YEAR BOOK

AMERICAN AMARYLLIS SOCIETY

VOLUME I

IN MEMORIAM–
HENRY NEHRLING
1853-1929

1934

1934

FIRST NATIONAL AMARYLLIS SHOW

Sponsored by the

AMERICAN AMARYLLIS SOCIETY

In cooperation with the

ANNUAL ORLANDO AMARYLLIS FESTIVAL

At Orlando, Florida, April 3 to 4, 1934

Amarylleae blooms will be exhibited from the collections in various sections of the United States. Exhibitors living at a distance may show cut blooms if more convenient. Send exhibits directly to the Chairman who will give the same the best of attention.

For details see report of Exhibitions and Awards Committee or write to—

I. W. HEATON, Chairman
EXHIBITIONS AND AWARDS COMMITTEE,
1414 Ridgewood Ave., Orlando, Florida.

The 1935

NATIONAL AMARYLLIS SHOW

Sponsored by the

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will be held in

SOUTHERN CALIFORNIA

The place, dates and details will be arranged by a local committee, and final announcements will be made through the press.

For details write to

RICHARD DIENER
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EDITORIAL COMMENT

Some correspondents have wondered why the period of economic readjustment was chosen for the launching of the American Amaryllis Society. As a matter of fact the event was probably in a great measure a coincidence since the interest in plants is only indirectly affected by economic upheavals. For over a hundred years, even before the days of William Herbert, there have lived men and women who have catered to the *Amarylleae,* and the stage was set for the organization of the Society even before the chain of recent events Moreover, in this dawning age of planned, stabilized quality production, there is room for individuals to cultivate first rate avocations or hobbies. The particular field selected, whether it shall be stamp collecting, golfing, fishing, travel, plant collecting and breeding, etc., will depend upon the individual preference. The number of persons interested in *Amarylleae* is undoubtedly great enough to support a thriving organization—not the largest but surely a high quality association. Apparently no similar Society organized in this country was begun under such favorable auspices. The response was spontaneous and was not only confined to America but was world-wide. The roster of Charter Members speaks for itself.

And then, too, there was no room for failure with the availability of such willing and efficient workers as *Messrs. Hayward. Gebert, Duckworth, Ulrich, Wheeler, Heaton, Ainsley; Mesdames. Carter, Churchwell, McArthur;* and many others. It is a constant joy to work with *Mr. Hayward,* your Secretary, for instance. He is wrapped up entirely in his plant world. His brilliantly active mind encompasses the whole plant realm, but especially the *Amarylleae.* His enthusiasm is contagious and all should be warned to avoid him unless they wish to become plant enthusiasts.

The editorial policy of the Year Book is to publish timely articles but without too much formality. The Year Book will be at all times of, for and by the members of the Society. However, when necessary to establish fundamental facts, entirely technical papers will be published.

It is fitting and proper that the first issue of the Year Book be dedicated to the memory of the late *Henry Nehrling* who did so much to popularize *Amarylleae* culture in America. The portrait is typical of the man and will be appreciated by all. The *Nehrlingiana* by *Dr. Stone* and *Mr. Mead* give us at least in outline a word picture of his stature. *May he be remembered as long as Amarylleae bloom!*

It would be difficult to comment on all of the important papers in the Year Book. No attempt will be made in this direction excepting to point out some important problems treated, and to acknowledge a debt of gratitude to contributors from across the seas.

The two great needs at present center around a complete inventory of *Amarylleae* material, and a practicable method of vegetative propagation. These subjects have been duly emphasized. The reprinting of the *Genus Hippeastrum* from Baker's *Amaryllideae* is especially valuable to the members at this time, and the articles on propagation, although only a beginning will be welcomed by all.

Finally, we owe an especial debt of gratitude to our contributors in England, Holland and Japan. In England, *Mr. Worsley,* the Dean of the *Amarylleae* fraternity, has volunteered to make available his vast fund of information; the *Hon. Henry D. McLaren* has proved to be a genuine inspiration to us, and *Mr. Chittenden,* of the Royal Horticultural Society, has furnished much valuable information and assistance. In Holland, the venerated *Mr. E. H. Krelage,* a real *Amarylleae* enthusiast of many years standing, has volunteered his services, and *Mr. Ikeda,* in Japan, will keep the members informed on *Amarylleae* events in his country.

HAMILTON P. TRAUB,
Editor.

Orlando, Florida,
January 28, 1934.

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1934 Year Book 1934
AMERICAN AMARYLLIS SOCIETY

In Memoriam—Henry Nehrling 1853-1929*

DR. WITMER STONE

The Academy of Natural Sciences of Philadelphia

On September 26, 1883, twenty-one ornithologists met in New York City to organize the American Ornithologists' Union. Two who had been prominent in the preliminary arrangements but who were unable to be present were enrolled among the founders and twenty-four additional Active Members were chosen from those known personally to the founders or from their published ornithological works. Among these was Henry Nehrling then living in the state of Missouri.

Of the Founders only five survive today and of the additional Active Members only six, so that in length of membership, Henry Nehrling with his forty-six years in the ranks of the A. O. U. stood close to the top of the list—a record of loyalty to our Society of which he might well have been proud, especially when we consider the few opportunities that he enjoyed of personal contact with his fellow members. Indeed so far as I can ascertain he attended but one meeting of the Union and while personally known to Dr. Merriam and probably to Mr. Ridgeway and others his visits to the ornithological centers of the East seem to have been few indeed.

Henry Nehrling was born of German-American parentage in the town of Herman, near Howard's Grove, Sheboygan County, Wisconsin, on May 9, 1853. His father was Carl Nehrling and his mother Elizabeth Ruge. His early education he received from his mother and grandfather and he was later sent to a Lutheran parochial school located several miles from his home. His daily walks winter and summer to and from school, through the then primeval forest, familiarized him with every aspect of nature and helped to develop the passionate love for the out-doors—the birds and flowers, that characterized his entire life. He soon learned the haunts of the wild things of the woods and fields—where the Wild Pigeons roosted, where the Grouse had its drumming log and where grew the rarer plants.

From 1869 to 1873 he attended the State Normal School at Addison, Illinois, and upon graduation became a teacher in the Lutheran schools, a position which he held until 1887, teaching at various places in Illinois, Missouri and Texas. It has been said, probably with much truth, that he looked upon his teaching mainly as an instrument by means of which he could carry on his studies of

* This article, and also the Portrait of Henry Nehrling, are reprinted by kind permission of the Author and Editor of the Auk. XLIX. 1932.

ornithology, and the changes from one locality to another added constantly to the breadth of his knowledge of bird life. During all this time he was accumulating data on the life-histories of North American birds and was publishing articles in popular magazines both in this country and in Germany, while a paper in the 'Bulletin of the Nuttall Club' presented his observations on the birds of parts of Texas about which comparatively little was known at that time. His studies of our native birds culminated with the appearance in 1889, of the first part of a pretentious work published simultaneously in German and English and dealing with the life histories of our familiar species. This work, a prospectus of which appeared in 1886, was apparently originally planned as a publication in German only, 'Die Nordamerikanische Vogelwelt,' but by the time of the appearance of the first part an English edition had been added under the title of 'North American Birds,' which when the twelve parts constituting Vol. I were completed (1893), was changed to 'Our Native Birds of Song and Beauty.' Volume II was completed in 1897. The author tells us that the work "is intended to fill the gap between the very expensive and the merely technical ornithological books," and "to combine accuracy and reliability of biography with a minimum of technical description." The need for such a work was deeply impressed upon him when, as a boy, he craved a book that would tell him about the birds he saw everywhere about him but a book that could be purchased with the limited means at his disposal.

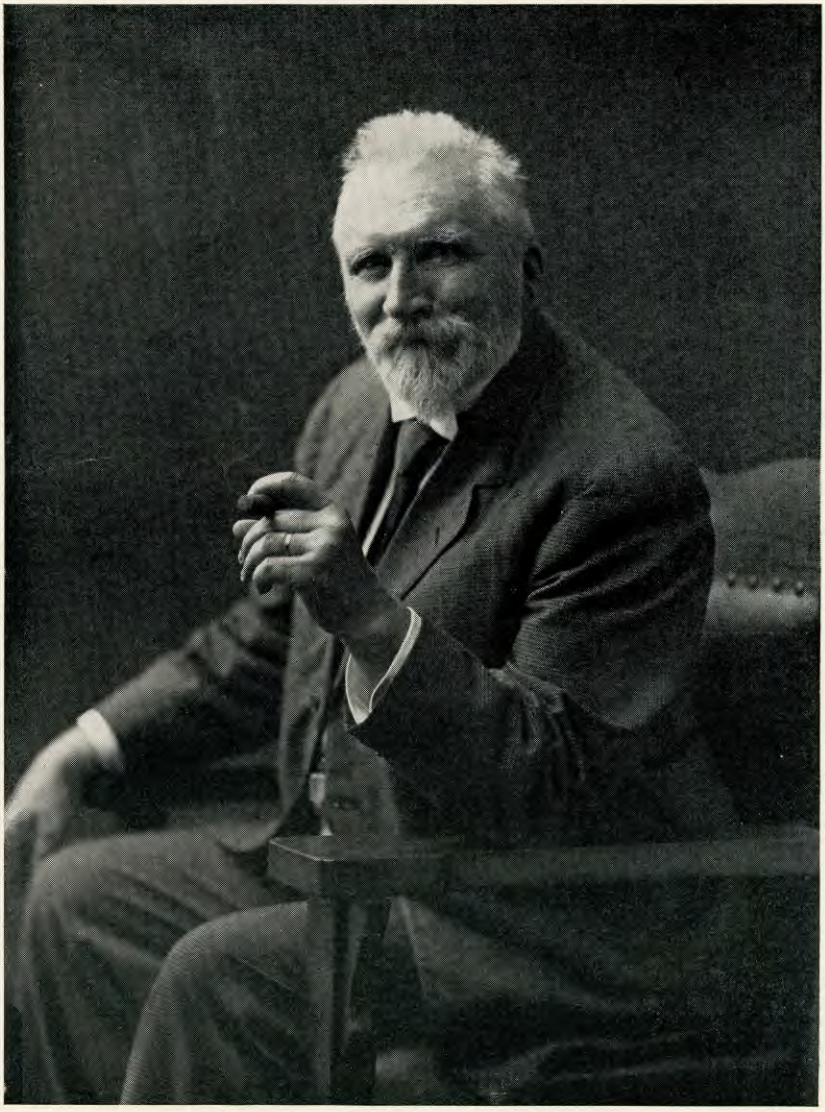
Dr. Elliott Coues praised Nehrling's work very highly in his several reviews in 'The Auk' and concludes with congratulations on a "work which departs so widely from the average of its kind by making so near an approach to such as Audubon typifies."

That he succeeded in fulfilling the promise of his prospectus is evident to anyone who reads his volumes and they show how thoroughly he knew his birds and how deeply he appreciated the beauties of nature. Unfortunately Nehrling's work does not seem to be so generally known as it should be, possibly on account of a limited edition and lack of publicity. It is really an outstanding title in the literature of American ornithology and should be read by all who delight in pleasing descriptions of bird life and pen pictures of nature in her varied moods. Robert Ridgeway made paintings for some of the plates while others were by two German artists, Prof. A. Goering and Gustav Muetzel. The heavy paper with ornamental borders and the sumptuous gold lettered morocco binding are characteristic of the German style in such matters.

In 1887 Nehrling was made deputy collector and inspector of customs at the port of Milwaukee a position which he held until 1890 when he was appointed secretary and custodian of the Public Museum of Milwaukee, a post evidently much more to his liking. During his connection with the museum a former member of his staff states that "he made many important additions to the collections and laid the foundations for the future greatness and educational usefulness of this well known institution." Unfortunately owing to politics Nehrling lost his position in 1903 after twelve years of unselfish service.

As early as 1884 Mr. Nehrling had bought a tract of land at Gotha, Florida, not far from Orlando. He first visited it in 1886 and from that time seemed to have definitely fixed upon Florida as his future permanent home.

Thither, then, he moved in 1904 after a brief association with the Philadelphia Commercial Museum, an association notable particularly for the fact that the American Ornithologists' Union met in Philadelphia in the autumn of 1903



H. Helmholtz

and Nehrling enjoyed the opportunity for the first time of attending a meeting of the Society of which he had been a member for so many years. It was during this period that I made his acquaintance and much of his time was spent in the bird room at the Academy of Natural Sciences studying the collection —a friendship developing which has always been one of the pleasant memories of my life.

While always a lover of flowers, even from his early boyhood, Nehrling apparently did not seriously take up horticulture until the time of his residence in Milwaukee where he built a greenhouse and devoted his spare time to the rearing of tropical plants, especially species of Amaryllis of which he produced many new horticultural varieties.

The exhibit of tropical plants at the Chicago Exposition was a great delight to him, especially the palms and Caladiums, and the cultivation and breeding of the latter became one of his hobbies when he removed to Florida. Here on his place at Gotha he developed a wonderful botanic garden and entered into correspondence with horticulturists in all parts of the world securing seeds of rare tropical species for raising and writing many articles on plant breeding for magazines and newspapers, as well as a volume on the Amaryllis which remained one of his favorite plants. In his experiments with the Caladiums he produced many new and beautiful varieties as a result of long and patient effort. It has been remarked that people are too prone to take the results of the horticulturists' work as a matter of course without any realization of the patience, industry and thought which go into the breeding of new varieties, and few probably realized the devotion of Nehrling to his hobby nor the extent of his knowledge of the subject.

Free to enjoy the practice of his favorite pastime and surrounded by the beauties of semitropical nature one might have thought Nehrling's life one of complete happiness but unfortunately, like many another gifted scientist, he lacked the business sense necessary for material success and absolutely honest himself took honesty for granted in others. The result was that he was often the victim of the unscrupulous and his life was frequently beset by financial difficulties. Indeed it is to worriment over these that the breakdown in health which resulted in his death is attributed. He died at Gotha, Fla., on November 22, 1929.

In consideration of his outstanding knowledge of horticulture, Nehrling had been appointed a collaborator in the Bureau of Plant Industry of the U. S. Department of Agriculture as early as 1906. At the Garden Club convention at Miami, in March 1929, he was awarded the Meyer Medal for distinguished service in his chosen field, a tribute that brought tears of gratitude to his eyes as in faltering tones he expressed his appreciation.

The life of Henry Nehrling was one wholly devoted to science but always to out-door science and contact with living things, rather than to the technical research of the closet naturalist. It was also pretty evenly divided between his two consuming interests—ornithology and horticulture and, to use the terms of the breeders of plants and animals, the former was the dominant factor in his earlier years and the latter in the closing period of his long and useful career.

From the wide circle of Mr. Nehrling's acquaintances one hears only the highest praise of his personal character. "Above all" writes Mr. A. H. Andrews, of Estero, Florida, "Dr. Nehrling was intensely human, being a man of genial and kindly disposition, as only a real lover of nature can be. A typical German

professor of the old school, of courtly manner and enthusiastically absorbed in his work, he made a host of warm friends and was as pleased as a child when visitors admired his garden."

Dr. David Fairchild writes me: "He was always a naturalist at heart,—reminding me of what I imagined Fritz Mueller of Blumenau, Brazil, was like. A plant savant—and how few others are left!—men who love plants with a passion that is delightful to see. His life was filled with financial worries but it had also a great deal of real pleasure in it for he was always playing with things he adored. His caladiums, his bromeliads, his palms, bamboos and ficus filled his days with a busy kind of pleasure."

Henry Nehrling's ornithological knowledge is already placed on permanent record in his 'Native Birds of Song and Beauty' and the publication of his contributions to horticulture, which we understand is contemplated would preserve for posterity the accomplishments in this field also, of the gentle, kindly scholar who labored so long and so successfully in interpreting nature and in adding to the knowledge and the pleasure of mankind.

HENRY NEHRLING AS I KNEW HIM*

THEODORE L. MEAD, *Florida.*

My friendly acquaintance with the late Henry Nehrling began almost forty years ago when he was still Custodian of the Milwaukee Museum although already interested in Gotha, Florida, property. Before 1893, our acquaintance had ripened into friendship and in return for a number of palms he sent me his fine illustrated quarto book, **"Our Native Birds of Song and Beauty"** issued in 1893 and containing friendly mention of his visits to my home and to the bird protection he found there.

Nehrling was always a most generous friend. Nothing gave him greater pleasure than sharing his botanical treasures with his friends, his acknowledgements of others' work in his field was always most generous and unstinted and he was the most modest of men in claiming recognition for his own attainments and wonderful success in collecting plant treasures. He was catholic in his botanical tastes with a keen sense of beauty of flower and foliage; his first desire was to obtain a beautiful plant, not selfishly, but to demonstrate and share its beauty with many others. Undoubtedly no plant lover that ever made him a visit was sent away empty handed.

But there are many men of many minds. Dr. Nehrling says, "Some years ago two friends of mine and I drove along the highway. It was October and the edges of the highways were a mass of golden flowers. One companion said, 'See the gold along the road. Isn't it wonderful!' I joined him in his admiration. The other, a business man, burst out with 'fools! "Gold along the road", Gold in your pockets is what counts, not gold along the road!' He intended to cut down two large dense and beautifully formed **Ficus aurea** trees that grew in the rear of the Hotel—It cost me much talking to save them".

In earlier days when there were no hampering quarantines, it was comparatively easy to acquire and test new and beautiful plants from all the world;

* An address by Theodore L. Mead, of Oviedo, at the Nehrling Commemoration Exercises in Rollins College, November 29th, 1931. Held under the auspices of the Quest Society of Florida, Lake Wales.

and every land and every clime added beauties to his collection at moderate expense and labor, but it is not recorded that any single injurious pest or insect was allowed to escape and become a menace to other property. Nor has any injury resulted from my own less extensive free importations from all the tropical countries of the world.

Nehrling told me that altho born in the United States, his home people spoke German in the family, and he did not know any English until after he was eleven years old. His ancestors were people of culture, familiar with German master-pieces and he himself wrote many valuable papers for publication in German periodicals. He is the author of a brochure, "Die Amaryllis oder Rittersterne (Hippeastrum)" published in Germany, which is a most comprehensive account of all the known species and hybrids of **Amaryllis** and also contains appreciative and enthusiastic accounts of magnificent gardens in Texas and Florida.

As long ago as 1917, Dr. Fairchild, himself a dean of botanical explorers, finds Nehrling's home the most interesting place in Florida.

In 1923, Nehrling writes from Naples,—"Letter and plants received—a most wonderful collection and the orchid carries a message I well understand . . . . I wish you were here, I need a kindred spirit in the neighborhood."

"In spite of the mosquitos, I love this place. I love it although the soil is nothing but sea-sand, and you have to make your soil, every inch of it, but as long as I can get hold of mulch, it is not difficult to add humus to the soil.

"The six **cycads** that I brought with me from Gotha weighed over sixteen hundred pounds, they are at present extremely beautiful. So, you see I am not lonesome.

"I think if you would come down some day in your flivver, Mrs. Mead with you, you would find much in my garden to take along. You are welcome to anything you like to have. Bring a trailer along!

"So far, I have dug about five hundred holes 3 ft. deep and 5 ft. wide, and filled them with old grass sod, muck and compost. I have found that plants will grow only if thus treated. At Gotha no such treatment was necessary."

In 1924 he writes,—"I am trying to obtain a lot of **Bromeliads** from our Botanical Gardens but the Directors are difficult to approach on account of quarantine regulations". One of the quarantine officers remarked that Botanical Gardens are just breeding places for injurious insects, and naively inquired why Nehrling was not content with the offerings of the Florida commercial growers, ignoring the fact that he already had under observation probably ten times as many kinds of plants as all the commercial growers put together, and had not a tenth part of the plants that were necessary for his work.

Nehrling proceeds,—"There are a few large private collections of **Bromeliads** in Germany that could be obtained for a song, but quarantine regulations forbid . . . . I could get possession of such a collection containing over 500 species and 150 hybrids for $200.00, but I have been turned down. They also turned me down when I tried to buy the whole Klissing collection of **Caladiums** containing all the best **Bleu, Bause, Hoffmann** and **Lietze** hybrids."

Your beautiful **Billbergia** hybrids have given me again a terrible **Bromelia** fever. It is so intense that I have written lots of letters for new material—to Trinidad, Costa Rica, British Honduras and to specialists in Germany—there

were at least fifty of them in bygone years,—and to Holland, etc. . . . . Carlos Wercherle discovered some most beautiful new species in the mountains of Costa Rica and sent me a consignment of 50 species, mostly new ones. They came as far as Jacksonville, but were returned to him by the agent of the Board and Wercherle could not be induced to send another lot even after I had sent him the special permits. In the Palmengarten in Frankfurt A/M, and at Kew they have fine collections of the most beautiful ones. A parcel containing some came as far as Jacksonville, but were sent back before I could protest. Dr. Lyons of Hawaii has a dozen or eighteen new kinds for me but they cannot come in. An old friend wrote me from Hong Kong that he will send me lots of **orchids** from Southern China but the importation to this country is hopeless. Dr. Purpus sent me some of the finest Mexican **Aechmeas** but I never received them. I could get lots of **orchids** from the Castleton Gardens but they will not be admitted. . . . I received a magnificent collection of epiphytic **Bromeliads** but so reeking with the fumes of hydrocyanic acid that unpacking them made me ill for the rest of the day. Every plant had been killed by the excessive fumigation. I am only allowed to import seeds and must have special permits for that.

"The edge of my swamp is lighted up with the innumerable flower trusses of **Ixora coccinea** and **I. lutea.** Yes, dear Mr. Mead, I am quite enthusiastic in spite of my late sickness. The only trouble is that I am getting old—feeling often like a **really** old man. And my correspondence is immense since I am writing for the **American Eagle** (Estero). The editor says this is missionary work, but even such work is sometimes a burden."

In April, 1926, Nehrling writes,—"This was certainly a most eventful week for me. A box from the Brooklyn Botanical Garden and from the Missouri Botanical Garden, a package from a near-by friend, a box of rarities from the Garfield Park Conservatories, a box from Punta Gorda with bulbs of double blooming **Amaryllis** and your parcel with its most valuable contents.

"Cattleyas do best here and grow wonderfully well on the **Palmetto** trunks; one of your hybrids formed a large clump and had fifteen flower trusses and another has seven spikes of bloom. I could obtain many more but it is next to impossible to obtain permits, and then only for small plants—big ones are barred.

"Thank you very much for the flowering **Phyllostachys aurea.** I had never seen a Bamboo flower, they do not bloom until past 40 years of age. I feel quite elated over your opinion of my Bamboo Essay in the **American Eagle**—it was written with much love and enthusiasm.

"My tropical plant collection grows almost daily—tho' we have had no frost, a few delicate plants were chilled, but **Crotons, Pandanus** (11 species), **Ficus** (40 species), **Palms** (about 100 species), **Cycads** (8 species) did not find the winter too cold".

Later in 1926 he writes,—"I am extremely sad tonight. A shiftless cracker lives about a mile north of here and his kids set the woods on fire. It made its way southward with tremendous fury, burned several groves that had been mulched and then came towards my place. No power on earth could stop it, tho' I and my boy and several men from the neighborhood worked hard to check it. Hundreds of my palms, among them an avenue of Royal Palms, huge and dense **Ficus** species, and magnificent clumps of Pandanus, were completely destroyed. The fire went over the entire front of the place and could

not be checked until it had made inroads of 300 feet. Then hundreds of buckets of water finally brought it under control. I rested this evening as I seemed entirely exhausted, but at ten a. m. the fire came directly from the West towards my little house. Two men and I had it finally under control but this afternoon it started in Mr. Haldeman's avocado grove directly northeast of my house. I had visitors at the time and all helped me to check it. I carried water and the boy and the guests used shovels and hoes and pine branches to extinguish it. I am perfectly tired out and last night I had no sleep at all. Whether or not most of my palm trees will survive I do not know. Tho' my losses are large, it might have been worse. Almost all the plants killed can be replaced from my reserve stock. Had the fire reached my slat houses the damage would have been enormous. I have not yet told my wife and children the whole story of the disaster."

In October, 1926, he writes,—"I had the finest and most interesting time of my life not only at Cornell, but also in Northern New York, the Adirondacks and even in that ant-hill of humanity, the City of New York—or rather "New Jerusalem". In visiting the **International Plant Science Congress** at Ithaca, I met many great botanists personally, whose names I had known for many years. The University buildings are most wonderful and the campus extremely picturesque. Dr. Mez and I and others spoke about ideals of life. One, an American, made the remark that America could not be called a land of ideals as business alone was regarded as 'worth while'. Dr. Mez said it was only necessary to look at those beautiful University buildings and their picturesque surroundings to be convinced that only a people of the highest and loftiest ideals could have created them. All of us applauded.

"Flower gardens in New York State disappointed me—mostly green lawns, very well kept could be seen. But when we went through the Shenandoah Valley and South and through South Carolina and Georgia, there were flower gardens galore.

"When returning to Gotha in October, I found the water of my lake far out of its former banks—at least 600 feet. All my fine **Camellias** stand 1 to 2 feet deep in water and where I used to grow my **Caladiums** the water is 3 to 4 feet deep. Here in Naples the fury of the hurricane is quite evident. All the red maples in the hammock swamp are torn to pieces, big pines up-rooted but there is no standing water and most of my plants have not been harmed. The roof of the house is gone and the house blown off its piers. My boy had had all my bedding and clothes dried in the sun and the books etc. aired. Many of the best books and photographs had suffered but little."

A letter dated April 1927, states that this "was a double red letter day for me as Mr. and Mrs. Edison spent the entire day with me. We had great times and Edison is **really** a great man. I never knew that he was so much interested in plants. He took particular interest in my **Ficus** species about 100 different ones in number. Each was tested in regard to the quantity and quality of the rubber it contains and he went at it systematically and thoroughly. Both were enthusiastic about my plant articles in the **American Eagle** and spent several hours in my little shack, looking over my books and photographs, etc."

Nehrling was a brave man, but great losses and disappointments in 1927 due to misplaced confidence in business associates whom he supposed to be his friends, really broke his heart and hope. When I last visited him in Naples in 1928 he was still carrying on with faith, hope and charity, trying amid innum-

erable hardships to help others to the best of his ability, and always generous to a fault, he added invaluable plants to my store of epiphytes from those that still remained in his possessions.

He was truly a man of whom the world was not worthy, and we shall not soon see his like again.

NEHRLINGIANA

THE PLANT WORLD IN FLORIDA. From the published manuscripts of Henry Nehrling. Collected and Edited by Alfred and Elizabeth Kay. Introduction by David Fairchild. Sponsored by the Garden Club of Palm Beach. New York, The MacMillan Company, 1933. 304 Pages. Price $3.50

Here is one of those books, containing a quantity of immensely valuable material in its chosen field, but which nevertheless causes a feeling of regret in the reader because it might have been so much better and so much more complete.

The volume as it stands, it must be admitted, is a good introduction to sub-tropical and tropical ornamental horticulture, and for the material that is included in the pages by the editors, who undoubtedly toiled many a weary hour over pages without end, the book is highly recommended. But the fact remains, particularly clear to those who know the material available in Nehrling's works in print and in manuscript, that the result has been to deprive the book of much of human interest relating to the man, and place it in the category, more or less, of just another minor plant cyclopedia.

For instance, there are paragraphs and paragraphs about rare palms which are seldom seen in Florida, even in collections, while fancy leaved caladiums, on which the learned plantsman spent many years of study, and which have proven one of the most enduring monuments to his genius, are dismissed by the editors with two paragraphs on page 261. The "panama hat plants" get more than three pages.

