosea X) tall plant with fulvous red markings on golden yellow base with edging of gold. Petals Canna to Antique red, (4-J-11); throat slightly greenish yellow and Goldenrod Yellow, (10-L-5). No eye zone markings; full open flower, medium size and medium compact.

NUBIANA (No. HC203); medium compact flower, dark chocolate red petals with light yellowish white stripe down center approximately 1/8 inch wide. Orange throat. Sepals slightly lighter (orange) in tone. Main color of blade darker than Vulcan. Medium size, free flowering.

ANTARES (No. HC186); tall growing plant, large flower, starlite, deep fulvous red, with darker eye zones and yellow throat. Faint lighter keel, and tipping of sepals in yellow shade.

FLORIDA (No. HC110); foliage evergreen; 1½ ft, in height; flower stalk 2 ft. in height; branched from base upward; 16 to 18 flowers to the stock; begins blossoming during last week in April in Florida; flower is of unusual coloring, throat is light Chrome Yellow, 10-L-4; eye-zone, Bois de Rose, 5-J-9; upper part of inner segments is Rose Blush, 5-C-9 with a Light Chrome Yellow stripe in the center; inner slightly more than 1½″ in width and curled back at the tip; outer segments are 1″ wide, semi-straight and twisted at the ends, lighter in color than inner segments, diameter across face, 4¾″; perianth 3½″ in length, tube about ¾″ long; modestly sweet-scented, and a rapid multiplier.

Introduced by Hamilton P. Traub, Mira Flores, Orlando, Fla.

INDIAN CHIEF (No. 311); foliage evergreen, upright and 2¼″ in height; flower stalk branched, 3 ft. high, with 12 to 15 flowers; flower 2¾″ long, tube slightly less than 1″, individual segments 5½″ long; diameter across face with segments curled back at the tip, 6″ to 7″, (8″ to 10″, if segments are uncurled); general aspect of flower is a bright Brazil Red changing to totem Red, 4-J-12, in full Florida sunshine, throat is saffron Yellow, eye-zone Buccaneer Red, 4-L-12, upper portion of inner segments is Brazil Red, 4-K-12, with a stripe of Saffron Yellow in center; outer segments are overlain

with Buccaneer Red and with a very narrow stripe of Saffron Yellow in center; first flowering date early April, and a recurrent bloomer.

GRANADA (No. 312); foliage evergreen, to 1½ ft., high, flower stalk, branched, to 2¾″ high, with 12 to 15 flowers, flower length, 2¾″, tube less than 1″, diameter across face, 5″, with inner segments slightly curled back at tip, and outer segments distinctly curled back at tip, giving the flower a distinctly triangular shape in front view; the coloring is very striking,—throat Spanish Yellow, 10-L-7, inner segments between Monterey Red, 5-J-12 and Autumn Glory, 5-K-12, and with a narrow yellow stripe in center; outer segments, Moroccan Red, 5-K-11, bordered with Golden Yellow; first flowering in early April, and a recurrent bloomer.

HAPPINESS (No. 349); semi-robust, scape branched; flowers of medium size, petaline segments of bright coppery-rose with narrow light orange stripe in center; sepaline segments only slightly suffused with coppery-rose; throat bright orange; first flowers in April, but is a recurrent bloomer; can stand full sunlight.

DR. HUGHES (No. 309); semi-robust; growth habit and flower shape of *Soudan,* flower color (vinacious-rufous) similar to *Cinnabar,* but slightly deeper colored.

DR. STOUT (No. 318); very vigorous, leaves evergreen, up to 1½ ft.; scape up to 3½ ft. branched, 25 or more flowers; flower diameter 6 to 7 inches; flower color is a striking combination, throat and ground color, 10-L-9 (near Sunburst), overlain with Moroccan Red, 5-K-11, the eye zone is somewhat darker, and the sepaline segments are of the same color; a rapid multiplier; first flowering date latter part of May, but has several blooming periods in Florida; can stand full sunlight.

GOLDEN GLOW (No. 319); leaves evergreen, up to 1½ ft.; scape up to 2 ft., branched, with 7 to 8 flowers; color a rich Golden Glow; 9-L-6; flower diameter more than 5½ inches; segments crisped in the upper one-third, particularly around the margins; blooming date in Florida, latter part of April.

ELAINE (No. 346); semi-dwarf; segments are a delicate shade of salmon rose, near 10-A-9, eye zone Old Coral, 3-J-19, throat orange very slightly tinged greenish; does best in partial shade; first blooming date latter part of April.

MAUVE ROSE (No. 315); robust; flowering habit of *Bijou;* throat and ground color Apricot Yellow, suffused mauve rose, (near to 7-E-5), a very unusual color combination; first blooming date middle of April, flowers several times during season.

GLORIOSA (No. 314); semi-robust; throat greenish changing to Golden Glow, segments Algerian Red, (5-L-10), eye zone scarcely perceptible; first flowering date early April. The flower, when fully open in afternoon, is reminiscent of the Genus *Gloriosa,* hence the name.

LENA HUGHES (No. 302); semi-robust; salmon rose with delicate eye zone of a little deeper shade; flower medium in size, but segments are broad and slightly curled back giving the flower a full appearance; first flowering date early April.

WEKIWA (No. 328); semi-dwarf; narrow segments somewhat like *Wau-bun,* but of a rich dark velvety red; first flowering date latter part of April.

EOLA (A variety tentatively introduced in 1937, is hereby withdrawn).

VICTORY TAIERHCHWANG (No. 310); semi-robust; scape branched with 20 or more flowers; petaline segments are near to Spanish Wine (Garnet plus), 7-J-6, (with prominent bright orange stripe in center), eye zone is darker Spanish Wine; sepaline segments are slightly lighter; throat bright orange; first flowers in May, but is a recurrent bloomer, and can stand full sunlight.

SAN JUAN (No. 345); robust; scape branched with 23 to 25 flowers; petaline segments India Red, 7-L-6, eye zone slightly darker; sepaline segments slightly lighter; throat dull orange.

CHARLOTTE TRAUB (No. 305); semi-robust, scape branched with many flowers; ground color bright orange; petaline segments with narrow orange stripe in center, overcast with Emberglow; sepaline segments lighter; orange throat; first flowers in April, but is a recurrent bloomer.

Introduced by R. P. Lord and E. L. Lord, Orlando, Florida.

BARBARA LORD; Clear buff-orange background, no shading at center; irregular rosy-bronze eye spot; petals wide and very wavy; 4 in.; scape 2½-3 ft.

CIMARRON; Shape and size of Soudan; color of Cinnabar but slightly more fulvous, thinning out to a wide creamy yellow margin on petals; glowing orange throughout; eye zone slightly darker; scape 4′; foliage evergreen; free bloomer; early mid-season.

COLUMBINE; The 4 in. flower is very full and of firm texture; ground color clear golden yellow, faintly flushed rosy buff at eye zone, merging ground color at tip; petals 1¼ in., largest near tip; sepals ¾ in.; scape stout, erect, 3 ft.; recurrent bloomers; early.

COPPER LUSTRE; 5 in. flower with a vivid orange-yellow throat and midrib; ground color is intense copper with a metallic sheen; petals 1 in. wide, with a garnet eye zone; sepals 5/8 in.; scape erect; 2½ ft.; free and recurrent bloomer; early.

CORALIE; 4½ in. flower; throat bright yellow, petals 1¼ in. wide, deep coral rose, with clear red eye zone; sepals 7/8 in., same shade but unmarked; scape 30 in.; stout, erect, vigorous; recurrent bloomer, early.

GITANA; Full flower, 4-5 in.; lemon yellow throat; petals 1¼ in., coppery rose, with rosy purple eye zone; sepals 7/8 in., flushed coppery rose with golden margin and midrib; scape 3 ft., slender; continuous bloomer; early.

HARLEQUIN; The velvety 4 in. flower is very full; all segments are intense dark red with the golden throat color extending along midrib to the tip; petals 1 in. wide and undulate; sepals 5/8 in.; scape 4 ft., 20 to 30 flowered; very free bloomer; recurrent; early.

HECTOR; Large (over 6 in.) wide open flower; deep golden throat; petals wide, creamy yellow background, with rosy-bronze suffusion, wide golden yellow center stripe, edges only slightly ruffled; sepals orange with a rosy-bronze suffusion; good substance; pronounced fragrance, free bloomer and very showy.

KUBLAI KHAN; An 8 in. flower of exceptionally firm substance; ground color intense orange; petals 1½ in., flushed red-orange at eye zone; sepals 7/8 in. wide; scape stout; ascending, 2½ to 3 ft.; vigorous and a recurrent bloomer; early.

MOONGLOW; a beautiful and distinct pale creamy yellow, the outer segments of a just sufficiently deeper tone to form a lovely contrast with the wide ruffled inner ones; faintly fragrant.

ROMANY; Flower full, large (7 in.); rich mahogany brown; large maroon eye zone; a most intense daylily with a lustrous sheen; floriferous, continuous bloomer; vigorous; 2½ to 3 ft.

STELLA ROSE; Medium full with a spread of 6 in., segments recurved at tips; throat golden, star-shaped; petals are ruffled, 1 in. wide, clear salmon-rose with a dark-red angular eye zone; sepals are ⅝ in. wide and slightly darker; scape 2½ to 3 ft., suberect; recurrent bloomers; early.

SUNBEAM; 7 in. flower with a golden throat; glistening sheen; petals 1½ in. wide, intense yellow-orange; sepals ¾ in., just slightly darker; scape suberect, 3 ft., very free bloomer.

TURY; Flowers medium sized (4 in.) but numerous. A definite break in Hemerocallis, having a lily-like form and habit of bloom; Wide pale yellow throat; segments broad recurved at the tips, outer third dusted with cinnamon; scape stiff, erect, 3 ft. Exceptionally good garden effect.

VESUVIUS; A very lovely flower of soft ashy pink, eye zone of a darker rose; throat pale yellow; very full, 5 in.; foliage evergreen; mid-season; 3½ to 4 ft.

VICTOR LORD; Another distinct break in daylilies. Rich clear red with no trace of brown or orange, color evenly distributed with no eye zone; throat area very small and pale lemon yellow; petals 2 in. and sepals fully 1 in. wide; flower large (6 in.) and very full; plant vigorous and floriferous (20 to 30 blooms); mid season; 3½ ft.

AMARYLLIS PROCERA—EXTRACT FROM MR. WORSLEY'S LETTER TO MAJOR PAM: DATED 8-20-38

Dear Major Pam,—

Hippeastrum procerum. Yes, Mr. Hayward's statements are quite correct. Finding that the pollen of garden vars. of **Hippeastrum** failed every time to fertilize **H. procerum,** and thinking that perhaps some failure in cultivation was responsible, I crossed one **procerum** with another and raised seedlings which grew quite well.

This species is difficult to do well with under cultivation. Even at Petropolis (only 2 miles from its habitat) the bulbs die out quickly as its requirements are not met.

In Gard. Chron. of 5-4-29 you will find a Monograph (from my pen) with 4 figures treating of this plant, but I am sorry that I have not a copy I can send you.

(Continued on p. 153.)

4. CYTOLOGY, GENETICS AND BREEDING

CYTOTAXONOMIC NOTES ON THE GENUS HABRANTHUS[1]

WALTER S. FLORY,

Texas Agricultural Experiment Station
A. & M. College of Texas

The genus *Habranthus* has had a tumultuous history, and at one period suffered the fate of certain of our less powerful nations. First established in 1824 by Herbert, its members were placed in *Hippeastrum* by Baker in 1878. The latter author in 1888 concurred with Bentham and Hooker (1883) in their division of Herbert's *Habranthus* between *Hippeastrum and Zephyranthes.* Then for almost a half century this genus was botanically extinct. In 1927 Stapf recognized Herbert's conception of the genera mentioned here as the most rational one. More recently Mr. H. H. Hume (personal correspondence) and Sealy (1937) carried out extensive studies the results of which lend convincing proof to the idea that taxonomically *Habranthus* is deserving of independent, generic, status.

Members of the tribe *Zephyrantheae* have received but slight attention cytologically. The chromosome numbers of only six species seem to have been reported in published form. In addition to one species of *Sternbergia* with which we are not interested here, Yamamoto and Hosono (1931) list *Zephyranthes candida* as having 2n = 36; Nagao and Takusagawa (1932) give n = 19, 2n = 38 for this form and 2n = 46 in *Z. carinata;* and *Z. Lindleyana* has 2n = 48 according to Fernandes (1930). In 1913 Pace gave n = 12, 2n = 24 for *Atamosco texana.* The present writer (1937) reported 6 pairs of somatic chromosomes as being present in *Zephyranthes robusta.* After Mr. Hume called my attention to the fact that Habranthus was reinstated as a genus a fuller report on the chromosomes of this form, now listed as *Habranthus robustus,* was *made (1938).* It may be said here that the large size, small number, and general external morphology of the chromosomes in this latter form would seem to make them favorable subjects for an analytical study of chromosome structure.

The return of *Habranthus* to generic rank removes two of the forms studied cytologically from *Zephyranthes. Habranthus robustus,* first named in 1829, after having been successively named *H. robustus* Herbert, *Hippeastrum tubispathum* Baker, and *Zephyranthes robusta* Benthan and Hooker, is returned to the original Herbertian appellative. The "Atamosco Lily" or "Copper Lily" which Pace studied was originally named *Zephyranthes texana* by Herbert (1836). A year later Herbert designated it as *Habranthus Andersonii* var. *texanus.* This was changed by Steudel to *H. texanus* in 1840, and in 1897 Greene made the combination *Atamosco texana* (Morton, 1935). This form is again

[1]Contribution No. 451 to the Technical Series, Texas Agricultural Experiment Station; approved by the Director, March 18, 1938.

taxonomically referred to as *Habranthus* and for the present *H. texanus* may be as proper a designation for it as any. The limited cytological evidence supports the taxonomic separation of *Habranthus* from *Zephyranthes*. *Habranthus robustus* and *H. texanus* with 6 and 12 pairs of chromosomes respectively would seem to be more closely related to each other than to the *Zephyranthes* species with 18 or 19, 23, and 24 pairs of chromosomes. There are many points in this connection which a more extended cytological knowledge could illuminate.

According to Sealy (l.c) *Habranthus texanus* is the only form of this genus to occur in a wild condition outside of South America. It is very similar to *H. Andersonii,* a native of Uruguay. These facts have led Sealy (following Hume's suggestion) to consider that probably the "Copper Lily" was introduced into Texas from South America by early Spanish missionaries. This whole proposition is very interesting, especially to Texans with an enthusiasm for native amaryllids.

The habitat of this "Copper Lily" is widespread in Texas. It occurs in the East Texas Timber Belt, on the Coastal Prairies, on the Rio Grande Plains, on the Blackland Prairies, and to some extent in the Edwards Plateau (Cory and Parks, 1937). In other words it occurs at numerous places over an area of at least some one hundred and forty or one hundred and fifty thousand square miles, an area equal to one twentieth of that of the continental United States. Such an extended distribution would make it seem somewhat improbable that this is an exotic plant.

On the other hand we might mention several factors which would seem, if not favorable, at least unopposed to the theory that *H. texanus* is an introduction to Texas. In the period from 1690 to 1735 at least 14 missions were founded in Texas (Hildrup, 1914). Sufficient time has elapsed for a rather wide dispersion of the species, provided that material was sent to this state during the early years of the missions. This plant form has been known in Texas for more than a hundred years; Drummond in 1835 collected specimens, apparently native, for shipment to England. This indicates that, if introduced, it was brought in at an early period and so would have had adequate time to spread. Although this species very seldom, in the writer's experience, propagates itself by divisions, it does readily set and copiously produce seed which germinates quickly and well, permitting its rapid distribution. Thus it is possible that some of the Franciscans did introduce this *Habranthus* into Texas; that it was spread to various sections of the state by the friars; that in several regions it became an escape; that it became more widespread, due to natural dispersion, prior to Drummond's visit; and that its range has continued to widen since 1835.

It is not to be gainsaid that while among the available facts some may be construed as favoring the theory there are others, in addition to those already mentioned, which oppose it. It should be noted that the only records available to us list the various Texas missions as having

been founded by Spaniards coming out of Mexico, and also that *H. texanus* is not reported from that country (Morton, 1937). On the surface the two facts of the previous sentence seem to be irreconcilable with the theory advanced in Sealy's paper and appear to deny that this North American *Habranthus* has been introduced, at least in the manner suggested. It is needless to say that further taxonomical, cytological and historical research is necessary before it can be stated without fear of successful contradiction that *Habranthus texanus* is either an indigent or an exotic.

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(Continued from p. 150.)

Having visited its habitat and seen the plants growing there, I am of opinion that it cannot be well grown in earth. It grows on narrow ledges on nearly perpendicular walls of crystaline rock where its roots are bound by some creeping phylodendrons over an inch or so of rock detritus and organic matter.

Although the temperature in winter admits of light ground frosts and the night air temperature at this alt. (about 4,000 ft.) probably falls to 30° F. or rather lower, the accumulated sun heat on the rocky background (right up to the bulbs) probably prevents frost reaching the bulbs. They do not grow in an erect posture, but at an angle of about 45° (135° with the horizon) in full sunlight and in a saturated air in wind swept positions. Hence you will see the difficulty of reproducing such conditions in this country. My bulbs were grown in 8" drain pipes filled with rock, fibre and live moss. In the second year they had established themselves and flowered freely for several years. Their only enemy was wood lice that gnawed the roots unless trapped daily. Unfortunately I had a mining business in Spain which took me from home for some time, and in my absence the gardener neglected the woodlice traps and let the plants get into bad health, from which I failed to recover them. I have none now, nor do I think I could grow them here as facilities are now wanting. It is a completely evergreen species and seems to have defied cultivation everywhere. I shall always treasure the memory of the days when I saw it in its natural habitat.

Leon A. Page, Winter Park, Florida *See pages 161, 163 and 199*

Amaryllis procera—blooming size bulb

Plate 112

5. PHYSIOLOGY OF REPRODUCTION

VERNALIZATION AND PHASIC DEVELOPMENT WITH SPECIAL REFERENCE TO AMARYLLIDS

W. M. James, *California*

A preliminary trial of vernalization as elaborated by Lyssenko and others at the Odessa Plant Breeding Institute indicates that it may be used to shorten the period necessary to bring bulbous plants into bloom from seeds.