The illustrations are no better than they should have been, considering the wealth of material of this kind available in the state.

Its shortcomings need not deter a student of the flora of the tropics and northern conservatories from purchasing the book and perusing it. It is worth the price, in spite of what it might have been.

There are good quotations from Nehrling's writings on Florida climate and soil; shade trees of Florida; palms; rubber or Ficus trees, orchids and other epiphytes, vines, bulbs, including **Hippeastrum** species and hybrids, on which Nehrling did much work, bamboos, cacti, and foliage plants. There is some account of **Crinums, Haemanthus, Hymenocallis, Amaryllis belladonna** and **Eucharis** among the Amaryllids treated.

The reader in northern climes will get the smell of humid tropical vegetation in his nose and visions of plants he can scarcely imagine in his mind. Graceful palms, airy **araucarias,** beautiful amaryllis, the distinctive Gloriosa or Climbing Lily, the prickly bromeliads, orchids, in other words, the aristocracy of the plant world, these were the broad fields in which Nehrling lived and performed his labors of love. Sketchy though it is, one can at least glimpse the full stature of the man in the writings here collected. W. H.

SECRETARY'S MESSAGE

To the Officers and Members of the American Amaryllis Society—

The calendar year of 1933 witnessed the organization of the American Amaryllis Society (May 21), the enrollment of its charter members and the preparation of the first issue of the Society's Year Book, of which this item is a part. It was the formative period of the Society's growth.

In spite of the economic depression a group of Amaryllis enthusiasts had the faith in their favorite horticultural field to undertake the formation of a society, to be world-wide in its scope, devoted to the advancement of *Amarylleae* culture in all its branches. In a short time a membership that is really world-wide in its geography and international in its significance was attained. When this article was written, the Society had members in Great Britain, Holland, East Africa and Japan besides the various sections of the United States. The hearty response of Amarylleae enthusiasts was heartening and encouraging.

The major accomplishments of the Society in this early period of its existence are,—

The adoption of a Constitution and By-Laws; the adoption of the *Fischer Color Chart* as the official color chart of the Society; the preparation of a classification of flower types (*Hippeastrum)* for exhibition purposes; the adoption of a descriptive form for *Hippeastrum;* the adoption of a tentative prize schedule for *Amarylleae* and *Alstroemeriae;* and the preparation of a hybrid *Hippeastrum* check list.

The adoption of official popular names for various *Amarylleae,*—"Amaryllis" for *Hippeastrum;* "Belladonna Lily" for *Amaryllis belladonna;* "Crinum Lily" for *Crinum;* "Zephyr Lily" for *Zephyranthes;* "Amerindian Lily" for *Hymenocallis;* and "Aztec Lily" for *Sprekelia formosissima.*

Initial steps were taken for the importation of rare and interesting species of *Hippeastrum, Zephyranthes.* etc., through contact made with foreign botanical gardens, departments of agriculture, botanists, collectors and others. Arrangements were made and official permit obtained from the United States Department of Agriculture for the importation of bulbs of *Zephyranthes caerulea,* Bak., from Argentina. Steps were taken to locate a source of *Hippeastrum rutilum citrinum,* Bak., and *Hippeastrum procerum,* Lemaire, apparently not in the trade or in collections in Europe or the United States. The Society owes a debt of gratitude to the Bureau of Plant Quarantine of the United States Department of Agriculture for cooperation in these matters, and also to the Bureau of Plant Industry for valuable assistance rendered in difficult research problems.

The directors of the Society approved a tentative schedule of dedications for forthcoming issues of the Society's Year Book as follows: 1934, the late *Henry Nehrling;* 1935, *Mr. Theodore L. Mead;* 1936, *Mr. Alexander Worsley;* 1937, *Mr. E. H. Krelage;* 1938, the late *Rev. William Herbert;* 1939, *James Veitch & Sons;* and 1940, *Robert P. Ker and Sons.*

The Board of Directors decided to sponsor an annual *National Amaryllis Show* and voted to hold the 1934 exhibition at Orlando, Florida and the 1935 show in Southern California.

The progress of the American Amaryllis Society to date has been remarkable. The future development of this organization, as in the past, will require much real work. It has been the "golf", the principal recreation of its organizers up to the present time. All its labors have been labors of love and lightened on that account.

The present year of 1934, I am confident, will see an increasing interest displayed by flower growers in the *Amarylleae.* It is to be hoped that the members of the Society will do everything they can to help in this good work.

As to the Year Book, I can add nothing. It speaks for itself and for the unrelenting diligence and boundless care of the editor, *Dr. Hamilton P. Traub* of Orlando. Only he will ever know the hours and hours of enthusiastic application its production has cost.

Yours horticulturally,

WYNDHAM HAYWARD, *Secretary.*

Winter Park, Florida,
January 28, 1934.

REPORT OF EXHIBITIONS AND AWARDS COMMITTEE

The first National Amaryllis Show will be held in the main lobby of the Chamber of Commerce Building, Orlando, Florida, East Central Avenue, April 3—4, 1934. This lobby will accommodate 224 lineal feet of display benches carrying up to 900 six-inch pots without crowding. Although cut blooms are acceptable, it is suggested that all local exhibitors display their blooms with the bulb potted in six-inch pots if possible. Out of town growers may ship their blooms in bud to reach the Committee about two days before the Show in order to allow time for blooms to open for the show. The blooms should be cut just as the tip of the flower begins to bulge and packed in shagnum moss with waxed paper protecting the carton. Later cutting may cause the bloom to open in transit and earlier cutting may result in failure of flower to open. Be sure to ship in time to reach us about two days before the Show. A single scape of any variety, un-named or named, may be entered until 1937, after which date three scapes will be required.

The Committee wishes to thank Mr. Slaughter, Secretary of the Orlando Chamber of Commerce, for his kind co-operation in furnishing publicity and helping with the arrangements and also Radio Stations WDBO, Orlando, and WRUF, Gainesville, Fla. for the time given the Society on the Air.

The 1935 National Amaryllis Show will be held in Southern California. The place, dates and details will be arranged by a local committee, and final announcements will be made through the press.

I. W. Heaton, *Chairman.*

January 1934,
Orlando, Florida.

CRINUMS AND HIPPEASTRUMS IN THE ROYAL BOTANIC GARDENS, KEW, ENGLAND

The following list of *Crinums* and *Hippeastrums* cultivated at the Royal Botanic Gardens, Kew, England, was kindly furnished by the Curator.

Crinum abyssinicum
Crinum asiaticum
Crinum augustum
Crinum campanulatum
Crinum giganteum
Crinum kirkii
Crinum moorei
Crinum pendunculatum
Crinum rattrayii
Crinum sanderianum
Crinum heterostyle
Crinum schimperi
Hippeastrum aulicum
Hippeastrum bifidum
Hippeastrum equestre
Hippeastrum reginae
Hippeastrum pratense
Hippeastrum rutilum
Hippeastrum vittatum

REPORT OF TRIAL COLLECTIONS COMMITTEE

The committee has been fortunate in obtaining the free grant of lath house space and care for the trial collection of the Society in Florida, through the kindness of Mr. I. W. Heaton of Orlando, Florida, a member of the Society and the representative of the Southeast on this committee. It is located on Mr. Heaton's bulb farm near Orlando, Florida.

It will be the purpose of the committee to gather together specimens of all available species of the Amaryllis family in the special field of the Society for the purpose of making them available for study and examination by members and others interested. The committee will welcome donations of bulbs for the collection, and in time hopes to accumulate as complete a group of Amaryllids as possible by gifts, exchanges with botanic gardens, collectors, etc., and by importation of bulbs or seed of rare species and varieties.

The collection includes, at present, **Hippeastrum solandriflorum,** the gift of Mr. Robert D. Mitchell of Orlando; **Zephyranthes Ajax,** the gift of Mr. James L. Gebert, New Iberia, La., and also **Hippeastrum equestre, Crinum americanum,** and unidentified **Crinums** and **Hymenocallis.** The species in the collection will be checked with herbarium specimens on blooming and every effort will be made to have the collection botanically accurate.

After a few years, if natural propagation gives sufficient increase of the bulbs to numbers more than the collection needs, extra bulbs will be distributed on application to members of the Society particularly interested in the various kinds. It is the hope of the committee that by the end of 1934, donations will have made the collection one of the most representative of its kind. As soon as practicable other trial gardens in other parts of the country will be established. Every precaution for the proper cultivation and preservation of the bulbs donated to the collection will be taken.

W. HAYWARD, Chairman.

December 1933.
Orlando, Florida.

THE SOCIETY'S FISCAL YEAR

The fiscal year of the Society begins on January first, and the first fiscal year began on January 1, 1934. The Society was organized in 1933, and all who have paid dues in 1933 or 1934 have paid up their membership until January 1, 1935. They will receive one copy of the 1934 Year Book. The 1935 Year Book will be sent to all who pay dues during that year.

The first Year Book was published in February 1934 in order to make available preliminary information to the members. In the future the Year Book will be issued in September or October of each year, beginning in 1935.

Constitution and By-Laws
of the
American Amaryllis Society

CONSTITUTION

ARTICLE I.

NAME.

SECTION 1. This organization shall be known as the American Amaryllis Society.

ARTICLE II.

OBJECT OF THE SOCIETY.

SECTION 1. The object of the American Amaryllis Society shall be the promotion of *Sub-order I Amarylleae,* and *Sub-order II, Alstroemerieae Order Amaryllideae.* (Baker, J. G. Handbook of the Amaryllideae. George Bell & Sons. London. 1888).

ARTICLE III.

HEADQUARTERS.

SECTION 1. The headquarters of the American Amaryllis Society shall be maintained in Orlando, Florida.

ARTICLE IV.

MEMBERS.

SECTION 1. This Society shall consist of the following classes of members:

Annual Members
Life Members
Patrons
Corresponding Members
Fellows

ARTICLE V.

OFFICERS AND DIRECTORS.

SECTION 1. The officers of the Society shall consist of a President, three Vice Presidents, Secretary and Treasurer, who shall be elected annually. Provided, however, that one Vice-President shall be chosen from the Standard Time Zones according to the following grouping: (a) Eastern, (b) Central, and (c) Mountain and Pacific.

SECTION. 2. There shall be three Directors at large, elected from the membership of the Society, to serve terms of three years, one of whom shall be elected each year.

SECTION 3. The election of one director from each branch society may be established by By-law or action of the Board of Directors.

SECTION 4. Officers and Directors shall hold office until their successors are elected and assume their duties.

ARTICLE VI.

Board of Directors.

Section 1. The Board of Directors shall consist of the Officers and Directors of the Society, as provided in Article V, Sec. 1 and 2.

Section 2. The Board of Directors shall be the governing body of the Society, and shall have power to act on all matters pertaining to the Society.

Section 3. The Board of Directors shall meet at stated intervals and at the call of the president.

Section 4. One-third of the members of the Board of Directors or their proxies, shall constitute a quorum for the transaction of business.

Section 5. Members of the Board of Directors who are unable to be present at meetings of the Board may designate proxies, said proxies to be other than regular members of the Board. No person shall hold more than one proxy.

ARTICLE VII.

Election of Officers and Directors

Section 1. 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 any office.

Section 2. The names of the two persons receiving the highest number of nominating votes for each office shall be included in the final ballot, together with such additional names as the nominating committee shall select; provided that in case any person is nominated by the nominating ballot for more than one office, as provided above, the nominating committee shall determine the office for which the nomination shall stand.

Section 3. Officers and Directors shall be elected by mail ballot. The votes shall be canvassed as provided for in the By-Laws. A plurality vote shall elect.

ARTICLE VIII.

Branch Societies.

Section 1. For the purpose of developing regional interest in the objects of the Society, the Board of Directors may authorize regional, state or local branches.

Section 2. All members of Branch societies shall be fully paid members of the American Amaryllis Society.

Section 3. Branch Societies shall form and conduct their own organizations, subject to this Constitution and By-Laws.

Section 4. Activities of Branch Societies which might interfere with the interests and policies of other branches or of the Society at large, shall be subject to the action of the Board of Directors.

ARTICLE IX.

Committees and Secondary Officers.

Section 1. Standing committees may be established by By-Law or action of the Board of Directors.

Section 2. The position of editor, librarian, and other secondary officers may be established by By-Law or action of the Board of Directors.

Section 3. Special committees may be authorized by action of the Board of Directors or by plurality vote of the members present at any regular meeting of the Society.

ARTICLE X.

Meetings of the Society.

Section 1. The Annual meeting of the Society shall be held on the second Wednesday in April. Other meetings shall be held at the call of the Board of Directors.

ARTICLE XI.

PUBLICATIONS.

SECTION 1. The Society shall sponsor a year book and such other publications as may be authorized by the Board of Directors.

ARTICLE XII.

AMENDMENTS.

SECTION 1. This Constitution may be amended by the following procedure: The proposed change shall be submitted in writing to the Secretary, supported by the signature of not less than ten members in good standing, at least fifteen days prior to an annual meeting. A copy of the proposed amendment shall be supplied to each member with the report of the annual meeting. At the time of the next annual election a copy of the proposed amendment shall be mailed to each member with the ballots. Votes on the amendment shall be returned with the election ballots and be canvassed by the Board of Directors. Two-thirds of the ballots cast must be in the affirmative for the amendment to be adopted.

BY-LAWS

ARTICLE 1.

ORDER OF BUSINESS.

The following order of business shall be observed at all meetings unless set aside by vote:

1. Call to order.
2. Reading of minutes of previous meeting.
3. Reports of officers and committees.
4. Communications and resolutions.
5. Unfinished business.
6. New business.
7. Adjournment.

ARTICLE 2.

CLASSES OF MEMBERSHIP.

SECTION 1. Annual Members,—Persons who are interested in the purposes of the Society who shall pay annual dues of two dollars.

SECTION 2. Life Members,—Persons interested in the purposes of the Society who shall pay one hundred dollars, or who secure fifty or more new members in any 12 months period.

SECTION 3. Patrons,—Persons interested in the objects and aims of the Society who contribute two hundred dollars or more to its support, and who shall pay no dues.

SECTION 4. Corresponding Members,—Those whom the Society has elected in foreign countries to report on subjects of interest to the membership and who shall pay no dues.

SECTION 5. Fellows,—Those whom the Society has elected as Fellows in recognition of their achievements in the special field of the Society and who shall pay no dues.

ARTICLE 3.

VOTING PRIVILEGES.

SECTION 1. Only annual members, life members, patrons and Fellows shall be entitled to vote.

SECTION 2. Only annual members in good standing, life members, patrons and Fellows shall be eligible to hold office.

ARTICLE 4.

Election of Members.

Section 1. Nominations for membership in the Society shall be presented to the Secretary in writing, accompanied by the required dues. All applicants for membership shall be approved by the membership committee, subject to review and action by the Board of Directors.

ARTICLE 5.

Election of Officers and Directors.

Section 1. The Secretary shall send to all voting members, not less than 90 days before the date of the election, a list of the offices to be filled, together with the names of those whose terms expire.

Section 2. The Board of Directors shall select a nominating committee of three members at least two months before the annual meeting.

Section 3. The nominating committee shall obtain the written consent to serve from all nominees before the names are placed on the final ballot.

Section 4. Ballots shall be sent to each member one month before the annual meeting. Ballots shall be returned to the Secretary and must reach him not less than five days before the annual meeting.

Section 5. The President shall appoint at least three tellers to canvass the final vote for each office.

ARTICLE 6.

Duties of Officers.

Section 1. The President shall perform the usual duties of such office, be the directing head of the Society, and chairman of the Board of Directors.

Section 2. The Vice-Presidents in order of seniority in years shall act in the absence or incapacitation of the President.

Section 3. The Secretary shall keep a record of the proceedings of the Society and of the Board of Directors, and conduct their correspondence. He shall collect and pay to the Treasurer all moneys due the Society, getting his receipt therefor. He shall also keep a record of all receipts and expenditures of the Society as authorized by the Board of Directors.

Section 4. The Treasurer shall receive from the Secretary all moneys belonging to the Society and shall deposit the same, as directed by the Board of Directors. He shall pay out all moneys only on written notice from the Board of Directors. All payments shall be made by check, signed by the Treasurer, on accounts approved by the Board of Directors.

Section 5. The Board of Directors shall arrange for meetings of the Society and for exhibitions and tours. It may appoint sub-committees from its members or committees from the Society at large for specific purposes. It shall consider the formation of branch societies. If a vacancy occurs in any office of the Society, the Board of Directors shall fill the vacancy by appointment for the unexpired term.

ARTICLE 7.

Payment of Dues.

Section 1. The fiscal year of the Society shall begin on the first day of January.

Section 2. The year book shall be sent only to those members who have paid their dues for the current year. Members whose dues have not been paid by March 1st shall be considered delinquent. They will not be entitled to receive the publications or other benefits of the Society until arrears are paid.

Section 3. The names of all members whose dues have not been paid by July 1st shall be dropped from the rolls of the Society. Due notice of non-payment of dues will be mailed to delinquent members on or after March 1st, but nothing in this Article shall be construed as making such notice obligatory on the part of the officers of the Society, or the non-receipt of such notice the cause for any action against the Society or its officers on account of removal from membership, or non-receipt of any of the Society's publications or other benefits.

ARTICLE 8.

Meetings of the Board of Directors.

Section 1. A meeting of the Board of Directors shall be held on or before the first Wednesday in April of each year, for outlining the work and activities of the year.

Section 2. Other meetings will be held by direction of the Board.

Section 3. Special meetings may be held on two weeks' notice at the call of the President, or on request of three membrs of the Board.

ARTICLE 9.

Branches.

Section 1. Each state and regional branch society shall elect a member to represent it on the Board of Directors.

Section 2. Regional or state branch societies having representation on the Board of Directors shall consist of not less than fifty members residing in such region or state.

Section 3. Fifty cents of the membership dues of each branch member shall be made available for the use of the regional, state, or local branch to which the member belongs.

ARTICLE 10.

Standing Committees.

Section 1. As soon as practicable after the annual meeting, the President shall appoint the following standing committees:

1. Membership
2. Finance
3. Auditing
4. Publications
5. Exhibitions and Awards
6. Trial Collections
7. Research

ARTICLE 11.

Secondary Officers.

Section 1. As the need shall arise the Board of Directors shall appoint an editor, a librarian, or such other secondary officers as may be needed.

ARTICLE 12.

Awards.

Section 1. The Society may award, in accordance with the importance and value of the exhibit or contribution to the culture of the AMARYLLEAE and ALSTROEMERIEAE, Gold Medals, Silver medals, Bronze medals, First Class Certificates, Awards of Merit, Cultural Certificates and other awards.

Section 2. The Society may recognize by suitable award persons, corporations, or other institutions who or which have made great contributions to the culture of the AMARYLLEAE and ALSTROEMERIEAE.

ARTICLE 13.

Publications.

Section 1. The Board of Directors shall supervise the issuing of the publications of the Society.

Section 2. The publications of the American Amaryllis Society shall not be sold or otherwise furnished to other than members of the Society except as approved by the Board of Directors.

Section 3. Back numbers of publications may be sold to new members desiring copies of the same at prices as determined by the Board of Directors.

ARTICLE 14.

Amendments.

Section 1. An amendment to the By-Laws may be adopted by a majority vote at any meeting of the Board of Directors, providing a notice in writing has been mailed to all members of the Board one month in advance of the meeting.

Section 2. A proposal to amend the By-Laws may be submitted in writing to the Board of Directors by any branch society or by any five members.

1. Amarylleae Exhibitions and Regional Activities

THE AMARYLLIS IN ENGLAND

THE HON. HENRY D. MCLAREN, *North Wales, Great Britain*

The Amaryllis Family, **Amaryllidaceae,** is a very large one, and botanically the name **Amaryllis** applies only to **Amaryllis belladonna,** although horticulturally the name ranges over a wide range of genera. But when one speaks coloquially of amaryllis—at any rate in England—one means the hybrid **Hippeastrum**—in its best forms one of the world's most noble flowers.

It is of course a greenhouse plant in England requiring stove temperature during its growing season if it is to show its best; but in the winter when it is dried off it needs no more heat than will safeguard the bulb from frost.

Various **Hippeastrum** species are grown by those botanically inclined, such as **H. aulicum, H. reticulatum,** and **H. vittatum,** all for the greenhouse, **Acramannii** (Garaway, 1835), a scarce and just hardy plant and **H. pratense (Haebranthus pratensis)** thrive in warm places outdoors. The latter species is a wonderful sight when it produces freely its flaming orange scarlet flowers. But for one plant of any of the species a hundred plants of the hybrids are grown in England. Their cultivation is easy, their flowering is regular, and by starting them early or late, as the case may be, they can be brought into bloom at such a date, from January to May, as may be desired by the grower. By constant hybridization and selection since the year 1799, the modern hybrid amaryllis has got far ahead of its original progenitors. An exceptionally good bulb may have two spikes of flower with four blooms on each. I happened to measure a large flower once, and it was 10 inches by 8 inches in size. The flowers range from dark scarlet with maroon centre to the purest unspotted white—and indeed a good batch of the pure white form is one of the loveliest plant groups that can be grown.

It is told that the first pure white amaryllis that appeared was a jealously guarded treasure, and it was exhibited at a show by its owner with the greatest pride. But a sharp and sharp nosed individual smelt at its perfume long and closely and then hurriedly left the show. At the door he got out his knife, scraped some adhering pollen from his nose, and hastened to put it on the stigma of a plant in his own greenhouse. The progeny of this ingeniously contrived cross included some white flowered plants, which were thus brought into more general cultivation.

In this country Messrs. James Veitch & Sons of Chelsea and Messrs. Robert Ker & Sons of Liverpool did much to improve the breed of amaryllis. Both these firms have however now ceased to exist and the best strains are carried on by amateurs. The late Sir George Holford of Westonbirt devoted much time and skill to raising improved forms, and when his collection was dispersed, a large portion of it went to Mr. Clive Cookson of Hexham. Sir George paid much attention to getting a flower of good substance and of self colour. The Rothschild family have always been interested in this plant, and the collections formed by more than one member of the family have descended to Mr. Lionel

de Rothschild at Exbury—where hybridization is carried on energetically, and where scarlet forms are made a feature.

Baron Schroeder has also a fine collection at The Dell. The collection at Bodnant is founded on the Ker strain, but, as in other collections, home raised plants have gradually ousted the older ones. Among the plants grown here are white forms and a fine form with a white ground suffused with rose pink originated by Ker and called by him "Nestor."

Unfortunately, greenhouses are somewhat out of favour these days and amaryllis are not so widely grown in England as they were; but every year the hybridists improve them, and what we have lost in quantity we have, I believe, gained in quality.

DESCRIPTIVE REVIEW OF THE 1933 U. S. DEPARTMENT OF AGRICULTURE AMARYLLIS SHOW

AND NOTES ON 1934 EXHIBITION

Bureau of Plant Industry, *United States Department of Agriculture,* Washington, D. C.

The twentieth annual Amaryllis Show of the U. S. Department of Agriculture was held from 9:00 a. m. to 9:00 p. m. daily, March 20 to March 27, 1933, both dates inclusive, at the Greenhouses of the U. S. Department of Agriculture, Constitution Avenue at Fourteenth Street, N.W., Washington, D. C.

On display in the exhibition were 1,200 amaryllis plants which ranged in color from dark red through various shades of red, orange-red, pink and striped types to pure white. Each plant bore two flower stems with from two to seven flowers on each stem. Some of the flowers measured as much as ten inches from tip to tip. The bulbs in flower were all hybrids originated by the Department. A number of seedlings which were flowering for the first time were included in the show.

The exhibition was attended by 23,820 people. This number was lower than the attendance for previous years due to the fact that for at least half the period of the show the weather was inclement. The visitors to the exhibition included Mrs. Franklin D. Roosevelt, Mrs. Henry A. Wallace, other cabinet ladies and groups from public and private schools and garden clubs. Many of the visitors were from near-by states and, in some instances, from points as distant as New York City.

The twenty-first annual Amaryllis Show which will be held sometime in March of 1934 will include new seedling plants flowering for the first time. It is expected that the custom of the wife of the Secretary of Agriculture holding a preliminary showing will be revived for that exhibition. Such a preliminary showing was not held last year as the display was opened too soon after the inauguration of the new administration. The guests at the preliminary showings are the wife of the President of the United States, and the wives of cabinet officers, of the diplomatic corps, of Justices of the Supreme Court, of members of both houses of Congress, of ranking officers of the Army and Navy, of officials of the Department of Agriculture and members of residential society.

TENTATIVE CLASSIFICATION OF AMARYLLIS FLOWER TYPES FOR EXHIBITION PURPOSES*

At this time it is an open question as to the types of flowers which should be standardized in hybrid Amaryllis. Only time will tell what the preference of the membership will be in this matter. For exhibition purposes, therefore, Amaryllis shall be placed tentatively into the (I) Grandiflora, and (II) Miniature groups on the basis of flower types found in the 38 species,—

Grandiflora Group

The Grandiflora group is tentatively divided into the following subgroups,—

(a) Tube long ..... SOLANDIFLORUM TYPE
(*Hippeastrum solandriflorum* and hybrids of this flower type)

(b) Tube short closed in with distinct neck at throat ..... PSITTACINUM TYPE
(*H.aulicum; H.organense; H.psittacinum; H.cybister; H.calyptratum; H.pardinum;* and hybrids of this flower type)

(c) Tube short; not closed at throat ..... EQUESTRE TYPE
(*H.equestre; H.reticulatum; H.stylosum; H.rutilum; H.vittatum; H. breviflorum;* and hybrids of this flower type..

(d) Tube very short; not closed at throat ..... LEOPOLDI TYPE†
(*H.andreanum; H.reginae; H.miniatum; H.scopulorum; H.mandoni; H. leopoldi; H. procerum;* and hybrids of this flower type.)

Miniature Group

The Miniature group is tentatively divided into the following subgroups,—

(a) Tube narrowly funnel shaped ..... PHYCHELLA TYPE
(*H.phycelloides; H.bicolor; H.herbertianum;* and hybrids of this flower type.)

(b) Tube openly funnel-shaped ..... HABRANTHUS TYPE
(*H.soratense; H.chilense; H.roseum; H.lineatum; H.brachyandrum; H.advenum; H.bifidum; H.bagnoldi; H.berteroanum; H.jamesoni; H.modestum; H.rhodolirion; H.uniflorum; H.montanum; H.pratense;* and hybrids of this flower type.)

TENTATIVE PRIZE SCHEDULE*

SYNOPSIS OF SECTIONS AND CLASSES

Section A. Amaryllis (Hippeastrum);	Classes	1- 499
Section B. Crinum Lily (Crinum);	Classes	500- 599
Section C. Zephyr Lily (Zephyranthes);	Classes	600- 699
Section D. Amarylleae Genuinae, except Sections A, B and C Above	Classes	700- 799
Section E. Amerindian Lily (Pancratiae);	Classes	800- 899
Section F. Alstroemerieae:	Classes	900- 999
Section G. Narcissi and Relatives; (Coronate);	Classes	1000-1099

* Report of the Special Committee on Description, Nomenclature and Check List approved by the Board of Directors.

† Possible subdivisions,—"Reginae Type," petals irregular; "Leopoldi Type," petals regular.

Professional Classes And Awards

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 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 varietal exhibit shall consist of one or more potted flowering plants, or one or more flower scapes up to and including 1937; after which date three potted flowering plants or three flower scapes shall be required in each case. For the present, in the color classes, varieties with flowers minutely dotted, keeled, striped, cross-barred, etc. shall be grouped according to the predominating color.

Section A. Amaryllis (Hippeastrum)

Class 1. Best collection of botanical species and varieties.
Class 2. Best collection of 10 or more named Grandiflora varieties.
Class 3. Best collection of 5 to 10 named Grandiflora varieties.
Class 4. Best collection of 5 or more Miniature varieties.
Class 5. Best Display.
Class 6. Best Bloom in Show.

Standard Grandiflora Varieties

SOLANDRIFLORUM TYPE ..... Classes 100-129

Class 101. White without markings
Class 102. White with light markings
Class 103. Yellow
Class 104. Orange
Class 105. Pale red
Class 106. Lighter red
Class 107. Light red
Class 108. Red
Class 109. Dark red
Class 110. Darker red
Class 111. Any other color
Class 112. Best bloom

PSITTACINUM TYPE ..... Classes 130-159

Class 131. White without markings
Class 132. White with light markings
Class 133. Yellow
Class 134. Orange
Class 135. Pale red
Class 136. Lighter red
Class 137. Light red
Class 138. Red
Class 139. Dark red
Class 140. Darker red.
Class 141. Any other color
Class 142. Best bloom

EQUESTRE TYPE ..... Classes 160-189

Class 161. White without markings
Class 162. White with light markings
Class 163. Yellow
Class 164. Orange
Class 165. Pale red
Class 166. Lighter red
Class 167. Light red
Class 168. Red
Class 169. Dark red
Class 170. Darker red
Class 171. Any other color
Class 172. Best bloom

LEOPOLDI TYPE ..... Classes 190-219

Class 191. White without markings
Class 192. White with light markings
Class 193. Yellow
Class 194. Orange
Class 195. Pale red
Class 196. Lighter red
Class 197. Light red
Class 198. Red
Class 199. Dark red
Class 200. Darker red
Class 201. Any other color
Class 202. Best bloom

Standard Minature Varieties

PHYCHELLA TYPE ..... Classes 220-249

Class 221. White without markings
Class 222. White with light markings
Class 223. Yellow
Class 224. Orange
Class 225. Pale red
Class 226. Lighter red
Class 227. Light red
Class 228. Red
Class 229. Dark red
Class 230. Darker red
Class 231. Any other color
Class 232. Best bloom

HABRANTHUS TYPE ..... Classes 250-279

Class 251. White without markings
Class 252. White with light markings
Class 253. Yellow
Class 254. Orange
Class 255. Pale red
Class 256. Lighter red
Class 257. Light red
Class 258. Red
Class 259. Dark red
Class 260. Darker red
Class 261. Any other color
Class 262. Best bloom.

Section B. Crinum Lily (Crinum)

Class 501. Best collection of botanical species and varieties
Class 502. Best collection of hybrid varieties
Class 503. Best Bloom.

Section C. Zephyr Lily (Zephyranthes)

Class 601. Best collection of botanical species and varieties
Class 602. Best collection of hybrid varieties
Class 603. Best Bloom.

Class 651. White
Class 652. Yellow
Class 653. Orange
Class 654. Pale red
Class 655. Lighter red
Class 656. Light red
Class 657. Red
Class 658. Dark red
Class 659. Darker red
Class 660. Blue
Class 661. Any other color.

Section D. Amarylleae Genuinae, Except Sections A, B and C, Above

Class 701. Best collection of botanical species and varieties, in any Genus.
Class 702. Best collection of hybrid varieties in any Genus.
Class 703. Best Bloom in any Genus.

Section E. Amerindian Lily (Pancratieae)

Class 801. Best collection of botanical species and varieties in any Genus.
Class 802. Best collection of hybrid varieties in any Genus.
Class 803. Best Bloom in any Genus.

Section F. Alstroemerieae

Class 901. Best collection of botanical species and varieties in any Genus.
Class 902. Best collection of hybrid varieties in any Genus.
Class 903. Best Bloom in any Genus.

Section G. Narcissi and Relatives (Coronate)

Class 1001. Best collection of botanical species and varieties in any Genus.
Class 1002. Best collection of hybrid varieties in any Genus.
Class 1003. Best Bloom in any Genus.

Class 1075. Best collection of *N. tazetta subspecies*
Class 1076. Paperwhite Grandiflorus.
Class 1077. Grand Soleil d'Or.
Class 1078. Chinese Sacred Lily.
Class 1079. Best collection of *N. tazetta* hybrids.

Amateur, Novice and Boys' and Girls' Classes and Awards

In all the classes indicated above, separate awards will also be made for ***Amateur,*** *Novice* and *Boys'* and *Girls'* exhibits.

2. Standardization of Color Descriptions

FISHER COLOR CHART OFFICIALLY ADOPTED

Part of the work assigned to the Special Committee on Description, Nomenclature, and Check List was to find a practical means of standardizing *Amarylleae* color descriptions. After considering other possibilities such as Maerz and Paul, *Dictionary of Color* (1930), and Ridgeway, *Color Standards and Nomenclature* (1912), the committee reported that the *Fischer Color Chart* (1932), published by the New England Gladiolus Society, appeared to be the most practical device now available for the purpose. It is adequate for most purposes, easy to use and inexpensive. With the kind permission of the Publishers, the *Fischer Color Chart* was officially adopted by action of the Board of Directors.

It is recommended that the *Fischer Color Chart* be used whenever possible in reporting Amarylleae color descriptions in the Year Book and elsewhere. *The users of this Chart should bear in mind that the Colored printing inks, especially the red, employed in the process for reproducing the chart, do not hold their color permanently if exposed to strong light.* The chart should not be hung exposed on a wall but kept carefully away from light when not actually in use.

The Publishers of the *Chart* have generously agreed to furnish the same to members of the American Amaryllis Society at $1.00 unmounted, and $1.50 mounted on heavy cardboard, and folding like a checker board to protect the colors from light. Enquiries should be addressed to your Secretary, Mr. Wyndham Hayard, 2240 Fairbanks Ave., Winter Park, Fla.

—Hamilton P. Traub, and I. W. Heaton,
Special Committee on Description, Nomenclature and Check List.

ORIGIN OF THE FISHER COLOR CHART

Eugene N. Fischer, *Massachusetts*

In serving at gladiolus exhibitions in the capacity of a judge it was surprising to me to see that quite a number of the exhibitors had their entries wrongly placed in the color sections. It appeared that the fault lay more in confusing the names of the colors than in not knowing color, or seeing color wrongly. So one could conclude that the exhibitor did not know just what color the names meant that were used to designate some of the color classes.

The thought came to me that the exhibitor would be better guided in the placing of his exhibits properly if just the six simple color names of the spectrum, modified with adjectives denoting the degree of light or darkness, should be used. To suggest this form of simple color nomenclature I wrote an article entitled, *"Helpful Hints as to Colors"* for the 1930 Year Book of the New England Gladiolus Society.

In this article was described how all the colors, with their tints and shades, are variations derived from the three primary colors—Red, Yellow, and Blue. The main object was to point out that by using only six spectrum color names the relation of the colors to each other could be shown, and a better idea of the color conveyed than by using many names that are unfamiliar to most of us.

For instance, if the description of the color of a flower was blue-violet, we would know by the color name that it is predominately violet—nearer to violet than blue. Or, if described as violet-blue it would be nearer to blue. A name unfamiliar to the majority of persons would not denote the exact placement of the color in the spectrum, except to a very limited few.

The following year, being put on the Color Classification and Schedule Committee of the New England Gladiolus Society, I made a diagram sketch of the six

important spectrum colors with their intermediates and variations in a circle, to show the idea of this simple color nomenclature to the committee. The other members of the committee were much impressed with its clarity, and suggested that I make a color chart based on the idea of the sketch. The chart was worked out in oil colors and was completed in time to be used at our annual exhibition in 1931, where it was tried out successfully.

The Executive Committee of the Society then decided to make the chart available for the use of all members. The difficult problem came up as to how it should be reproduced by a printing process to approach as nearly as possible the color values of the original.

After much consideration the Four-Color Halftone Process was chosen, employing red, yellow, and two distinct blues. The result of the final printing was very close to the original chart and amply serves the practical purposes and underlying idea behind it, which are so well explained by Mr. Frank O. Shepardson in another article.

THE FISHER COLOR CHART

F. O. Shepardson, *Massachusetts*

One of the hardest problems confronting introducers and lovers of beautiful flowers is a method of adequately describing the colors of their favorites so that others may get a fair idea of the exact hue intended. In order to do this it is obvious that there must be some common standard of color names so that a descriptive term must mean the same thing to all concerned.

How far removed from this so desirable condition we have strayed is most distressingly evident when we try to decipher some of the color descriptions in current catalogs. For instance when we find the terms *Begonia Rose, Hermosa Pink, Eosine Pink, Vinaceous Lavender, Jasper Pink, Pinard Yellow,* etc., how nearly definite an idea do they convey to most of us? Even the older and more common names such as *Lavender, Salmon, Purple, Mauve, Buff,* etc., convey such widely varying impressions to different people as to be incredible.

What appears to be our greatest need therefore is an entirely simplified, accurate, comprehensive system of descriptive color terminology, suitably illustrated for comparative purposes. This is exactly what is offered in the *Fischer Color Chart.*

The Fisher Color Chart consists of an accurately produced spectrum wheel divided into 6 sections, one for each spectrum color, and each section divided into 3 segments, the center group being the pure spectrum color with the addition of black and white, while on either side is shown the same color combined with a smaller amount of the neighboring color. Thus between Orange and Red are 2 groups, the one called Red-Orange, being composed of approximately ⅔ Orange modified by ⅓ Red, while the other named Orange-Red consists of ⅔ Red and ⅓ Orange. (See Fig. 1.)

Again, each of the 18 color groups is graded into 6 tones or values from dark to light, the 2 inner bands showing the addition of black and the outer 3 bands the addition of white. While these varying tones are described on the chart as Dark, Darker, Light, Lighter, and Pale, many of those most familiar with the chart have numbered the bands from 1 to 6 beginning with the darker center band as No. 1, and refer to the bands by number rather than by name.

Now as to the actual workability of the chart, take any ordinary flower, determine a section of the petal that fairly represents the average color of the flower, and place on the chart. A few seconds will suffice to determine which plate most nearly matches. Designate it with the group letters plus the number of the band, (thus—O R 5) and any one of the thousands of *Fischer Color Chart* owners can tell instantly almost exactly the hue intended. Even where a perfect match is not found it is easy to qualify thus—Between O R 4 and R O 4. At the Boston Show in 1931 when the original *Fischer Color Chart* was first shown a group of Gladiolus fans compared and placed every variety entered in the open classes, well over 100 kinds, and in no cases were we unable to agree as to which plate was nearest, in almost every case within a few seconds.

Even to the person who has never seen the *Fischer Color Chart*, the descriptive terminology conveys a pretty definite impression. For instance—Light-Red-Violet: ⅔ Violet and ⅓ Red with approximately 25% of white added—surely not so hard to get some idea of the hue intended.

The basic idea is simply this, that in the 6 spectrum colors with the addition of black or white lies the entire range of color. Every hue in existence is made up of some one or more of these, and it should not be difficult to describe any hue, using only these definite spectrum names, leaving no question of opinion as to the exact meaning of some indefinite descriptive term.

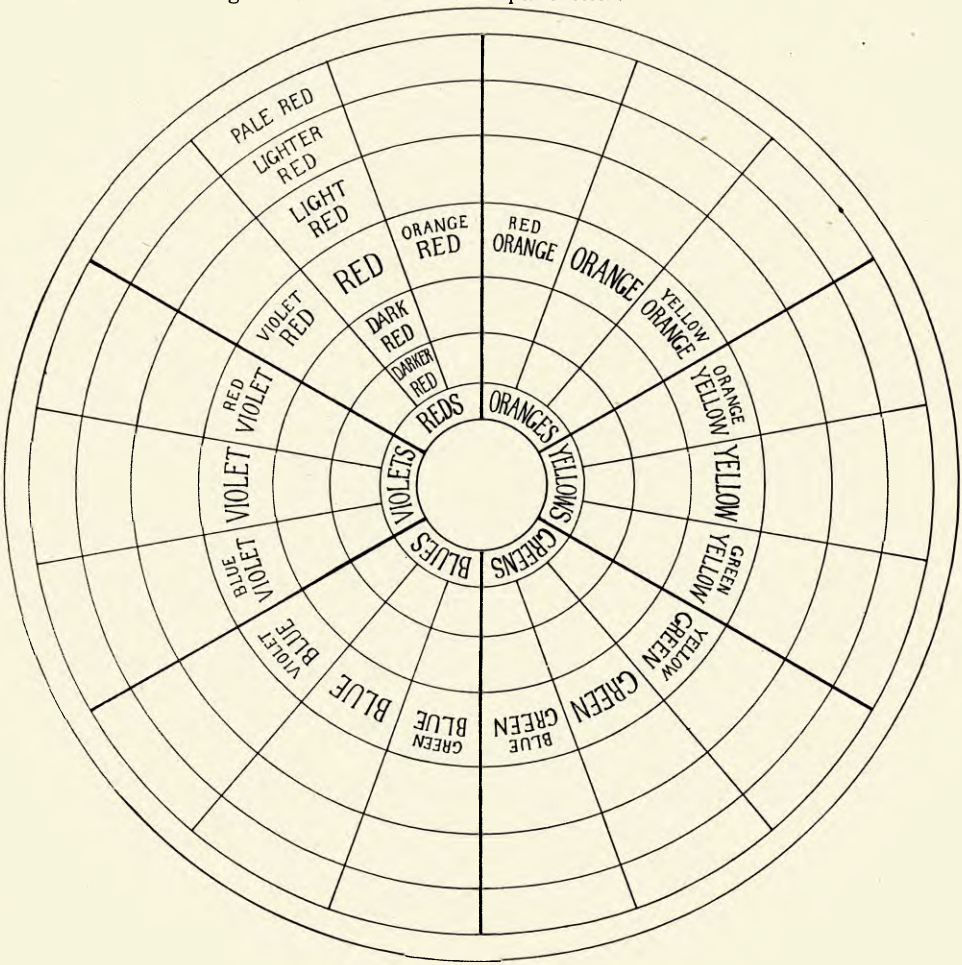


FIG. 1. FISCHER COLOR CHART

A further outstanding service to *Fischer Color Chart* owners will soon be available. Mr. Francis Bibby of Medfield, Mass., has compiled a correlation of several hundred of Ridgway's most commonly used terms, giving the color analysis of each and designating which plate on *Fischer's Chart* most nearly illustrates it. Thus the *Fischer Color Chart* becomes a key to *Ridgway* terminology, and this should prove of inestimable value to all interested in color description. This correlation will be published in the 1934 issue of the New England Gladiolus Society Year Book.

3. Description of the Amaryllideae

BOTANICAL DESCRIPTION

This section will serve as an inventory of the plant material in which the Amaryllideae enthusiast is interested. On account of space limitations, only three subjects are included under this head in this issue of the Year Book,—(a) Key to the Genera of the AMARYLLEAE and ALSTROEMERIEAE, (b) The Species of the GENUS HIPPEASTRUM, and (c) The GENUS AMARYLLIS. In future issues it may be practicable to include other important Genera,—CRINUM, ZEPHYRANTHES, HYMENOCALLIS, etc. The classical work on the Amaryllidaceae was published by William Herbert in 1837. This has served as a foundation of all later systematic work on this plant family. The latest revision of the Genera and Species of the Amaryllideae was published by Baker in 1888. As First-Assistant in the Herbarium at Kew Gardens, he had the opportunity of examining living specimens of most of the species included in his monograph. Both of these works are out of print and difficult to obtain. We are happy, therefore, to state that the Key to the Genera of Suborder I—AMARYLLEAE, Suborder II—ALSTROEMERIEAE and the species of the Genera HIPPEASTRUM and AMARYLLIS according to Baker are reprinted by kind permission of the publishers, Messrs. G. Bell & Sons, Ltd., York House, Portugal Street, London, W.C. 2.—Ed.

Key to The Genera of Suborder I.—Amarylleae and Suborder II—Alstroemerieae of The Order Amaryllideae, According to Baker 1888.

Suborder I. AMARYLLEÆ.—Rootstock a tunicated bulb. Leaves all radical. Peduncle a leafless scape.

Tribe 1. CORONATÆ.—Flower furnished with a corona between the perianth and stamens.

1. CRYPTOSTEPHANUS.—Perianth funnel-shaped; tube long. Corona of 12 minute linear scales.—Angola. [1][1]

2. NARCISSUS.—Perianth hypocrateriform; tube long. Corona a distinct petaloid cup.—*Europe, West Asia, North Africa.* [27]

3. TAPEINANTHUS.—Perianth-tube very short. Corona of 6 minute scales.—*Spain, Morocco.* [1]

4. PLACEA.—Perianth funnel-shaped; tube very short. Corona small, membranous, deeply 6-cleft.—*Chili.* [5]

Tribe 2. AMARYLLEÆ GENUINÆ.—Corona none; filaments free.

* *Anthers erect; filaments inserted at or near the base.*

† *Stamens epigynous; filaments short.*

5. GALANTHUS.—Inner segments different from the outer, permanently connivent.—*South Europe, West Asia.* [6]

6. LEUCOJUM.—Perianth-segments all alike. Filaments short.—*South Europe, North Africa.* [9]

7. LAPIEDRA.—Perianth-segments all alike. Filaments long.—*Spain.* [1]

†† *Stamens perigynous; anthers small, globose.*

8. HESSEA.—Perianth-tube none are very short.—*Cape.* [8]

9. CARPOLYZA.—Perianth-tube distinct.—*Cape.* [1]

[1] The numbers in brackets indicate the number of species admitted by Baker. —Ed.

††† *Stamens perigynous; anthers oblong or linear-oblong.*

Flowers solitary.

10. GETHYLLIS.—Peduncle short. Perianth hypocrateriform. Stamens uniseriate, often numerous.—*Cape.* [9]

11. APODOLIRION.—Peduncle short. Perianth funnel-shaped. Stamens biseriate. —*Cape.* [6]

12. COOPERIA.—Peduncle elongated.—*Texas & North Mexico.* [2]

Flowers umbellate.

13. ANOIGANTHUS.—Perianth-tube very short. Filaments long, filiform.—*Cape.* [1]

14. CHLIDANTHUS.—Perianth-tube long. Filaments short, dilated at the base.—*Andes.* [1].

** *Anthers dorsifixed, versatile.*

† *Ovules many, superposed; testa black.*

Flowers solitary; spathe tubular in the lower half.

15. STERNBERGIA.—Peduncle short or produced. Perianth regular, erect, bright yellow. Seeds globose.—*South Europe, West Asia.* [4]

16. HAYLOCKIA.—Peduncle short. Perianth regular, erect, whitish. Seeds flat. —*Monte Video, Buenos Ayres.* [1]

17. ZEPHYRANTHES.—Peduncle elongated. Perianth regular, erect or suberect. Seeds flat.—*America.* [34]

18. SPREKELIA.—Perianth ringent, horizontal, bright red; 3 lower segments convolute; stamens and style declinate.—*Mexico & Guatemala.* [1]

Flowers umbellate. Spathe 2—4-valved, and pedicels subtended by filiform bracteoles.

19. UNGERNIA.—Perianth-tube short. Seeds many in a cell, flat, winged. Peduncle solid.—*Asia.* [3]

20. LYCORIS.—Perianth-tube short. Seeds few in a cell, turgid. Peduncle solid. —*China & Japan.* [5]

21. HIPPEASTRUM.—Perianth-tube usually short, rarely long. Seeds many in a cell, usually flat. Peduncle hollow.—*America.* [38]

22. VALLOTA.—Flowers erect. Perianth-tube long, broadly funnel shaped, pulvinate at the throat. Seeds winged at the base.—*Cape.* [1]

23. CYRTANTHUS.—Perianth-tube 2—3 times longer than the oblong segments, naked at the throat. Spathe-valves 2-4.—*Cape, Angola.* [20]

†† *Ovules 2, basal, collateral; testa pale.*

24. GRIFFINIA.—Flowers lilac, umbellate. Leaves broad, thin, petioled.—*Brazil.* [7]

††† *Ovules 2 or few, collateral or fascicled from the centre of the placenta.*

25. CLIVIA.—Fruit baccate. Ovules several. Bulb imperfect.—*Cape.* [1]

26. HÆMANTHUS.—Fruit baccate. Ovules 2. Bulb large, tunicated. Flowers very numerous; segments narrow.—*Cape, Trop. Africa, Socotra.* [38]

27. BUPHANE.—Fruit capsular. Spathe-valves 2.—*Cape, Trop. Africa.* [2]

†††† *Ovules few or many, superposed. Seeds few, green, turgid.*

Fruit indehiscent or bursting irregularly.

28. CRINUM.—Perianth-tube long. Flowers white, sometimes flushed or keeled with red.—*Cosmopolitan.* [79]

29. AMARYLLIS.—Perianth-tube short; segments broad.—*Cape.* [1]

30. AMMOCHARIS.—Perianth-tube short; segments narrow, acute.—*Cape.* [1]

Fruit a 3-valved capsule.

31. BRUNSVIGIA.—Style filiform. Capsule turbinate, acutely angled.—*Cape.* [10]

32. NERINE.—Style filiform. Capsule globose, obtusely angled.—*Cape.* [10]

33. STRUMARIA.—Style swollen and triquetrous towards the base.—*Cape.* [4]

Tribe 3. PANCRATIEÆ.—Corona none. Stamens appendiculate towards the base, often united in a distinct cup.

** Ovules many or few, superposed.*

† Leaves broad, petioled.——All Andine.

34. Eucrosia.—Perianth funnel-shaped, coloured; tube short. Stamens declinate, exserted, irregularly connate and callose at the base. [1]

35. Stricklandia.—Perianth funnel-shaped, coloured. Stamens straight, just exserted, united in the lower half, callose at the base. [1]

36. Callipsyche.—Perianth funnel-shaped, coloured; tube short. Stamens declinate, much exserted, free, callose at the base. [3]

37. Phædranassa.—Perianth coloured, subcylindrical; segments long or short. Filaments very obscurely appendiculate towards the base. [5]

38. Urceolina.—Perianth coloured; tube cylindrical, suddenly dilated. Filaments very obscurely appendiculate towards the base. [3]

39. Eucharis.—Perianth white, regular, subrotate; tube subcylindrical, suddenly dilated. Filaments quadrate, united in a distinct cup. [5]

40. Plagiolirion.—Perianth white; tube short, cylindrical; limb rather irregular. Filaments united in a toothed cup. [1]

41. Calliphruria.—Perianth white; tube funnel-shaped; segments oblong, as long as the tube. Filaments quadrate, with a large tooth on each side of the anther. [2]

†† Leaves linear or lorate, sessile.

42. Eustephia.—Perianth coloured, subcylindrical; tube short. Filaments with a narrow wing on each side, ending in a tooth.—*Andes of Peru.* [1]

43. Stenomesson.—Perianth coloured, subcylindrical; tube long. Filaments united in an entire or toothed cup.—*Andes.* [11]

44. Hyline.—Perianth white; tube none; segments linear. Staminal cup very short.—*Brazil.* [1]

45. Pancratium.—Perianth white; tube funnel-shaped. Staminal cup large.—*Old World.* [12]

*** Ovules 2-6, basal, collateral.*

46. Hymenocallis.—Perianth-tube long. Staminal cup erect.—*Tropical & Subtropical America.* [31]

47. Elisena.—Perianth-tube short. Staminal cup deflexed.—*Andes.* [3]

**** Ovules 2-3, medial.*

48. Vagaria.—Perianth funnel-shaped; segments narrow. Leaves lorate. Ovary 3-celled.—*Syria.* [1]

49. Eurycles.—Perianth with a slender tube and broad segments. Leaves broad, petioled. Ovary 3-celled.—*Malaya, Australia.* [2]

50. Calostemma.—Perianth funnel-shaped. Ovary 1-celled. Leaves various.—*Australia.* [3]

Suborder II. Alstrœmeriæ.—Root of fleshy fibres; rootstock none (except in *Ixiolirion*. Inflorescense a simple or compound umbel. Flowering stems leafy.

** Roostock bulbous.*

51. Ixiolirion.—Perianth-segments subequal. Stem erect.—*Western Asia.* [2]

*** Rootstock none.*

52. Alstrœmeria.—Three outer segments of perianth different from three inner, and the latter unequaled. Stem erect. Ovary 3-celled.—*Brazil, Chili.* [44]

53. Bomarea.—Three outer segments of perianth different from three inner, the latter equal. Stem usually elongated, sarmentose. Ovary 3-celled.—*Mexico, S. America.* [75]

54. Leontochir.—Segments of perianth subequal. Ovary 1-celled.—*Chili.* [1]

Species of The Genus Hippeastrum According to Baker.

HIPPEASTRUM *Herb.*[1]

Perianth funnel-shaped, usually more or less declinate; tube usually short, rarely long, often furnished with minute scales or a distinct neck at the throat; segments nearly equal or the lowest of the inner row narrower. *Stamens* inserted at the throat of the tube, more or less declinate; filaments filiform; anthers linear or linear-oblong, versatile. *Ovary* 3-celled; ovules many, superposed; style long, declinate; stigma capitate or trifid. *Capsule* globose, loculicidally 3-valved. *Seeds* usually flattened, with a thin black testa.—*Rootstock* a bulb with membranous tunics. *Leaves* linear or lorate. *Peduncle* hollow. *Flowers* usually 2 or more in an umbel, rarely solitary, but if so, the spathe is bifid down to the base, and the pedicel furnished at the base with a linear bracteole. *Flowers* usually bright red or whitish.

* *Leaves linear.*

Subgenus 1. HABRANTHUS (*Herb.*).—Perianth openly funnel-shaped; tube short. Stigma trifid.

Umbel 1-2-flowered	Sp. 1-5.
Umbel 3-6-flowered	Sp. 6-10.

Subgenus 2. PHYCELLA (*Lindl.*)—Perianth narrowly funnel-shaped; tube short.

Sp. 11-13.

Subgenus 3. RHODOPHIALA (*Presl*).—Perianth openly funnel-shaped; tube short. Stigma capitate.

Umbel 1-flowered	Sp. 14-16.
Umbel 2-6 flowered	Sp. 17-18.

** *Leaves lorate.*

Subgenus 4. MACROPODASTRUM.—Perianth with a long tube. Stigma capitate.

Sp. 19.

Subgenus 5. OMPHALISSA (*Salisb.*)—Perianth with a short tube, closed in by a distinct neck at the throat.

Stigma trifid	Sp. 20-23.
Stigma capitate	Sp. 24-25.

Subgenus 6. ASCHAMIA (*Salisb.*).—Perianth with a short tube, not closed in at the throat. Stigma capitate.

Perianth-tube very short	Sp. 26-32.
Perianth-tube ½-1 in. long	Sp. 33-35.

Subgenus 7. LAIS (*Salisb.*).—Perianth-tube short, not closed in at the throat.

Stigma trifid	Sp. 36-38.

Subgenus HABRANTHUS.

1. H. SORATENSE Baker.—Bulb ovoid, under 1 in. diam. Leaves about 4, narrow linear, 10-12 in. long, contemporary with the flowers in September. Peduncle slender, 4 in. long. Umbel 2-flowered; spathe-valves 2, linear, 3 in. long; pedicels ¾-1 in. long. Perianth-limb erect, 4-4½ in. long; tube 3 in. long, funnel-shaped at the apex, cylindrical below it; segments oblong-lanceolate, 1¼ in. long, ¼ in. broad at the middle. Stamens as long as the segments; anthers ¼ in. long. Style deeply trifid.

Hab. Andes of Bolivia; Sorata, alt. 8000—9000 ft., Mandon!