It is not my intention to describe all the technique of the operation or to discuss in detail the principles involved. However, a brief summary will show why I think the method may be of use to bulb growers. Very detailed information is contained in Bulletins No. 9 and No. 17 of the Imperial Bureau of Plant Genetics in Great Britain.

Briefly, the process of vernalization makes possible the introduction into field cultivation of many plants whose use is limited by the effect of natural geographical and climatic factors.

Lyssenko and his fellow workers assume that there is a very clear distinction between the phenomenon they refer to as growth, namely increase in weight and size of the plant, and the phenomenon they refer to as phasic development or a qualitative change in the nature of the plant. We can easily understand their use of the term "growth" because there is visual evidence of it all around us. The term "phasic development" is not quite so easy to understand.

These Russian scientists have proved experimentally that certain qualitative changes which they call "phasic developments" must take place in the plant before it can reproduce itself sexually. These changes can be independent of the size and age of the plant, and the plant may enter the reproductive cycle without continuing to grow, and vice versa, it may grow and not make the qualitative change leading to reproduction. Environment affects this process and if the external conditions are favorable both for growth and phasic development, the plant will grow and at the same time pass the stages preparatory to sexual reproduction.

The change that takes place during phasic development is not visible, but nevertheless is very definite. The progress of the plant toward seed development is the only outward indication that the change has taken place.

Probably the most important part of Lyssenko's work was to indicate that these qualitative changes which he and his co-workers call phasic development can take place in the seed in which the embryo has just commenced development, but has not broken the seed coat. Thus, we see that the process of preparation of a plant towards sexual reproduction may occur in the embryo and may be separated in time from the growth of the plant. This makes possible the practical application of the method of vernalization.

We may wonder just how this method may be useful to us. I think one example will indicate its importance. Some of the best kinds of wheat grown in the United States are called winter wheats because the seeds are sown in the fall and the seedlings make little growth during the fall and early winter. Phasic development continues to take place and is more or less completed while growth is practically suspended during the coldest part of the winter. In the spring, growth starts in again and the plant flowers and produces seed. In parts of Russia winter wheat can not be planted in the fall because of climatic conditions. When it is planted in the spring, environmental conditions prevent phasic development and the plants very seldom set seeds. When vernalized seeds are planted in the spring, sexual reproduction takes place in due course and a normal crop of grain is produced.

The process of vernalization consists of germinating seeds to the point where the embryos are ready to pierce the seed coat and then holding the seeds for a time at a temperature low enough to suspend growth. Phasic development takes place during the time growth is suspended.

Lyssenko's work was all done with annuals, so I had no guide at all as to how much treatment seeds of bulbous plants would require. Late in the summer I vernalized some seeds of *Leucocoryne ixioides odorata* and planted them about the middle of September. At the same time I planted my main crop of *Leucocoryne* seeds. Growth of plants from vernalized seeds appeared to be the same as that of plants from untreated seeds. In about two months the tops of the plants from treated seeds died normally. Examination underground showed that the little bulbs had made the same growth that ordinarily would have taken six or seven months.

Next season I intend to vernalize some seeds for a longer period. Ordinarily *Leucocoryne* requires three seasons growth to flower from seed. By fertilization I have reduced that period to two seasons and I am in hopes that proper vernalization will make it possible to secure flowers of this bulbous plant in one year from time of planting seeds.

VEGETATIVE PROPAGATION OF CLIVIAS

I. W. Heaton, *Florida*

In 1936 Herbertia I described a method of propagating Clivias by bud destruction. While this method is much faster than the normal natural increase, it does not meet all requirements of a commercial grower. Last spring another method was tried and found much more satisfactory.

Just prior to the growing period Clivia plants make quite a few new roots. When these new roots are three to four inches long, they are carefully removed from the stem with a tiny piece of the stem attached. A sharp, pointed, narrow knife is needed for this operation, and care must be taken not to damage the root by rough handling. The average

(Continued on page 205.)

6. AMARYLLID CULTURE

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

VALLOTAS IN GERMANY

F. MEYER, *Hamburg, Germany*

Vallotas prove nowhere hardy in this country, and, therefore, are always handled as pot plants in cool greenhouses. They are met with occasionally in some provincial nurseries, but are by no means esteemed as favorites by market gardeners, for their flowering season lasts only a short time, and it comes mostly during the late summer months, when the public demand for pot plants is not very great.

However, Vallotas are observed in the windows of sitting rooms or porches in country and city homes (Plate 109). Most plants favored for homes, like Cyclamens, Begonias, etc., are only short-lived, suffering soon from the much too dry air; and only a few species are able to withstand successfully for long such uncongenial conditions. Three amaryllids fall in the latter class,—*Clivia miniata, Haemanthus albiflos,* and *Vallota purpurea.*

If grown from seeds, the culture of Vallotas needs some years for the seedling to reach the flowering stage, and in addition the seedlings seem to be more or less variable not so much in color as in size of the flowers. Desirable varieties are propagated only by offsets and they flower mostly in the second year after potting up (Plate 109).

Suitable air conditions for Vallotas are easily secured, and failures are therefore mostly due to unfit soils. The soils should always incline to the heavy and acid side, a little less so while the bulbs are young. They require repeated repotting. In soils too light or containing too much lime they dwindle away. Mature bulbs should be potted up in a mixture of alluvial clay, fibrous peat, a little leaf-mould, river sand, and rubbed old, dry cow manure. Neutral or even alkaline sand as well as loam should be avoided. The reaction of the soil solution should not exceed very much a pH value of 6.0.

Immature bulbs may be planted a little below the surface and should be held during the warm summer months in cold frames. They should be repotted as soon as the pot-bound condition is reached, always without disturbing the fleshy roots. Mature bulbs are planted partly raised above the soil level.

The pots should be chosen as small as possible. Ample drainage is necessary, and particularly needed, when the plants are shifted into their final pots, where they may rest for years, as long as they prove healthy. After becoming pot-bound, they respond well during summer growth, if supplied with weak liquid manures. I always prefer complete ones, but with the proportion of the nitrogenous constituents reduced, and well balanced with regard to acid and alkaline ions, and without any injurious "filler" compounds.

If, after years, repotting of old plants is needed, it may be done advantageously soon after the flowering period. Propagation is successfully carried out by dividing old clumps in early spring.

Curiously enough, the growth responses of pot grown plants are quite different from those observed in their natural home. It is reported by different authors, lastly again by Miss Sarah V. Coombs (South African Plants for American Gardens, p. 80), that in the wilds the leaves die down soon after flowering time. But pot grown plants are to all intents and purposes evergreen.

From spring to the end of flowering time they need bright light, fresh air, and plenty of water. After this they should be watered sparingly and during the winter months they should be given no more water than is necessary to keep the plants sturdy. During the period of partial rest, they will receive sufficient light if placed in a window looking out to the east or west.

Recently our famous nurseryman, *Herr* George Arends, Wuppertal —Ronsdorf, Germany, the well-known originator of many fine strains of Primulas, Astilbes, Saxifragas, Rhododendrons etc., tried to improve Vallotas by means of cross-pollinating different strains and varieties. His own, large flowering type, perhaps *var. major*, pollinated with its own pollen, proved fully self-sterile, because all plants belonged probably to the same self-sterile clone.

Herr Arends then procured bulbs from different sources; among them some from Dutch nurseries. Several strains produced flowers from very small bulbs, but the foliage died down partly soon afterwards. To all appearances these were recent importations, or, in any case, represented forms still very near the wild species of South Africa.

After cross-pollinating several different types, the progeny proved highly variable with reference to size and shape of flowers, but less so in color. However, the color differences were distinct enough to make possible the selection of fine dark reds and others distinguished by a lovely rosy salmon shade. The most striking hybrids will be used in further breeding work.

The old hybrid *Vallota purpurea* x *Cyrtanthus sanguineus* (Hort. Bull.), is apparently nowhere available in Germany, but this report apparently suggested to *Herr* Arends the idea of continuing breeding work in this direction. Success in this direction would increase both color range and the durability of Vallotas, and, furthermore, would combine their more robust constitution with the gracious habit of *Cyrtanthus*. With this in mind, all available *Cyrtanthus* species of the trade were procured,—*C. obliquus*, *C. angustifolius*, *C. lutescens*, and *C. Mackenii*. The most sought after species, *Cyrtanthus sanguineus*, was not available in continental nurseries.

All attempts at crossing the last three small-flowered species with Vallota seedlings failed in both directions, and only with *Cyrtanthus obliquus* did *Herr* Arends succeed after encountering many difficulties and disappointments.

Now the seedlings from the annual crosses are growing to the flowering stage, and the first blooms are expected next year, in 1939.

HAEMANTHUS CULTURE IN SOUTH AFRICA

JOHN MARTLEY, *Banhoek, Stellenbosch, South Africa*

It is only recently that I have taken up the cultivation of our native South African bulbs. This is a large field and full of very great interest. It is only within the last year or so that I have been able to start on the curious but attractive genus of *Haemanthus*.

This is one of the larger genera of the Amaryllidaceae native to South Africa for there are thirty-four species listed in Herbertia 1936. With the exception of our local species *H. coccineus* I have only had time so far to secure a few bulbs of about six of these, and two species from Kenya both of which were mentioned in Herbertia 1935.

Haemanthus coccineus (Plate 110, upper left) is common in Western Cape Province and is found in a great variety of soils—sandy to gravelly with a greater or lesser admixture of clay. The flowers appear in February and March like clumsy red paint brushes poking their heads up out of the ground. By April the brushes have become rather untidy heads of pinkish-red berries, each berry with one to three large seeds. The two leaves appear about this time. In the open these are pressed close to the ground but when grown among other vegetation, the leaves of this species are longer and narrower and partially upright. The photograph (Plate 110, upper left) shows three flower heads in gravelly soil among large stones on the upper mountain slopes at Banhoek near Stellenbosch. Early in January a veld fire had swept over the ground burning up all the vegetation, and when this photograph was taken in February these red paint brushes were very striking objects.

Haemanthus hirsutus has a bulb very like *H. coccineus* and two leaves similarly closely pressed to the ground. It is a smaller and daintier species than *H. coccineus* and the surface of the leaves is covered with coarse hairs. Last year I secured three bulbs of this species from Barkly West and the photograph (Plate 110, lower right) was taken recently of one of the bulbs which flowered. The flower head is quite dainty with pure white flowers and golden tips to the spreading stamens. At the present moment I have the prospect of a nice harvest of seeds from this flower head from which I can increase my stock.

The third photograph (Plate 110, upper right) is of *Haemanthus Katherinae*, a species which comes from Natal. Instead of there being only two leaves as in the two species described above there is a definite stem with up to a dozen large leaves. Another difference is that the flowers appear with the leaves. The overall height is about eighteen inches. The flowers are large and daintily spaced and of the same beautiful sunset pink as the Inanda Lily, *Cyrtanthus sanguineus*.

The fourth photograph (Plate 110, lower left) is of two species from Kenya, *Haemanthus filiformis* and *H. Lynesii*. In both species the bulb and the leaf characters are the same as in *H. Katherinae*. The bulbs were obtained in December and were potted at once. The photograph was taken at the end of February. This shows that the leaf and the flower appear more or less at the same time. The inflorescense of *H. Lynesii* is a handsome bright red spherical mass, about 6 inches in

diameter, formed of red perianth segments and red, gold-tipped stamens. In due course I will have the name of this species confirmed as I have had another *Haemanthus* described to me under this name which is evidently a different species and of which I am hoping to secure a few bulbs for comparison.[1]

Haemanthus filiformis (Plate 110, lower left) is a comparatively small species but with the same sort of open inflorescense as in *H. Katherinae,* but the coloring is not nearly so distinctive. There is an interesting point about *H. filiformis* that should be worth while investigating. In the species of *Haemanthus* with which I am familiar the flower head is a simple umbel. In *H. filiformis* the outer pedicels are two-flowered and there is an interesting graduating between these and the inner one-flowered pedicels. The outer flowers have a perianth in five parts and the stamens range from six to five due to a varying amount of connation between two stamens on the side of the second flower. On the inner pedicels the flower is normal and hexamerous as is generally the case in Amaryllidaceae. Examining the series of pedicels from the centre to the periphery, it looks as if the second flower had arisen in the axil of one of the perianth segments of what otherwise would have been a normal solitary flower. This perianth segment becomes thus the subtending bract of the second flower. When fully developed the second flower has four perianth segments, four stamens, and what would appear to be a normal style and ovary. In the hope of harvesting seeds later I did not sacrifice the flower in the cause of science.

I had hoped to obtain a photograph of *Haemanthus Pumilio* before publication. It occurs in the Western Province in flat sandy ground that in wet weather, in winter, is at times water-logged. The flower appears before the leaves towards the end of March and resembles a small dull pink paint brush. Several leaves appear shortly afterwards which are very similar to those of *Nerine sarniensis* but much shorter. The bulb is small but not unlike that of *H. coccineus.*

It is a simple matter to raise *Haemanthus* from seeds. These start to germinate soon after ripening and should be sown not later than two, or at most, three months after harvesting. Seeds that have considerably advanced in germination will grow satisfactorily when planted but of course the sooner they are sown the better. In *Haemanthus coccineus* and *H. hirsutus* the seed leaf soon appears. Next season there is still only one leaf and it is not until the third or fourth season that the full number of two leaves make their appearance. The bulbs of these species take about five or six seasons to reach the flowering stage from time of seed planting. The seeds of the other species I have handled *(H. Katherinae, H. magnificus, H. natalensis)* behave somewhat differently. The first germination is under the ground with the formation of a small bulb to which the food material in the catyledon is transferred. Then follows a longer or shorter rest period and it is not until six months or more from the preliminary germination that the first leaf appears above ground.

March 12, 1938.

[1]The plant had been labeled **H. multiflorus,** but it turned out to be **H. Lynesii,** and this name is used in the text.—**Ed.**

CRINUM KRELAGEI

WYNDHAM HAYWARD, *Florida*

The variety of hybrid Crinum, known as *C. Powellii Krelagei,* is one of the outstanding hybrid Crinums in the trade today, and is a tribute to the work of the great Krelage firm in Holland, which made such important contributions to the breeding of amaryllids over the period of a century.

The illustration of this Crinum (Plate 111) appearing in this issue of Herbertia shows the distinctive character or shape of the flowers, but utterly fails to exhibit the delicate tone of the pink coloration which is one of the variety's main charms. The umbel is frequently larger in good specimens. The writer has grown bulbs of the variety *Krelagei* for four years, receiving them from Holland. It is not quite as vigorous as the American variety Cecil Houdyshel, and is a lighter shade of pink.

The shape of the individual flowers in the umbel is very distinct—a little flaring edge makes the blooms one of the most "open" of the *Powellii* group. The flowers remain in good condition throughout the day in full sun, as a rule, which is unusual in Crinums. The bulbs multiply well, and grow vigorously in rich well drained soil. They can be multiplied rapidly by vegetative means. A strong, established bulb will produce five or six scapes of bloom in one season.

In Florida the flowering season starts with the first warm weather of early spring, in late February or March, and continues through April into May. The foliage of the plant is typically *Powellii* in character. The plant is evidently a selection from a number of seedlings of the *C. longifolium-C. Moorei* cross.

AMARYLLIS PROCERA

FRANK VASKU, *Florida*

Through the kindness of a friend we now have a dozen blooming size *Amaryllis procera* bulbs in Florida. They are odd, queer looking bulbs, more like giant crinums than amaryllis in appearance (See Plate 112). Having just received the bulbs the latter part of March of this year, I can do little else than pass on the information that the exporter has given me about their native habitat.

He writes:—"They grow in soil which lies on top of rocks. The soil is very light formed of decomposed leaves and is black, because several times the vegetation, on the mountain where they grow, was burned. They grow *in full sun* amongst weeds which are about the height of the bulbs, there are no trees near, and there is *always plenty of wind.* Perhaps the most important fact is the situation of the plant,—you will never find them on a flat land, but always on slanting ground, the side of a mountain, which is the reason for the bulb being curved and not straight." He goes on to say that they stand below freezing weather in winter and up to 35 degrees centigrade (95 degrees F.) in the shade in summer; and that there are long periods of drought

followed by constant rains. Humidity is always high, so much so that during the driest weather "everything is wet as if it had been raining" every morning.

There are a number of items of great interest in the paragraph above. They grow in full sun, amongst tall weeds, on sloping ground, with plenty of wind. By considering these facts we can probably understand the ecology of the plant better and thus appreciate the factors that have moulded its form, size, and character through countless generations. This *Amaryllis* species is hardy withstanding both long seasons of drought and periods of drenching rains; the heat of tropic summer sun and the below freezing weather of winter. Will it be able to adapt itself to our Florida conditions? They grow in full sun and wind among the weeds, but how much do these weeds protect and shade them? They are never found on level ground. Is this because they must grow on slopes, or is it that only here are found the soil conditions and protection from animals necessary for its well being? We shall endeavor to answer these and other questions as we work with this interesting new-comer to our garden.

AMARYLLIS PROCERA—ITS ECOLOGY AND SOME DEDUCTIONS REGARDING CULTURE, AND BREEDING POSSIBILITIES

Cecil Houdyshel, *California*

Amaryllis procera, popularly called the "Blue Amaryllis" and "Empress of Brazil," does not seem to be offered in the American trade (Plate 112). It is described in Bailey's Cyclopedia of Horticulture which seems to indicate that it may have been formerly available.

Two factors conspire to make this species almost unknown outside its native Brazil. First, the difficulty and expense incurred in importing them. They cannot be dispatched in the mail from Brazil. There is an embarkation fee, a fee for consular invoice and the expense for boxing and packing above the cost of the bulbs. The second factor is the report that the bulbs bloom only the first year after importation.

Probably no one has propagated this species vegetatively and only a few have raised seedlings of it. Most of those who have had the imported bulbs apparently have not found them amenable to either garden or greenhouse culture. We have personally written to a great many growers and find no one who offers a suggestion as to the right culture.

There may be plants that cannot be grown outside their native habitat, but they must be few indeed. No such species is in memory now but certainly some must have offered almost insurmountable difficulties. Study and experimentation have usually shown a successful method. Sometimes the difficulty has been a simple and apparently unimportant factor.

In attempting to cultivate a new species, the ecology of the plant in nature is the proper index for cultural methods. After long inquiry we succeeded in getting into contact with a collector in Brazil who could give a most intelligent report regarding the natural conditions under which *Amaryllis procera* grows.

At Petropolis, near Rio de Janeiro, in south latitude 23°, is a mountain on whose steep slopes this species grows in profusion. No bulbs are found growing on the level lands. Here very strong winds prevail. In the winter there is occasional frost and the temperature at night sometimes falls to 28 degrees F, (-2 degrees C). The days are warm in the sun but decidedly cool in the shade. In the summer the day temperature rises to about 92 degrees F, (33 degrees C.) in the shade.

The rainfall is quite different from southern California in amount and distribution. In the winter, there is little or no rain, but on cool mornings the dew drops from trees and plants like a shower, wetting the ground beneath. There is sometimes a period of three months without rain. Summer rain is abundant. Rain may continue for three weeks, pouring down or drizzling at intervals, the sun never showing. The atmosphere is so humid that boots kept in a closet for two weeks will be covered with mildew. Our correspondent keeps his cigars against the chimney to keep them dry.

The mountains at Petropolis although steep are apparently never very high or rugged but are well worn down and rounded. "Very old," geologists would say. The mountain, where the bulbs are collected has been burned over many times and the soil is therefore black and composed of humus from leaves and charred bits of weeds. Probably because of the moisture the combustion is not very complete and much charcoal enters into the soil composition. The soil is underlaid by solid rock at a depth of only 10 to 20 inches, (25 to 50 cm). Probably the soil is fairly acid although the effect of the ash left from burning over might modify that. The rapidity with which soluble compounds are leached out by the heavy rainfall may make it a factor of no great importance.

No trees grow on the mountain, and only such plants survive that can withstand burning over. *Amaryllis procera* grows in full sun among weeds of about its own height, which is 3 or 4 feet (Plate 112). It is autumn flowering. The plant society in which it is found includes, besides the unknown weeds, bromeliads and a certain grass which burns very easily.

The soil for this species apparently should be composed of nearly pure humus with some leaves and bits of sticks only partly reduced by decay. To this should be added a liberal amount of granular charcoal including the powder. The drainage must be perfect, such as that afforded by a steeply sloping terrace or an elevated bed and underlain a foot below the surface with a thick layer of rocks. If rocks are flat let them be tipped not horizontal.

Since they like strong winds they would likely require perfect ventilation in a greenhouse. Circulation of the air by means of an electric fan might even be advisable.

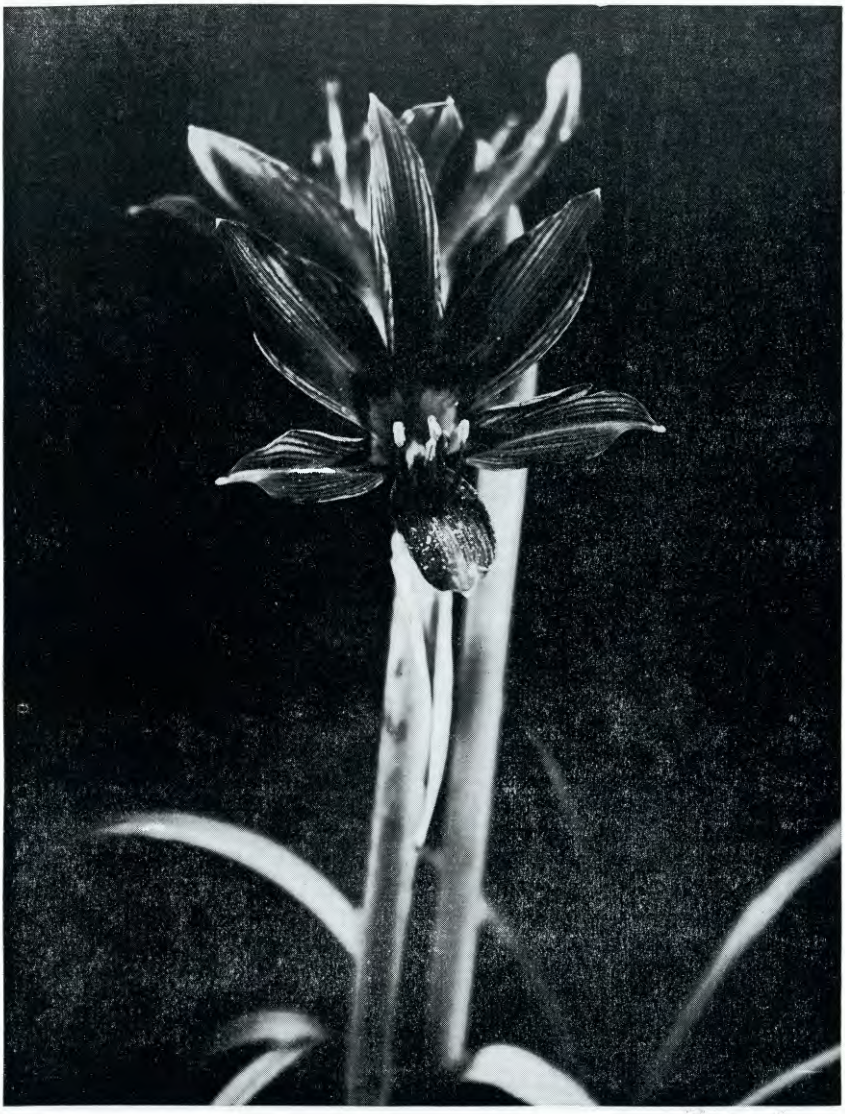
The species will no doubt require that it be kept nearly dry through the winter. The nature of the soil required and the climate of south Brazil points to the necessity of almost daily watering during the summer. Danger lurks in this practice. Potted bulbs might not thrive under this regime because of imperfect drainage. Probably large bottomless pots set on coarse gravel would be best.

Amaryllis lovers would of course like to have a "blue" amaryllis. Our correspondent states that his father years ago shipped many of the bulbs to Europe but because they bloomed only the first year they ship very few now. There would be a good demand for this species and for improved hybrids of it if it were not too difficult to manage. Assuming that this is a possible attainment three steps are suggested to that end.

First,—to work out cultural methods that will sufficiently resemble natural conditions to maintain and flower the imported bulbs at least for a time.

Second,—to grow many selfed seedlings for the purpose of developing a more amenable type. Vegetatively reproduced bulbs will never do it, but it might be possible with multitudes of seedlings. Nature has done it frequently. So has man. When climatic changes have occurred in a region, some plants have been gradually modified by natural selection and have survived. Seedlings of any species vary in visible characters and probably at least as much or even more in characters which relate to their capacity or lack of capacity to survive under any particular soil and climatic conditions. If this is true then possibly, if many thousands of seedlings were grown, even in the first generation, one or several plants might be found that would be much better fitted to our methods of culture and our climate. In succeeding generations some worth while results could surely be expected. The breeder's handicap here is that he does not have Nature's opulence in resources to bring the desired change. Nature produces millions of seedlings and has aeons of time to accomplish a result. But Nature cannot think nor can it plan for a desired end. Intelligent man with limited means, but with a purpose in view can imitate nature's method and may produce results more rapidly. The procedure then is to grow seedlings in the greatest number possible discarding all but the thriftiest the first year. Possibly only a few of the selected plants could be brought to maturity and those only by the exercise of great skill. Succeeding generations by a similar rigid selection would surely bring a strain of *Amaryllis procera* amenable to culture. Such things have been done and that is why we can grow corn in Minnesota and even in Manitoba.

Third,—to produce hybrid strains of "blue" amaryllis by breeding methods. I will not elaborate on this. By crossing, characters are combined in the first generation, and segregation is secured in the second generation. Even a better "blue" flower might result and certainly hybrids of easier culture. It would probably be better to cross with the lightest colored hybrids in order to avoid the dominance of red as a color character in the seedlings. A species, *Amaryllis iguapensis,* white with red or lilac stripes, described from South Brazil, might be useful in crossing, if it is obtainable.



Leon P. Page, Winter Park, Florida *See page 167*

Amaryllis aulica var. stenopetala

Plate 113

Leon L. Page, Winter Park, Florida *See page 167*

Allium neapolitanum

Plate 114

AMARYLLIS AULICA VAR. STENOPETATA

WYNDHAM HAYWARD, *Florida*

This species of *Amaryllis* (formerly *Hippeastrum)* is one of the few known in cultivation today, and is one of the most interesting and worth while for several reasons.

It is of moderately easy culture, thriving in pots in any good *Amaryllis* soil, and will grow fairly well under lath shade in Florida when planted in ordinary sandy loam soil, and kept weeded and fertilized. It appears to like very good drainage, like some other *Amaryllis* species.

Its most significant feature is its fall to winter blooming habit. It is of great value to hybridizers on this account. In Florida the bulbs will bloom under good culture any time from late November until Christmas. There may be two spikes to the bulb, each with usually two large, upward-turned flowers of an attractive bright crimson, with rather narrow segments. Contrary to what might be expected, the appearance of the bloom is quite impressive, and it appears at a time of year when a cheerful colored flowering plant is very welcome.

The plant illustrated (Plate 113) is *Amaryllis aulica var. stenopetata* and it was received from a firm in Holland, where this species is still fairly common in the trade. It is very rare in the United States. Efforts to set seed on *A. aulica* have so far been fruitless, but the pollen should have very promising results when applied on out-of-season blooms of the spring-flowering types of hybrids. The bulbs of *A. aulica* propagate fairly rapidly by offsets.

ALLIUM NEAPOLITANUM

WYNDHAM HAYWARD, *Florida*

Allium neapolitanum, Cyr., (Plate 114) is a highly decorative and easily managed member of the ornamental onion tribe which is well worth growing in pots or in the open border in good soil. In warm climates the bulbs will bloom in February or March. It is said to need protection if grown outdoors in the north. It is also reported to be used for cut flowers abroad and in California. It is probably the most popular species of *Allium.*

A. neapolitanum forces easily, and produces showy umbels of white flowers on slender, wiry stems. The bulbs are quite inexpensive, a few cents each or less in quantity. Any good soil seems to suit them, although they should have good feeding if they are to be used another year. The leaves are somewhat narrow and spreading, and loose-lying in the pots, adding a graceful touch to the blooming plant. What is perhaps most important of all, there is no perceptible onion smell in this allium. The plants may grow to a foot or more tall, but mostly smaller. In Florida and similar climates it is recommended that the bulbs be planted in the Fall. They multiply by offsets and can be raised from seed.

NARCISSI IN FLORIDA

WYNDHAM HAYWARD, *Florida*

One season's trial planting has been sufficient to prove that gardeners in the sub-tropics need not limit themselves to growing Polyanthus or Tazetta narcissi as is commonly the case.

An experimental planting of some three dozen varieties of Narcissus, including many types, at Lakemont Gardens Winter Park, Florida, during the winter of 1937-38, (an especially dry one and somewhat unfavorable in regard to cool weather) revealed a number of types and varieties which are worth trying in any part of the world which may be South of the cooler part of the temperate zone and just above the tropics. (Winter Park lies between the 28th. and 29th. parallel of North Latitude.)

By the sub-tropics is generally understood that part of the world which is suitable for the culture of the citrus fruits to the best advantage. In Florida, South of Jacksonville, narcissi are rare in gardens with the exception of the Tazetta varieties, *Grand Monarque, Paper White, Grand Soleil d'Or, Chinese Sacred Lily, etc.* These Polyanthus varieties are cultivated by the acre in North Florida and do quite well in gardens over the lower Southern states generally.

Late in 1937 the writer obtained a carefully labeled collection of narcissi from Mr. Cecil Houdyshel, Laverne, Calif., and made a test planting of them in medium rich soil, on a moist but well drained lakeside. The only preparation given before planting the bulbs was the application of some hydrated lime, as the soil was known to be somewhat acid.

The bulbs began to bloom in February, in the following order: First, a small dainty un-named variety of *Narcissus odorus* (Jonquil hybrid) of the Campernelle type. Mr. Houdyshel wrote that he obtained it from southern Georgia, where it is common in old gardens. It bloomed vigorously and freely, with a good root system and foliage,—estimated as 90% of optimum.

Second, *Tresserve* (Yellow Trumpet type) was estimated at 75% of optimum. The slightly smaller size of the bloom may have been due to the small size of the bulb.

Third, *Narcissus odorus,* variety *Orange Queen* was very attractive and effective,—estimated as 90% of optimum.

Fourth, *Narcissus odorus,* Campernelle type, variety *Giganteum,* was also showy and effective,—estimated as 90% of optimum. Vigorous and free blooming.

Fifth, *Narcissus Incomparabilis,* variety *Homespun* was very pretty and charming,—estimated as 80% of optimum.

Sixth, Trumpet Narcissus, *King Alfred,* gave satisfactory blooms, but these were smaller than expected,—probably 75% of optimum.

Seventh, *Narcissus Incomparabilis,* variety *Sir Watkin* was as good as King Alfred in blooming results,—estimated as 75% of optimum.

Eighth, *W. P. Milner* (listed as a White Trumpet Narcissus, but bloomed a light lemon yellow) gave small, poor bloom,—about 50% of optimum.

All of these varieties bloomed by March 7, 1938, the date of writing; and the satisfactory nature of the results may be judged from the fact that practically all of the flowers were pulled and sold in mixed bouquets in the writer's cut flower business as fast as they appeared. A number of the varieties failed to bloom by the date mentioned, and a later report may be required to cover their performances. However, the names of the varieties unsuccessful up to the present, are not given, since the one planting described in these notes is of course not adequate to justify the final rejection of any variety.

Nevertheless the results so far point to the fact that the species, and their hybrids, from Southern Europe, seem quite suited for sub-tropical planting. Whether they will maintain themselves from year to year and increase will be determined in the course of time. Also some at least, of the *Narcissus Incomparabilis* and the Trumpet Daffodils, will "force" sufficiently well in a warm winter climate to repay the garden lover for planting them.

GROWING AMARYLLIS IN POTS

I. W. Heaton, *Florida*

For years the main question has been,—"Why don't my amaryllis flower?" It seems that every amateur has another formula for this, and therefore much misinformation is disseminated to the general public. Amaryllis are naturally hard to kill and if a few simple rules are followed will flower every year, even though grown under very adverse conditions,—dry air and steam heat, and little sunlight.

First; purchase your bulbs early and pot early for late potted bulbs will be blind the next spring and may require two seasons to restore natural vigor. Any good soil with drainage with pH above 6 but below 7.8 will suit amaryllis. During the first two months until leaf growth has started, water sparingly. Feed good plant food during the growing season.

Second; after the bulb has flowered and the danger of frost is past, plunge the pots in a partly shaded location, until early fall. If early flowers are desired the bulbs can be placed in the root cellar for a few weeks' drying off, before starting to water and feed prior to the next flowering period. Never permit the bulbs to become too dry, as this treatment will result in loss of the roots. With proper storage conditions the bulbs may be left dormant until the flower scape appears in the spring, before being brought to the light. Do not over water. Each year after flowering some of the top soil in the pots may be removed and replaced, but do not repot each year, rather every three or four years.

HYBRID AMARYLLIS CULTURE IN POTS

WYNDHAM HAYWARD, *Florida*

There are perhaps few plants more generally grown and admired and about which less is understood than the hybrid amaryllis. The amaryllis, is a tropical plant, and will not stand freezing, and must therefore be largely grown in pots in the North, although it will endure winters in the open ground as far up the Atlantic coast as North Carolina in protected places.

The bulbs are occasionally handled in northern gardens under "gladiolus culture," but this is not generally very satisfactory. The ordinary "instinct" of the amaryllis is to bloom in the early spring, February to April, before outside weather conditions in that area are suitable for planting the bulbs outdoors, and the bulbs do not give their best blooming results unless they are established in soil, or are potbound.

Simplicity is the keynote of the amaryllis bulb's requirements, and many thousands of amateur and professional gardeners with no particular gift or skill in horticulture, grow and flower them with success, year after year. Success in growing the bulbs in pots may be said to depend on several factors—vigor of the bulb; the potting soil, water, plant food, drainage, acid or basic reaction of the potting medium, temperature, light, etc.—any one of which may affect the culture adversely.

The writer has found the following to be an admirable potting soil for hybrid Amaryllis; 1/3 coarse sand; 1/3 medium rich garden loam; 1/3 old, rotted cow manure, well broken up. This mixture should have some ground limestone added if there is cause to believe it is much below neutral in pH reaction. The best available information indicates that a soil pH (reading for acidity and basicity) ranging from 7.0 and 7.4 is satisfactory for hybrid amaryllis. They will tolerate a lower reading, but below 6.0 growers are apt to run into serious difficulties.

The pots should be well drained. At least an inch of coarse gravel or broken crocks should be placed in the bottom of each pot, and a large piece of crock placed over the hole in the first place. The bulb should be planted upright with not more than ½ of its bulk in the soil. In repotting it is possible to raise the bulbs until they are 2/3 out of the soil, with good results.

Potting is best done while the bulbs are dormant, from October to February. Some bulbs will start into growth at once after repotting, provided the pots are placed in the light and warmth. Others will remain obstinately dormant several months, and may bloom without making leaf or root growth. However, some time in the winter or spring, the bulbs will start to grow, and water should then be given in a judicious and conservative manner.

When the leaves and roots start, the watering can be slightly increased, just enough to keep the soil thoroughly moist, but never enough to make it soggy or sour. The drainage in the pot will help to avoid this condition. During the spring and summer after growth starts, the plants can be fed with weak liquid manure or a teaspoonful of 5-7-5 commercial fertilizer stirred into the topsoil of the pot every three weeks.

If the bulb is vigorous and other conditions are favorable, the plant will produce long leaves in summer which will begin to "ripen off" in Fall, and in warm climates a second growth period sometimes comes in the late Fall months. In the North, the bulbs can be placed outside in the summer, in half shade, sunk in the ground to the rims of the pots, and watered as needed. Aphis, thrips and red spiders are less likely to attack the foliage under outdoor conditions.

When the first cool weather of Fall arrives the bulbs should be brought inside, and two methods of procedure are open to the grower at that time. The bulbs may either be dried off in their pots and stored away with the pots laid on their sides in a warm dry place for the next few months, or they may be kept in the light and warmth, with just enough moisture given them to retain the foliage. In any case, watering should be sparingly done in the winter months of November, December and January.