[1] See Baker in Journ. Bot. 1879, 79.

2. H. CHILENSE Baker in Journ. Bot. 1878, 82. *Habranthus chilensis* Herb. *Amaryllis chilensis* R. & P.—Bulb globose, 1-1½ in. diam.; neck 1-3 in. long; tunics dull brown. Leaves about 2, narrow linear, contemporary with the flowers, 6-9 in. long. Peduncle 6-9 in long. Umbel mostly 2-flowered; spathe-valves linear, 1½ in. long; pedicels ½-1 in. long. Perianth-limb erect or ascending, 1½-2 in. long; tube very short; segments bright red or yellow, oblong, acute, 1/3 in. broad at the middle. Stamens shorter than the perianth-segments; anthers oblong, ⅛ in. long. Style reaching to the tip of the segments; stigma trifid.

Hab. Sandy plains of South Chili, **Pavon! Lesson! Reed!** Flowers in spring.

3. H. ROSEUM Baker in Journ. Bot. 1878, 82. *Habranthus roseus* Herb.; Sweet, Brit. Flow. Gard. ser. 2, t. 107. *H. pumilus* Lodd. Bot. Cab. t. 1771. *Zephyranthes purpurea* Philippi.—Bulb ovoid, under 1 in. diam.; neck short; tunics dark brown. Leaves about 3, contemporary with the flowers in summer, narrow linear, glaucous, a foot long. Peduncle slender, ½ ft. long. Flower usually solitary, nearly horizontal; spathe 2-valved, 1-1½ in. long; pedicel shorter than the spathe. Perianth-limb 2 in. long, bright red; tube very short, greenish; segments oblong-lanceolate, acute. Stamens shorter than the segments; anthers ⅛ in. long. Style longer than the stamens; stigma trifid.

Hab. Chili, **Reed!** Introduced into cultivation from the Island of Chiloe by Lieut. Barlow in 1831, but now lost.

4. H. LINEATUM Baker in Journ. Bot. 1878, 82. *Habranthus lineatus* Philippi.—Bulb and leaves unknown. Peduncle slender, ½ ft. long. Umbel 2-flowered; spathe-valves linear, above 2 in. long; pedicles half as long as the spathe-valves. Flowers cernuous, yellow, marked with red lines, 1½-2 in. long; tube ¼ in. long; segments oblanceolate, 1/3 in. broad. Stamens much shorter than the segments. Style shorter than the segments; stigma trifid.

Hab. Chili, near Santiago, **Philippi.** Flowers in September.

5. H. BRACHYANDRUM Baker.—Bulb and leaves not seen. Peduncle slender, a foot long. Umbel 1-flowered; spathe-valves linear, 2 in. long; pedicel as long as the spathe. Flower nearly erect, bright red, 3½ in. long; tube short, funnel-shaped; segments oblong-lanceolate, acute, ½ in. broad. Stamens under an inch long. Style reaching halfway up the flower; stigma deeply trifid.

Hab. On the Parana, lat. 26—27° S., **Parodi!** Received at Kew in 1883, a dried specimen.

6. H. ADVENUM Herb. App. 31. *Amaryllis advena* Gawl. in Bot. Reg. t. 849; Bot. Mag. t. 1125. *Habranthus hesperius* Herb. *H. mendocinus* Philippi. *Eustephia Macleanica* Baker in Ref. Bot. t. 332, non Herb. *Chlidanthus Cumingii* Presl.—Bulb ovoid, 1½ in. diam.; neck short; tunics dark brown. Leaves linear, a foot long, glaucous green. Peduncle ½-1 ft. long. Umbel 2-6-flowered; spathe-valves lanceolate, 1½-2 in. long; pedicels 1-3 in. long. Flowers horizontal or ascending, openly funnel-shaped, 1½-2 in. long, yellow or red; tube very short, greenish, crenulate at the throat; segments oblong-lanceolate, acute, ¼ in. broad. Stamens declinate, much shorter than the perianth; anthers ⅛ in. long. Style exceeding the stamens; stigma trifid. Var. *pallidus* Herb.; Lodd. Bot. Cab. t. 1760, has pale yellow flowers. *Habranthus miniatus* D. Don in Sweet Brit. Flow. Gard. ser. 2, t. 213, has large bright red flowers.

Hab. Chili, about Valparaiso, Santiago, &c., flowering in December and January. First figured by Feuillee in 1714.

7. H. BIFIDUM Baker in Journ. Bot. 1878, 83. *Habranthus bifidus* Herb. in Bot. Mag. t. 2599.—Bulb globose, 1½ in. diam.; tunics dark brown; neck 2-3 in. long. Leaves 2-3, linear, slightly glaucous, a foot long, produced after the flowers. Peduncle slightly compressed, a foot long. Umbel 3-6-flowered; spathe-valves lanceolate, 2-3 in. long; pedicels slender, 1-2 in. long. Flowers bright red, erect or suberect, about 2 in. long; tube very short, coronulate at the throat; segments oblanceolate-unguiculate, obtuse, cuspidate, ¼-1/3 in. broad. Stamens declinate, unequal, about half as long as the limb; anthers ⅛ in. long. Style longer than the stamens; stigma trifid.

Hab. Plains of Buenos Ayres and Monte Video. Introduced by Lord Carnarvon about 1825. Flowers in March. I cannot separate as species **Habranthus kermesinus** Herb. (Bot. Reg. t. 1638). **H. intemedius** Herb. (Bot. Reg. t. 1148). **H. nobilis, nemoralis, spathaceus, angustus** (Bot. Mag. t. 2639), **pulcher,** and **pendunculosus** Herb. Received alive lately from Colonel Trevor Clarke and Miss F. Hall, of Paddington. A closely allied plant gathered by Jameson and Colonel Hall in the Andes of Ecuador will probably prove a distinct species.

8. H. BAGNOLDI Baker in Journ. Bot. 1878, 83. *Habranthus Bagnoldi* Herb. in Bot. Reg. t. 1396.—Bulb globose, 2 in. diam.; tunics nearly black. Leaves linear, glaucous, a foot long. Peduncle slender, a foot long. Umbel 4-6-flowered; spathe-valves lanceolate, 2 in. long; pedicels finally 2-3 in. long. Flowers erect or sub-erect, openly funnel-shaped, 1½-2 in long, yellow, tinged with red; tube very short, funnel-shaped, coronulate at the throat; segments oblong, 1/3-½ in. broad. Stamens rather shorter than the perianth-limb; anthers 1/6 in. long. Style as long as the perianth; stigma trifid.

Hab. Chili, near Coquimbo, **Cuming** 865! Var. **Gilliesianus** Herb., from Melocoton, has smaller flowers than the type, pale yellow, with shorter pedicels. **H. punctatus** Herb., collected by Reynolds in South Chili, has copious small reddish dots on the flower-segments.

9. H. BERTEROANUM Baker in Journ. Bot. 1878, 83. *Hippeastrum Berteroanum* Philippi.—Leaves and bulb unknown. Peduncle 9-12 in. long. Umbel 5-6-flowered; spathe-valves lanceolate, 1½-2 in. long; pedicels sometimes as long. Flowers purple, unspotted, openly funnel-shaped, 2¼ in. long; tube very short, minutely squamulose at the throat; segments oblanceolate, 1/3 in. broad. Stamens much shorter than the flower.

Hab. Chili; Rancagua, flowering in Janunary, **Bertero.**

10. H. JAMESONI Baker in Journ. Bot. 1878. 83.—Bulb and leaves not seen. Peduncle slender, ½ ft. long. Umbel 2-4-flowered, spathe-valves lanceolate, 1½-2½ in. long; pedicels shorter than the spathe. Flowers horizontal, ascending or cernuous, red, 2-2½ in. long; tube very short, funnel-shaped; segments oblong, acute, ½ in. broad at the middle; lower inner narrower. Stamens declinate, unequal, about half as long as the segments. Style rather longer than the stamens; stigma trifid.

Hab. Argentine Republic; ravines near Jachal, flowering in February, **Jameson!**

Subgenus PHYCELLA.

11. H. PHYCELLOIDES Baker in Journ. Bot. 1878, 83. *Habranthus phycelloides* Herb. in Bot. Reg. t. 1417.—Bulb ovoid, 1½-2 in, diam.; neck about 2 in. long. Leaves 3-4, narrow linear, glaucous, contemporary with the flowers. Peduncle ½-1 ft. long. Umbel 3-6-flowered; spathe-valves linear, 2-3 in. long; pedicels 1½-2 in. long. Flowers erect or ascending, bright red, yellowish inwards; tube 1/3 in. long, with a minute ciliated corona at the throat; segments oblanceolate, 1/3 in. broad, connivent except at the tip. Stamens as long as the perianth; anthers 1/6 in. long. Style exserted; stigma minutely tricuspidate.

Hab. Andes of Chili, **Macrae! Reed!** Introduced into cultivation in 1830. Connects the subgenera **Habranthus** and **Phycella.**

12. H. BICOLOR Baker in Journ. Bot. 1878, 83. *Amaryllis bicolor* R. & P. *A. cyrtanthoides* Sims in Bot. Mag. t. 2399. *A. igena* Lindl. Bot. Reg. t. 809. *Phycella ignea, cyrtanthoides, magnifica, graciliflora, attenuata, brevituba, bicolor,* and *biflora* Herb. (Bot. Reg. t. 1943). *P. angustifolia* Philippi.—Bulb globose, 2 in. diam.; tunics dark brown; neck 1-2 in. long. Leaves about 4, contemporary with the flowers, linear, obtuse, 1½-2 ft. long, about ½ in. broad, narrowed to the base. Peduncle slender, terete, 1-1½ ft. long. Umbel 4-9-flowered; spathe-valves lanceolate, 1-1½ in. long; pedicels slender, as long as the spathe. Flowers ascending, narrowly funnel-shaped, 1½-2 in. long, bright red, passing into yellowish green towards the base; tube short, funnel-shaped, appendiculate with 6 minute teeth at the throat; segments oblanceolate, with a long claw, connivent, 1/3 in. broad near the tip. Stamens unequal, declinate, nearly as long as the segments. Style exserted; stigma capitate.

Hab. Frequent in Chili, about Valparaiso, &c., flowering in October. I cannot make out any specific characters to separate the synonyms above cited. The finest variety is **P. magnifica** Herb., which has a perianth-limb 3 in. long.

13. H. HERBERTIANUM Baker in Journ. Bot. 1878, 83. *H. andinum* Baker. *Phycella Herbertiana* Lindl. in Bot. Reg. t. 1341. *Rhodophiala? andina* Philippi.—Bulb globose, 1½ in. diam. Leaves 3-4, contemporary with the flowers, 1-1½ in. long, ½ in. broad. Peduncle slender, a foot long. Umbel 4-6-flowered; spathe-valves lanceolate, 2 in. long; pedicels slender, 1-1½ in. long. Flowers bright red, suberect, narrowly funnel-shaped, above 2 in. long; tube very short; segments oblanceolate, acute, ¼ in. broad above the middle. Stamens as long as the segments; anthers 1/6-¼ in. long. Style exserted; stigma capitate.

Hab. Chili; Cordilleras of Santiago, **Philippi!** Introduced into cultivation by Macrae in 1825, but now lost.

Subgenus RHODOPHIALA.

14. H. MODESTUM Baker in Journ. Bot. 1878, 83. *Rhodophiala modesta* Philippi. —Bulb ovoid, ½ in. diam.; tunics grey; neck 1-2 in. long. Leaves 2-3, narrow linear, developed after the flowers. Peduncle very slender, 1-flowered, protruded only about an inch from the neck of the bulb, Spathe of 2 linear valves ½ in. long. Pedicel erect, ¼ in. long. Flower erect; tube very short; segments oblanceolate, acute, under 1-12th in. broad, white, with a broad red keel. Stamens rather shorter than the segments. Style as long as the limb; stigma capitate.

Hab. Andes of Chili; Cuerta de los Molles, **Philippi!**

15. H. RHODOLIRION Baker in Journ. Bot. 1878, 84. *Rhodolirion andinum* Philippi. —Bulb and leaves unknown. Peduncle 1-flowered, 1½ ft. long. Spathe-valves lanceolate, 1½-2 in. long; pedicel ¾ in. long. Perianth bright red, openly funnel-shaped, 3 in. long; tube greenish, ¾ in. long. Stamens half as long as the limb. Style overtopping the stamens; stigma capitate.

Hab. Chili; Andes of the Province of St. Fernando, **Bustillos.**

16. H. UNIFLORUM Baker in Journ. Bot. 1878, 83. *Rhodolirion montanum* Philippi. —Bulb globose, 1½ in. diam.; neck 2-3 in. long. Leaves linear, developed after the flowers. Peduncle 1-flowered, 2-4 in. long; spathe-valves linear, an inch long; pedicel very short. Flower erect, red, about 2 in. long; tube funnel-shaped, above ½ in. long; segments oblong, acute, ½ in. broad at the middle. Stamens half as long as the limb. Style erect, overtopping the stamens; stigma capitate.

Hab. Chili; Cordilleras of Santiago, **Philippi!** Judging from the description, **Rhodophiala uniflora** Philippi, from the Province of Atacama, differs from this by its shorter tube, which is only as long as the ovary.

17. H. MONTANUM Baker in Journ. Bot. 1878, 83. *Habranthus montanus* Philippi. —Leaves linear, 1/6 in. broad. Peduncle 9-12 in. long. Umbel 2-4-flowered: spathe-valves lanceolate, 1½ in. long; pedicles rather shorter. Perianth an inch long, openly funnel-shaped, yellow; segments reflexing towards the tip. Stamens straight, slightly shorter than the perianth. Style just exserted; sigma faintly 3-lobed.

Hab. Chili; Province of Talca; Cordillera of St. Francisco, **Philippi.**

18. H. PRATENSE Baker in Journ. Bot. 1878, 84. *Habranthus pratensis* Herb.; Bot. Reg. 1842, t. 35. *Rhodophiala amarylloides* Presl. *Placea pratensis* Poepp. *Stephanoma elegans* Kunze. *Habranthus speciosus* Herb.—Bulb ovoid, 1¼-1½ in. diam.; neck short; tunics dark brown. Leaves linear, contemporary with the flowers in spring, 1-1½ ft. long, ¼-½ in. broad. Peduncle moderately stout, 1-2 ft. long. Umbel 2-4-flowered; spathe-valves lanceolate, 2 in. long; pedicels 1-1½ in. long. Flowers brigh red, ascending or horizontal; tube very short, appendiculate at the throat with minute linear scales; segments 2½ in. long, oblanceolate, ½ in. broad above the middle, subobtuse. Stamens declinate, more than half as long as the limb; anthers linear-oblong. Style declinate, as long as the limb; stigma capitate.

Hab. Hills and plains of Chili, introduced into cultivation about 1840. Received in 1872 alive from Mr. Tyerman. I cannot separate specifically **Rhodophiola Volckmanni** and **R. læta** Philippi, the latter a plant of the hills of Atacama.

Subgenus MACROPODASTRUM.

19. H. SOLANDRIFLORUM Herb. App. 31; Bot. Mag. t. 2573 & 3771; Lindl. Collect. t. 11; Lodd. Bot. Cab. t. 1200.—Bulb ovoid, 3-4 in. diam.; neck short. Leaves lorate, 1½ ft. long, above an inch broad. Peduncle slightly 2-edged, 1½-2 ft. long. Umbel 2-4-flowered; spathe-valves lanceolate, 2-3 in. long; pedicels 1-1½ in. long. Perianth-limb funnel-shaped, 7-10 in. long; tube greenish-cylindrical, 4-5 in. long; segments greenish white, obovate, 4-5 in. long, 1-1½ in. broad. Stamens shorter than the segments; anthers linear-oblong. Style as long as the segments; stigma capitate.

Hab. North Brazil, **Burchell! Gardner** 3477! Guiana, **Schomburgk** 700! **Appun** 2328! Venezuela, **Fendler** 1505! Colombia, **Lehmann** 2140! Flowers in January. Introduced into cultivation in 1820.

Subgenus OMPHALISSA.

20. H. AULCIUM Herb. App. 31. *Amaryllis aulica* Gawl. in Bot. Mag. t. 3311; Bury, Hexand. t. 19; Lindl. in Bot. Reg. t. 444, 1038.—Bulb ovoid, 3 in. diam.; neck short. Leaves 6-8, lorate, bright green, 1½ ft. long, 1½-2 in. broad. Peduncle stout, terete, 1½ ft. long. Umbel generally 2-flowered; spathe-valves lanceolate, red-brown, 3-4 in. long; pedicels 1½-2 in. long. Perianth-limb 5-6 in. long; tube short, with a distinct incurved green corona at the throat; segments bright crimson, green at the base; outer segments and lowest inner about an inch broad above the middle; 2 upper inner much broader. Stamens shorter than the segments; filaments bright red; anthers ½-¾ in. long. Style as long as the segments; stigma deeply trifid. Var. *stenopetalum* Bot. Reg. t. 444, has all the segments much narrower than in the type.

Hab. Central Brazil, **Gardner** 5210! **Regnell** 440! **Weir** 314! Introduced into cultivation in 1819. I cannot distinguish as species **H. Heuserianum** Karst. Fl. Columb. t. 102, gathered by Dr. Heuser at St. Paulo, **H. robustum** A. Dietr. or **Amaryllis Rougieri** Carriere in Rev. Hort. 1882, 312, with coloured figure. A form gathered by Balansa in Paraguay (529) has segments only ½—¾ in. broad.

21. H. ORGANENSE Hook. in Bot. Mag. sub t. 3803. *Amaryllis aulica* var. *glaucophylla* Bot. Mag. t. 2983. *A. Gardneri* Seubert. *A. correiensis* Bury, Hexand. t. 9.—Bulb large; neck short. Leaves 5-6, lorate, glaucous, 1-1½ ft. long, 1½ in. broad, acute. Peduncle stout, 1½ ft. long. Umbel generally 2-flowered; spathe-valves lanceolate, 3-4 in. long; pedicels much shorter than the spathe. Perianth-limb 5-6 in. long; tube ½ in. long, funnel-shaped, with a small incurved green corona at the throat; segments bright crimson, with a green keel in the lower half, oblong, acute; outer 1½-1¾ in. broad at the middle; inner lower much narrower. Stamens nearly as long as the segments; filaments bright red; anthers linear-oblong, 1/3 in. long. Style as long as the segments; stigma deeply trifid.

Hab. South Brazil; Organ Mountains, alt. 4000—5000 ft., **Bowie** and **Cunningham! Gardner** 686! 688! **Glaziou** 8992! Closely allied to **H. aulicum.**

22. H. PSITTACINUM Herb. App. 31. *Amaryllis psittacina* Gawl. in Bot. Reg. t. 199; Lodd. Bot. Cab. t. 1204; Bury, Hexand. t. 23.—Bulb 3-4 in. diam.; neck produced. Leaves 6-8, lorate, glaucescent, 1-1½ ft. long, 1-1½ in. broad. Peduncle stout, 2-3 ft. long. Umbel 2-4-flowered; spathe-valves lanceolate, longer than the pedicels. Perianth-limb 4-5 in. long; tube very short, broadly funnel-shaped, with a distinct incurved greenish red corona; segments oblong, acute, undulated, 1-1¼ in. broad, with a crimson edge, a green keel, and crimson stripes radiating from the keel. Stamens much shorter than the limb. Style shorter than the limb; stigma trifid.

Hab. South Brazil, introduced into cultivation in 1814. Flowers in spring. **H. Griffini** Herb. (Bot. Mag. tl 3528) is a fine hybrid between **psittacinum** and **Johnsoni.**

23. H. CALYPTRATUM Herb. App. 31. *Amaryllis calyptrata* Gawl. in Bot. Reg. t. 164; Lodd. Bot. Cab. t. 864. *A. fulvovirens* Schott. *A. unguiculata* Morren.—Bulb globose, 3 in. diam.; tunics brown; neck short. Leaves 5-6, lorate, acute, bright green, 1½-2 ft. long, 2 in. broad. Peduncle terete, green, 2 ft. long, ½-¾ in. diam. Umbel 2-3-flowered; spathe-valves lanceolate, 3 in. long; pedicels shorter than the spathe. Perianth-limb 4 in. long; tube funnel-shaped, ¾ in. long, with a distinct incurved corona at the throat; segments oblong-unguiculate, acute, 1¼-1½ in. broad, pale yellow, reticulated on the face with cross-bars of green. Stamens exserted; anthers linear-oblong, 1/3 in. long. Style exserted; stigma deeply trifid.

Hab. Brazil, **Gardner** 687! Introduced in 1816. Described from a plant flowered by Messrs. Veitch in May, 1877.

24. H. CYBISTER Benth. in Gen. Plant. iii. 725. *Sprekelia Cybister* Herb. in Bot. Reg. 1840, t. 33; Bot. Mag. t. 3872; Flore des Serres, t. 455-6.—Bulb ovoid, brown, 2 in. diam. Leaves produced after the flowers, lorate, green, 1-1¼ in. broad. Peduncle above 2 ft. long, glaucescent, subterete, purple downwards. Umbel 4-6-flowered; spathe-valves lanceolate, reddish; pedicels stout. Perianth-limb 3-4 in. long; tube very short, with an incurved bearded neck at the throat; segments bright crimson, tinged with green towards the tip and outside, narrowed gradually from near the base to the acute point, the three upper twisted up, the three lower close together. Stamens 1-1½ in. longer than the segments; filaments greenish; anthers oblong, ¼ in. long. Stigma small, minutely 3-lobed.

Hab. Andes of Bolivia. Introduced into cultivation about 1840, but now lost. Connects **Sprekelia** and **Hippeastrum.**

25. H. PARDINUM Dombrain in Floral Mag. t. 344. *Amaryllis pardina* Hook. fil. In Bot. Mag. t. 5645.—Bulb globose, 2-3 in. diam.; neck short. Leaves 5-7, fully developed after the flowers, lorate, bright green, finally 2 ft. long, 2 in. broad at the middle, narrowed to 1 in. near the base. Peduncle glaucous, subterete, 1½ ft. long. Umbel generally 2-flowered; pedicels 1½-2 in. long; spathe-valves lanceolate, 2 in. long. Perianth-limb 4 in. long; tube funnel-shaped, under ½ in. long, with a distinct incurved greenish yellow fimbriated corona at the throat; segments oblong-unguiculate, acute, 1½-1¾ in. broad above the middle, greenish, more or less flushed and copiously minutely spotted with red, not vittate, upper broader and lowest inner narrower than the others.. Stamens declinate, a little shorter than the segments; anthers ½ in. long. Style as long as the segments; stigma faintly 3-lobed.

Hab. Andes of Peru; discovered by Pearce; first flowered by Messrs. Veitch in 1867. Described from a plant that flowered at Kew in February, 1882, and a specimen received from M. André the same year.

Subgenus ASCHAMIA.

26. H. ANDREANUM Baker in Gard. Chron. 1880, ii. 424.—Bulb 4-4½ in. diam., copiously proliferous; tunics brownish grey; neck short. Leaves lorate, developed after the flowers. Peduncle 12-15 in. long, brownish violet, slightly 2-edged. Umbel 4-6-flowered; spathe-valves 2, rose-red, lanceolate, 1½-2 in. long; pedicels 1-1½ in. long. Perianth-limb 4 in. long; tube very short, not coronulate at the throat; segments oblanceolate-oblong, acute, ½-¾ in. broad above the middle, pale red, with streaks of brighter red, not vittate nor distinctly keeled. Stamens 1-1½ in. shorter than the limb. Style longer than the stamens; stigma capitate.

Hab. Central Cordilleras of New Granada, alt. 6000—8000 ft., on the banks of one of the branches of the Rio Cauca. Discovered by M. André in 1876.

27. H. REGINÆ Herb. App. 31. *H. regium* Herb. *Amaryllis Reginæ* L.; Miller, Ic. t. 24; Bot. Mag. t. 453; Red. Lil. t. 9; Bury, Hexand. t. 24.—Bulb globose, 2-3 in. diam. Leaves fully developed after the flowers, 2 ft. long, 1½ in. broad at the middle, narrowed gradually to ½ in. near the base. Peduncle 1-1½ ft. long. Umbel 2-4-flowered; spathe-valves lanceolate, 2-3 in. long, equalling the pedicels. Perianth-limb bright red, 4-5 in. long; tube funnel-shaped, 1/3-½ in. long; throat with a large greenish white star; segments obovate, acute, 1-1¼ in. broad at the middle; lowest inner narrower. Stamens shorter than the limb; anthers yellow, 1/6-¼ in. long. Style as long as the limb; stigma faintly 3-lobed.

Hab. Mexico and West Indies to Brazil and Peru. (Native area doubtful). **H. africanum** Welw. Herb., from "aboriginal woods on Prince's Island, alt. 3500 ft., appears to be a form of this species. **Amaryllis Alberti** Lemaire in Ill. Hort. t. 498, is probably a double-flowered form. Introduced into cultivation in 1728, and called **Lilium Reginæ** by Dr. James Douglas in honour of Caroline, the wife of our George II. I have not seen the Venezuelan **H. pronum** K. Koch, nor the Peruvian **H. stenopetalum** A. Dietr., briefly noticed by K. Koch in Wockenschrift, 1874, p. 37.

28. H. MINIATUM Herb. App. 31. *Amaryllis miniata* Ruiz & Pavon.—Bulb ovoid, 2-3 in. diam; neck short. Leaves lorate, 1½-2 ft. long, an inch broad above the middle. Peduncle 1-1½ ft. long. Umbel 2-4-flowered; spathe-valves lanceolate, 2 in. long, pedicels 2-3 in. long. Perianth-limb 3½-4 in. long, bright red; tube ¼ in. long, obscurely coronulate at the throat; segments obovate, sub-acute, 1-1¼ in. broad; inner segments narrower than the outer, especially the lowest. Stamens a little shorter than the limb; anthers linear-oblong, ¼ in. long. Style reaching to the tip of the segments; stigma capitate.

Hab. Andes of Peru, **Pavon!** Quebrada of Pariahuanca, **Matthews;** not known in cultivation.

29. H. SCOPULORUM Baker.—Bulb ovoid, 2-2½ in. diam.; neck short. Leaves lorate, narrowed gradually from the middle to the base. Peduncle a foot long. Umbel 2-flowered; spathe-valves lanceolate, 1½-2 in. long; pedicels as long as the spathe. Perianth-limb bright crimson, 2½-3 in. long; tube very short, funnel-shaped; upper outer segment ¾ in. broad at the middle; lower inner ½ in. Stamens as long as the perianth. Style a little exserted; stigma capitate.

Hab. Andes of Bolivia; Sorata, temperate region, alt. 8000—9000 ft. **Mandon** 1193! Allied to **H. Reginæ** and **miniatum.**

30. H. MANDONI Baker.—Bulb ovoid, 2-3 in. diam. Leaves lorate, 2 ft. long, an inch broad at the middle. Peduncle stout, 1-flowered; spathe-valves lanceolate, 3-4 in. long; pedicel 2 in. long. Flower erecto-patent, bright crimson; perianth-limb 5 in. long; tube greenish ,funnel-shaped, ½ in. long; segments obovate, acute, outer 1½ in. broad; upper the longest; inner all above an inch broad. Stamens much shorter than the limb; anthers yellow; ¼ in. long. Style nearly as long as the limb; stigma capitate.

Hab. Andes of Bolivia; near Sorata, temperate region, alt. 8000—9000 ft., **Mandon** 1195! Intermediate in general appearance between **H. Reginæ** and **aulicum.** It may be identical with **H. Warszewiczianum** A. Dietr., briefly described by K. Koch, Wochenschrift, 1864, 38.