During January and February the bulbs should be watched carefully for the first signs of growth, and when leaves or a bud appear, the pots should be brought up to the light and warmth ("benched," in greenhouse parlance) and watering started. Some growers recommend repotting at this time provided great care is taken not to injure the principal roots. However, usually it is sufficient to repot every two or three years. On alternate years, some of the top soil should be removed and replaced with fresh compost. In this way the bulb will remain "established" and will bloom at its optimum. It is also recommended to soak the root ball in warm weak manure water when starting the bulbs in the late winter, after the drying off period. This should be continued only long enough to allow the root ball to become thoroughly wet.

The difference between the quality and character of a bloom from an amaryllis bulb that has been established for a year or so is most remarkable to the beginner. Many persons who have never grown the bulbs believe that the first season's flowers, often produced without roots or leaves, are something like normal. As a matter of fact this kind of performance only exhausts the bulb, and makes recovery more difficult for the following year's blooming time.

In other words, thrifty growth following the blooming period is the essential for good flowering results the next season. Under the principles of treatment outlined above, mature bulbs may be retained in prime condition for many years, in fact indefinitely, barring accident.

The "red rust" of amaryllis, is apparently a symptomatic condition, in hybrid amaryllis, and not a disease in itself. It merely signifies that some condition about the bulb is not to its liking. It may indicate sour soil, poor drainage, thrips or other insect injury, etc.

Insect injury is of great importance with hybrid amaryllis. In Florida in the open the large "lubber" Grasshoppers sometimes devour the foliage of Amaryllis bulbs. This cuts down the carbohydrate food supply to the bulb and the bulbs gradually decline unless protective measures are taken. Most growers collect these insects and destroy them, but the easiest method of control might be the use of a lead arsenate spray on the leaves. In the home and greenhouse, thrips sometimes at-

tack the foliage, especially on the under side of the leaves. Red spiders have a similar habit. Soft scales are occasionally found on the leaves and likewise mealy-bugs. These may be controlled by sprays, nicotine compounds, pyrethum, etc., or by a simple wiping of the leaves, top and bottom, occasionally, with a damp cloth.

ALSTROEMERIA CULTURE IN OREGON

DEAN ASPER, *Oregon*

Alstromerias are not common in Oregon, and are known here as Peruvian Lilies. So far as I have been able to ascertain *A. Aurantiaca* and *A. Aurantiaca var. lutea* are the only varieties grown commercially. Possibly there are other varieties in private collections.

Culture seemingly is simple here. Beds are prepared with leaf mold and well rotted cow manure and are worked in deeply. Seeds are sown in the beds in September and spaced so that the plants may be grown to flowering size without transplanting. After the plants reach flowering size both the plants and cut flowers are taken from the beds as wanted. As *Alstromeria* increases by underground root stocks and also "self seeds" in the beds, each bed continues to furnish plants for some time. Of course the beds run out in time and new beds are started as needed. I am told that these varieties are hardy here without protection. There is a good demand here for the Alstromerias both as cut flowers and also for the plants, according to the grower from whom I received my information.

NUTRIENT SOLUTIONS WITH SPECIAL REFERENCE TO HYBRID AMARYLLIS

I. W. HEATON, *Florida*

It has been known for over seventy years, that plants obtain the necessary mineral elements for growth from the soil solution, resulting from the solvent action of water upon the soil particles. This is a complex system and only when the various elements are in correct proportion, can maximum growth be obtained. If the balance is changed by leeching or concentration, in the soil of any of the important elements, unfavorable growing conditions result, due to either exhaustion of necessary food elements or concentration and accumulation of injurious salts. It is seldom that ideal conditions can be maintained during a growing season under field conditions.

Various plant physiologists have been avoiding the unknown factors in soil culture by growing plants in solutions of known concentration of mineral elements, either directly in solution or in sand culture (sand moistened with solution). In reality there is little difference between soil and solution culture, except that in the latter, the important factors may be regulated so that more nearly ideal conditions for growth are secured.

Dr. W. F. Gericke of the California Agricultural Experiment Station first developed solution or tank culture on a commercial scale. He was followed later by Mr. R. B. Withrow and Mr. J. P. Biebel of the Purdue University Agriculture Experiment Station, and Mr. J. W. Shive and Mr. W. R. Robbins, of the New Jersey Agriculture Experiment Station. Cornell University also contributed along this line. The Purdue men developed sand culture, while the others worked on nutrient solutions with continuous feeding. According to the California system the plants are grown directly in the solution without support of any kind. Shallow tanks containing the solution are covered with wire netting on which hardwood shavings are placed to hold the plant stems. The roots are free in the solution. While water culture eliminates the labor of watering the plants there is difficulty in maintaining the oxygen and iron supply unless the solution is aerated, as oxygen is only slightly soluble in water. The iron is slowly precipitated from the solution and must be frequently replaced to prevent iron chlorosis. This feature and the difficulty of supplying sufficient oxygen more or less limits tank culture to the experts, who can test exactly the content of each item in the solution. At the same time by this method it is fairly easy to control the concentration of the other food elements, as the solution is not changed by any chemicals which might be in sand or cinders used in the other methods.

Mr. Withrow and Mr. Biebel developed a sand culture method more applicable to control in the hands of the average grower. Under their method the plants are grown in sand and the solution is applied by subirrigation, the surplus draining back to the storage tank to be used again, resulting in considerable savings over the continuous flow method used at Cornell and New Jersey. The method of continuous flow is mainly for experiments in plant nutrition and is not for commercial use. But at the same time this testing by continuous flow will develop the formula we will need for sand culture. Basicly all three methods are the same, in that the plant food is dissolved in water and fed as required by the plants.

The sand culture method appears for various reasons the best for hybrid amaryllis, and as the equipment required is the same in all methods, except in the matter of aeration, which can be disregarded in this method, as the sand will contain oxygen in the spaces between the soil particles as soon as the surplus solution has drained away. Further, occasional stirring of the solution before irrigation will carry part of the precipitated iron content with the solution.

The equipment needed consists of a tank at least 8 inches in depth and of a convenient size, with a drainage hole in base, and raised to enable the solution to be drained back into the storage tank. A complete illustration of a sand culture bench will be found in Circular No. 232, Nov. 1937, Purdue University Experiment Station.

As yet there has been no definite work on a special solution formula for hybrid amaryllis, and it will require several years' testing before the best type of solution for this crop will be discovered.

Dr. Ausker E. Hughes, formerly Chemist of the United States department of Agriculture, has suggested the following formula.

(Commercial grades of Fertilizer salts in parts per Million, derived from $CaH_4(PO_4O)_2$; $2CaSO_4$; KNo_3 and $(NH_4)\ 2SO_4$): Nitrogen, 100, 67 parts derived from Potassium Nitrate; Phosphoric Acid, 208; Potash 244; Magnesium Sulphate, 69; Manganese Sulphate, 69; Iron Sulphate, 34; Copper Sulphate, 34; Zinc Sulphate, 17; and Borax, Trace. The above solution when made up will have a low pH value, and will require the addition of Dolimite lime to raise it to a reading of pH7. This will also increase the content of magnesium to some extent.

The excellent results secured in raising seedling amaryllis in flats fed with Nitrophoska No. 5 suggested the following formula,—

Nitrogen, 111; Phosphoric acid, 222; and Potash, 222; with the minor elements as above, and the same treatment for pH. Both of these formulas disagree with those suggested by the experimenters quoted above,—

Mr. Withrow gives the following formula:

Magnesium Sulphate (anhydrous), 1 lb. (2 oz. per M gals.)
Monocalcium Phosphate (food grade) 0-55-0, 2 lbs., 6 oz.
Potassium Nitrate, 13-0-44, 1 lb., 4 oz.
Ammonium Sulphate, 20-0-0, 1 lb., 4 oz.
Calcium Sulphate (agri. gypsum), 13 lbs., 4 oz.
Iron Sulphate, 4 oz.
Manganese Sulphate, ¼ oz.
Copper Sulphate, ⅛ oz.
Zinc Sulphate, ⅛ oz.
Borax, 3 oz.

Translated into parts per million there we have,—Nitrogen, 50, with 33 parts from ammonium sulphate; Phosphoric acid, 176, and Potash, 235.

In the second formula he increases the Potassium Nitrate to 10 lbs., or 175 parts per million from this salt, and 33 parts from ammonium sulphate reducing the Phosphoric acid to 1 lb., 2 oz., or 80 parts.

There is very little difference in the third formula except a reduction of gypsum. From past experience I feel that Mr. Withrow's solutions are not suitable for amaryllis for the nitrogen-potash ratio is not on a 1 to 2 basis. Commercial acid phosphate, reasonably free from flourine, will supply all the sulphur required, replacing both the Monocalcium Phosphate and gypsum. The latter is not of much value for it is so slightly soluble in water.

Early publication of Herbertia makes it impossible to include final results secured from the use of Dr. Hughes's and the Nitrophoska formulas. For an accurate check of both of the solutions and soil culture, two tanks have been planted with two bulbs each of the following varieties of amaryllis; *Dutch Pure White* seedlings, 1″ dia.; *Dutch Salmon* seedlings 1″ dia.; *No. 211,* Propagations 2-2½″ dia.; *No. 1494,* 1″ dia.; *No. 1449,* 1¼″ dia.; *No. 1320,* 2″ dia.; *No. 5110,* 1½″ dia.; slow growing variety; *Mephisto,* 1½″ dia.; *No. 156,* 1½″ dia.; and *No. 211,* 2″ bulbs at 18 months. The tops were trimmed even but the roots were not cut. In 10 days every bulb but the *Salmon* seedlings had produced a

new leaf with an average growth of 3″. The color was much improved and a chlorotic condition of the *No. 211's* had disappeared. Evaporation and transpiration is at the rate of a gal. per week, and this loss of water is replaced with fresh water. The food elements are not depleted except as the bulbs absorb them. The absorbed elements are replaced every thirty days and this on the basis of chemical tests. The free solution is tested by means of colorimetric methods for the various salts, and a sample of the original is saved and labeled for comparison with the thirty day tests, when a lighter color will show the need of additional salts. These are added to the solution, and it is retested until the original color is obtained. In this way the stock solution is not wasted every thirty days, but can be used as long as the tests show the normal concentration of plant food. After a few months the rate of absorption will be evident for each salt and may be easily replaced, with only infrequent chemical tests. From a cost standpoint it appears that sand culture will materially reduce the expense of growing amaryllis. While the original equipment will cost about 2 cents per bulb, the depreciation is small, and great savings will result from the labor items in cultivating and weeding.

Results First Thirty day Period. Total leaf growth of each variety, in inches.

	Tank 1	Tank 2
Bulb—Pure White	32″	41″
Salmon	20″	1″
#211	8″	3″
#1494	12″	13″
#1449	6″	1″
#1330	38″	19″
#5110	16″	21″
#1	22″	25″
#156	26″	17″
#211, 5 bulbs	122″	120″
	302″	261″

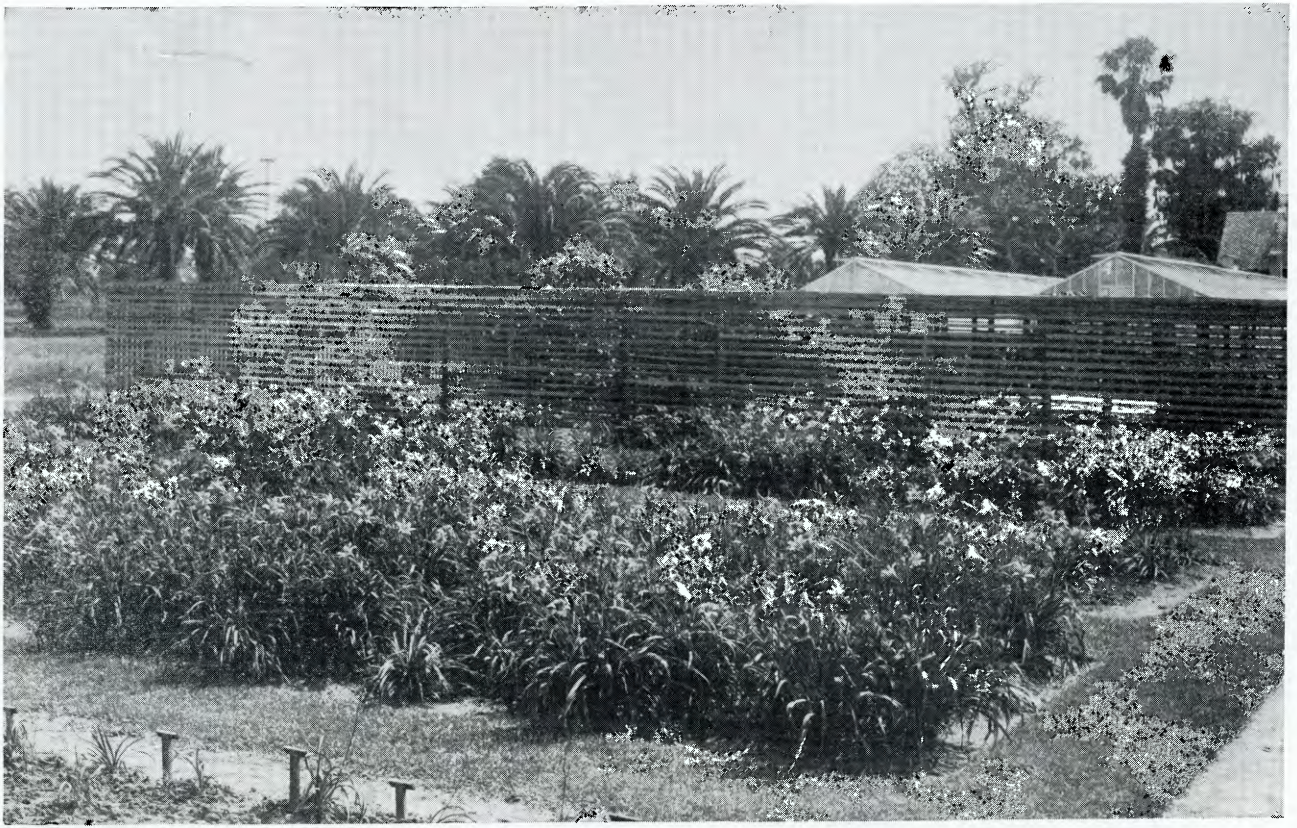
Tank No. 1 has produced firmer foliage as well as more growth during the first month.

THE CULTURE OF HYBRID AMARYLLIS

I. W. Heaton, *Florida*

During the past year I have made little change in cultural methods. Barnyard manure has become scarce and I have turned to leaves for a source of humus. This has required the addition of extra lime and I am now using oyster shell. To reduce labor costs and permit more frequent feeding for the past year all of the plant food has been in the form of chemicals applied with the irrigation water. The average feeding is 200 pounds per acre each month of a 10-20-20 chemical fertilizer.

The 10-20-20 mixture, applied as above, was also used with fine results on 54,000 seedlings raised in flats. At the rate of 500 seedlings per flat the size was well over ½ inch in bulb diameter at the end of nine months.



H. H. Hume

See page 94

Partial view of Daylily Trial Grounds, Florida Agricultural Experiment Station, Gainesville

Plate 115

7. HARVESTING, STORAGE AND FORCING

PERIODICITY, FORCING AND EARLY FLOWERING IN THE AMARYLLIDACEAE

JOHN GRAINGER, *England*

The Amaryllidaceae occupy a place of honour amongst the plants which can delight the eye with fragrant bloom in winter. Such floral amenities are not, however, obtained without horticultural effort, and considerable skill is needed to obtain Christmas bloom from such plants as the Daffodil. The simplest method is to hasten the period of obvious growth of the shoot by temperatures above normal. This is the practice of forcing, but modern research opens the possibility for even greater control of the time of flowering, by the use of further treatment. A proper understanding of the newer methods must be laid upon a knowledge of the periodic development of each species. At present, detailed results are only available, amongst the Amaryllidaceae, for the Daffodil, and to a limited extent, for *Hippeastrum hybridum*.

ORGANIZATION OF THE DAFFODIL BULB

The annual history of the Daffodil has been studied in great detail by Huisman and Hartsema (1933). A bulb of forcing size, lifted at the beginning of May would show, in longitudinal section, a number of scales, representing three or four years' growth, arising from a conical root-plate. No flower bud would then be visible, even by the aid of a strong lens, but a minute bloom will later develop in the centre. Each year's contribution to the bulb is made upon a standard pattern, and for convenience, such an annual increment is shown in Plate 116. Three scale leaves (S) are the first organs to be formed, and encircle the bulb completely except for an opening near the apex. Inside these are three, or possibly four, foliage leaves (Ls), with scale-like bases. The innermost base does not completely surround the bulb, but the others do so, except for the opening near the apex, where the leaf blades emerge. A flower initial (F), and later the bloom, occupies the centre, whilst a bud (Lb) which will make the succeeding year's contribution to the bulb, lies at one side of the flower initial, opposite to the last foliage leaf. Side bulbs arise freely in the Daffodil, and each originates as a bud (Sb) in the axil of a foliage leaf, usually the first. Only one side bud is usually formed in any year's growth; multi-nosed bulbs arise through the adherence of what are functionally separate bulbs, for each "nose" represents about three years' growth.

A bulb of forcing size has usually two active annual increments, surrounded by the brown, shrivelled remains of a third. Each increment is organized in uniform manner, each culminates in a terminal flower, each provides for continuity of growth from a sub-terminal bud, and each allows subsequent vegetative propagation by the formation of a side bud. Development of the scales and foliage always takes one complete year, and the leaves which emerge with a flower commenced their formation twelve months before the bloom initial appeared (Fig. 34). When the

requisite number of vegetative primordia have been laid down, that is, when three scales and three foliage leaves have been formed in miniature, flower formation commences, usually in the month of May. The growing-point in the centre of the bulb then passes through the stages described in Plate 117, until every organ of the future flower is complete in miniature. This stage is reached in Yorkshire about the middle of August (Grainger 1935) and in Holland at the end of July (Huisman and Hartsema 1933). Formation of the flower bud is made at the expense of food stored in the scales; the bulb is living upon its capital, and though it appears inactive, growth is really vigorous within. The

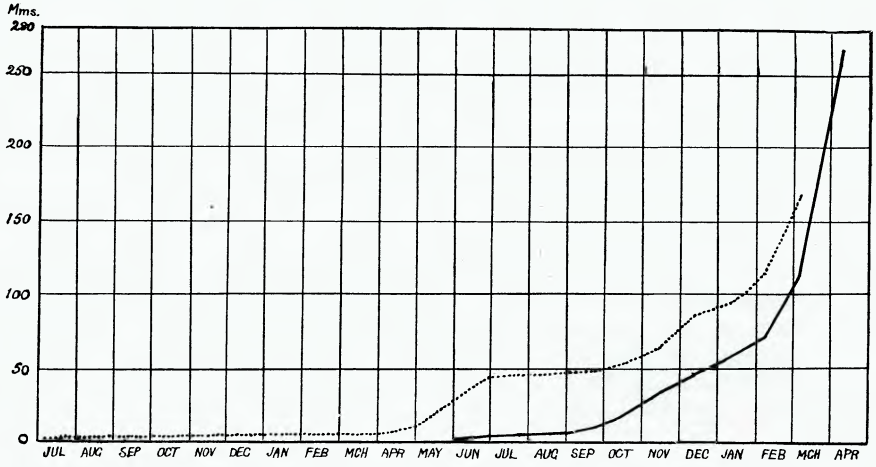


FIG. 34. The relative rates of formation of the leaves (....) and the flower (—) of a Daffodil bulb (From data of Huisman and Hartsema 1933).

attainment of a bloom bud complete in miniature marks the beginning of a period of rest, when the bulb is really quiescent. This rest period may last for five or six weeks, and upon its completion the bulb sends forth roots, the shoot growing point continues its work, and from this time until the flower emerges, growth is maintained steadily. There are thus two periods of growth, separated by a rest period.