31. H. LEOPOLDI Dombrain in Floral Mag. t. 475-6. *Amaryllis Leopoldi* Moore in Gard. Chron. 1870, 733, fig. 140.—Bulb globose, 2-3 in. diam.; neck short. Leaves lorate, finally 1½-2 ft. long. Peduncle stout, subterete. Spathe-valves lanceolate. Perianth-limb the most regular of all the species, 5 in. long, 6-7 in. diam. when fully expanded; tube short, without any distinct incurved corona at the throat; segments obovate, 2 in. broad, white towards the tip, bright red at the middle, with a bifid white keel in the lower half of the red, and a large greenish white throat. Stamens declinate, rather shorter than the segments; filaments white; anthers purplish, above ½ in. long. Style longer than the stamens; stigma capitate.

Hab. Andes of Peru, discovered by Pearce. First flowered by Messrs. Veitch in 1869, and named in honour of Leopold, King of the Belgians.

32. H. PROCERUM Lemaire in Ill. Hort. xi. 408. *Amaryllis procera* Duchartre; Flore des Serres, t. 2077-8. *A. Rayneri* Hook. fil. in Bot. Mag. t. 5883.—Bulb large, ovoid, with a long neck. Leaves about a dozen, distichous, falcate, ensiform, finally 2-3 ft. long, 1½-2 in. broad, firm in texture, cartilaginous on the edge. Peduncle 1-1½ ft. long, much compressed, ancipitous, shorter than the leaves, 1-1¼ in. diam. Umbel 4-12-flowered; spathe-valves 2-3 in. long, exceeding the pedicels. Perianth-limb 5-6 in. long, lilac, not starred at the throat; tube very short; segments oblanceolate, acute, under an inch broad. Stamens much shorter than the limb; anthers yellow, ½ in. long. Stigma capitate.

Hab. South Brazil, near Petropolis. Introduced by Binot about 1863, in which year it was described by Duchartre. Very distinct.

33. H. EQUESTRE Herb. App. 31. *Amaryllis equestris* Ait.; Jacq. Hort. Schoen. t. 63; Bot. Mag. t. 305; Red. Lil. t. 32. *A. punicea* Lam. *H. occidentale* Roem. *A. Belladonna* Swartz, non Linn.—Bulb stoloniferous, globose, 2 in. diam.; tunics brown; neck short. Leaves 6-8, fully developed after the flowers, lorate, bright green, 1½ ft. long, 1½-1¾ in. broad, narrowed gradually to the point. Peduncle terete, rather glaucous, 1½-2 ft. long. Umbel 2-4-flowered; spathe-valves green, lanceolate; pedicels 2-3 in. long. Perianth-limb 4-5-in. long, 4 in. diam. when expanded; tube green, an inch long, obscurely coronulate at the throat; base of the segments yellowish green; upper part bright red; 3 outer 1¼-1½ in. broad; 3 inner narrower, especially the lowest. Stamens shorter than the segments; anthers small, oblong. Stigma obscurely 3-lobed.

Hab. Throughout Tropical America from Mexico and the West Indies to Chili and Brazil. Var. **major** Bot. Reg. t. 234; Bury, Hexand, t. 41, is a form with very large flowers. The species was first noticed by Hermann in 1698. Described from plants that flowered at Kew in 1873 and 1879. I cannot find any specific character by which to distinguish A. Roezli Regel in Gartenflora, 1874, 290, t. 809, gathered by **Roezl** in the Andes of Bolivia. **H. barbatum** Herb. **(Crinum barbatum** Linn. herb.) is apparently not more than a white-flowered variety of this species. **H. pyrrochroum** Lemaire in Ill. Hort. t. 420, and **H. spathaceum** Sims in Bot. Mag. t. 2315, are probably both also varieties.

34. H. RETICULATUM Herb. in Bot. Mag. sub t. 2475. *Amaryllis reticulata* L'Herit. Sert. Angl. 12, t. 14; Bot. Mag. t. 657; Andr. Bot. Rep. t. 179; Red. Lil. t. 424. *Coburgia reticulata* Herb. *Leopoldia reticulata* Herb.—Bulb subglobose; neck short. Leaves 4-6, thin, oblanceolate, bright green, 2 in. broad above the middle, narrowed gradually to the base. Peduncle nearly terete, a foot long. Umbel 3-5-flowered; spathe-valves lanceolate, 2 in. long; pedicels 1-1¾ in. long. Perianth-limb 3½-4 in. long; tube ½-1 in. long, not coronulate at the throat; segments obovate-unguiculate, connivent in the lower half, an inch broad at the middle, bright mauve-red, with copious cross-bars of a deeper shade. Stamens shorter than the perianth. Stigma faintly 3-lobed. Seeds fewer and less compressed than in the other species.

Var. H. STRIATIFOLIUM Herb. *Amaryllis reticulata* var. *striati-folia* Herb. in Bot. Mag. t. 2513; Bot. Reg. t. 352; Bury, Hexand. t. 48.—Leaves broader, with a distinct white keel. Perianth-segments hardly at all reticulated with cross-bars.

Hab. South Brazil. There is a specimen at the British Museum, dried from the gardens of Messrs. Lee, of Hammersmith, in 1781. It was introduced in 1777. The only indigenous specimens I have seen were gathered by Burchell in March, 1826, on the shores of Botafogo Bay and near the village of Sao Domingas.

35. H. STYLOSUM Herb. in Bot. Mag. t. 2278. *Amaryllis stylosa* Bury, Hexand. t. 33. *A. maranensis* Gawl. in Bot. Reg. t. 719. *A. staminea* Seub.—Bulb globose, 3 in. diam. Leaves 4-6, bright green, lorate, 1¼-1½ in. broad. Peduncle 1½ ft. long. Umbel 3-8-flowered; spathe-valves lanceolate; pedicels 1-2 in. long. Perianth-limb 4 in. long, bright flesh-red; tube ½ in. long, obscurely fimbriate at the throat; segments oblong, acute, under an inch broad. Stamens a little exserted; anthers linear-oblong, ¼ in. long. Style much exserted; stigma capitate.

Hab. Guiana and North Brazil, **Burchell** 9819! **Gardner** 1167! Introduced by Lord Carnarvon from Marantham in 1821. Described from a plant flowered by Messrs. Backhouse in May, 1878.

Subgenus LAIS.

36. H. RUTILUM Herb. App. 41. *Amaryllis rutila* Gawl. in Bot. Reg. t. 23; Lodd. Bot. Cab. t. 1449. *H. bulbulosum* var. *rutilum* Herb.—Bulb subglobose, stoloniferous, 2-3 in. diam.; neck short; tunics pale. Leaves 6-8, lorate, bright green, a foot long, above an inch broad. Peduncle glaucous, slightly compressed, a foot long. Umbel 2-4-flowered; spathe-valves lanceolate, 1½ in. long; pedicels slender, as long as the spathe. Perianth-limb 3-4 in. long; tube green, cylindrical, ¾ in. long, obscurely coronulate at the throat; segments oblong, acute, bright crimson, with a green keel extending halfway up, ¾-1 in. broad at the middle, the lower inner narrower. Stamens shorter than the segments; filaments red; anthers linear-oblong, ¼ in. long. Style as long as the limb; stigma trifid.

Var. H. FULGIDUM Herb. *Amaryllis fulgida* Gawl. in Bot. Reg. t. 226; Bury, Hexand. t. 26. *A. miniata Sims* in Bot. Mag. t. 1943; Bury, Hexand. t. 35, non R. & P. *A. brasiliensis* Tratt. Tab. t. 333. *H. subbarbatum* Herb. in Bot. Mag. t. 2475. *H. bulbulosum*, vars. *subbarbium, unguiatum, fuigiaum, Simsianum,* and *equestriforme* Herb.—More robust. Bulb 3-4 in. diam. Leaves broader. Perianth-limb 4-5 in. long; tube 1 in. long; segments bright scarlet, with a green base and keel in the lower half, more ovate, 3-4 in. long, outer 1-1¼ in., inner lower about ¾ in. broad.

Var. H. CROCATUM Herb. *Amaryllis crocata* Gawl. in Bot. Reg. t. 38.—Habit as robust and leaves as broad as in *fulgidum,* but flower smaller, saffron-coloured, with more undulated segments.

Var. CITRINUM Baker. *Amaryllis crocata* Bury, Hexand. t. 16.—Flower bright yellow.

Var. H. ACUMINATUM Roem. *Amaryllis acuminata* Gawl. in Bot. Reg. t. 534 & 1188. *A pulverulenta* Lodd. Bot. Cab. t. 484; Bury, Hexand. t. 45. *H. pulverulentum* Herb. in Bot. Mag. t. 2273.—Flowers pale pink; segments very acute.

Hab. South Brazil, especially about Rio Janeiro, **Miers** 3123! 3598! **Glaziou** 8991! **Tweedie! Vauthier! H. Martianum** and **bahiense** Roem., and **H. glaucescens** Herb. appear to be also varieties of this very variable species. Introduced into cultivation about 1810.

37. H. VITTATUM Herb. App. 31. *Amaryllis vittata* Ait.; Bot. Mag. t. 129; L'Herit. Sert. t. 15; Red. Lil. t. 10; Bury, Hexand. t. 32 & 40.—Bulb globose, 2-3 in. diam. Leaves 6-8, lorate, bright green, 1½-2 ft. long. Peduncle 2-3 ft. long. Umbel

2-6-flowered; spathe-valves lanceolate, 2-3 in. long; pedicels as long as the spathe. Perianth-limb 4-6 in. long; tube funnel-shaped, an inch long, obscurely coronulate at the throat; segments obovate-oblong, acute, 1-1½ in. broad, white towards the edge and distinctly keeled with white, striped with bright mauve-red between the keel and edge; expanded limb 3-5 in. diam. Stamens shorter than the perianth-limb; anthers linear-oblong, ¼ in. long. Style as long as the limb; stigma deeply trifid.

Hab. Andes of Peru, introduced into Europe in 1769. There is a specimen at the British Museum dried from the garden of Mr. Malcolm in 1777. Flowers in April and May. It varies much in the size of the flower and distinctness of the stripes. Var. **minor** Bury, Hexand, t. 40, has a perianth 4 in. long. Var. **Harrisoniæ** Lindl. Bot. Reg. t. 988, is probably a hybrid between **vittatum** and **solandriflorum** (Bury, Hexand, t. 27).

38. H. BREVIFLORUM Herb. Amaryll. 137, t. 21, fig. 4; Bot. Mag. t. 3549.—Bulb ovoid, 2-3 in. diam. Leaves lorate, green, 1½ ft. long, 1¼-1½ in. broad. Peduncle terete, glaucous, 2-3 ft. long. Umbel 5-6-flowered; spathe-valves lanceolate; pedicels slender, 2-3 in. long. Perianth-limb 2½ in. long, funnel-shaped; tube very short; segments oblanceolate-oblong, subacute, white, keeled with red, the outer ¾ in. broad above the middle, the lowest inner ½ in. Stamens shorter than the limb; anthers small, oblong. Style shorter than the limb; stigma trifid.

Hab. Buenos Ayres, **Tweedie!** First flowered in cultivation at Glasgow in April, 1836.

Hybrids.

The broad-leaved species of *Hippeastrum* hybridise with great facility, and the original hybrids can be easily intercrossed. Since the year 1799, when *H. Reginæ* was first crossed with *H. vittatum* by a watchmaker of Prescott, in Lancashire, called Johnson, after whom the hybrid was named, a very large number of beautiful types have been produced. About 100 of these, with Latin names, are enumerated, and their parentage given in the second edition of Sweet's 'British Flower Garden,' in 1830.* Up to that time the principal species crossed were *Reginæ, reticulatum, vittatum, aulicum,* and *solandriflorum;* and rarely *equestre, psittacinum, fulgidum,* and *stylosum.* Since 1870 *pardinum* and *Leopoldi* have been largely used, especially the latter. I will only attempt here to enumerate a few of the hybrid types which have been figured or to which Latin names have been given.

Forms nearest *Reginæ*:—*Johnsoni* Bury, Hexand. t. 1; *brasiliensis* Red. Lil. t. 469; *Gravinæ* Melazzo; *Carnarvonia* A. DC. Pl. Rar. Hort. Genev. t. 9; *spectabile* Lodd. Bot. Cab. t. 159.

Forms nearest *aulicum*:—*Ackermanni; Ackermanni pulcherrima* Moore, Mag. 1850, ii. 5; *Chelsoni* Floral Mag. t. 545; *Mendeli* Floral Mag. n. s. t. 167; also Floral Mag. t. 97, and new series, tabs. 77, 347, and 359.

Forms nearest *reticulatum*:—*Sweetii, Colvillei, præclara, formosa, gloriosa,* and *Goweni.* Recent forms, Flore des Serres, t. 2427; Floral Mag. t. 383, and new series, tabs. 22 and 153.

Forms nearest *solandriflorum*:—Crossed with *vittatum* it gives *ambiguum* Bot. Mag. t. 3542; also forms figured Bot. Reg. t. 876, and Gartenflora, tabs. 949 and 956; also *picta* Bury, Hexand. t. 5, a fine cross with *Johnsoni,* figured Bury, Hexand. t. 46, *Harrisoni* Bury, Hexand. t. 21, and *marginata, Croomii, Haylocki, Herberti,* and *Carnarvoni.*

Vittatum has been largely crossed with the four foregoing species.

Pardinum gives the spotted types in Veitch's recent hybrids. A fine cross between this and *Leopoldi* is figured Gard. Chron. 1877, fig. 136.

Forms near *Leopoldi*:—A form very near the type is *Hendersoni* Floral Mag. n. s. t. 117. The best hybrids recently raised by Mr. Heal for Messrs. Veitch at the present day have an open regular flower, with scarcely any tube and much imbricated segments, derived from *Leopoldi,* combined with a brilliant scarlet colour, probably derived from *Reginæ* through *Johnsoni.*

* See also Herbert, Amaryll. 335; Trans. Hort. Soc. iii. 196, iv. 42; Journ. Hor. Soc. ii. 19; Gowen in Trans. Hort. Soc. iv. 498; Lindley in Trans. Hort. Soc. v. 337; Kunth, Enum. v. 529; Miss Rosenberg's 'Corona Amaryllidacea,' published at Bath in 1839, with coloured plates of five hybrids; Dietrich in Berlin Gartenzeit. 1884, 121; K. Koch, Wochenschrift, 1864, 17, 30, 37; Goldring in Garden, 1883, 193; Douglas in Garden, 1887, 250, t. 614; and G. Don in Sweet. Brit.. Flow. Gard. ed. 3, pp. 671-675.

The Genus Amaryllis According to Baker.

AMARYLLIS *Linn. ex. parte.*

Perianth funnel-shaped, with a short tube and 6 subequal oblong acute connivent segments. *Stamens* inserted at the throat of the tube; filaments long, filiform; anthers linear, versatile. *Ovary* 3-celled; ovules many in a cell; style filiform, declinate; stigma capitate. *Capsule* globose, bursting irregularly. *Seeds* like that of a *Crinum.*

The name *Amaryllis* is still universally given in gardens to the species and hybrids of *Hippeastrum,* which has a flower like that of the present plant, but entirely different capsule and seeds.

1. A. BELLADONNA Linn. Sp. Pl. 421; Bot. Mag. t. 733; Red. Lil. t. 180. *A rosea* Lam. *A. pudica* Gawl. *Coburgia Belladonna* Herb.—Bulb 3-4 in. diam.; tunics rather fibrous. Leaves 7-9 produced after the flowers, lorate, distichous, dull green, 1-1½ ft. long, under an inch broad. Peduncle solid, compressed, 1-1½ ft. long. Flowers 6-12 in an umbel, produced in March and April at the Cape; pedicels 1-1½ in. long; spathe-valves 2, large, green. Perianth rose-red in the type; tube ½ in. long; segments 2-3 in. long, ½-¾ in. broad above the middle. Capsule globose, 1 in. diam. *A. pallida* Red. Lil. t. 479, differs only by its pale flowers.

Var. A. BLANDA Gawl. in Bot. Mag. t. 1450. *Coburgia blanda* Herb.—Leaves more sheathing at the base, longer and broader, reaching 2-3 ft. Flowers larger, lighter in colour, and opening wider; segments 3-4 in. long, 1-1¼ in. broad.

Hab. Southern Provinces of Cape Colony. Introduced into cultivation in 1712. Many forms are named in gardens. Sweet calls the genus **Belladonna,** and admits four species, **B. purpurascens, pallida, pudica** and **blanda.** See also **purpurascens,** Flore des Serres, t. 911; and **rubra,** Flore des Serres, t. 1415.

COLLECTING CRINUM AMERICANUM & HYMENOCALLIS SPECIES IN THEIR NATIVE FLORIDA HABITAT

WYNDHAM HAYWARD, *Florida*

Brief excursions by motor car into the countryside of Central Florida have resulted in the finding of numerous plants of *Crinum americanum* and a *Hymenocallis* species during the summer and fall of 1933 by the writer in company with Dr. Hamilton P. Traub.

The bulbs are found growing abundantly in muck or muddy ditch banks along the side of the road from Orlando to the East Coast of Florida in the valley of the St. John's River. Groups of the *Crinum* bulbs may often be located by the sight of the chaste white star-like flowers on a scape a foot and a half high. The bulbs are small, about an inch in diameter, with a long neck that comes up through the mud. This makes their digging difficult. Scattered in among the *Crinums* occasionally may be found a few *Hymenocallis* plants, of the same size, but indentifiable by their flat leaves and amaryllis-like character of growth.

An effort will be made during 1934 to identify the species of *Hymenocallis* obtained. The writer also discovered a group of large bulbs of another *Hymenocallis* species, probably *H. caribaea,* with bloom stalks four feet tall, growing in high pine land near Winter Park, Florida, during July 1933. An attempt is also being made to collect *Zephyranthes atamacso,* and *Z. treatieae.*

DESCRIPTION OF NEW VARIETIES

In future issues of the Year Book a limited amount of space will be devoted to the description of new varieties. The entries must be brief and those sending in such items for publication should first fill out the complete descriptive form and then write the brief synopsis. The item sent in should cover only the outstanding distinguishing characters. Color descriptions should conform to the *Fischer Color Chart.*

TENTATIVE DESCRIPTIVE FORM FOR AMARYLLIS (HIPPEASTRUM)*

Approved by the

AMERICAN AMARYLLIS SOCIETY

1. Specific or Hort. name: .....
2. Parentage, if a hybrid .....
3. Date introduced ..... 3. By Whom .....
   .....
4. Synonyms .....
5. Locality .....
6. Habitat .....
7. Deciduous or Evergreen ..... 8. Vigor of plant .....
9. Time of flowering ..... Duration .....
10. *Bulb*: (a) General shape ..... (b) Dia. in cm. .....
    (c) length in cm. ..... (d) Other characters .....
11. *Leaves*: (a) position; upright or drooping .....
    (b) general shape .....
    (c) shape in cross section ..... (d) length in cm. .....
    (e) width at base in cm. ..... (f) width at center in cm. .....
    (g) width at top in cm. ..... (h) tip pointed or rounded .....
    (i) color ..... (j) striping .....
12. *Flower Scape*: (a) length in cm. .....(b) width in cm.....
    (c) color ..... (d) Number of scapes.....
    (e) No. of flowers per scape ..... (f) Other characters .....
13. *Flower*: (a) length in cm. ..... (b) tube: long .....
    tube short, closed at neck ..... tube short, not closed at neck ..... Tube very short not closed at neck .....
    (c) width in cm. ..... (d) Position; erect .....
    Horizontal ..... Drooping .....
    (e) Perianth segments; narrow ..... broad ..... pointed at tip....., rounded at tip ..... all equal .....
    all not equal, lower imperfect ..... other differences .....
    (f) *Perianth color*: ground ..... minutely dotted, ..., keeled ....., striped .....
    edged ....., cross bars ..... tipped .....
    star....., other color details .....
    (g) *Pistil*: trifid ..... capitate ....., style color ....., stigma color .....
    other details .....
    (h) *Stamens*: Filament color ..... anther color .....
    other details .....
    (i) Scent .....
14. *Propagation*: bulblets, slow ..... rapid .....
    seed .....
15. *Cultural Requirements* .....
    .....
16. Other details: .....
    .....
17. *Synopsis* (Give a brief statement of the outstanding and distinguishing characters) .....
    .....
    .....
    .....
    .....

* Report of the Special Committee on Description, Nomenclature and Check List approved by the Board of Directors.

A PRELIMINARY AMARYLLIS (HIPPEASTRUM) CHECK LIST*

This check list of horticultural forms of *Hippeastrum* is a mere beginning, and it is hoped that amaryllis enthusiasts everywhere will add new entries, and will offer additional information on present entries, as well as corrections of errors that have crept in.

AUTHORITIES CONSULTED: The check list is based upon the authorities listed below excepting as indicated in the foot note. The Committee is especially indebted to Mr. F. J. Chittenden of the Royal Horticultural Society, London, who furnished much valuable information.

Authorities

	Abbreviations**
Baker, J. G. Handbook of the Amaryllideae Geo. Bell & Sons. London. 1888	B
Chittenden, F. J. Royal Horticultural Society, London. Communication dated Oct. 20, 1933	C
†Gartenwelt, Berlin 18.... to date	GW
†Gartenezeitschrift, Berlin 18.... to	GZ
†Gardeners Chronicle (London)	GC
Herbert, William Amaryllidaceae James Ridgway & Sons, London. 1837	H
Houdyshel, Cecil Catalog 193... La Verne, Calif.	Hou.
†Ker, Robert P. & Sons (Liverpool, England) Catalogs (18.... to 19....)	K
Nehrling, Henry Die Amaryllis oder Rittersterne (Hippeastrum) Paul Parey. Berlin 1909	N
†Revue Horticole (Paris); 18.... to date	RH
†Royal Horticultural Society, London, Journal 18.... to date	RHS
†Sweet, ... British Flower Garden, 1830	S
Veitch, Harry The Hippeastrum (Amaryllis) Journal Royal Hort. Soc. London 12:243-255 1890	VH
†Veitch, James & Sons Chelsea, England Catalogs 18.... to date	VJ

Amaryllis Breeders

Introductions by the following amaryllis breeders are included:

England:
Dr. E. Bonavia (18.... to 19....)
James O'Brien (18.... to 18....)
..... Brookes (1..... to 1.....)
..... Colvill (18.... to 18....)
C. R. Fielder (18.... to 18....)
Messrs. Caraway & Sons (18.... to 18....)
..... Griffin (18.... to 18....)
R. Harrison (18.... to 18....)
William Herbert (17.... to 18....)
Sir G. Holford (18.... to 19....)
.....Johnson (17.... to 18....)
Messrs. Jas. Ker & Sons (18.... to 19....)
Lionel de Rothschild (18....)

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*Report of the **Special Committee on Description, Nomenclature and Check List** approved by the Board of Directors.

The suffix **(illus.) after the abbreviation indicates that the variety is illustrated.

†Entries from these authorities are not included in the present report on account of insufficient time; these and still other authorities will be consulted in the preparation of the final report to appear in a future issue of the Year Book.

HAMILTON P. TRAUB, Chairman,
I. W. HEATON
Special Committee on Description, Nomenclature and Check List.

Baron Schroeder (18....
Sir Chas. Strickland (17.... to 18....)
..... Sweet (17.... to 18....)
Messrs. Jas. Veitch & Sons (18.... to 19....)
B. S. Williams (17.... to 18....)
France:
..... De Candolle (17.... to 18....)
Eugene Souchet (18.... to 18....)
Louis Van Houtte (18.... to 18....)
Holland:
.....de Graff (18.... to 18....)
..... van Seden (18.... to 19....)
Germany:
Herren Haage & Schmidt (18....
Frau Anna Jay (18....
Italy:
.....Melazzo (17.... to 18....)
America:
W. Otto Gronen (18.... to 18....)
Cecil Houdeshel (18....
Henry Nehrling (1853 to 1929)
H. Pfister (18.... to 19....)

Order of Arrangement

The order of arrangement is as follows: Name; introducer and year of introduction in parentheses; authorities consulted, indicated by abbreviations, including note on illustrations; synonyms; parentage, if known; full description as far as known; and awards:— *A.M.* indicates Award of Merit, and *F.C.C.* indicates First Class Certificates from the Royal Horticultural Society, London; the name and dates following abbreviations refer to the exhibitor and date of exhibition.

A. Broginart (Souchet, 18....) N.; *H. vittatum hybrid.*

Acadia (..... 18.....) N.; "schwefelfarbig, licht rot angeflogen und geadert".

Acramanii (Garaway, 1835) N.; C.; VH.; Syn. *Ackermani, Acramanni; H. aulicum platypetalum* X *H. psittacinum; A.M.;* Lawrence, July 1, 1930.

Acramanii pulcherrimum (Garaway, 1850); N.; Syn. *Ackermannii pulcherrimum.; H. aulicum* X *Johnsoni*

Acquisition (Veitch, 1889) C.; *A. M.;* Veitch, March 12, 1889.

Agamemnon (Holford, 1906) C.; *A. M.;* Sir G. Holford, Apr. 3, 1906.

Agneta (....., 18.....) N.; orange red, bordered with white.

Alba Rosea Marginata (Ker, 18....) N.; white, all segments veined rose red; *Leopoldi* type.

Alberti N. (illus).; Syn. *Hippeastrum alberti* Lemaire; a double form of *H. equestre.*

Allmanni (Colville, 18....) H.; *H. calytratum* X *H. vittatum;* named for the Professor of Botany at Dublin.

Altaclarae (Herbert, 18....) B.; *H. psittacinum* x *Griffini,* named for the estate, Highclere.

Ambignum (,) B.; *H. solandiflorum* x *H. vittatum.*

Andersoni (Herbert, 18....) H.; *H. rutilum* x *H. vittatum*; named for the conductor of the Chelsea Garden.

Andromache (Ker,....) N.; violet red; *Leopoldi* type.

Andromeda (Ker .... 18....) N.; very light ground with red veins; *Leopoldi* type.

Aphrodite (Ker.....) N.; white, striped and feathered red; *Leopoldi* type.

Apple Blossom (Holford, 1899) C.; see also *Fair Lady; A. M.;* Sir G. Holford, Mar. 14, 1899.

Apollo (Ker, 18....) N.; deep carmine red edged white; *Leopoldi* type

Arona (....., 18....) N.; yellow (much like a *Clivia* yellow).

Artemise (Souchet, 18....) N.; *H. vittatum* hybrid.

Aurora (Ker, 18....) N.; light red, strongly veined red; *Leopoldi* type.

Autumn Beauty (Veitch, 18....) N.; VH.; *H. reticulatum striatifolium* x *H. Leopoldi;* fall blooming.

Autumn Charm (Veitch, 18....) N.; *H. reticulatum striatifolium* x *H. leopoldi;* fall blooming.

Averunicus (Veitch, ...) N.; C.; orange red, petals border white; *A. M.;* Veitch, April 9, 1901.

Baffin (Souchet, 18....) N.; *H. vittatum* hybrid.

Baroness Schroeder (....., ...) C.; *A. M.;* Schroeder, April 24, 1928.

Baron Palles (Williams, 18....) N.; *Defiance* x *H. reticulatum;* fall blooming.

Batemanni (Colville, 18....) H.; *H. reginae* x *H. rutilum;* named for J. Bateman.

Ben Hur (Nehrling, 19....) N.; *H. equestre* x *Empress of India;* light orange red; flower stalk 3¼ ft. high.

Benthami (Herbert, 18....) H.; *H. stylosum* x *Johnsoni;* flowers of a gloomy but variable red; named for the botanist Bentham; raised at Spofford.

Besson (.....) C.; *A. M.;* Sir G. Holford, March 22, 1898.

Black Beauty (.....) C.; *A. M.* Holford, April 20, 1925.

Black Prince (.....) C.; *A. M.;* Holford, April 7, 1903.
Braziliensis; See *Johnsoni.*
Brenda (....., ...) *C.; A. M.;* Veitch, April 13, 1897.
Brian Boru (.....,.....) C.; *A. M.,* Holford, April 3, 1906.
Brilliant (Seden) N.; VH.; *H. pardinum* hybrid.
Brookesi (Brookes, 18....) H.; *H. rutilum* x *Johnsoni.*

Calliope (Ker, 18 ...) N.; scarlet red, with a rose red sheen; *Leopoldi* type.
Calphurnia (....., 18....) N.; rose with white star.
Calypso (....., ...) C.; A. M.; Holford, April 19, 1910.
Cardinal Wolsey (....., ...) C.; *A. M.;* Holford, April 19, 1910.
Carminata (Ker, 18....) N.; a most beautiful new color combination—ground color light rose red, the whole flower sprinkled with red; *Leopoldi* type.
Carnarvoni (Herbert, 18 ...) H.; B.; *H. solandiflorum* x *Johnsoni;* raised at Highclere; named for the brother of William Herbert.
Carnavonia (deCandolle, 18 .) H.; B.; *H. reginae* x *H. vittatum.*
Cartoni (Herbert, 18....) H.; *H. aulicum* x *Sweetii;* named for Carton, the gardener at Highclere.
Cassandra (Ker, 18....) N.; red, white veins; *Leopoldi* type.
Cecelia (....., 18....) N.; white over a rose scarlet-ground.
Charles Penny (....., ...) C.; *A. M.;* Hambledon, April 9, 1892.
Chelsoni (Sedan.....) N.; VH.; *H. pardinum* hybrid.
Chimboraso (..... , ...) C.; *A. M.; Holford,* Apr. 13, 1897.
Chimere (..... , ...) C.; *A. M.;* Veitch, April 11, 1895.
Clemence (Souchet, 18....) N.; *H. vittatum* hybrid.
Cleopatra (Van Houtte, 18....) N.
Cerise Magnificum (....., ...) C.; *A. M.;* Schroeder, Mar. 13, 1928.
Climax (..... 18....) N.
Clonia (..... , 18....) N.; white veined red, *A. M.;* Veitch, Mar. 22, 1898.
Clovelly, (..... , ...) C.; *A. M.;* Holford, Mar. 26, 1901.
Colvillii (Colville, 18....) H.; B.; *H. reticulatum* x *H. reginae.*
Comte de Germiny (Williams, 18....) N.; *H. reticulatum* x *Defiance;* fall blooming
Conquerant (Souchet, 18....) N.; *H. vittatum* hybrid.
Corinna (....., ...) C.; *A. M.;* Veitch; Mar. 14, 1893.
Cornut (Ker, 18....) N.; deep rose red, similar to the rose, *General Jacqueminot; Leopoldi* type.
Count Cavour (Van Seden, 18....) N.
Creon (....., 18....) N.; lower petals lilac red; upper veined red.
Crimson King (..... , ...) C.; A. M.; Veitch, April 12, 1892.
Croomii (....., 18 ...) B.; *H. solandriflorum* hybrid.
Crown Prince of Germany (....., 18....) N.
Cupid (Ker, 18....) N.; unchanging pure white, slightly penciled red; *Leopoldi* type.

Daones (....., ...) N.; C.; *A. M.;* Veitch April 12, 1898.
Daubenii (Herbert, 18....) H.; *Griffini* x *Johnsoni;* raised at Spofford; named for the botanist at Oxford.
Defiance (Van Houtte, 18....) N.
DeGraff (DeGraff, 18....) VH.
Digweedi (Herbert, 18 ...) H. *H. reticulatum* x *H. vittatum;* raised at Highclere.
Daones (....., 18....) N.; C.; See Doanes; zinnabar red with white edge.
Donnii (Herbert, 18....) H.; *Hookeri* x *Haylocki;* a complicated cross raised at Spofford; in most of which the stripe of *H. reticulatum striatifolium* has descended from the first cross; named for the botanist at King's College.
Dr. Masters (Williams, 18 ...) N.; clear red; *H. pardinum* hybrid; *Leopoldi* type.
Doris (....., ...) C.; *A. M.;* Veitch, April 11, 1895.
Duke of York (.....) C.; *A. M.;* Holford, April 13, 1897.
Dulas (....., 18 ..) N.; rose, deep red toward center; a small but very beautiful flower.

Eclatante (Ker, 18 ...) N.; red with purple sheen; *Leopoldi* type.
Eclipse (..... , 18 ...) N.; C.; strong grower; white with border veined red; *A. M.;* Veitch; Mar. 22, 1892.
Edith M. Wynne (Veitch, 18 ...) N.; VH.; *H. reticulatum striatifolium* x *leopoldi;* fall blooming.
Eglamor (Veitch 18 ...) N (*illus*).; *Leopoldi* type flower.
Eldorado, (...., ...) C.; *A. M.;* Veitch, Mar. 14, 1893.

Empress of India (deGraff, 18....) N.; VH.; *H. psittacinum* x *Graveanum;* 4-6 flowers to scape; brilliant color.

Enchantress (Veitch, 18...) N.; an old not perfect but very vigorous growing sort; rose red; striped carmine; delightfully scented.

Eros, (....., ...) C.; *A. M.;* Veitch, March 24, 1896.

Esther (Pfister, 18....) N.; *Dr. Masters* x *H. pardinum.*

Etiole (Souchet, 18....) N.; *H. vittatum* hybrid; Yellowish white, red stripes.

Eurasian (....., ...) C.; *A. M.;* Veitch, April 15, 1913.

Excellent (....., ...) C.; *A. M.;* Veitch, March 14, 1893.

Fair Lady (....., ...) C.; *A. M.;* Veitch, April 7, 1903.

Favorite (Veitch, 18....) N.; VH.; *H. reticulatum striatifolium* x *H. leopoldi;* fall blooming.

Fiedelio (Van Seden, 18....) N.

Field Marshall (....., ...) C.; *A. M.;* Holford, April 3, 1906.

Finette (Ker, 18....) N.; white with a few light red stripes, *Leopoldi* type.

Firebrand, (....., ...) C.;*A. M.;* Paul, April 12, 1892.

Flora (Ker, 18...) N.; white, very pale red border and veins; *Leopoldi* type.

Formosa (....., 18....) B.; *H. reticulatum* hybrid.

Francisca (....., 18....) N.

Fucinus (....., 18...) N.; cream yellow, dotted with red.

fulgens, (....., ...) C.; *F. C. C.;* Backhouse, April 4, 1865.

Gem (....., ...) C.; *A. M.;* Veitch, April 24, 1894.

General Buller (....., ...) C.; *A. M.;* Veitch, April 23, 1902.

Gereant (....., ...) C.; *A. M.;* Holford, April 19, 1910.

G. Firth, (Williams, 18....) N.; *Defiance* x *H. reticulatum;* fall blooming.

Gloriosa (....., 18....) B.; *H. reticulatum* hybrid.

Gorgeous (....., 18...) N.; C.; very large flowers; clear carmine red; *A. M.;* Veitch; Mar. 26, 1895.

Goweni (Herbert, 18....) H.; B.; *H. reticulatum* x *H. rutilum;* raised at Highclere; very beautiful.. Named for R. J. Gowen.

Gracchus (....., ...) C.; *A. M.;* Veitch, April 20, 1909.

Grahami (Herbert, 18...) H.; *Johnsoni* x *H. vittatum;* approximating the latter, but with larger and more brilliant flowers and tender constitution; named for the botanist at Edinburgh.

Grand Monarch (.....,.....) C.; *A. M.;* Veitch, April 9, 1890.

Graveanum (de Graff, 18....) N.

Gravinae (Melazzo, 18....) B.; N.; Syn. *H. gravinae,* Melazzo; *H. reginae* hybrid; glowing red, banded with white.

Griffini (Griffin, 18....) H.; *H. psittacinum* x *Johnsonii;* very beautiful and variable in its color; but always distinguishable from *H. psittacinum* by the upper segment not being depressed.

Harrison (Harrison, 18...) H.; B.; N.; Syn. *H. harrisonii. H. reticulatum* x *H. stylosum.*

Haylocki (Sweet, 18...) H.; B.; *H. solandiflorum* x *H. rutilum;* raised at Spofford; named for the gardener of William Herbert.

Hendersonii (.....,18...) N.; *H. leopoldi* hybrid.

Hendersonii Coccinea (....., 18....) N.; *H. leopoldi* hybrid.

Henslowi (Herbert, 18...) H.; *H. reginae* x *H. rutilum;* raised at Spofford; very brilliant, named for the botanist at Cambridge.

Herberti (Sweet, 18...) H.; B.; *H. solandiflorum* x *H. stylosum;* raised at Spofford; named for William Herbert; pale orange in color.

Her Majesty (Williams, 18...) N.; *Defiance* x *H. reticulatum;* fall blooming.

Hermita (Veitch, 18....) N. (*illus*).; lilac red with green throat; *Leopoldi* type.

Hidalgo (....., 18...) N.; imposing flower; orange red shaded carmine.

Hidenley (Strickland, 18....) N.; *Acramanii Pulcherrimum* x *H. reticulatum;* fall blooming.

Holloway Belle (Williams, 18....) N.; C.; *Leopoldi* type; *A. M.;* Apr. 10, 1894.

Hon. Maurice Gifford (....., ...) C.; *A. M.;* Apr. 21, 1896.

Hoodii (Sweet, 18...) H.; *H. equestre* x *H. reginae.*

Hookeri (Herbert, 18....) H.; *Goweni* x *H. vittatum;* named for the botanist at Glasgow.

Iceberg (....., ...) C.; *A. M.;* Fri. G. Holford, Apr. 21, 1925.

Ideala (Veitch, 1897) N.; C.; *A. M.;* March 22, 1898; cream white with orange-scarlet dots, especially toward the center.

Ignacite (....., 18...) N.; C.; *A. M.;* Veitch, April 13, 1897; milk white; very light green in throat; feathered red.

ignescens; F. C. C.; Veitch, May 30, 1865.
Imperatrice du Bresit (....., ...) C.; *A. M.;* Sir Trevor Lawrence, Jan. 14, 1902.
Iris (Ker, 18....) N.; white, pale red veins; *Leopoldi* type.

Jasper, (....., ...) C.; *A. M.;* Ker, May 29, 1906.
John Heal (Veitch, 18....) N.; VH.; *H. Leopoldi* hybrid.
John Ruskin (....., 18.....) N.; giant flower; orange scarlet with white bands.
Johnsoni (Johnson, 1810) H.; N (*illus*).; B.; Syn. *H. johnsoni; Amaryllis braziliensis; H. vittatum* x *H. reginae.*
J. R. Pitcher (....., ...) C.; *A. M.;* Williams, March 10, 1891.
Julius (....., ...) C.; *A. M.;* Veitch, May 19, 1903.

Kineton (....., 18....) N.; Light red with white star.
Kohinoor (Gronen, 18....) N.; *Brilliant* x *H. psittacinum;* deep lilac red ground, tips of petals and center yellowish-white; flowers small but of *Leopoldi* type.

Lady Ardilaun (Williams, 18....) N.; *Leopoldi* type.
Lady Howick (....., ...) C.; *A. M.;* Sir Geo. Holford, April 2, 1907.
Lady Juliet Duff (....., ...) C.; *A. M.;* Lady Duff, Apr. 23, 1929.
Lady Margaret (Veitch, 18....) N.; *H. reticulatum* x *H. leopoldi;* fall blooming.
Lady Winifred Gore (....., ...) C.; *A. M.;* Smith, Mch. 10, 1896.
Lamberti (Herbert, 18....) H.; *Cartoni* x *Grahami;* raised at Spofford and named for A. B. Lambert.
Leoni (....., 18....) N.; pure white tips of petals orange red.
leopoldii; F. C. C.; Veitch, Dec. 21, 1869.
Lightning (....., ...) C.; *A. M.;* Paul, Mch. 28, 1893.
Lindleyi (Herbert, 18....) H.; *Griffini* x *Carnarvoni;* raised at Spofford; named for the botanist at London University.
Lindseyi (Herbert, 18....) H.; *H. aulicum* x *H. reticulatum;* named for the gardener at Highclere.
Lois (....., ...) C.; *A. M.;* Sir Geo. Holford, May 22, 1901.
Lord Bovingdon (....., ...) C.; *A. M.;* Holford, Mch. 26, 1901.
Lord Brassey (Williams, 18....) N.; *Leopoldi* type.
Lord Roberts (..... , ...) C.; *A. M.;* Williams, May 25, 1895.
Lyso (....., 18....) N.; white and red, veined with green.

Madonna (Veitch, 18....) N.
Magic (....., ...) C.; *A. M.;* Holford, Apr. 20, 1926.
Magnificent (....., ...) C.; *A. M.,* Ker Apr. 6, 1909.
Major Wilson (....., 18....) N.; *Brilliant* x *H. psittacinus,* dark red ground color, petals tipped cream white. Small flowers of *Leopoldi* type.
Marathon (....., ...) C.; *A. M.;* Veitch, Apr. 9, 1901.
Marcus (....., ...) C.; *A. M.;* Veitch, Apr. 6, 1909.
Margaret Pomfret (Gronen, 18....) N.; *Brilliant* x *H. psittacinum;* dark red ground color, petals tipped cream white; small flowers of *Leopoldi* type.
Marginata (....., 18....) B.; *H. solandiflorum* hybrid.
Marginatum conspicum (Van Houtte 18....) N.
Marginatum venustum (Van Houtte, 18....) N.
Marion (Pfister, 18....) N.; *Dr. Masters* x *H. pardinum.*
Marjory (....., ...) C.; *A. M.;* Holford, April 3, 1906.
Mars (....., ...) C.; *A. M.;* Paul, March 8, 1892.
Melpomene (Ker. 18....) N.; Reddish white, strongly veined red; *Leopoldi* type.
Mendeli (....., 18....) B.; H. aulicum hybrid.
Mephisto (....., 18....) N.; lilac red.
Meteor (Veitch, 18....) N.
Milton (Veitch, 18....) N.
Minerva (Ker, 18....) N.; light red ground color; white band and white veins; *Leopoldi* type.
Mme. Modjeska (Cronen, 18....) N.; greenish center, dark red ground color with petal tips cream white; flowers small but of *Leopoldi* type.
Model (Ker, 18....) N.; cream white with red stripes and veining; *Leopoldi* type.
Montezuma (Nehrling, 19....) N.; cross between *H. equestre* and *Empress of India;* flowers 10" wide, short trumpet; fiery orange red with yellow star; flower stalk 3¼ ft. high.
Mrs. Bilney (....., 18....) N.; white dotted red; *A. M.;* Veitch, April 22, 1902.
Mrs. Carl Jay (Jay, 18....) N.; (*illus*).; *H. reticulatum* is one parent; fall blossoming; *A. M.;* Jay, June 11, 1907.

Mrs. Cleveland (Pfister, 18....) N.; rose red.

Mrs. Garfield (Veitch, 18....) N.; VH.; progeny of *Hippeastrum reticulatum* x *Defiance;* fall blossoming.

Mrs. Lee (Veitch, ...) VH.; see also *Mrs. Wm. Lee; H. reticulatum* hybrid; fall blooming.

Mrs. Montefiore (....., 18...) N.; C.; large white flowers, "leicht rot gestrichelt"; *A. M.;* Veitch; Mar. 12, 1895.

Mrs. Wm. Lee (Williams, 18...) N.; progeny of *H. reticulatum* x *Defiance;* fall blooming.

Munroi (Colville, 18....) H.; *H. psittacinum* x *H. equestre;* named for the gardener of the Horticultural Society, London.

Murillo (....., ...) C.; *A. M.;* Sir G. Holford, Mar. 14, 1899.

Musigny (....., ...) C.; *A. M.;* Rothschild, Mch. 19, 1912.

Navala (.....,.....) C.; *A. M.;* Veitch, Mch. 8, 1898.

Nestor (Ker, 18...) N.; deep glowing red with white tips; *Leopoldi* type.

New Pink Pearl (....., ...) C.; *A. M.;* Holford, Apr. 20, 1926.

Nimrod (....., ...) C.; *A. M.;* Veitch, Mch. 14, 1893.

Norma (....., 18....) N.; peculiar shade of red and white.

Novelty (.....,.....) C.; *A. M.;* Paul, Mch. 27, 1894.

Nysa (....., ...) C.; *A. M.;* Veitch, Apr. 8, 1902.

O'Brieni (O'Brien, 18...) N.; *H. pardinum* x *H. reticulatum;* fall blossoming; constitution too weak and soon disappeared.

Olympia (....., ...) C.; *A. M.;* Veitch, Mch. 27, 1894.

Ophelia (Williams, ...) N.; C.; *Leopoldi* type; *A. M.,* Mar. 28, 1893.

Oriflamme (Souchet, 18....) N.; *H. vittatum* hybrid.

Pardinum; C.; F. C. C.; Veitch, Mch. 19, 1867.

Parkeri (Herbert, 18....) H.; *H. rutilum* x *reticulatum;* named for the foreman at Spofford.

Pearl Maiden (....., ...) C.; *A. M.;* Sir Geo. Holford, Apr. 3, 1906.

Pera (.....,.....) C.; *A. M.;* Veitch, Mch. 23, 1897.

Picta (....., 18...) N.; also known as *Hippeastrum picta;* progeny of *Hippeastrum solandriflorum* x *Johnsonii.*

Pink Beauty (Ker, ...) N.; light red rose with white star; *Leopoldi* type.

Pink Blossom (.....,.....) C.; *A. M.;* Holford, Apr. 21, 1925.

Pinkie (.....,.....) C.; *A. M.;* Sir Geo. Holford, Apr. 20, 1909.

Pink Pearl (Ker, 18....) N.; rose red. *Leopoldi* type.

Pinzoon (....., 18....) N.; ideal form; deep scarlet red.

Pirlotti (Haage & Schmidt, 18....) N.; fall blooming.

Praeclara (....., 18....) B.; *H. reticulatum* hybrid.

President Carnot (....., ...) N.

Prince Edward (....., ...) C.; *A. M.;* Veitch, Mch. 12, 1895.

Prince of Orange (Van Houtte, 18....) N.

Princess Osra (....., ...) C.; *A. M.;* Sir Geo. Holford, Mch. 8, 1898.

Prof. Koch (....., ...) N.

Progress (Ker, ...) N.; shining red; *Leopoldi* type.

Pulchrum; C.; F. C. C.; Veitch, June 4 1873.

puniceum ignescens; C.; A. M.; Preston, Apr. 11, 1928.

Purity (....., ...); *F. C. C.;* Burns, Apr. 28, 1908.

Queen of Spots (Bonavia, 18....) N; *H. paradinum* hybrid (?)

Queen Alexandra (....., ...) C.; *A. M.;* Veitch, Apr. 22, 1902.

Queen Mary (.....,.....) C.; *A. M.;* Ker, Mch. 14, 1911.

R. P. Pitcher (Williams, 18....) N.; *Defiance* x *H. reticulatum;* fall blooming.

reticulatum—Mrs. Garfield (....., ...) C.; *A. M.;* Clarke, Aug. 28, 1928.

Rialto (....., ...) C.; *A. M.;* Veitch, April 9, 1901.

Robin (.....,.....) C.; *A. M.;* Sir Geo. Holford, Mch. 14, 1899.

Ronda (....., 18....) N.; white ground with a little red; *A. M.;* J. Veitch, Apr. 19, 1904.

Rosalind, (.....,.....) C.; *A. M.;* Veitch, Mch. 24, 1896.

Rose du Barry (....., ...) C.; *A. M.;* Rothschild, Mch. 19, 1912.

Rosemary (.....,.....) C.; *A. M.;* Rothschild, May 19, 1931.

Rose Madder (.....,.....) C.; *A. M.;* Ker, May 29, 1906.

Rose Perfection (Ker, ...) N.; rose red, *Leopoldi* type.

Royal Standard (Veitch, 18...) N.; *H. leopoldi* hybrid (?)

Ruby (.....,.....) C.; *A. M.;* Schroder, Jan. 27, 1931.
Ruby Gem (Ker, 18...) N.; beautiful ruby red; *Leopoldi* type.
Ruth (Pfister, 18....) N.; *Dr. Masters* x *H. pardinum.*

Salvator Rosa (.....,.....) C.; *A. M.;* Paul, Mch. 14, 1893.
Sappho (Ker,.....) N.; deep carmine, *Leopoldi* type.
Scarlet Gem (Ker, 18....) N.; pure brilliant scarlet red; *Leopoldi* type.
Sea Nymph (..... , ...) C.; *A. M.;* Paul Apr. 23, 1899.
Seraph (....., 18....) N.; brilliant lilac red; white star and streaks.
Serapis (....., 18...) N.; lilac red; white stripes.
Seymouri (Herbert, 18...) H.; *H. alicum* x *H. vittatum*; named for the gardener of William Herbert.
Sibyl Houdyshel (Houdyshel, 19....) Hou.; white reticulated and bordered pink.
Silver Queen (.....,.....) C.; *A. M.;* Paul, Mch. 22, 1892.
Sir Christopher Wren (....., ...) C.; *A. M.;* Sir Geo. Holford, Mch. 25, 1902.
Sir William (.....,.....) C.; *A. M.;* Roy. Bot. Gard. Kew, Feb. 14, 1899.
Smollet (....., 18...) N.; scarlet red, deepening in center.
Snowdon (Fielder, 18...) N. (*illus.*); finest white up to 1909; *Leopoldi* type; *F. C. C.;* Apr. 19, 1904.
Snow King (Ker, 19....) N. (*illus.*); pure white. *Leopoldi* type.
Socrates (.....,.....) C.; *A. M.;* Veitch, Mch. 14, 1898.
solandriflorum, C.; *A. M.;* Pam, Oct. 7, 1924.
Southey (....., 18....) N.
Speciosa (Ker, 18...) N.; the edges and tips white, with middle deep red; *Leopoldi* type.
Spectabile (....., 18...) B.; N.; *H. reginae* hybrid.
Spectabilis (Ker, 18...) N.; beautiful red, tips of petals white; *Leopoldi* type.
Speculum C.; *A. M.;* Veitch, Apr. 10, 1894.
Splendidum (Herbert, 1824) VH.; *H. vittatum* x *H. reginae* or *H. equestre.*
Spofforthiae (Herbert, 18....) H.; *H. aulicum* x *Carnarvoni,* named for the estate Spofford.
Spotted Angelina (Bonavia, 1909) N.; *H. pardinum* hybrid.
Spotted Orfeo (Bonavia, 18....) N.; *H. pardinum* x ?
Star of India (....., 18....) N.; dark red with broad white bands.
Sweetii (Sweet, 18....) H.; B.; *H. reticulatum* x *Johsoni.*
Sylvannus (....., ...) C.; *A. M.;* Veitch, Apr. 8, 1902.
Sylvia (Veitch, 18....) N.; C.; *H. reticulatum* x *H. leopoldi;* fall blooming; *A. M.;* Apr. 19, 1892.
Syren (....., 18....) N.; C.; clear rose; large flower; *A. M.;* Veitch, Mar. 28, 1893.

Tacola (.....,.....) C.; *A. M.;* Veitch, Mch. 22, 1898.
Telemus (....., 18....) N.; white ground, veined lilac red.
Tettaui; N.; cultivated form of *H. aulicum robustum.*
The Bride (.....,.....) C.; *A. M.;* Holford, Apr. 20, 1926.
The Champion (.....,.....) C.; *F. C. C.;* Veitch, Mch. 11, 1890.
The Czar (.....,.....) C.; *A. M.;* Holford, Apr. 13, 1897.
The Hon. W. F. D. Smith (.....,.....) C.; *A. M.;* Hambledon, Feb. 14, 1893.
The Vigil (..... , 18...) N.; white striped with red.
Thunberg (.....,.....) C.; *A. M.;* Veitch, Apr. 13, 1897.
Titan (.....,.....) C.; *A. M.* Veitch, Apr. 10, 1900
Topaz (....., 18...) N.; C.; orange red; border and striped with white; *A. M.;* Veitch, Apr. 13, 1897.

Vandyke (.....,.....) C.; *A. M.;* Veitch, Mch. 24, 1891.
Viscountess Hambledon (.....,.....) C.; *A. M.; Smith,* Apr. 21, 1896. ....
Vittatum Harrisonianum (.....,.....) C.; *F. C. C.;* Bull, Feb. 14, 1894.
Vulcan (....., ...) C.; *A. M.;* Sir G. Holford, Apr. 2, 1907.

Zephyr (..... , ...) C.; *A. M.;* Veitch, Apr. 10, 1900.

4. Amarylleae Breeding

HYBRIDIZATION IN AMARYLLEAE*

A. Worsley, *Middlesex, England*

I purpose in this article to deal with hybrids that have been raised in gardens between individuals of this sub-order, from warm, temperate, tropical, and equatorial regions, differing from each other specifically (or in a higher degree), and especially with the few that have come under my own observation in a living state.

I have purposely excluded the *Narcissi,* and two other genera hardy in Great Britain (*Galanthus and Sternbergia*), partly because I have not made a special study of them, and partly because the subject of hybridization within such limits has already been dealt with by expert writers.

One generalization, however, is not out of place here. The habitat of the *Narcissi* is over a comparatively restricted area, and the fact that so many alleged hybrids have originated in a natural state without human interposition, coupled with the ease with which hybridization is effected in gardens, indicates that the whole genus has within comparatively recent times sprung from one prototype. Even between the extreme types of this genus exist regular gradations of individuals, each differing in some respect from each other—there is hardly one link missing in the chain.

This, again, points to a period of time, by no means lengthy, antecedent to which the genus was represented by only one, or at most very few, types or species; for this period has not been long enough for any number of the intermediate types to die out. Hence it follows that if the bulk of species of *Narcissus* are of recent establishment, the relationship existing between them is closer, and their individual characters not so irrevocably fixed as in the case in other genera in which no break has occurred for an enormous period of time.

The hybridization of *Narcissi* is, therefore, an occupation in which the chances of success are so great as to amount to a practical certainty. But when attempts are made to hybridize, say, the *Crinums* of Asia or Africa with those of America, the chances are equally great against a successful issue. Yet the prize is great, too, for success establishes a fresh epoch in that branch of horticulture, and opens fresh possibilities and fresh avenues of enterprise for all to profit by.

Among the genera specially dealt with in this article, forty-seven in number, only one, *Hippeastrum,* has become generally recognised among florists as worthy of special treatment.

It is a matter of general belief that the first hybrid raised was *H. johnsoni,* about 1799, and from this and other subsequent crosses the present race of mongrels has been evolved.

Yet this fact has for many years stood out in my mind as of paramount importance, that if a botanist were to find growing wild all the *Hippeastrums* cultivated to-day at our most notable professional establishments, he could not, at the outside, make more than two species out of them. Out of these, *H. vittatum,* remains just as it was nearly one hundred years ago in all its principal specific characters; it is certainly bigger, wider in the segments, more expanded in the flower—it has, in short, been *"improved,"* but it has not been altered. I can see no evidence of hybridization, no evidence of anything further than selection and good cultivation would naturally produce.