The Practice of Normal Forcing

It is a matter of common horticultural experience that the second period of growth can be hastened or forced by temperatures warmer than normal. The natural blooming time of the Narcissus is in April, but flowers can be obtained at the end of December by forcing treatment only. Bulbs are lifted from the field about mid-July, after the foliage has withered. The *Poeticus* division of Narcissi should, however, be lifted somewhat earlier. Bulbs of this class have a very short rest period, and begin to root soon after the foliage has yellowed. The time of lifting must be so arranged so that new roots are not broken, for most bulbs cannot increase the number of their water-abrosbing root tips by branching, and every broken root is a curtailment of the essential water supply.

Lifted bulbs should be dried, but care must be taken to avoid strong sunlight, which may cause a breakdown of the tissues. Severe breakdown may even endanger the growing point, whilst partial damage always diminishes the available supply of food stored within the bulb scales. Shelters for bulb drying should be provided. These may be either well-ventilated rooms, or sheds with open sides. The bulbs should be packed in single layers within shallow boxes which can be stacked like potato sprouting boxes.

Daffodil bulbs for forcing are usually potted or boxed at the beginning of September. The pots or boxes are placed close together in a cool situation, and are then covered to a depth of about 6 inches by soil, sand or fine ashes. This treatment is known as "plunging," and provides the requisite cool temperature for the rest period. Any other cool environment, such as an unheated cellar, would serve the same purpose. The rest period will probably extend to the early part of October, when roots begin to form, and the bulb becomes firmly anchored in the soil. The pots or boxes may then be brought into a cool greenhouse, and later into increasing temperatures, as mentioned below. Growth takes place steadily, and culminates with the appearance of the flower at Christmas or in January.

Temperatures are important during the time of leaf extension and blooming—the "stretching period" of the Dutch investigators. The best conditions appear to be provided by a temperature of 9°C. (48°F.) until the shoot is about 3 cms. long; then 17°C. (63°F.) until the leaves are 6 cms. long, when a temperature of 20°C. (68°F.) will bring about flowering in the shortest time (Blaauw, Hartsema and Huisman 1932). It has also been established (Grainger and Crawshaw, 1938) that a temperature of 75°F., applied from above the plants by electric lamp-type heaters when flower buds are visible, will hasten their bursting by 10 to 14 days, when compared with a normal greenhouse temperature of 65°F.

Principles and Practice for Early Flowering

Hastening the period of shoot growth is the usual conception of forcing, but a similar treatment with temperatures warmer than normal could also be applied to the flower-forming growth which precedes the rest period, and when combined with further treatment to shorten the time of rest, would make it possible to have blooms at a very early date. This line of argument, portrayed in Plate 118, has been abundantly proved by experiment, though many necessary horticultural details still require elucidation.

The writer obtained Daffodil blooms on November 25th, 1931 (Grainger 1935). Bulbs were lifted on May 19th. from a Yorkshire field, and were stored in an incubator at a temperature of 75°F., until the flower initials were complete. This happened in the early part of August instead of later in the month, as under natural conditions. A period of about three weeks was thus saved from the yearly schedule. The causes and physiology of a rest period are not yet understood, but it is known that cool temperatures or treatment with certain chemicals can, in general, be used to shorten it. An ice-box, maintained at a tempera-

ture of approximately 45°F. was used to this end, and after four weeks' treatment, roots began to appear. The bulbs were then potted, and taken to progressively warmer houses, until they produce a satisfactory quota of very decorative, if somewhat small, flowers well before the end of November. This was, however, regarded more as a demonstration of botanical principles than as a successful horticultural practice, and for suitable cultural details, the work of van Slogteren (1933, 1935, 1936) must be consulted.

It is, in the first place, difficult to apply the necessary temperatures to hasten flower formation, unless the bulbs are lifted from the field. The usual time of lifting in Holland is mid-July, and there is considerable evidence to show that lifting before the normal time is correlated with the small size of the resulting flowers (van Slogteren 1933). Growers are thus left with the two alternatives:—1. to grow bulbs destined for forcing in such a position that the soil can be warmed artificially, or 2. to lift at the normal time , without any hastening of flower bud formation, and then subject the bulbs to a cool temperature, until they are ready for extension growth. The latter treatment appears to be the more successful in practice, and several kinds of Narcissi, lifted in mid-July, stored at 48°F. until the end of October, and then brought into forcing temperatures, have flowered before the end of November (van

Plate 116.—Diagrams of the yearly addition to a narcissus bulb, in optical plan, A, and longitudinal section, B. A bulb of forcing size contains two or three such contributions. Three scales (S) without foliage leaves are formed on the outside, then three scales (Ls) with leaf blades, shown by the break-lines at the tips in B. All the scales and leaf bases except the innermost one (Ls' in A) encircle the bulb completely at the base (see A), but a small opening near the tip (indicated in B) allows the leaf blades to emerge. The flower (F) is visible in the centre, and the bud (Lb) at the side opposite the last foliage leaf, is already forming the next annual increment. It should be mentioned that although the diagrams show the organs added to the bulb each year, the full development of the scales and leaves has occupied nearly two years (see Fig. 34), for the bud Lb grows very slowly during the time when the leaves (Ls) and flower (F) extend and appear above ground. A bud (Sb) arises in the axil of the first foliage leaf, and forms a side bulb, which will form about two annual increments of scales and leaves before making a flower. The position of the previous year's flower stalk (Fs) is shown to orientate the other parts; F becomes Fs in the succeeding year, Lb becomes the next annual contribution, whilst Sb proceeds to form another "nose" to the bulb, and ultimately separates from its "parent."

See text on page 177.

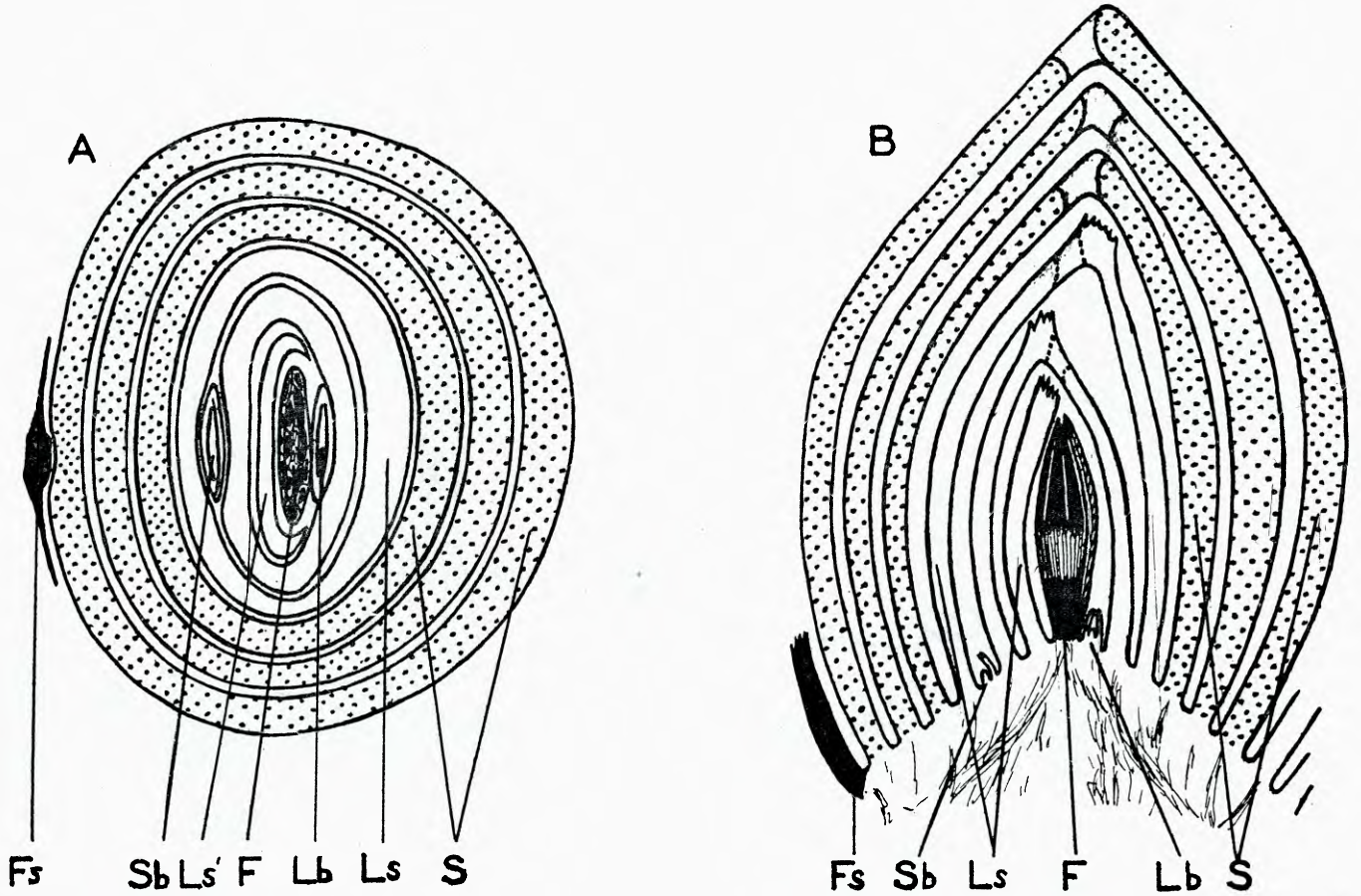
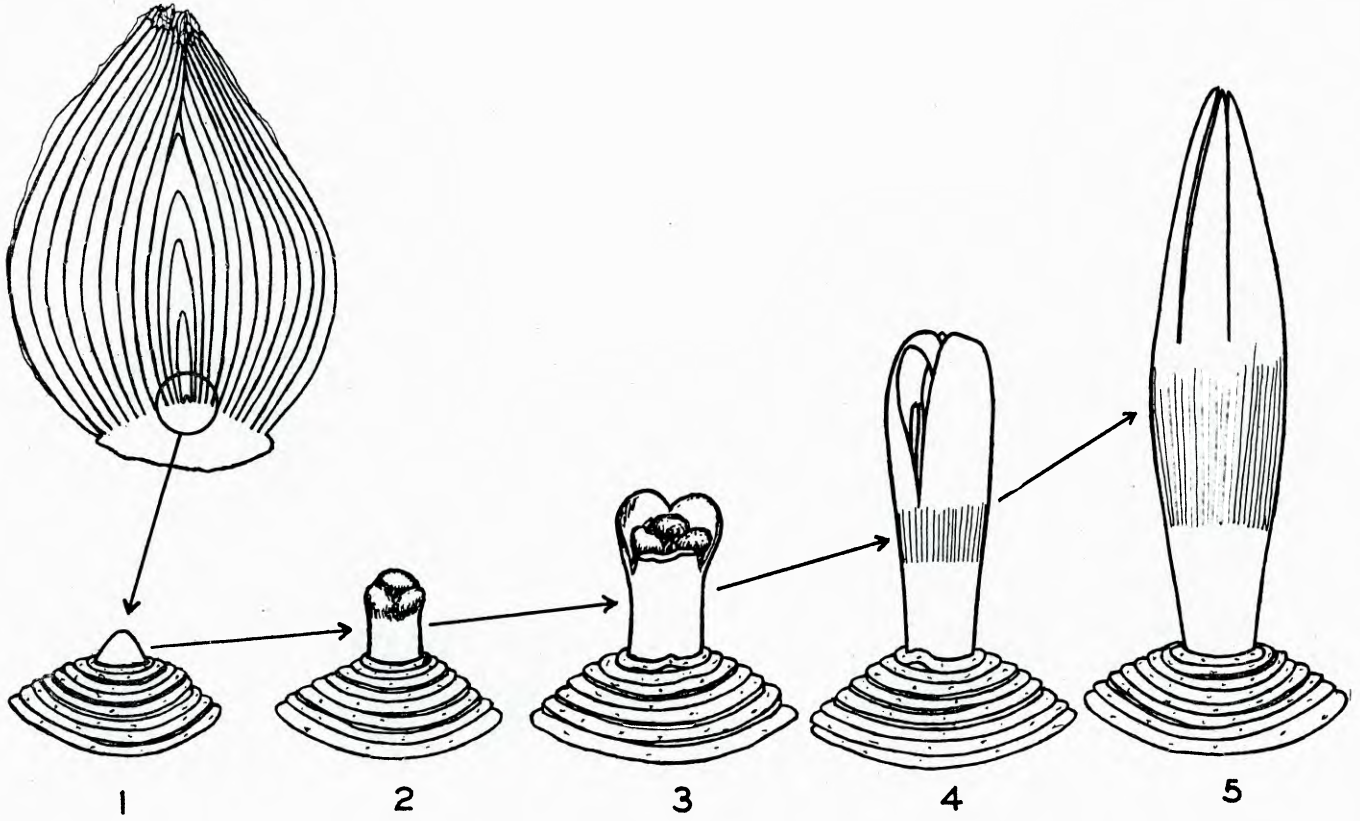


Diagram of the yearly addition to a narcissus bulb. See legend on opposite page, and page 177

Plate 116



Development of the young flower in the narcissus bulb (Growing-point diagrams magnified 12 diameters; bulb diagram ¾ natural size). *See legend on opposite page, and page 178.*
Plate 117

Slogteren 1933, 1935). Several experiments have shown that storage at 68°F. for two weeks immediately after lifting in July, is sometimes beneficial, and doubtless this marks the completion of the flower-forming period. Gerritsen and van der Kloot (1936) give the optimum temperatures for this stage as 68°F. falling regularly to 63°F.

The early forcer should have control of his bulbs at all stages. Daffodil bulbs do not lend themselves to early-flowering treatment before entering the devious channels of commerce. Bulbs stored at 48°F. should not be exposed to a higher temperature before they are forced into growth, and this fact alone makes it difficult to market refrigerated bulbs. It also appears that places with a relatively warm climate in mid-July are not so naturally suitable for the production of early daffodil blooms as cooler districts, unless artificial storage is adopted. One noteworthy feature of the results of van Slogteren is the relatively short period of actual forcing. Bulbs may be stored at 48°F., from mid-July until the first week in November, and still flower before the end of that month. Such a long period of refrigeration represents not only the rest period, but also the first period of forcing at a cool temperature. Bulbs are apparently stored without planting until mid-September, when boxing takes place, and further refrigeration is accomplished in this condition. Van Slogteren gives the following temperatures as optimal for the Daffodil:—

	July	Aug.	Sept.	Oct.	Nov.
For early forcing	62–64°F.	46–48°F.	46–48°F.	46–48°F.	46–48°F.
For later forcing	62°F.	62°F.	59°F.	48°F.	48°F.

Plate 117.—Development of the young flower in a narcissus bulb. At the beginning of May, the growing-point in the centre of the bulb is very minute and roughly conical in shape (1). A side bud which would later grow into the next year's shoot (Lb in Fig. 1) forms about this time, but for the sake of clarity, neither this bud nor the floral bract (spathe) is shown in this series of diagrams. The growing-point elongates, and then three low projections appear (2). These are the initials for the outer perianth lobes, and they are quickly followed by three more, the inner perianth lobes, within the first series, and alternating with them (3). The front outermost lobe is broken in (3) to show the alternating initials within. Diagram 4 represents a stage when the stamens have appeared, and the ovary is being laid down, whilst (5) represents the flower complete in miniature. The trumpet would be laid down at this time; it arises as a ring of tissue around the stamens. This stage is reached in Yorkshire at the middle or end of August, and somewhat earlier in Holland.

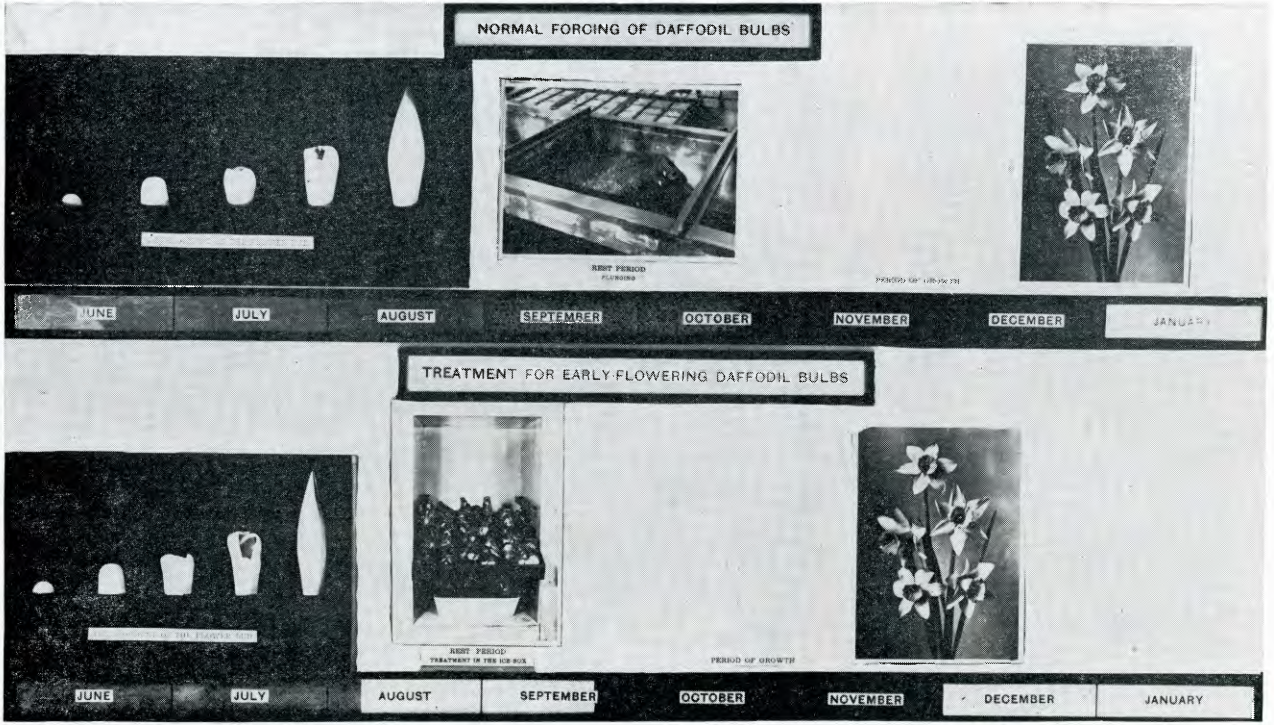
Growing-point diagrams magnified 12 diameters; bulb diagram ¾ natural size. See text on page 178.