I have only once seen a form of *H. vittatum* which in my estimation showed a probable hybrid origin. This came to me from the West Indies under the name of *"Defiance,"* but no information as to origin or parentage were forth-coming. It is a small-flowered, brilliantly-coloured form, resembling that figured in *Bury, Selection of Hexandrian Plants* (1831), tab. 31, as *"superba,"* but remarkable for having the typical vittate marks obscured towards the base of the upper segments by red suf-

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fusion. The style is also ascending to an unusual degree, and carries the stigma as high as the tip of the upper segment at maturation. I have raised hundreds of seedlings from dozen of alleged hybrids bearing the typical vittate markings, and these have all come as true from seed as any good species would do.

In these experiments I have obtained the alleged hybrids from a variety of sources, both British and continental. I have also attempted, times without number, to implant the vittate markings upon self-coloured forms, such as *H. equestre,* and vice versa; but without any results so far, although I have now some promising supposed hybrids with *H. aulicum.*

The other species which the botanist could form has no exact counterpart in nature. It has a short, wide-segmental, well expanded, large, substantial flower with the hairy throat of *H. equestre major,* the colour most commonly of *H. equestre* and *H. rutilum* (rarely of *H. aulicum*) and the keel markings of *H. reginae.* The colours are now very varied and the rarer colours, especially the coppery-reds and those nearest white, have of late been diligently sought and selected, and hence have increased in collections at the expense of the eliminated colour varieties.

Recently some pure self reds have appeared in collections, and these at first caused some speculation, although it is admitted that in all parti-coloured or "marked" flowers there is a tendency for selfs to appear at times spontaneously among the seedlings. (I had an example last summer, where out of some thousand *"Cloth of Gold"* Marigolds, three plants reverted to pure yellows.)

I have always held to the theory that if we could only look back far enough into the past we should see that the first parents of all our parti-coloured or marked flowers were selfs, and inconspicuous-coloured at that. Hence the appearance of selfs among our collections of seedling *Hippeastrums* did not surprise me in the least, although I was unaware of any coloured selfs among good species.

In the summer of 1895, however, I received from Brazil a box of bulbs which proved to be those of *H. stylosum,* and among these were a few bulbs of a self-red species hitherto undescribed, for which Mr. Baker, on examination of the flowers, suggested the very appropriate name of *H. tricholepis,* described and figured in M.S.S., Feb., 1896. This was an interesting incident, not as tending to disprove the assertion of alleged hybridizers—that they had introduced something new to the genus in their self-coloured reds, but as putting forward a tenable proposition that the result of their efforts had caused a colour reversion to some ancestral type, such as might have occurred in any seedling.

On the same hypothesis, it is easy to account for the occasional appearance of a few whitish, or greenish-white, seedlings.

Having described these two species, a botanist could do no more. Out of the twenty species which, according to Mr. Baker, belong to the subgenera (*Macropodastrum, Omphalissa, Aschamia,* and *Lais*), and which may be said to constitute the true *Hippeastrums,* seventeen have been at some time common in cultivation. Of these seventeen common species, the alleged hybridizers have succeeded in perpetuating one (*H. vittatum*), and four others in one composite form. No traces of the remaining twelve exist. Where can we find the habit of colour of *H. porcerum,* the habit of *H. solandriflorum,* or *H. cybister* (so remarkably distinct), the spreading stamens of *H. calytratum,* the spots of *H. pardinum,* the double flowers of *H. alberti,* or the marvellous markings of *H. leopoldi* or *H. reticulatum?*

Some say that the pre-potency of certain species has extinguished the weaker blood of the rest (?). If so, that is an effect which intelligent persons would be expected to fight against. It is a certain fact that the species of which all traces have disappeared are not long-lived as individuals, nor good seed-bearers under cultivation.

If on top of this the efforts of our hybridizers to impregnate other species with their pollen were ineffectual, their ultimate disappearance is easily accounted for, without having to call in any speculative ideas. My belief is that there has not been so much genuine hybridization among the *Hippeastrums* as we have been led by some to think; yet the fact remains that something has been done, and that the blood of some four species runs in our present mongrel race.

Messrs. Veitch have done great work among the garden forms, and have produced a race of large-flowered mongrels. They were the introducers of *H. pardinum* and of *H. leopoldi,* and many people lay great stress on the improvement caused by these introductions. But to my mind it is very doubtful to what extent, if at

all, their blood runs into the existing garden mongrels. No doubt many attempts were made, and seedlings raised, but Mr. Harry Veitch himself records in his contribution to the issue of the *Journal of the R. H. S.*, July, 1890, that "many of them," the supposed hybrids, "came so near the species as to be practically the same thing, or the same but slightly varied, yet we are able to select several distinct new forms showing a marked improvement on their progenitors in breadth and substance of segment, size and symmetry of flower, &c." This certainly shows careful selection, but disproves hybridization.

When we try to discover when and by whom hybridization has been effected, we are met by grave difficulties. Mrs. Bury's work, published in 1831, just when the early hybridizers were in full swing, figures four supposed hybrids, and these figures may reasonably be held to give us either the whole of the ascertained hybrids that had up to then been flowered, or at least the most remarkable of them. For it cannot be supposed that a work got up at such expense and with such care would have figured the least noteworthy forms. Yet among the four figured there is not one solitary case in which specific hybridization had undoubtedly taken place. At best we have to deal with guesses and suppositions, which subsequent writers have treated as though they were dealing with ascertained facts.

In dealing with these earliest hybrids figured by Mrs. Bury, attention should be drawn to the fact that the *Liverpool Botanic Gardens*, where many of the plants were drawn, gave, at that period, unrivalled facilities for studying the subject with which I am dealing.

A Mr. Harrison, a native of Liverpool, but living in Brazil, was then sending home many species of *Hippeastrum*, mostly of great beauty, and all of them new to cultivation, to his friends and relatives in Liverpool.

As, in those days, few private individuals possessed efficiently-heated structures to grow such plants in, the botanic gardens became the recipients of most, if not all, of these importations. Hence, it was here, under the care of Messrs. Shepherd, that a great opportunity occurred for the hybridization of these plants. To begin with *Johnsoni*, we are at once plunged into a sea of doubt and speculation. Mr. Baker says that Johnson was a watchmaker of Prescot, in Lancashire, when he effected the first hybridization in 1799; but Mrs. Loudon, in 1841, writes that he was "a person named Johnson who had a small garden at Mitcham in 1810;" no other information was apparently forthcoming about him at that date. Mrs. Bury's figure was certainly drawn prior to 1830, yet she evidently felt that she was treading on dubious ground, for she says—

"The prototype is said to have been first raised about the year 1799, from the seed of *vittata* impregnated with *formosissima*, by Mr. Johnson . . . and the present specimen is from one of the original bulbs, presented by Mr. Johnson to the late E. Falkner, Esq., of Fairfield, near Liverpool."

At least she felt certain that this plant that she was drawing was indubitably the *Johnsoni* of Johnson himself. It bears a seven or eight-flowered scape, and is of a dark self crimson, banded to the apices of the segments, with a narrow, sharply defined, deep red keel, turning suddenly to whitish-green in the lower third.

The plant called *Johnsoni* nowadays is an entirely different thing; it has three or four flowers, is of a light brick-red colour, with a lighter-coloured (or white) keel in the lower two thirds, as described in Nicholson's *Dictionary of Gardening*. He only claims that it was one of the earliest hybrids. Only once have I seen the *Johnsoni* of Johnson alive, and that was about a dozen years ago, in the collection of the late Mr. James Backhouse, of York. I believe that the plant is now extinct. As to its parentage, *formosissima*, as we know the name, and as it is figured in Bury's work, belongs to the genus *Sprekelia*, which will not fertilise the stigma of any true *Hippeastrum* (so far as very extensive experiments teach me; Dr. Bonavia has reached the same conclusion as the result of his experiments). Secondly, there is no resemblance whatever to *Sprekelia* in the alleged offspring. The alleged female parent, *H. vittatum*, is one that I have never succeeded in hybridizing, nor does *Johnsoni* bear any resemblance whatever to *H. vittatum*.

Hence, I think we may dismiss the supposed parentage of *Johnsoni* as pure guesswork—and bad at that. It might pass as a hybrid between *H. equestre*, and some form of the *rutilum-reginae* group, or it might be simply a seedling of some variety of the latter group.

Mrs. Bury notes a "fringed nectary in the throat," and this is especially remarkable in *H. equestre major,* and in a less degree of some *rutilum-reginae* forms, such as *H. subbarbatum* (*Bot. Mag.,* 2475). The facts, as they are presented by Mrs. Bury, would not lead me to class *Johnsoni* as a true hybrid, much less as one of ascertained parentage.

Mrs. Bury notes that "many learned disputes" had arisen on the subject, and that "many seedlings from *reginae* and others have obtained the appellation of *Johnsonian.*" We are referred to the writings of *Herbert, Gowen,* and *Lindley,* for further information. Mr. Baker states that *Johnsoni* was raised out of *H. reginae* by *H. vittatum.*

To proceed with Mrs. Bury's hybrids. The beautiful and distinct white form called *"picta,"* I have never seen alive. Had a hybrid origin been claimed for it, no one could have controverted the statement. But no claim to hybridization is put forward by Mrs. Bury. In figure 7, however, a very lovely unnamed seedling is figured (white, edged pink), raised out of *H. solandriflorum* by *Johnsoni.* It is a pity that such a charming and distinct form should so soon die out of cultivation, for there does not appear to be any subsequent record of this seedling or hybrid. Not improbably it was a mule, in which case it would die out in about five or six years, the average length of family-life of *H. solandriflorum* under cultivation in England.

The reverse cross is also given in fig. 46, showing a fine crimson flower with white star, and long tapering apices to the segments. I have seen nothing like this alive. If *Johnsoni* was not a hybrid, then these two beautiful seedlings were specific hybrids, and not improbably mules. Mr. Baker, in his invaluable *Handbook of the Amaryllideae,* pp. 47, 52, 53, gives a mass of information about the earlier and subsequent hybrids and mongrels.

H. griffini, of the *Botanical Magazine,* 3528, is cited as a hybrid between *H. psittacinum* and *Johnsoni.* Certainly the figure is not typical of *H. psittacinum,* and the plant is not improbably a hybrid. Yet it cannot be said that its parentage is undoubted, because it appears (in the letter-press) that it was raised by "W. Griffin in his hothouse at S. Lambeth previous to 1820," and did not flower till after sixteen years or more had elapsed. Seedlings usually flower in from eighteen months to four years from date of sowing, and in sixteen years or more there was certainly time for many things to happen.

Any attempt to follow out the 100 alleged hybrids named in Sweet's *British Flower Garden* in 1830, or those dealt with by the other authors referred to by Mr. Baker, cannot be made within the limits of this article. But with regard to those for which hybrid origin is claimed, mentioned in Mr. Baker's work, I would remark that I have received direct from different parts of South America plants indistinguishable from those figured in *Redoute,* 469 (*Brasiliensis*), and by Loddiges in *Botanical Cabinet,* 159 (*spectabile*) for which Loddiges raised no claim to hybrid origin. Mr. Baker has also included among alleged hybrids, plants such as *ambiguum* of *Botanical Magazine,* 3542, and *Harrisoni* of *Bury,* 27, of which latter Mrs. Bury distinctly states that it was imported from Peru and flowered for the first time in 1824. (*Vide* also Nicholson in *Dictionary of Gardening.*)

It may perhaps be claimed fifty years hence that the alleged new species, *H. arechaveletae,* is a hybrid, because it resembles some such alleged hybrid of the early years of last century. Some of the hybrids, or mongrel-bred plants, mentioned by him I have, or have had, alive in my collection—such as *Carnarvonia.*

Mr. James O'Brien figured in the *Garden* of July 12, 1879, the fine hybrid *O'Brieni,* raised out of *H. pardinum* by *H. reticulatum,* but this also seems to have proved a mule, and died out in due course.

M. Van Houtte also figured in his *Fl. des Serres,* 1277, an alleged hybrid between *H. reticulatum* and *H. vittatum,* but I have no information as to whether the parentage of this plant was ascertained beyond doubt. There seems nothing improbable in the parentage from the figure.

Sir Charles Strickland, Bart., informs me of a hybrid between *H. aulicum* and *H. calyptratum* which he has in cultivation. This extremely interesting plant should certainly be figured and put on record. I have visited the districts where both species grow in close proximity, although I never found them intermingled. Both species are prolific in varieties, but I found no trace of any intermediate forms, such as might be reasonably supposed to be natural hybrids, between them.

The following give some notable plants belonging to this genus, for which a hybrid origin has been claimed:—*Ackermani pulcherrima* (*H. aulicum* x *Johnsoni*),

Garaway, Bristol, 1850; *Splendidum* (*H. vittatum* x *H. reginae, or H. equestre*), Herbert (Bot. Reg. App., 1924); *Johnsoni II* (*H. vittatum* x *H. reginae*), Gowen, Hichclere; *Acramanii* (*H. aulicum* x *H. psittacinum*), Garaway, Bristol, 1835.

I have put *II* after *Johnsoni,* to distinguish it from the *Johnsoni* of Johnson.

My own efforts have been directed for many years to raise *Hippeastrum* hybrids, but I cannot claim to have met with success in any single instance. From this experience it would appear that raising inter-specific hybrids in this genus is a much more difficult matter than is generally supposed.

The labours of many hybridists during the past century have only produced, so far as I am aware, the three or four undoubted hybrids mentioned previously, viz: (1), *H. solandriflorum* x *Johnsoni;* (2), *Johnsoni* x *H. solandriflorum;* (3), *H. pardinum* x *H. reticulatum,* and possibly *H. reticulatum* x *H. vittatum.* These must be reduced to two or three if *Johnsoni* is regarded as a hybrid. Probably, almost certainly, others have been raised, and their parentage left in doubt. I think this has been more especially the case with such species as *H. equestre, H. aulicum,* and the *rutilum-reginae* group. I have found all these species to be good seed-bearers on their own pollen, or when crossed with mongrel forms. The fact that such mongrels have already in them the blood of these species, accounts to my mind for the ease with which they cross back with their pure bred relations. Dr. Bonavia also informs me that when in Lucknow he raised many crosses of *H. equestre* (presumably with garden mongrels ?), which produced interesting and beautiful varieties. My own experience coincides with this. The epiphytal section, from the Organ Mountains, also set seed freely with me on their own pollen; and I have raised seedlings from *H. solandriflorum, H. stylosum,* and *H. vittatum.* In fact in every case where fair and prolonged trials were carried out with healthy bulbs, fertile seeds were produced. I experimented with twenty-five species and varieties of *Hippeastrum,* not including hybrids.

Among allied genera such as *Habranthus, Zephyranthes,* and *Sprekelia,* I can find no specific hybrids. Some *Zephyranthes* seed very freely with me, especially *Z. brachyandra* (*Habranthus brachyandrus* of some), *Z. gracilfolia, Z. rosea, Z. elliptica* (*sp. nova*), and *Z. andersoni. Z. branchyandra* is a most extraordinary plant as regards seed production. I have taken the greatest precautions to prevent self-fertilization, often cutting into the flower the day before expansion to remove the inert anthers; and have attempted to cross it with every form of *Hippeastrum* and *Zephyranthes.* On practically every occasion seed has formed, and with unvarying regularity the seedlings have proved true to type. This mystery is one I have been unable to solve.

To test the "prepotency" theory, I tried the pollen of *Sprekelia, Placea,* and *Lycoris,* with just the same result, or lack of result. *Z. candida major* never bears seed with me, though typical *Z.candida* does so freely in most places; *Z.carinata* also never carries seed, nor does *Sprekelia.* I experimented with thirteen species in these genera.

Among *Hymenocallids,* some three very interesting hybrids have been raised:—

H. macrostephana was raised in Herbert's time, by crossing *H. speciosa* and *H. calathina.* Recently Mr. Hoog (of the firm of C. G. Van Tubergen, Junr., Haarlem), repeated the cross, taking fine forms of both species as parents. He has named his hybrid *Daphne,* and it is certainly both superior to, and distinct from, the *H. macrostephana* previously in commerce. It differs from Mr. Baker's description, in having foot-stalks 7 inches long to the leaves, and the flowers are larger and "toothed" differently. It appears to be a mule.

H. amancaes crossed with *H. calathina* by Herbert gave the sulphur-coloured hybrid of *Botanical Register,* 1665 equiposed between either parent. This hybrid (*Sulphurea*) is still living, and I received it a few years back from Sir Charles Strickland.

Colonel Trevor Clarke, by crossing *H. calathina* with *Elisena longipetala,* raised a hybrid which Mr. Baker could not differentiate from the Peruvian *Ismene deflexa.*

I cultivate twelve kinds of *Hymenocallis* and *Elisena,* and find them all to carry seeds at times, excepting the two hybrid mules, and a new sp. (*schizostephana*).

Among *Eucharis* and *Urceolina,* two hybrids are recorded. Far the most interesting is the generic hybrid (*Urceocharis,* Mast.) between *Eucharis* (species?) and *Urceolina aurea* raised by Messrs. Clibran. This, roughly, takes after *Eucharis* in colour, and *Urceolina* in form. *Stevensii* is a hybrid between *E. candida* and *E. sanderi,* of recent origin, I think.

Burfordiensis, raised in the garden of Sir Trevor Lawrence, but of unascertained parentage, has recently been claimed as a hybrid. Similar claims have been advanced to another form under the name of *Elmetiana.*

Mr. Krelage, in his short monograph of the genus *Eucharis,* listed both *Mastersii* and *Bakeriana* as hybrids, the former between *E. grandiflora* and *E. sanderi;* the latter between *E. grandiflora* and *E. candida.* I cultivate only five kinds of these genera, and the only one which bears seed with me is *E. lehmanni,* which does so regularly.

In the large cosmopolitan genus *Crinum* is wide field for hybridization. I know of three undoubted hybrids. Kunth, in his *Enumeration,* vol. v., p. 582, gives twenty-three alleged hybrids, and Sweet, B. F. G., p. 512, gives thirty-two.

Herbert claimed *Govenianum* as a hybrid, and had it figured, but the plant apparently died out shortly after.

Bury (fig. 30) gives an unnamed hybrid raised out of *C. pedunculatum* by *C. zeylanicum.* Curiously enough, the result, as appearing in the painting, shows a plant indistinguishable from *C. amabile.* However, there is no reason for hesitating to accept Bury's statement as to its hybrid origin.

C. Powelli was apparently raised some time not long prior to 1887, in Sir W. Bowman's garden, by crossing *C. moorei* and *C. longifolium.* The result is a beautiful and very useful plant equi-poised between the parents, but possessing originally a brilliant rosy-pink colour more intense than either. Since then *Powelli* has become widely spread in British gardens, and a very beautiful pure-white form has appeared, besides others bearing many shades of pink. The hybrid has all the hardiness of *C. longifolium,* and, I am informed, seeds freely, which is very rare in hybrids. I have, however, some doubt as to whether *C. moorei* is a good species. Seedlings raised by me, from plants flowering in the open ground, in a garden where no other open-air forms were grown, showed a wide divergence from the type, both in colour and shape of flower. The same splendid rosy-pink that *Powelli* has appeared in one seedling, combined with a flower widely divergent in shape from the parent. In fact, had I attempted to hybridize the parent, and had I succeeded in raising such a plant as this. I should have been quite satisfied that I had raised a true hybrid. This is, I believe, the way in which many alleged hybrids have been raised by really conscientious gardeners.

Only two of my seedling *C. moorei* have yet flowered, and neither of them was true to type.

Of course, if *C. moorei* comes "any way" from seed, we may entertain doubts as to whether the blood of longifolium enters into the composition of *Powelli,* which might be merely a seedling of *C. moorei.*

In any case, if *C. moorei* does not come true from seed, it is not a "species," and hence *Powelli* would not be a specific hybrid, nor the plant below (*C. scabrum* x *C. moorei*). Among the twenty-five kinds of *Crinum* cultivated in my garden I find *C. moorei* the most certain seed-bearer. *C. giganteum, C. odorum* (*sp. nova*), and *C. purpurascens* have never borne fertile seed.

Recently I raised a new hybrid *Crinum* out of *C. scabrum* by *C. moorei schmidti.* The female parent was the Jamaican variety, which is by far the finest form of *C. scabrum.* The seedlings flowered in three years and ten months, and the foliage partook of the characters of both parents. The flowers were most like *C. moorei* in shape, but of a brilliant crimson-pink colour, more intense than in any *Crinum* I have seen before. Another seedling from the same fruit was not so intense in colour. Both have refused to carry seed so far.

Another plant of tantalizing parentage is *Amaryllis kewensis.* When I first saw this plant at Kew, some dozen years or so back, it was labelled *"Amaryllis hybrid, Arbuckle's var."* Later on it got down to *Amaryllis belladonna, Arbuckle.*

At one time, as far as I could gather from various sources, it had come to the Royal Gardens as an unflowered supposed hybrid between *Brunsvigia josephinae* and *Amaryllis belladonna.* Its supposed parentage did not carry it through the critical examination to which it was subject on flowering. But still, there it was—a live thing that was *not Amaryllis belladonna,* and yet could claim no ascertained parentage.

And so it got called *A. kewensis.* And certainly, as a commemorative name, its splendid infloresence, unmatched among the *Amaryllids* for fragrance and beauty, entitled it to be associated with the Royal Gardens.

Yet I am of opinion that had this plant been claimed as an ascertained hybrid of *Brunsvigia* and *Amaryllis* by some authority, such claims could not have been overlooked: for it shares in many respects the characters of both suggested parents. Among the five kinds of *Brunsvigia* and *Amaryllis* in my garden, all bear seeds freely.

In the *Gardeners Chronicle* of Nov. 10, 1900, mention is made of an alleged hybrid between *Vollota* and *Amaryllis*, raised by Mr. Rix of Truro, having cerise flowers. He states that he has never known *Vallota* to produce seed unless artificially impregnated. This is not my experience, although it is certainly a bad seed bearer in some districts. At Terrington, in N. Yorkshire, where I cultivated *Vallota*, it seeded freely every autumn without any artificial impregnation.

Mr. Rix himself says that, The only noticeable difference is the thicker necks of the bulbs, and the variation in colour"—that is from the female parent. It would appear that in Mr. Rix's seedlings, 89 per cent. came true, 2 per cent. were anaemic, and 9 per cent. showed colour variety. This is not much beyond the allowed 5 per cent. of variation in true species. I would also remark that cerise coloured *Vallotas* were recorded many years ago, and constitute a well ascertained, but inconstant, colour variety. I have an old plate marked "225, *J. Andrews*" (believed to be from the *Foral Magazine*) of this variety.

Among *Vallota* and *Crytanthus* I have only heard of one hybrid, raised by crossing *Cyrtanthus* (*Gastronema*) *sanguineus* and *Vallota*. This interesting plant is nearly equi-posed between its parents but has not the showy points of either. It is named *C. hybridus*, and was raised apparently in 1885, and first described by Mr. N. E. Brown, but I have never seen any statement as to who raised it, or which was the female parent.

I have on several occasions repeated the cross both ways, but without raising seed except on one occasion; in fact, I can never get *C. sanguineus* to carry seed of any sort, and of recent years, from some cause (probably smoke), *Vallota* has refused to thrive in the London neighbourhood.

Among *Nerines* some twelve hybrids have been raised dating from Herbert's time. He himself raised seven: *N. curvifolia* x *N. undulata* gave *Mitchamia* and *Veriscolor; N. curvifolia* x *N. flexuosa* gave *Haylocki; N. sarniensis* x *N. undulata* gave *Spofforthiae; N. flexuosa* x *N. undulata*, and x *N. humilis; N. humilis* x *N. undulata*, and *N. curvifolia* x *N. sarniensis*, all gave unnamed hybrids.

Mr. Baker also tells us (*Handbook of Amaryllideae*, p. 103) that within recent years the following hybrids have been raised by Messrs. O'Brien, Leichtlin, Cam, and others:—*N. pudica* x *N. humilis* gave *Amabilis; N. flexuosa* x *N. sarniensis* gave *Elegans; N. sarniensis* x *N. curvifolia* gave *Meadowbanki; N. flexuosa* x *N. curvifolia* gave *Manselli* (said to be hardy); *N. undulata* x *N. flexuosa* gave *Roseo-Crispa*. I have the two latter.

Some of these show a great advance on the parents, but a really critical examination by an expert would, I feel sure, reduce this list. I think that the facility with which the species of *Nerine* hybridize is due to the same causes which have admitted of a similar state of things among the *Narcissi*.

Personally I do not claim much knowledge of this genus, and should be interested in learning whether all the alleged species of *Nerine* come true from seed?

Between *Clivia* and *Imantophyllum* one hybrid has been raised. *I. cyrtanthiflorum* (*Flore des Serres*, t. 1887), *I. miniata* x *C. nobilis*.

In *Haemanthus* I can only find one admitted hybrid, *Clarkei*, raised by Colonel Trevor Clarke by crossing *H. coccineus* and *H. albiflos*, but I have heard of several recently raised but not yet distributed, such as *H. King Albert* (*H. katherinae* x *H. puniceus*). Among the six species I cultivate *H. katherinae*, *H. Kalbreyri*, and *H. puniceus* bear seed freely.

Among the genera which have produced no hybrids whatever, I find the following carry seeds freely besides those I have incidentally mentioned above):—*Pancratium, P. canariense, P. illyricum*, and *P. maritimum; Lycoris cyrtanthiflora* (*sp. nova*); *Acis autumnalis*. The following plant I have frequently tested, but without ever raising seed: *Lycoris squamigera*. The following hybrids are said to have been recently raised, but have not yet flowered:—*Crinum giganteum* x *C. longifolium* (Elwes): *C. scabrleum* x *C. erubescens* (Elwes); *Vallota* x *Amaryllis* (Kew); *Brunsvigia* x *Amaryllis* (Kew).

Synopsis of Results

Number of admitted (specific or generic) hybrids of ascertained parentage:—

1	*Hippeastrum*	4
2	*Hymenocallis*	3
3	*Elisena*	
4	*Eucharis*	2
5	*Urceolina*	
6	*Crinum*	3
7	*Vallota*	1
8	*Cyrtanthus*	
9	*Nerine*	12
10	*Haemanthus*	1
11	*Clivia*	1
Tot. in 11	genera	27 hybrids
36	genera produced no hybrids.	
47	genera dealt with above.	

These results have been reached by a process of elimination. They do not claim to give the total number of hybrids raised in these genera, but only the ascertained hybrids of undoubted parentage.

As for those which have appeared from time to time in gardens by some fortuitous process, by some forgotten labours, or as the purely natural result of grouping together in one house the various members of one genus, these may be many or few, but it is beyond the reach of human forces to tabulate them in any way.

ATTEMPTS AT RAISING INTER-SPECIFIC HYBRIDS AT ISLEWORTH.

—A bare record of the few successes that have attended efforts at hybridization give no idea of the totality of effort required to produce even such meagre results. I have therefore tabulated a few of the crosses which I have attempted, and which were registered at the time. These do not represent one-half of the attempts I have made, because no register was kept, except in cases in which the swelling fruit gave promise of seed, and in hundreds of cases this did not occur. I have also practically eliminated the huge record of generic crosses attempted, none of which have, up to the present succeeded beyond possibility of dispute. I have defined for these purposes "a species" to be *a collection of individuals bearing evidence of a common parentage, in which all the important and easily recognizable attributes of the inflorescence and seeds are fixed, and which reproduce such characters in their seed progeny.*

Variations in the leaves or in the colour or markings of the flowers constitute varieties.

A specific hybrid, therefore, in my view, must differ *specifically* from the *female* parent.

A varietal divergence is not enough to *prove* hybridization, as self-fertilised seedlings of many pure species will show varietal divergence from the type in perhaps one per cent. to five per cent. of the seedlings.