It would seem necessary, moreover, to work out details of culture for different geographical regions. Conditions in Yorkshire vary considerably from those in Holland, though a qualitative similarity is always detectable. The completion of flower formation, for instance, is later in Yorkshire by three or four weeks, and it is perhaps significant that the artificial hastening of flower formation in early-lifted bulbs was by no means such a complete failure as van Slogteren reports for Holland. It is possible that the methods which yield such excellent results in the hands of Professor van Slogteren and his colleagues at Lisse, Holland, could not be applied to other localities without modification in detail. The principles of treatment are, however, firmly established, and it is now incumbent upon experimenters in other regions to adapt them to local conditions. A time of minimal floral beauty can be embellished by an Amaryllid, but the process requires the executive skill of the gardener to be coupled with the exactitude of a scientist, for it is important to control temperatures and other treatments exactly.

The periodicity of Narcissus is broadly similar to that of the Hyacinth and Tulip, but several important differences occur in detail (Gerritsen and van der Kloot, 1936; Mulder and Luyten, 1928). Practical details for early flowering are by no means interchangeable in the three kinds of bulb. An interesting problem connected with the ripening of Narcissus bulbs relates to their transport to the southern hemisphere. A bulb has thereby to withstand a journey across the equator, and has further to adapt itself to a different time of flowering, namely August instead of April. Such a change in the periodicity is accomplished by keeping the bulbs at the relatively higher temperature of 28°C. (81½°F.), with a humidity of approximately 70%, from the time of lifting, until the end of the following February, when they are sent to the southern hemisphere (Hartsema and Blaauw, 1935).

Periodicity of Hippeastrum hybridum

Periodic development in Hippeastrum has been studied by Blaauw (1931). The foliage leaves begin to appear about December or January, and continue to grow in regular succession until the following September, under Dutch conditions. Leaf formation is then arrested, and the main period of flowering usually takes its place. Flower buds appear to be formed fairly regularly every fourth leaf, and there may be as many as six flower buds, the result of two seasons' growth, when vegetative growth is arrested in the autumn. Two or three of these will flower at the main time of blooming (1, 2 and 3 in Plate 119); the others (4, 5 and 6) wait until the following year before they emerge. It should therefore be the care of the gardener to nourish the plants during one season for the blooms they are to produce in the next. If only two buds are ready to emerge at the flowering period, the second will bloom two or three weeks after the first, but if a third bud is capable of development, an interval of two months or more will separate it from the second. It is thus possible for the gardener to ensure a greater and more extended succession of bloom by arranging for the production of three flower buds in each year. The sooner leaf growth can be made to commence in De-



The principles for normal forcing of Daffodils (above) and for early flowering (below).

Normal forcing: Flower formation under natural conditions, completed towards the end of August, then rest period under relatively cool conditions of "plunging" under ashes within an open garden frame until mid-October, followed by period of growth and flowering at the end of December.
Early flowering: Flower formation hastened by a temperature warmer than normal, completed in early August; rest period shortened by treatment in an ice-box, followed by period of growth and flowering at the end of November.

Part of a specialist exhibit made by the writer for the Yorkshire Museums Federation.

Plate 118

See page 179

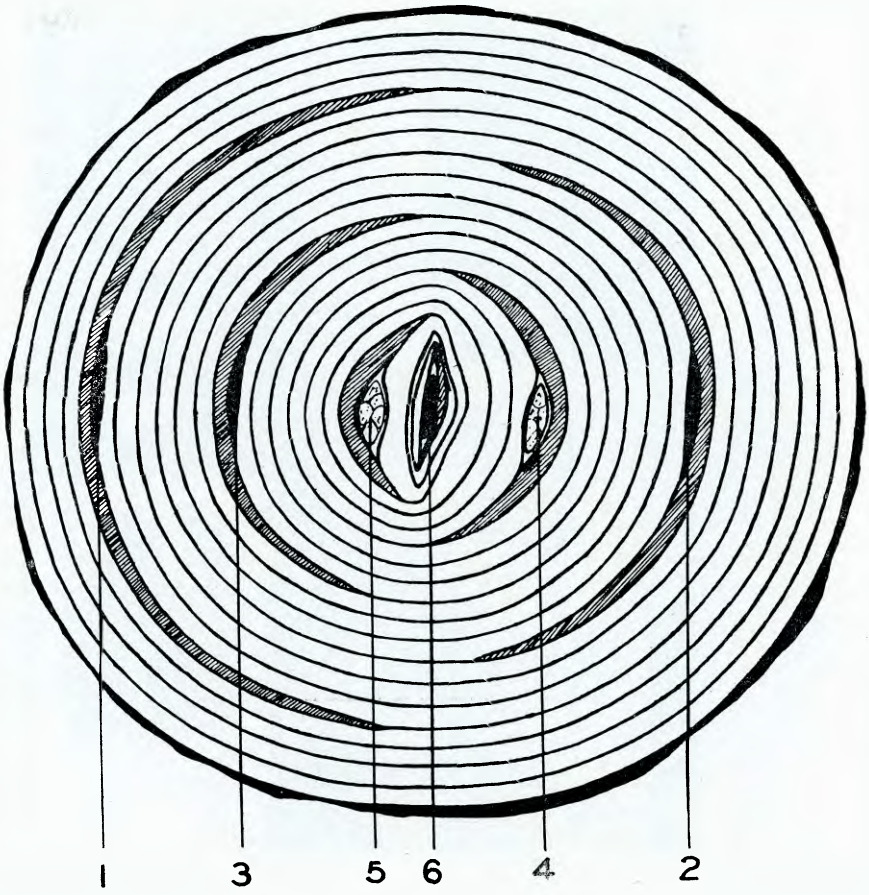


Diagram of a bulb of Hippeastrum hybridum, as seen in plan, showing six inflorescence initials.

Approximately two years' growth is represented by the bulb. The inflorescence buds arise in the axils of every fourth scale (shaded in the diagram, and not encircling the bulb completely as do the three preceding scales). Bloom buds 1, 2 and 3 are represented by the lower part of the stalk, as the plane of section passes below the inflorescences. These buds will bloom in one flowering period; buds 4, 5 and 6 will emerge a year later. It is possible for a bulb of two seasons' growth to have only four bloom buds; such a state of affairs could be visualised from the diagram if the central bloom bud (No. 6) and the outermost (No. 1), with all scales external to the latter, were omitted. Two inflorescenses would then appear at one flowering period, and two a year later. An interval of about two weeks would separate the pair of blooms in each season, whereas if three were available at each flowering period, the first and second would be separated by about 14 days, and the second and third by two months.

Modified from Blaauw. (1931). (See pages 184 and 187.)

Plate 119

cember, by the provision of more water or otherwise, and the longer it can be maintained in the autumn, the more chance is there for the appearance of the twelfth leaf of the season, with its concomitant third flower bud (i. e. No. 6 in Plate 119). Cessation of growth in autumn is often assisted by dry conditions, though this is not always so.

Horticulture is a skilful craft, an ancient art, and a developing science, which can give great reward for knowledge. The more exact control of plants made possible by modern investigations not only enhances man's diet, both quantitatively and qualitatively, but also gives that most desirable of assets: increased floral beauty.

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THE EARLY FORCING OF DAFFODILS

Prof. Dr. E. van Slogteren, *Director of the Laboratory for Flowerbulb-Research at Lisse, Netherlands*

After the early crocus the daffodils give color to our bulb fields, depending on the weather conditions of the preceding winter and early spring, and the fields become yellow in different shades beginning about the 15th of March or the first of April. The first hyacinth blooms follow about a fortnight later and they again are succeeded by the brilliant colors of the tulips.

Until about eight years ago the succession of flowers and colors in our glass-houses, on our flower markets and at our exhibitions was quite different from the sequence observed in the bulb fields.

In December the prepared hyacinths and a few tulips came first, succeeded by more hyacinths and tulips and with only a few exceptions we were not able to bring the daffodils into bloom before the second half of January. Most of the daffodils arrived after the first of February.

How can this discrepancy in precocity of the flowers on the fields and in the forcing-houses be explained? The bulb growers certainly had done everything that seemed possible to bring all kinds of bulb-flowers on the early market, but all methods, applied successfully to the other flower-bulbs to influence favorably the precocity of the flowers, practically failed with the daffodils.

The first attempts to force bulbous plants into flower were made by the Dutch bulb growers themselves before any official scientist had given any attention to the problem. The principle of "preparing" the flower-bulbs for early forcing was discovered by the Dutch bulb-grower, Nicolaas Dames, more than thirty years ago. He was the first to apply jarovisation or vernalisation to bulbous plants. Various methods of preparing flower-bulbs for early forcing have been applied.

(a) The bulbs may be planted in a milder climate, where they can flower earlier, can be lifted earlier, and thus gain somewhat in precocity as compared with the bulbs grown in our climate.

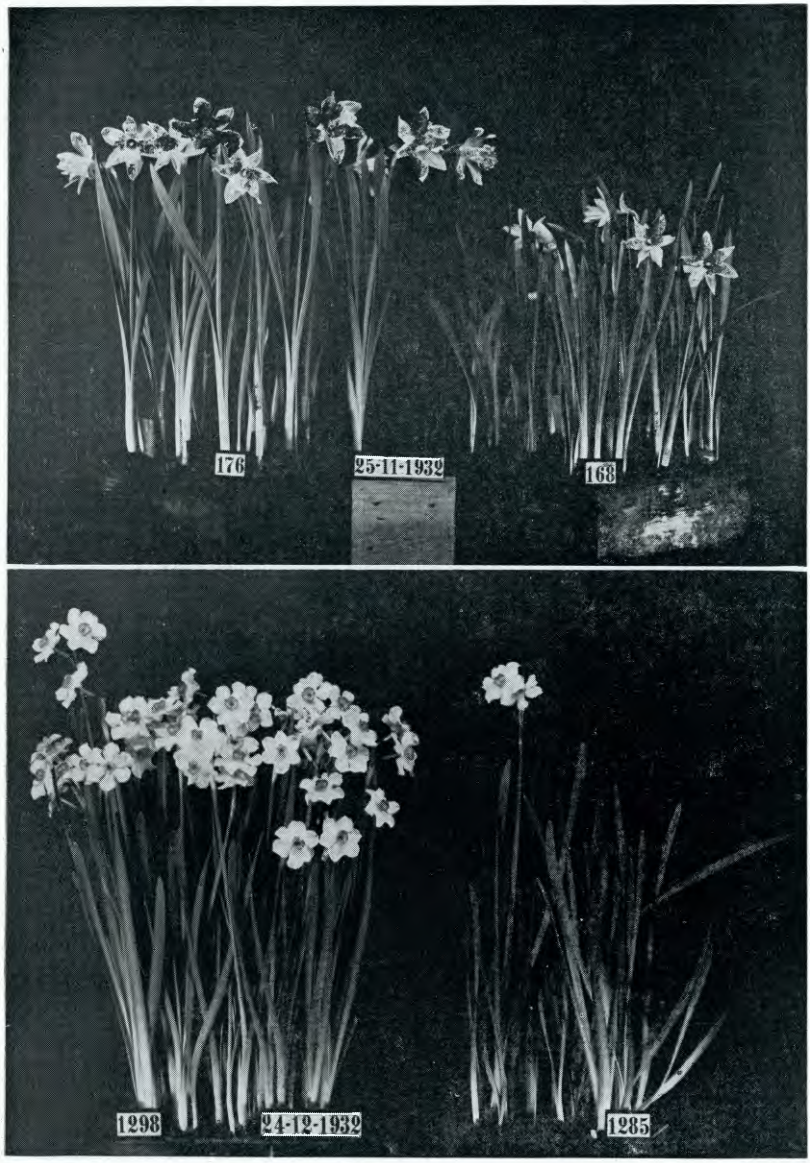
(b) The bulbs may be planted in glass-houses and thus giving them an artificial climate, which also makes them flower earlier and better fitted for early forcing.

(c) The bulbs may be planted in the open above heating tubes or electric cables buried in the soil. In this case the bulbs have all the advantages of the growing conditions in the open, and this is desirable for the production of proper sized bulbs, and in addition to this, during the last weeks of the growing season, before the lifting, the ripening of the bulbs in the soil and flower formation can be favorably influenced by a higher soil temperature than that provided by the natural climate.

The object of these three methods is to correct, during the growing period of the bulbs, adverse influences of the natural climate on the forcing capacity of the bulbs for the next season. It was the ingenious idea of Nicolaas Dames to improve the forcing capacity of his hyacinths by lifting them prematurely and by ripening them under artificial conditions instead of depending on the whims of the natural climate. Through a great number of experiments he succeeded in bringing hyacinths into bloom about four weeks earlier, lengthening in this way the period of sale for his products by about a month.

To make clear why this method did not give any satisfaction for daffodils, I am obliged to point out in brief some differences between the flower formation and development in hyacinths, tulips and daffodils. My explanations are based on the climatic conditions and the experiences in our climate. Later on we shall be able to secure an idea of the significance of these facts for other regions, where daffodils are grown.

The formation of the flower for the next season in hyacinths normally starts in July. By prematurely lifting the bulbs in June and applying different storage temperatures, the normal formation of the leaves in the bud for the next season can be stopped, and the formation of the



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Upper, Narcissus Golden Spur, both boxes lifted June 16; No. 176 kept for 2 weeks at 62.5 degrees F.; No. 168 at 48 degrees F., until forcing, Nov. 25.

Lower, Narcissus Mignon; No. 1285 lifted June 27; No. 1298 July 15; both kept at 48 degrees F., until forcing, Nov. 28.

Plate 120

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See page 191

Left, Narcissus Brilliancy; lifted July 15, Planted Sept. 13 at 48 degrees F.; in glass-house Nov. 7; in flower Nov. 28,

Right, Narcissus Early Surprise; lifted July 16; stored 2 weeks at 62 degrees F.; in glass-house Dec. 1; in flower Dec. 14; photo Dec. 21.

Plate 121

flower initiated. In this way to a certain extent it is possible to start the formation of the flower of the hyacinth when it seems desirable.

With tulips, lifting and storing at a higher temperature does not determine the beginning of the flower formation as with the hyacinths, but here the completion of the leaves first has to take place.

A great number of experiments, first by the bulb growers themselves, later on by Blaauw and his cooperators, by Beyer, and the writer in our laboratory for flower-bulb research at Lisse, have been concerned with the optimum storage conditions for influencing the formation and further development of the flower, and the forcing capacity of hyacinths and tulips.

Hyacinths and tulips are lifted in June and July, depending on the varieties and the desire to improve the forcing capacity. The premature lifting of tulip bulbs sooner leads to deterioration of flower quality than similar treatment of hyacinths. Most of the tulips are lifted in July, before the formation of the flower inside the bulb has begun. In the case of daffodils, however, the formation of the flower already starts in the beginning of May, about two and half months before the bulbs can be lifted. At lifting time the formation of the flower is practically ended and after lifting only extension growth takes place.

Premature lifting of daffodil bulbs very soon leads to excessive dwarfing of the flowers for the next season and mostly spoils the crop. For this reason the period of flower formation cannot be influenced artificially and this depends entirely on the natural climatic conditions of the district where the bulbs are grown. Most important for the forcing capacity of the daffodils is the fact that optimum storage temperatures for early forcing of the lifted bulbs are much lower than for the hyacinths and tulips, and even lower than the normal average temperature of our climate. The method applied most successfully for hyacinths and tulips, the applying of an artificial climate during flower formation in the bulb, therefore cannot be used for daffodils.

The three methods mentioned, planting in another climate, in glasshouses, or on top of heating units in the soil, are also of much less importance for daffodils since the optimum temperature for flower formation is so much lower than for hyacinths and tulips that the soil temperature may easily be made too high for the optimum development of the flower. Planting in a milder climate can make them bloom much earlier than in our regions, but the early summer following the spring here is mostly very hot and has a retarding influence and therefore the advantage attained during the winter, is again lost.

At present, after our investigations and experiments of the last ten years, we know that by treating daffodils as we did formerly, we only made them less fit for early forcing. (See Plates 120, 121, 122, and 123.) Generally we can say that daffodils lifted in our region, must be stored at a temperature of 46° to 48°F., while the average outside temperature in our country in July and August is about 65°F.

The growers had already found out by experience that storage indoors together with hyacinths and tulips retarded the flowering still more. By leaving them out-of-doors in the field the greatest precocity was

attained, but this still excluded the possibility of forcing them before the second half of January or later. Now after lifting we put them in refrigerated storage of about 46°-48°F., when we wish to have them as early as possible. For a somewhat later date we prefer to keep them at 62°F. during July and August and at 59°F. during September.

Griffiths complained about excessive dwarfing when he stored the bulbs immediately after lifting at 48°F. This may be due to the fact that the period of storage is too long when the bulbs are lifted earlier than takes place in this country. The stage of development of the flower, too, due to climatic influences, may not be far enough advanced at lifting time when they have been grown in a warmer climate and in this case I should certainly prefer to store the bulbs at about 62°F. until the second half of July or about the first of August.

In Table 1 the average monthly day temperatures together with the optimum temperatures for early and later forcing of daffodils under our climatic conditions, are indicated for a number of locations. With us, as I have stated before, flower formation has normally been completed when we store the bulbs at 46°-48°F. For other climatic conditions than in Holland one has to keep in mind that for early forcing it does not seem necessary to bring most of the varieties into cold storage (46°-48°F.) before the first of August.

TABLE 1.

Average monthly day temperatures, degrees Centigrade (Means for 24 hours)

	July	Aug.	Sept.	Oct.	Nov.	Dec.
De Bilt, Netherlands	16.8	16.6	13.8	9.6	5.0	2.6
New York City, U. S. A.	23.1	22.3	19.2	13.1	6.7	1.3
Washington, D. C., U. S. A.	24.9	23.6	20.1	13.6	7.2	2.3
St. Louis, Mo., U. S. A.	26.2	25.2	21.1	14.7	6.3	1.9
Chicago, Ill., U. S. A.	22.4	21.8	18.1	11.7	3.9	–1.5
Portland, Ore., U. S. A.	19.8	18.8	15.9	11.8	7.6	5.2
Los Angeles, Calif., U. S. A.	19.7	20.3	19.2	16.8	14.6	12.9
Greenwich, England	17.1	16.7	14.2	10.0	6.7	4.7
Optimum temperature for *early* forcing of daffodils	17.0 to 17.9	8.0 to 9.0	8.0 to 9.0	8.0 to 9.0	8.0 to 9.0	
Optimum temperature for *later* forcing of daffodils	17.0	17.0	15.0	9.0	9.0	

When the bulbs are lifted one has to investigate the stage of development of the flower-bud inside the bulb. If all the parts of the flower have not yet been formed it is advisable, to store the bulbs at a temperature of about 62°-65°F. When all parts have been formed and only extension-growth is still necessary, the bulbs can be stored at a lower temperature as mentioned above. (46°-48°F.). By following this procedure we have demonstrated that the period of sale for daffodils can be lengthened 4 to 6 weeks. Many varieties can be had easily by about the 15th. of December, and not less important from an economic point of view is the fact that the period of forcing in glass-houses has been shortened considerably at the same time.

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Left, Narcissus Incomparabilis Helios; lifted July 18; stored at 48 degrees F.; planted Sept. 15 at 48 degrees F.; in glass-house Nov. 18; in flower Dec. 5; photo Dec. 14.

Right, Narcissus Orange Glow; stored at 48 degrees F. from Aug. 2; planted Sept. 22 at 48 degrees F.; in glass-house Nov. 11; in flower Dec. 19.

Plate 122

Prof. Dr. van Slogteren *See page 191*

Upper, *Poetaz Narcissus White's Hybrid; lifted July 15; stored at 48 degrees F.; planted Sept. 15 in boxes outdoors; in glass-house Nov. 30; in flower Dec. 17; photo Dec. 24.*

Lower, *Narcissus Spring Glory; effect of glass-house culture (645); soil-heating (650); and field culture (657).*

Plate 123

The new methods of treating daffodils have given both agreeable surprises as well as disappointments with reference to the response of different varieties to this treatment. Some varieties, like *Crocsus* and *Bernardino* have lost a part of their popularity. One of our most beautiful varieties however, Mrs. E. H. Krelage, Plate 95, formerly seemed of no use for early forcing and was considered to be one of the latest of our daffodils. It responds however very well to cold storage and now gives a great number of flowers of excellent quality early in January.

It is clear that for optimum results with early forcing, the potting of daffodils has to take place at a low temperature, preferably not higher than 46°-48°F. The bulbs must not be planted before the soil temperature is sufficiently low.

It is possible to keep the bulbs dry in storage at 46°-48°F. until the end of September or the beginning of October, if the root development is kept back sufficiently by regulating the moisture in the storage room. If the soil temperature is too high and root growth is too rapid, the bulbs can be planted in pots or boxes that can be stored indoors at 46°-48°F. In this case great care must be taken that the boxes are sufficiently watered during this period.

Varieties which make roots easily later in the season, like *Sir Watkin* or *Helios*, may be kept dry at 46°-48°F. until rather late in the season, (we have kept them like this until October 16th, and had them in flower on Dec. 22), before planting them out of doors. At this date the soil temperature is usually low enough, certainly it is in our climate. Other varieties, like *Poeticus ornatus*, which do not make roots well enough if planted late, are better planted early under artificial temperature control.

When the bulbs have to be shipped one also has to take into account the possibility of climatic conditions before, during or after the voyage, influencing fitness for early forcing. Practically throughout the whole northern hemisphere where daffodils are forced, the high temperatures of July or August absolutely ruin the capacity of daffodils for early forcing. The forwarding of the bulbs in most cases should be delayed until the climatic conditions are more favorable.

Formerly we needed from 4 to 6 weeks forcing at 65°F. or higher to secure the blooms by February 1-15th. Now, at a temperature of 60°F., we bring a great number of varieties in bloom in about 10 to 20 days. We prefer not to force them at a higher temperature. If one is in doubt about the right date of setting them in the forcing house, it is advisable to start forcing at 55°F. When the foliage starts to grow and the flower-buds appear outside the bulb, the temperature can be raised to 60°F. or a little higher. If growth stops and the flower-stalks do not grow, it is very dangerous to raise the forcing temperature. In most cases this indicates that the potted bulbs have been brought into the glass-house too early and it is better to drop the temperature. If too much harm has not already been done, one should start forcing again in about one to two weeks later at 60°F.

One has to keep in mind that the morphological development and the size of the flower-bud are not always a reliable criterion as to the early

forcing capacity of any particular variety. A somewhat higher storage temperature in July and August may be more favorable for the extension growth of the flower-bud in some cases. Other bulbs, stored at a lower temperature, may show smaller flower-buds and therefore less advanced extension growth, yet the latter may flower about a month earlier than the former. This indicates that other factors also determine the fitness for early forcing and for this reason in our laboratory we have studied the biochemical processes that take place in the bulbs during storage. The carbohydrate metabolism is largely influenced by the storage temperature and we are studying this side of the problem to secure a better insight into the physiological processes that take place in the bulbs.

Summary

The formation of the flower of daffodils begins much earlier than with other flower-bulbs and may start about two and a half months before the bulbs can be lifted. The optimum temperature of this development of the flower in the bulb before it is lifted is rather low.

If the flower has been completely formed at lifting time the bulbs can be stored at 46°-48°F. If necessary a short period at about 62°F. may be advisable, until all parts of the flower are completed.

In a very early climate there may be danger of too long cooling. Starting at 46°-48°F. at the end of July is sufficient for early forcing. Preferably bulbs should not be planted before the soil temperature has dropped to 46°-48°F.

By applying these methods daffodil flowers can be had about 4 to 6 weeks earlier than heretofore in excellent quality, and the period of forcing can be cut down to about half the time formerly needed.

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8. THE SOCIETY'S PROGRESS*

THE SECRETARY'S MAIL BAG

Mr. Edward Steichen, Ridgefield, Conn., writes that he "had a grand time" during a three months trip through Yucatan and Southern Mexico early in 1938. "We saw in various places what looked like a double flowered Amaryllis. As might be expected, it wasn't very attractive, but seemed quite common," he adds. Mr. Steichen had a fine color photograph of Hemerocallis in the March 1938 issue of the "Ladies Home Journal."

Major Albert Pam of Wormley Bury, Herts., England, corresponding member of the A. A. S., had the pleasure of having a photograph of his greenhouse full of flowering plants of *Pamianthe peruviana,* that interesting winter-flowering amaryllid which was named after him, published in an issue of the Gardeners Chronicle (London) early in 1938 (March 12, page 175).

Dr. Harper Goodspeed, Professor of Botany and Director of the University of California Botanical Garden, has promised to share with the American Amaryllis Society any amaryllids collected during his projected plant exploration trip to Western South America during 1938-39. This exploration trip has the sponsorship of the California Garden Clubs, Inc. In 1937 Dr. Goodspeed arranged the importation of some 15,000 bulbs of the interesting *Leucocoryne ixioides,* "Glory of the Sun," illustrated in the 1936 "Herbertia," in order to find varietal types having greater vigor, different colors, etc.

Mr. Harry L. Stinson of Seattle, Wash., delivered a series of popular lectures on "Fundamentals of Botany" on the Civic Center Spring Program, of his City, during January, February and March. Mr. Stinson is a pioneer amaryllid enthusiast of the Northwest and is a charter member of the Society.

Dr. J. C. Th. Uphof, Professor of Botany at Rollins College, Winter Park, Florida, who contributes the notable article to this issue of Herbertia which relegates the Herbertian genus Hippeastrum to limbo (few will regret this) is the author of many distinguished monographs and scientific articles in the field of botany, biology and plant genetics. His work includes the latest revision of the Sarraceniaceae for the Pflanzenfamilien, Vol. 17b.

Perhaps the most interesting feature of the 1938 Southeastern Regional Amaryllis Show of the A. A. S., in Orlando, March 23-24, was the display of the light rose and pink- and white types of hybrid amaryl-

*Information in this section was prepared by Mr. Wyndham Hayward, Secretary of the Society.—Ed.

lis entered as a non-competitive exhibition jointly by Dr. H. P. Traub and Dr. A. E. Hughes. It was a revelation of the lightening effects of the use of pollen from the best near-white on the darker bulbs.

The months that Dr. A. E. Hughes served as executive secretary of the American Amaryllis Society were sufficient for him to leave an excellent record of service and cultural proficiency and efficiency. His culture of amaryllids, (he is a soil chemist by training) proved the most successful in an intensive way ever seen in Florida, without fear of contradiction. Our best wishes and those of all his friends in the Society go out to Dr. Hughes in his new position and we are grateful to him for his zeal and enthusiasm during a period of overwhelming activity.

Regarding some red-flowered Cyrtanthus bulbs which he donated to the A. A. S. Trial Collection, Mr. W. E. Rice of Downey, Calif., writes, "This is a very pretty thing; it will grow quite readily if given an abundance of water as long as it will grow. Full sized bulbs are about as large as Zephyranthes." Mr. Rice writes that he grows thousands of Hippeastrums, Chlidanthus, Lycoris, Sprekelias, etc. The Cyrtanthus proves to be well worth growing, and may be offered to A. A. S. members next season.

"We have already worked in reds, pinks, etc., for about 20 years, and we *ought* to have the best possible to obtain," Dr. A. B. Stout of the New York Botanical Garden advises in describing his researches in the new shades of Hemerocallis. All Daylily enthusiasts who can make the trip to New York are urged to visit the display gardens of the New York B. G. at Bronx Park in season, and see the wonderful new variations being evolved in the red and pink daylilies through the use of Hemerocallis fulva rosea, etc.

Daylily breeding is recommended without reserve for those real plantsmen who like to see something new develop from their own handiwork. All that is needed is a collection of the leading named varieties, and a few of the outstanding species and their varieties, for the amateur plant lover to create at least a few new things of value. The breeding of daylilies is still in its infancy and the possibility for variation is millionfold in the shades of yellow, orange, bronze, fulvous, pink, rose and red. Some time there may come a pure white one. Seedlings *can* be bloomed in less than a year in Florida or twenty to twenty-two months on an average.

"President Roosevelt," the Leopoldi type hybrid amaryllis introduced by I. W. Heaton in 1934 remains the outstanding named variety of this class in common cultivation today. In the writer's own experience it has almost all the desirable qualities, good shape, good color, fine texture, vigor of growth, ease of propagation, proved quality as a pollen and seed parent. Its rich red-orange flower with the startlingly white center is easily recognized by one who has once seen it, even after a year or two.

Pure white hybrid amaryllis are still the most sought-after color and the most scarce of all types. The pure white bulbs do not have the vigor of the colored types for very successful vegetative propagation on a large scale, and they grow slowly even under good cultivation. They take a year or two to become well established in pots, and resent disturbances severely. It is hopd that by widespread sowing of white seedlings under outdoor conditions, a strain can be developed which will breed reasonably true to color and type from seed, and which will produce an occasional bulb of sufficient vigor and vitality to make the vegetative propagation of pure white named varieties easy.

The writer takes this occasion to call attention to a previously unknown or unnoticed hybrid Crinum variety, which is hereby termed *Rawlinsii* for purposes of identification. This variety was donated to the A. A. S. Trial Collection by Mrs. Rawlins of Orland, Calif. The flower is of the Powelli type and may be a sister hybrid of some of the known *Powelii* varieties. However, the flower is darker rose-purple than any known *Powelii* variety, almost a wine color. It is several shades darker than *Cecil Houdyshel.* The form of the bulb, flower, foliage, scape, etc., is like *Powelii,* but smaller. The A. A. S. will have several bulbs of this for distribution in another season.

Mr. Frank Vasku of Winter Park has been the object of much horticultural visiting since he imported a dozen bulbs of the genuine Amaryllis (formerly Hippeastrum) procera (the "Blue Amaryllis") from Petropolis, Brazil, during spring, 1938. Mr. Vasku made the necessary commercial contacts on his own initiative through a missionary and deserves high commendation for his enterprise in making this first recorded introduction of the bulbs into the United States in many years. The picture of one of the bulbs (Plate 112) appearing elsewhere in this "Herbertia" speaks more than words can tell. It is a preposterously large amaryllis bulb, three feet long, and definitely not an epiphyte as previous sources had indicated. We predict that greenhouses and lathhouses will grow them by the dozens when the secrets of their culture are solved. A lavender-blue flowered amaryllis is about all that has been lacking short of a yellow one.

The American Amaryllis Society still stands in need of a few sizable donations for extra-Herbertia publications, as monographs, texts, etc., and for additional black and white and color plates for the Year Book. Grateful recognition of all special donations for whatever purpose will be accorded.

The Society acknowledges with appreciation the donation, received in 1937, of $50.00 from Maj. George Churcher, English plant fancier and gladiolus specialist in addition to his interest in Amaryllis, toward the extra burden of expense sustained by the Society in publishing the double issue of the 1937 Herbertia.

Ft. Lauderdale, Florida, on the lower East Coast of the state, will be a center for amaryllid pligrimages when Mr. R. H. Gore, the new executive secretary of the A. A. S. makes further headway with his collection of rare Amaryllis, Clivias, Nerines, Crinums, etc. Mr. Gore entered upon the cultivation of the amaryllids with a sincere and serious purpose, to provide Fort Lauderdale and Southern Florida with an outstanding collection of plants and bulbs of this group. From personal contact we know Mr. Gore to be a man of resolution and perseverance, and we feel safe in predicting great things for his gardens next to where the Gulf Stream rolls.

Won't the members of the American Amaryllis Society continue to consider the work of the Society and its welfare, *their* particular interest? If you like our Year Books, tell us so. If you have suggestions for its improvement, or ideas for publication or research within our field, let us know. The officers are always glad to have letters from members and readers in all parts of the world. It is this friendly, living, cooperative spirit which compensates for the many hours spent in official service.

The exhibit of a color photograph by Mr. Edward Steichen of New York and Ridgefield, Conn., attracted much attention at the 1938 Southeastern Regional Amaryllis show in Orlando, Fla. This photograph is of large size and was donated to the American Amaryllis Society especially by Mr. Steichen for reproduction in "Herbertia" when sufficient funds for the color printing plates may be available. Contributions toward this end will be welcomed. The picture shows a light type of flower of very pleasing shape and form. At the Orlando exhibition it rivaled the living flowers for popular interest.

"Gardening Illustrated" for March 5, 1938 shows a photograph of the flower, Amaryllis (Hippeastrum) *Edward Cartwright,* a magnificent variety with large, soft red flowers, shown by Mr. R. F. W. Cartwright, which received an Award of Merit from the Royal Horticultural Society in London at the R. H. S. Fortnightly Show, February 22-23.

Mr. Arthington Worsley, amaryllid specialist of Ventnor, Isle of Wight, England, author of the William Herbert biography in the 1937 "Herbertia," described a species novum (new species) of Gladiolus, *G. tardus,* December-flowering, in an early issue of the Gardener's Chronicle (England) this year (1938).

Sr. Joao Dierberger, of Sao Paulo, Brazil, corresponding member, writes that he believes he has discovered the genuine *Amaryllis* (Hippeastrum) *rutilum var. citrinum,* the rare *yellow* flowered amaryllis, lost for a century. We hope he sends the Society some seeds or bulbs as soon as possible!

Clivias seem to be coming in for greater popularity in Europe and America. The German horticultural papers are full of advertisements of seeds and plants of Clivia hybrids in the spring, and in America Mr. E. P. Zimmerman sends us a series of remarkable photographs of his lath houses of the plants in bloom. Mr. Cecil Houdyshel is also making Clivias an important specialty of his bulb business.

From Mr. John V. Watkins of the University of Florida, College of Agriculture, comes the comforting information that the clone of Hemerocallis fulva var. rosea (recently named *Rosalind* by Dr. Stout), greatest desideratum and most promising plant for the hybridizer, is at last finding its way into normal nursery channels, and in a few years should be available to the garden public at a reasonable price. He writes: " . . . *H. fulva rosea* bloomed for the first time in our garden (University of Florida) on May 6, 1934, having been received from the NYBG earlier in the year. Now there is enough stock for our needs and we have exchanged several divisions for new hybrids of northern plantsmen."

This note will serve to publish a new variety of *Sprekelia formosissima,* the same being *var. Superba,* referring to a distinct and superior type of this interesting species, donated to the Trial Collection garden (A-76) of the American Amaryllis Society by Mrs. Emma Foster of Covina, Calif. This variety has lighter red flowers, larger and more vigorous than the ordinary Sprekelia, and is noteworthy for its light throat, which is usually quite dark in the ordinary species. Mrs. Foster's bulb so far as known is of unknown origin, but in cultivation for some time. It is possible that it may be a hybrid of some sort, since it refuses resolutely to set seed, to its own or any other pollen. The bulb is typically Sprekelia, but larger than usual. It multiplies by offsets.

SECRETARY'S MESSAGE

"Superlative" has been the word covering the worldwide impressions of the 1937 Herbertia which have appeared in print in numerous horticultural trade, scientific and general publications since that outstanding issue came off the press.

Scarcely a letter has reached the secretary's office this last year without some mention of wonder and praise at the prodigious work accomplished and the marvelous result attained in the compilation of that volume. Appreciation unstinted and unreservedly deserved has been accorded with wide acclaim to its editor, Dr. Hamilton P. Traub of Orlando.

Exercising the secretarial prerogative, while we cannot induce the printer, over the editor's head, to insert an electro of the editor's happy countenance, we nevertheless yield to the temptation to quote from two sources, with reference to the 1937 Year Book,—

First, from "Horticulture," December 1, 1937, page 486:

"It would be too much of a task to give anything like an adequate review of this annual, but those who are interested in the Amaryllis and

allied plants will doubtless spend much time with it. I take off my hat to the hard-working editor, Hamilton P. Traub of Orlando, Fla., for the excellent job which he has done."

We take off our own hat to the editor, and have done it conscientiously for several years with ever increasing wonder and admiration at his editorial powers of enthusiasm, perseverance and "punishment."

The second, in a letter from Mr. Edward Steichen, President of the American Delphinium Society, and eminent New York photographer, now of Ridgefield, Conn., dated April 23, 1938:

"Your Year Book is a very impressive job. The amount of conscientious work involved takes on heroic proportions."

The above says it better than many lines of the present writer.

And now to the busy year since the 1937 Year Book went to press:

It has been a fleeting period, with all the joys and trials of plant enthusiasm, research, breeding and cultural problems. There have been interesting and substantial additions to the Trial Collections garden of the American Amaryllis Society, and the Society has grown in membership and importance internationally.

The 1938 Year Book, in its way will match the greatness of the last number. Mr. Ernst Krelage is a worthy successor to Dean Herbert in the annals of amaryllis lore. The name of Krelage will always be large in the records of amaryllid culture. His enthusiasm has also spread to other fields, as witness his service of a quarter of a century to the Dutch Bulb Growers Association. And yet he has retained an active interest in all the amaryllids as a whole, and from time to time, in the European horticultural press, there have appeared his comments and impressions on various subjects.

The Society records with regret the untimely resignation, and with pleasure the loyal service rendered by Dr. A. E. Hughes, formerly of Orlando and now of Detroit, Mich., as Executive Secretary during 1937 and 1938. Without his helpful cooperation the work of the Society and the conduct of its 1938 Regional Amaryllis Show in Orlando, Fla., would have been most difficult.

The officers announce with this issue of Herbertia the appointment of Mr. R. H. Gore, of Ft. Lauderdale, Florida, as successor to Dr. Hughes as Executive Secretary of the Society. Mr. Gore is a business man of Illinois and Florida who has now made the latter state his permanent home, and is building a collection of tropical plants and bulbs, specializing in the Amaryllis Family, (hybrid amaryllis, Clivias, Nerines, etc.) His collection will be outstanding in the Southeast and perhaps the whole country. His other interests in horticulture have encompassed daylilies and irises on a large scale in the North.

As a hotel owner in Ft. Lauderdale, Mr. Gore is planning to institute the first "Amaryllis Room" in any hostelry in the country, with murals and decorations of live plants in season. The Society is to be congratulated on acquiring the cooperation of a man of the experience and good business sense and genuine plantsman's enthusiasm of Mr. Gore.

The Secretary still insists that every member consider himself or herself a committee of one on the welfare of the Society, and spread the gospel of Amaryllis to the extent of one or two new members every year. Application blanks and other information will be supplied gladly. Our membership is still far short of financial security. Your continued co-operation in the sending of your dues with all promptness, and the obtaining of new members, and the donation of special contributions for general support of the Society and Herbertia, will save your editor and the other officers many gray hairs.

—WYNDHAM HAYWARD,
Secretary.

Lakemont Gardens,
Winter Park, Florida, U.S.A.,
April 30, 1938.

NOTICE OF 1939 NOMINATIONS

To the members of the American Amaryllis Society:

As provided by Article 5, Section 1, of the By-Laws of the American Amaryllis Society, which specifies that the secretary shall send to all voting members, not less than 90 days before the date of the annual election, a list of the offices to be filled and the names of those whose terms expire, this information is hereby incorporated in the data below, and same will take the place of a mailed notice to the members to this effect for the 1939 election:—

President	Mr. E. G. Duckworth
Vice Presidents	Mr. T. H. Everett, *New York, N. Y.*
	Mr. E. A. McIlhenny, *Avery Island, La.*
	Mr. Fred H. Howard, *Montebello, Calif.*
Secretary	Mr. Wyndham Hayward
Executive Secretary	Mr. R. H. Gore
Treasurer	Mr. R. W. Wheeler
Director-at-large for 3 years	Dr. Hamilton P. Traub

Article 7, Section 1 of the Constitution, provides that any voting member may submit to the Secretary, not less than sixty days before the annual meeting, nominations for officers and directors. These shall be submitted to a nominating committee, who shall select the candidates for the final ballot.

The Annual Meeting of the Society in 1939 will be held on the second Wednesday in April, as provided by Article 10, Section 1, of the Constitution, this being April 12, 1939. Therefore the names of nominees must be submitted by the voting members to the Secretary before February 12, 1939.

WYNDHAM HAYWARD,
Secretary.

June 8, 1938,
Winter Park, Florida.

The Secretary would like to take this opportunity of calling to the attention of members again the desirability of adding new members and enlarging the field of the Society by bringing it to the attention of horticulturists and garden lovers everywhere. The 1938 Year Book, we hope, will be considered a notable example of the Society's constant efforts to bring together the latest research, the newest accurate and useful information and interesting illustrations concerning the important amaryllis family. The income of your Society is used solely for the publishing of its Year Book, the holding of Amaryllis exhibitions, and generally supporting the other worthy aims of the organization.

REPORT OF TRIAL COLLECTIONS COMMITTEE

The Trial Collections Committee reports herewith the receipt of bulbs, plants or seeds of various Amaryllids since the publication of the report in 1937 Herbertia:

A-211—Hosta species, probably including *undulata media picta, coerulea* and *subcordata grandiflora,* from John F. Ruckman, Doylestown, Pa.

A-212—Seed pods of *Pamianthe peruviana,* from Maj. A. Pam, London, Eng.

A-213—Seeds of *Crinum Forbesianum,* from Mrs. Jerome W. Coombs, of Scarsdale, N. Y.

A-214—Small bulbs of *Elisena longipetala* x *Hymenocallis Calathina* hybrids *(Hymenocallis festalis* in the trade) from Al. G. Ulrich, St. Louis, Missouri.

A-215—*Pyrolirion aurea,* bulbs from Atkins Institution of Harvard University at Cienfuegos, Cuba.

A-216—*Zephyranthes tubispatha*—bulb from Mrs. W. D. Diddell, Jacksonville, Fla.

A-217—*Z. tubispatha*—bulbs from Dr. H. Harold Hume, Gainesville, Fla.

A-218—*Leptochiton quitoensis,* seeds from Maj. A. Pam, London, England.

A-219—Seeds of *Ixiolirion Pallasi* and *I. Ledebouri,* from John Ruckman, Doylestown, Pa.

A-220—Bulbs of Garfield hybrid Amaryllis, Nos. 13 and 30; from Garfield Park Conservatory, Chicago, Ill.

A-221—Bulbs of *Cyrtanthus flammea,* from John R. Heist, St. Augustine, Fla.

A-222—*Ammocharis falcata* seeds, from Maj. A. Pam, London, Eng.

A-223—*Pancratium* species, possibly *maritimum,* seeds from E. N. Blake, Laredo, Texas.

A-224—*Crinum pedunculata,* seeds, from Al. G. Ulrich, St. Louis, Mo.

A-225—*Habranthus texana* from W. Hayward.

A-226—*Alstroemeria nemorosa,* seeds from Maj. A. Pam, London, Eng.

A-227—*Bomarea campaniflora,* seeds from Maj. Pam.

A-228—*Cyrtanthus lutescens,* seeds from Maj. Pam.

A-229—*Zephyranthes macrosyphon,* seeds from Maj. Pam.

A-230—*Zephyranthes Ajax,* seeds, from Maj. Pam.

A-231—*Zephyranthes mesochloa,* seeds from Maj. Pam.

A-232—*Crinum longifolium,* from Maj. Pam.

A-233—*Hymenocallis galvestonensis,* bulbs from Cecil Houdyshel.

A-234—*Hymenocallis Amancaes,* bulbs from U. S. Dept of Agriculture P. I. No. 93769.

A-235—Seeds of supposed *Hippeastrum-Vallota* cross, from Dean Asper, Troutdale, Ore.

A-236—*Alstroemeria aurantiaca var lutea,* seeds and tubers from H. L. Stinson, Seattle, Wash.

A-237—*Alstroemeria chilensis*—seeds and tubers from Mr. Stinson.

A-238—*Hemorocallis,* plants of unknown variety from Mrs. J. H. Churchwell, Jacksonville, Fla.

A-239—*Haemanthus species,* seed from Maj. A. Pam.

A-240—*Cyrtanthus* species, bulbs from W. E. Rice, Downey, Calif.

A-241—*Crinum pedunculata,* seedling from Al. G. Ulrich, St. Louis, Mo.

A-242—*Crinum yemense,* bulb from Mr. Ulrich.

A-243—*Crinum Abyssinicum,* bulb from Mr. Ulrich.

A-244-A-255 from Dr. A. B. Stout, Curator of Education and Laboratories, New York Botanical Garden, New York, N. Y.

A-244 Linda Hemerocallis.
A-245 Circe Hemerocallis.
A-246 *Hemerocallis fulva rosea* (Rosalind).
A-247 *Hemerocallis Thunbergii* No. 1.
A-248 *Hemerocallis citrina* 7-10.
A-249 *Hemerocallis fulva maculata.*
A-250 *Hemerocallis multiflora* No. 2.
A-251 *Hemerocallis exaltata,* Series 1692, No. 19. (a seedling)
A-252 *Hemerocallis Minor* No. 3.
A-253 *Hemerocallis DuMortierii* No. 2.
A-254 *Hemerocallis gracilis* No. 3.
A-255 *Hemerocallis aurantiaca* No. 1.

(Continued from page 96.)

We wish to report that the new name, of the former "Verbandszeitung Deutscher Blumengeschaeftsinhaber," is "Deutsche Blumenbinderei." This is a weekly periodical.

Febr. 14, 1938
Berlin-Lichterf.-West,
Unter den Linden 58
Berlin

Deutsche Blumenbinderei
TSCHEUKE, *Editor*

(Continued from page 156.)

mature Clivia plant will make from ten to twenty new roots each spring and each one is a possible new plant.

These excised new roots are planted in three-inch pots and are handled just like seedling plants. They require from six to eight weeks to form new top growth. This forms at the junction of stem and root, and for the first season may be crooked, but it will be straight by autumn.

Judgement is required in watering and a potting soil with extra good drainage is needed. The new plants will out grow a seedling of the same age, and the mother plant flowers regularly and makes still more seeds, thus doing double duty.

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1938-39

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* This committee makes recommendations to the Board of Directors for the annual award of the *George Yeld Memorial Medal.*

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Mr. Edward Steichen.

PUBLICATIONS OF THE AMERICAN AMARYLLIS SOCIETY

A complete file of HERBERTIA, the year book of the American Amaryllis Society, is indispensable to all who are interested in amaryllids. A limited number of copies of the following are still available:—

Volume 1 (1934). Containing the biography of Henry Nehrling, and many valuable articles on amaryllids; with a portrait of Henry Nehrling and 16 other illustrations; a total of 101 pages.

Volume 2 (1935). Containing the autobiography of Theodore L. Mead, and many excellent articles on varieties, breeding, propagation, and culture of amaryllids; with portraits of Theodore L. Mead and David Griffith and 18 other illustrations; a total of 151 pages.

Volume 3 (1936). Containing the autobiography of Arthington Worsley, and important articles on description, genetics and breeding, physiology of reproduction, and amaryllid culture; with 3 portraits of Arthington Worsley, one color plate and 30 other illustrations; a total of 151 pages.

Volume 4 (1937). Containing the biography of William Herbert; the reprint of Herbert's essay, On Crosses and Hybrid Intermixtures in Vegetables; Dr. Darlington's essay, The Early Hybridizers and the Origins of Genetics, and many important articles on description; cytology, genetics and breeding; physiology of reproduction, and amaryllid culture; with two portraits, forty-four other plates and three figures; a total of 280 pages.

(Continued on page 210.)

THE BUYERS' GUIDE

OUR ADVERTISERS—MAY THE TRIBE INCREASE AND PROSPER

CECIL HOUDYSHEL, *California*

There is just one criticism that might possibly be offered regarding Herbertia's advertisements—there are not enough of them. This section is one of the most interesting in the book and always leaves the reader with a desire for more.

Firstly, I want to give my personal recommendation for every advertiser here. I have dealt with most of them and know many of them personally. I have found them dependable in their transactions, helpful with advice and information, and more imbued with the love of flowers than concerned with the profits in growing them commercially.

It is an accepted truth that advertising pays, but it is not generally realized that the statement needs amplification to make the meaning clear. The fact is that advertising benefits not only the advertiser, but also the buyers who read the advertisements and through them come into possession of fine stocks of amaryllids, and the latest in gardening necessities and luxuries.

Secondly, I want to say a word about opportunity. If I were to relate the most important events of my life, I would have to include the reading of an advertisement in my mother's flower magazine just forty years ago. Through that avenue I acquired a bulb of *Amaryllis Johnsoni,* and I liked it so much that my destiny was influenced. An avocation was acquired that became most literal in its meaning as it "called me aside" from my profession of teaching.

Opportunity is said to knock only once, but this is an error. The world is full of opportunities, and they beat a regular tat-tat-too on your front door and then go around to your back door and even tap on the window panes. They assail you from all sides. But unprogressive people close eyes and ears to opportunity. One of the most effective ways of doing so is to neglect legitimate and ethical advertising.

Thirdly, Herbertia, the annual messenger of inspiration that has revived and enlarged the amaryllid bulb industry in the space of a few years, really merits your consideration. The officers of the Society and the contributors to Herbertia have labored faithfully and unselfishly without remuneration, and the commercial growers of amaryllids who are benefitting from the revival of interest in this group of plants can do no less than to support the Society to the extent of taking out advertising space. In this way they are doing their share toward the advancement of the amaryllids while at the same time they are helping themselves.

Finally, I have a word to the buyers. Every amateur grower of amaryllids should be on the mailing list of every advertiser in Herbertia. At the expense of a post card you can learn much about culture, available species and hybrids. No matter how exacting your wants may be, you will find sources of supply for many of them, and possibly all of them, in the catalogs and price lists of Herbertia advertisers.

Patronizing Herbertia's advertisers, will not only advance all our self-interests in the Amaryllis Family, but indirectly you too are helping to make possible the publication of this book. If you are a lover of amaryllids, or of flowers generally, you will do what you can to make their culture more general. You will appreciate the importance of the cultivation of flowers in the development of cultural tradition, and you will believe that flowers may even be the Envoys of Heaven to Earth.

(Continued from page 208.)

Volume 5 (1938). Containing the autobiography of Ernst H. Krelage; the history of amaryllid culture in Holland by Ernst H. Krelage; Dr. Uphof's important article in which the name *Hippeastrum* is rejected; a revision of the tribes of the Amaryllidaceae; and the genera of Amaryllis; outstanding articles on forcing amaryllids by Dr. Grainger and Prof. Dr. van Slogteren; and many other articles on description, cytology, genetics and breeding; physiology of reproduction, and amaryllid culture; with 33 plates and 2 figures; a total of 218 pages.

The prices of the above described volumes *to non-members* are based on the available supply:

Volume 1, 1934, very scarce, $3.75 each, postpaid.
Volume 2, 1935, very scarce, $3.75 each, postpaid.
Volume 3, 1936, $3.25 each, postpaid.
Volume 4, 1937, (double number), $4.25 each, postpaid.
Volume 5, 1938, $3.25 each, postpaid.

The prices *to members* are $1.00 less per volume than indicated above.

Herbertia in sets	Price of sets, postpaid to non-members	to Members
Vols. 1, 2, & 3	$10.00	$ 9.00
Vols. 1, 2, 3, & 4	$14.00	$13.00
Vols. 1, 2, 3, 4, & 5	$17.00	$16.00

Make checks payable to the American Amaryllis Society, and send orders to the Secretary,

Mr. Wyndham Hayward,
Winter Park, Florida.

Agapanthus umbellatus
Amarcrinum Howardii
Chlidanthus fragrans
Clivia miniata
Cooperia Drummondii
pedunculata
Crinum Cecil Houdyshel
Ellen Bosanquet
Louis Bosanquet
Mrs. Henry Nehrling
J. C. Harvey
Peachblow
Powelii alba
Powelii rosea
Cyrtanthus lutescens
Eucharis amazonica
Haemanthus coccineus
multiflorus
Hippeastrum equestre
equestre var. Alberti
Johnsonii
Hybridum
advenum, red
advenum, pink
Hymenocallis calathina
caribaea
Sulphur Queen
Leucojum vernum
Lycoris aurea
radiata
squamigera
Nerine filifolia
Pancratium illyricum
maritimum
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citrina
robusta
rosea
texana
treatiae

JOHN R. HEIST

St. Augustine - - Florida

Highest Quality

GIANT HYBRID AMARYLLIS

Budded bulbs from January to May. Produce blooms in two weeks. **Price 50 cents each, $5.00 per dozen.** Prepaid in lots of 1 dozen or more.

•

Write for prices on bulbs 2" and up.

•

HYBRID AMARYLLIS SEEDLINGS

From hand pollenized seeds. **$2.00 per 100; $17.00 per 1000.** Prepaid.

Zephyranthes Robusta Bulbs

¾" and up, per 100, $3.50

H. B. DeBOER & SON

New Port Richey, Box 133, Florida

E. A. PETERSON J. F. RIEDEL

Peterson & Riedel

Giant American "Mead" Strain

HYBRID AMARYLLIS

Specializing in Stated Colors

COMMERCIAL BULB GARDENS

702 E. Michigan Avenue

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Native South African

AMARYLLIDS

•

JOHN MARTLEY

Stellenbosch, South Africa

•

Specialist in native bulbous species of the Lily, Iris and Amaryllis families.

CECIL HOUDYSHEL

LA VERNE, CALIFORNIA

New Crinums

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Spring, early Summer and Fall, our folders or small booklets, insignificant in appearance, not illustrated. Some noted Horticulturists have called them unique, entertaining, interesting, useful, humorous and other names we did not resent. Culture advice given. An edition of 17,500 will be prepared for Fall Bulbs available August 15. Send for it and ask your friends to send.

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