In many cases where seeds have been raised after attempted hybridization, sufficient time has not elapsed for them to flower; in other cases they have flowered and shown no specific divergence from the female type.

In the former case SMALL CAPITALS indicate the supposed male parent; in the latter case **bold face** is used in the subjoined tabular matter; and *italics* indicate that no fertile seed was formed.

The total of results gives 159 registered attempts, of which 146 are absolute failures, and thirteen possible successes. Of these thirteen, I have hopes of success in three cases, and have undoubtedly succeeded in one case.

On this analysis it would appear, on the one hand, that the chances of really effecting hybridization is at the most not more than about two per cent., perhaps not more than 0.6 per cent.; and, by including unregistered attempts, these figures would be halved.

On the other hand, it should not be overlooked that my object throughout was not to register the correct percentage of possible hybrids between all the species in any genus, but rather to raise hybrids between species so far removed from each other as to make any offspring possess horticultural merit. In short, my aim was to do the difficult thing rather than the obvious.

Vallota x **Gastronema sanguineum** (died after germination).

Sprekelia x *H. rutilum* (2)* x *H. equestre* (2) x *H. procerum* (discontinued efforts, as plant never carries seeds with me. It is recorded to have once carried seed in Col. Trevor Clarke's garden).

Brunsvigia josephinae x **Vallota** (died after germination).

Amaryllis x LYCORIS SQUAMIGERA (3).

H. rutilum x *H. equestre* (2), x *Sprekelia* (4), x **vittatum** (died), x *Z. brachyandrum,* x H. SOLANDRIFLORUM (2). (*H. rutilum* carries seeds freely on its own or mongrel pollen.)

H. procerum x *H. aulicum* (2), x *Sprekelia* (carries seed on its own pollen).

H. equestre x *H. rutilum* x *Sprekelia* (2), x *H. vittatum* x *H. solandriflorum* x *Z. andersoni* (carries seed freely with mongrel pollen).

H. reginae x *H. solandriflorum* x *Z. brachyandra.*

H. stylosum x H. SOLANDRIFLORUM.

H. tricholepis x *H. vittaum* (2), x *H. rutilum* x *Sprekelia*

H. vittatum x H. EQUESTRE x *Z. candida* (seeds freely on its own pollen).

H. organense x *Z. brachyandra.*

H. aulicum x H. VITTATUM (4), x *Z. candida* (2), x *H. rutilum* x *H. procerum* (2), (seeds freely on its own or mongrel pollen).

Habranthus advenum x *H. aulicum* (never set seed).

C. moorei x *C. scabrum* x *C. odorum* (13), x *C. fimbriatulum* (3), x C. CAMPANULATUM x *C. zeylanicum* x *C. amabile* (8) (seeds freely on its own pollen.

C. scabrum x C. MOOREI (hybrid raised) (seeds on its own pollen).

C. odorum x *C. moorei* (23), (never carries seed).

C. amabile x *C. moorei* (3), x *C. giganteum* (2).

C. fimbriatulum x *C. moorei* (2).

C. giganteum x *C. zeylanicum* (5), x *C. odorum* (4), x *C. moorei* (2), x *C. amabile* (3).

C. zeylanicum x C. giganteum x *C. moorei* (2), (never seeds with me).

C. purpurascens x *C. moorei* (6), x *C. amabile* x *C. giganteum* (never seeds).

Ismene calathina x ELISENA

Elisena x CALATHINA x *Moritzina* (3).

Hymenocallis speciosa x *H. calathina.*

Eucharis lehmanni x E. GRANDIFLORA (seeds freely on its own pollen).

E. sanderi x E. lehmanni (2), (never seeds).

Zephyranthes brachyandra x **H. rutilum,** x **H. aulicum** (2), x **Hippeastrum sp.** (2), x SPREKELIA (2), x Z. CANDIDA (2), x PLACEA ORNATA (4), x LYCORIS SQUAMIGERA.

Z. rosea x *H. aulicum* x *H. reginae* (2), (seeds on its own pollen).

Z carinata x *H. aulicum* (never seeds).

Z. gracifolia x *H. vittatum* (seeds on its own pollen).

THE USE OF ZEPHYRANTHES CARINATA IN HYBRIDIZING

REX D. PEARCE, *New Jersey*

Zephyranthes carinata is usually stated to be non-seeding, but I find that an occasional set may be obtained by persistent hand pollination. It seems to set seed more freely when it has a super-abundance of moisture at the roots, and lack of this may be the limiting factor in seed formation. It makes pollen freely, but has not so far proved to be a very successful parent in hybridization work. However, I have what may be a natural hybrid between Z. carinata and Z. robusta, although characteristics of the latter species are dominant.

*The figures in parentheses show the number of times that a particular cross was attempted.

THE NEHRLING HYBRID AMARYLLIS

HAMILTON P. TRAUB, *Florida*

The amaryllis enthusiast owes an undying debt of gratitude to the late Henry Nehrling (1853-1929) for his pioneer activities in amaryllis breeding in America. It was he who inspired Mr. Theodore L. Mead of Oviedo, Fla. in his highly successful work with a strain of the Nehrling Hybrids, which are now more generally available, especially in Florida, than any other strain.

Mr. Nehrling began his amaryllis breeding activities in the early 90's while he was living in Milwaukee, Wisconsin. His early efforts were limited since he carried on the work in a small green house. He continued the work more extensively during his residence at Gotha, Florida, 1906-1917, and at Naples, Florida, 1918-1929.

In the upbuilding of his strain he used introductions by the following breeders,—Veitch, 30 varieties; de Graff, 20 varieties; Williams, 10 varieties; James Douglas, 20 varieties. In addition he utilized a few varieties originated by Kenneth Finlayson, and also Johnsonii (*H. vittatum* x *H. reginae*), *Acramanii Pulcherrimum* (*H. aulicum platypetaium* x *H. psittacium*), *H. equestre, H. reginae, H. leopoldi,* and *H. solandriflorum conspicuum.* Indirectly through the named varieties by de Graff, Veitch and others, the species *H. pardinum* and possibly some other species entered into the strain.

Although his strain was undoubtedly as good as the best produced in America during his life time, his extreme honesty led him to admit as late as 1909 that the varieties with a short tube and open flower with a diameter from 8 to 12 inches (officially designated as the LEOPOLDI TYPE by the American Amaryllis Society) introduced by Veitch and Ker in England, and Bornemann in Germany, were superior to his own. It is of interest to note that when Nehrling first read the description of the variety Ideala (Veitch, 1897) he made an attempt to purchase it from the originator only to be informed that it had been sold. G. Bornemann, of Blankenburg am Hartz, purchased it for 60 marks, and raised from it his famous strain. Years later Nehrling received some of the progeny through Bornemann.

The development of amaryllis breeding and the extent of amaryllis culture have been profoundly influenced by the means of propagation employed,—by seedlings and offsets. Some of the best varieties were notoriously slow propagators. In Europe many named varieties were introduced before the Great War, but many of these apparently were not widely disseminated. In many cases the entire stock was sold to enthusiasts of commercial growers at fancy prices. In America, the main reliance was placed on propagation by seed and the bulbs were either sold as mixtures or were graded according to color after flowering and then disposed of at a higher price. Mr. Nehrling introduced only a very few named varieties; Mr. Mead introduced none. Mr. Mead apparently attempted to develop a strain which would reproduce fairly true from seed. His method consisted of crossing similar individuals—dark reds with dark reds; predominately whites with similar individuals; etc. Mr. Nehrling has left no exact record of his method of procedure. His primary aim was to produce a flower with a very short tube with petals all equal, 3½ to 4 inches in diameter, the entire flower wide open and measuring from 8 to 12 inches in diameter.

The amaryllis breeder of the present generation has as a foundation the rich mine of the Nehrling Hybrid Amaryllis. Considering the many species and important named hybrid varieties that have been used in building up this strain, the potential number of high type individuals to be raised from it should be great. Some of our contemporaries are already collecting the best individuals of the Nehrling and Nehrling-Mead strains. During the next decade these amaryllis breeders will undoubtedly make good use of this material in developing new strains of their own, thanks to the pioneer work of the late Henry Nehrling.

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THE MEAD STRAIN OF THE NEHRLING HYBRID AMARYLLIS

WYNDHAM HAYWARD, *Florida*

One of the most widely known and extensively propagated strains of hybrid Amaryllis (Hippeastrum) in Florida is that bearing the name of its originator, Mr. Theodore L. Mead of Oviedo, Fla. The Mead Strain of the Nehrling hybrid amaryllis is found in the planting stock of the great majority of the commercial growers of the state, from Pensacola east, and over the peninsula.

Its peculiar merits are so well recognized locally that numerous growers profess to handle only the pure Mead Strain. The name in Florida designates the standard stock for both amateur and professional growers. This strain is noted for the large size and desirable shape of flower and the wonderful variety of color variations and shades.

Mr. Mead, a naturalist and hybridizer of many species of plants, as well as a commercial fruit and vegetable grower and amateur horticulturist of note, is now past 80 years of age, and lives in Oviedo, in Seminole county, Central Florida.

His principal plant work, in cultural and hybridizing lines, has been with such subjects as the orchids, bromeliads, amaryllis, crinums, hemerocallis, gladioli, cacti, caladiums and fruit trees. His home at Oviedo is surrounded by a semi-jungle growth of palms, oaks, bamboos and other sub-tropical plants and trees. He maintains a greenhouse which contains many varieties of orchids and bromeliads in pots for use in hybridizing experiments. On the trees about his home numerous kinds of orchids, climbing cacti and bromeliads have been fastened to the bark. These have apparently been successfully naturalized.

It was with the aim of obtaining some definite information regarding the origin of the Mead Strain of hybrid amaryllis (Hippeastrum) that the writer and Dr. Hamilton P. Traub called on Mr. Mead at his home in the afternoon of April 22, 1933, and heard from the naturalist his own account of the beginnings of the strain of flowering bulbs that bears his name.

Mr. Mead said that some twenty years ago, the late Mr. Henry Nehrling, another noted naturalist and plant lover, of Gotha and Naples, Florida, gave him a bulb of "hybrid amaryllis", and that when the bulb flowered, he wrote to Mr. Nehrling, asking for pollen of other hybrid amaryllis, and Mr. Nehrling sent him some from his extensive collection of the best European hybrids. According to Mr. Mead, he pollenized his single amaryllis and from the seed that set as a result of this pollenization, he grew 180 seedlings. This was the beginning of the *Mead Strain.* Mr. Mead pollenized these seedlings, when they grew to blooming size, with pollen received from Mr. Nehrling who had assembled a large collection of Hippeastrum species and the best European hybrid amaryllis and had also done some pollenation work himself in the line of creating new hybrids since the 90's. This pollen from Mr. Nehrling's finest specimen flowers was used to build up the great variety of types and colors in the *Mead Strain.*

As the years went by, Mr. Mead said, he selected six main types for his stock, including the lightest, the darkest, those with hair lines of color, a tape of color about the flower, etc., and he confined his hybridization work to the development of these most desirable characteristics. He made other visits to Mr. Nehrling at blooming time and brought back pollen from choice flowers from the latter's collection at Gotha, Florida, for use in the crossings. Mr. Mead, however, introduced no named varieties of hybrid amaryllis.

The quality and characters of the *Mead Strain* of hybrid amaryllis gradually became known to bulb growers and dealers all over the state and elsewhere and the demand for the bulbs in large quantity increased until Mr. Mead was raising many thousands. At length he sold his main stock, keeping only seven hundred or so of the choice specimens for his personal collection. These he still has, and he continues to grow them in a small way mainly for his own interest and diversion.

In recent years the bulbs in his collection, from long growing on the same soil and difficult growing conditions, have suffered from a disease called "red wilt" or "red rust". Mr. Mead has been unable to give his collection all the time he could wish to keep them in maximum exhibition condition. However, on the visit

of the writer and Dr. Traub, the naturalist showed them many fine specimens in bloom, surpassing some of the best among many thousands seen in the bulb fields of other growers propagating the *Mead Strain.*

Mr. Mead said that after the main stock of his bulbs passed from his hands, they were distributed between two large growers who continue their sale and propagation, mainly by seed, to this time on a greatly increased scale.

The naturalist is a graduate of Cornell University (class of 1877), where he specialized in civil engineering, as a "practical anchor to windward". But he immediately gave up all thought of practicing his profession on coming to Florida a half century ago. He was an ardent collector of butterflies in his youth, and had a large collection of the North American species. Despite his advanced age, he lives an easy, natural life, mostly in the open air and under the Florida sun, and can step across his planting grounds with a speed that would tire many younger men. He is interested in Boy Scout work and still is Assistant Scoutmaster at Oviedo, having formerly been Scoutmaster for many years. He keeps up a lively interest in national affairs, books, and all things relating to human welfare.

HISTORY OF THE AMARYLLIS COLLECTION OF THE UNITED STATES DEPARTMENT OF AGRICULTURE

Bureau of Plant Industry, *United States Department of Agriculture,* Washington, D. C.

The United States Department of Agriculture's present collection of 2,500 bulbs of Hippeastrum hybrids, commonly referred to as amaryllis, was developed by successive cross-pollinations from the following twelve named varieties which were imported from England July 31, 1909; *Diana, Venus, Serapis, Progress, Achilles, Crimson King, Vesta, Virgin Queen, Monarch, Bacchus, Adonis, Scarlet King.* The colors of these varieties comprised dark red, rose, pink, blush, and white with red stripes.

When these bulbs flowered, Mr. E. M. Byrnes, then Superintendent of the Department of Agriculture greenhouses, undertook by cross-pollination to develop shades not included in the colors of the original flowers. The handling of the bulbs in this process was as follows:

February 14, 1910. The flowers were pollinated.
March 26, 1910. The ripened hybrid seed was gathered.
March 29, 1910. The seed was sown in seed boxes.
June 2, 1910. The seedlings were shifted from seed boxes to 2-inch pots.
August 22, 1910. The seedlings were shifted from 2-inch to 4-inch pots.
January 16, 1911. The seedlings were shifted from 4-inch to 6-inch pots.
November 22, 1911. The seedlings were shifted from 6-inch to 8-inch pots.
March 5, 1912. The seedlings were in full flower.

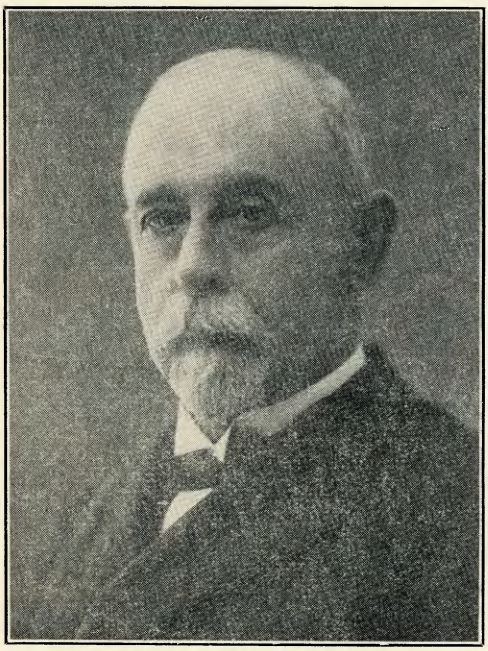
The same treatment was followed in the cross-pollinations conducted each subsequent year.

The cross-pollinations for the developing of new shades were progressing successfully, so Mr. Byrnes turned his attention to the problem of producing a pure white amaryllis. The first cross in this endeavor was made between a red-striped white bulb and an orange-striped white bulb. In about two years' time the resulting seedlings bore flowers, of which the two showing the most white were crossed. The seedlings resulting from this cross were grown to flowering size bulbs, and the process was repeated. All the bulbs resulting from these crosses bore lighter flowers than the parent bulbs, and from the third cross, which was made early in February, 1918, two bulbs were obtained which bore white flowers in March 1920. These flowers were small and not pure white, but successive selection and cross-pollination have brought about realization of the aim to produce a fine-size white amaryllis.

In 1914 Mr. Byrnes, desiring to devote his entire attention to the producing of the white amaryllis, turned over to his son, J. Wise Byrnes, who was associated

with him, the cross-pollinating of amaryllis for the purpose of obtaining new shades. Mr. J. Wise Byrnes succeeded his father as Superintendent of the Department of Agriculture greenhouses January 1, 1924, and since that time he has carried on all the amaryllis hybridizing. With the flowering of each new collection of seedlings the white is improved, new and subtle variations of shades appear, and an increase in the size of the flowers is noticeable. Cross-pollination is being continued to improve existing types and to obtain new colors, more shades, and a further increase in the size of the flowers.

IN MEMORIAM—DR. ATTILIO RAGIONIERI



DR. RAGIONIERI

It is with the deepest regret that we report the death of Dr. Attilio Ragionieri of Florence, Italy, on October 11, 1933. He was noted for his professional writings in the field of Medicine and his highly successful work in plant breeding which latter he carried on as a hobby.

His chief originations consisted of improved freesias, ranunculi, callas, hybrid amarylleae, lily-of-the-valley and various fruits. In describing a most interesting introduction, the bigeneric hybrid, *Crin(o)donna Corsii, (Amaryllis belladonna* x *Crinum moorei),* he states,*—

"Botanists will perhaps not deal too harshly with the creation of a new genus for this bigeneric Amaryllidaceous hybrid. . . . The illustration represents the original specimen (spoiled by a wind storm), upon which the following description has been made:

"CRINDONNA MEMORIA CORSII.—New Hybrid: Plant evergreen, the chief period of vegetation occurring at the end of summer. Bulb—8-9 cm. in diameter, ovoid, with rather fibrous tunic, plentifully proliferous, with a neck about 15 cm. long. Leaves 10-12 to a bulb, drooping sometimes, showing a tendency to be distichous, dark green, more or less carinate, 3-4 cm. broad, 70-90 cm. long. Peduncle—stout, compressed, green, with a purplish tone at the base, lightly glaucous, 50 cm. long. Spathe valves—about 13 cm. long, 3 cm. broad, with a rose coloured stripe occupying the third central portion in its whole length. Flowers—8-12 in an umbel, 18 cm. long including the pedicle, 10 cm. broad. Perianth with a slightly curved tube, 14 cm. long; segments acuminate, the three external ones 2 cm. broad, the interior ones 3 cm.; colour pinkish rose, more deep in the center of the segments and at their apex. Filaments—shorter than the corolla and of the same colour. Anthers—linear. Style—rather shorter than the perianth, colour dark rose pink. Stigma—trifid. Flowering time, August.

"I have dedicated this new hybrid to the venerated memory of the late Marquis Bardo Corsi Salvati, of Florence, the enthusiastic and very intelligent lover of fine plants, who had formed in his gardens at Sesto the most complete collection of stove and other plants in Italy."

* Gardeners' Chronicle (London), Jan. 15, 1921.

HIPPEASTRUM AND CRINUM HYBRIDS

CECIL E. HOUDYSHEL, *California*

I have raised quite a number of *Hippeastrum* seedlings, hardly more than 10,000 though on a guess. My seeds were very carefully selected and usually the result of hand pollination. I have produced a few very good seedlings. Most of the best that I have raised I have lost through gopher injury, dishonest employees, economic depression, etc. I hope that I can help yet a little more toward the improvement of the horticultural forms of the Amarylleae.

The *Crinum, Cecil Houdyshel,* was selected as the one best from about 600 seedlings of the same cross. It is the most profuse bloomer here that I have ever seen. I have flowers on it today (January 16). I have them in every month of the year in my garden and field. I do not give them much care. My new *Crinum, Virginia Lee,* which has produced about 25 bulbs, large and small, to date, bloomed first about four years ago. So you see that it multiplies rapidly. Although *Virginia Lee* is related to *Cecil Houdyshel* it is quite distinct. Its foliage is like *J. C. Harvey.*

THE BURBANK HYBRID AMARYLLEAE

WYNDHAM HAYWARD, *Florida*

The Burbank Strain of hybrid Amaryllis, at one time one of the leading strains in the United States, and the product of long continued experimentation and hybridization by the late Luther Burbank in California during the first two decades of the present century, seems to have fallen into neglect. The contributor of this article has had great difficulty in obtaining authentic information regarding the origin, development and dissemination of this Strain of hybrid *Hippeastrums,* and has had to fall back on material available in Mr. Burbank's own works published in 1914. It would appear from this source that among his originations were not only outstanding hybrid *Hippeastrums* but also a number of *Crinum* hybrids, and some bi-generic crosses.

HYBRID HIPPEASTRUMS. The plant breeding method employed by Mr. Burbank was based on the selection of the best individuals having the desired characteristics to the highest degree and then cross pollenizing these. He reports some difficulty at first until he discovered that the pistil of the flower matures after the stamens are ready to shed their pollen. The proper time for transferring the pollen, it is pointed out, is when the flower is beginning to fade.

Mr. Burbank began his *Hippeastrum* breeding with the following,—*Johnsonii, H.reginae, H. aulicum,* and later on he had several other species available. The objectives are set forth as being the attainment of strong stalks, broad leaves, abundant flowering, rapid propagation capacity, large bulb size, large flowers with wide petals and brilliant colors. It is of interest to note that after about 14 years of work his introductions were characterized by a flower size of 10 inches or more in diameter.

OTHER AMARYLLEAE. In connection with the *Hippeastrum* hybridization work, he sets forth the claim that he crossed *Sprekelia formosissima* with his *Vittatum Type* hybrid amaryllis. He states that he grew *Sprekelia* bulbs for 20 years, raising "probably a hundred thousand seedlings," but during this time he succeeded only once in hybridizing the plant. Only one individual of the union bloomed, he claims, and from this one numerous seedlings were grown. In the above case *Sprekelia* is claimed as the pollen parent but he explains that later he made a number of crossings on *Sprekelia,* using pollen from an improved hybrid *Hippeastrum.*

In the first case, he states that the offspring were almost infertile, and seldom set seed; the plants and leaves similar to the *Sprekelia,* but with blossoms larger than those of the *Sprekelia* and with curiously twisted petals. Second and third generations from his second series of crosses between *Sprekelia* and hybrid *Hippeastrum* showed a tendency to revert back to the hybrid Amaryllis type.

Mr. Burbank writes that he had grown about 20 species of *Crinum* and mentions specifically, *Crinum moorei, C. longiflorum, C. americanum, C. amabile, C. asiaticum.* He states that he had sold a number of hybrid varieties of *Crinum*

to the trade. These seem to have been nearly all lost, at least as products of Mr. Burbank's hybridizing.

Mr. Burbank describes the better type of hybrid *Crinums* as "a really splendid group of bulbous flowering plants." He mentions flower stems six feet long and flowers ranging from white through rosy pink to almost purple. He states that he experienced no difficulty in crossing the various species of *Crinum,* mixed hybrids being finally produced that represented combined characters of many species. The seed parent in most cases, he informs us, was *C. americanum,* the native Southern species, but in a few cases *C. amabile* or *C. asiaticum* was used.

CRINUM-AMARYLLIS BELLADONNA HYBRIDS. In Luther Burbank's works, published in 1914, are reported bi-generic crosses between a *Crinum* species and *Amaryllis belladonna.* Similar crosses are reported by Dr. Attilio Ragionieri of Florence, Italy, in Gardeners' Chronicle (London) January 15, 1921, which he named *Crindonna Memoria Corsii,* and by the firm of Howard and Smith, of Montebello, California, in Gardeners' Chronicle (London) November 21, 1925, which was named *Amarcrinum howardii.*

Both the Ragionieri and Howard crosses were made between *Crinum moorei* and *Amaryllis belladonna.* Mr. Burbank apparently does not name the species of *Crinum* he used!

THE HEATON HYBRID AMARYLLIS

I. W. Heaton, *Florida*

Six years ago we made a survey among the commercial florists regarding the Amaryllis as a commercial flower. The two main objections were, inability to produce timed bloom and the high percentage of poor colored stock. From the results of this survey, we made the specifications of the Heaton Strain, (a) rapid growth; (b) evergreen foliage; (c) rapid production by offshoots; (d) clean clear colors; (e) uniform, medium sized, well shaped bloom; (f) wide, even, recurved petals; and (g) the ability to produce at least 400 blooming size bulbs in four years by vegetative propagation.

To produce this strain we used the first year 200 Mead Strain, three inch, two year old, selected seedlings from Mr. Mead's original collection, purchased from Mr. Bender, Sanford, Florida; and also about 75 bulbs purchased from several local growers. The method of breeding followed was,—*Leopoldi Type* male to *Mead Type* female, color to color. The seeds were kept separate according to twelve flower colors. Twenty two months later, from 19,000 seedlings, over 5,000 bloomed. The bulbs were carefully checked in the field and only about 250 were removed to the seed house. These were perfect in every way and showed a definite improvement over their parents. This spring our seedlings from the United States Department of Agriculture, Bureau of Plant Industry, bloomed at twenty months of age. These large *Leopoldi Type* bloom furnished us the pollen to produce 130,000 seed bred to the seedlings produced by the first cross.

We claim no credit for the scientific breeding of this strain; it is really a selection of the cream of nearly 500,000 bulbs we have raised.

We do claim greater vitality. Every bulb in this strain has for three generations on both sides produced commercial bulbs in two years from seed. Our strain is 100 percent evergreen in Florida, since the *Vittatum* blood has been eliminated in so far as it affects dormancy. All *H. psittacinum* type of bloom has been rogued out and the *H. leopoldi* and *H. reticulatum* blood has been brought to the fore. While the *H. equestre* characteristics of multiplication by offshoots has been combined with the *Leopoldi Type* flower. The bloom of the Heaton Strain is a modification of the *Leopoldi Type;* the petals are wider at the tip and recurved toward the base, giving the bloom a more rounded appearance.

We wish to acknowledge our obligation to Mr. Mead of Oviedo, Florida; to the late Mr. Henry Nehrling; and to the U. S. Dept. of Agriculture officials in Washington, D. C. who have by their work made our strain possible. Mr. E. P. Hall, retired florist of Shelbyville, Ky., furnished us much inspiration and many valuable hints during the production of this strain.

THE DIENER HYBRID AMARYLLIS

RICHARD DIENER, *California*

The writer has been very much of an amaryllis enthusiast for many years. Breeding operations with the purpose of improving this class of plants have been carried on with two distinct strains; (a) a Mammoth Strain, built up from hybrid amaryllis (Hippeastrum) of the extra large flowered type, secured directly or indirectly from European breeders, and (b) *Hippeastrum equestre* hybrids produced by crossing this species with his *Mammoth Hybrids.*

The breeding method followed consisted of crossing individuals having the desired character (size, shape and color of flower, longest flowering season, rapid propagation capacity, etc.) to the largest degree, among a particular population, with other similar individuals.

Mammoth Hybrids. At the start attention was directed to the size character, and when some of the seedlings flowered during the summer after they had already flowered during the winter it seemed logical to secure individuals having both of these desirable characters. Thereafter all the effort was expended on individuals which flowered several times each year and also produced round flowers with a short tube and which were self colored. The results have been well worth while for some of the progeny flower several times each year and produce flowers over 10 inches in diameter. The colors are also quite marvelous. They cover those common to amaryllis, excepting yellow and blue. The attempts to produce a pure white variety possessing the other desirable characters have also been successful.

The *Mammoth Hybrids* described above should not be dried off but kept growing continually since flower scapes may appear almost any time during the year. However, in March and April, all which have received sufficient care will surely flower. The writer's plants are being grown under lath with the exception of the most rare which are raised in pots in the greenhouse.

Equestre Hybrids. About twelve years ago the firm of John Lewis Childs offered a so called "Everflowering" strain of amaryllis. The writer secured a dozen of these bulbs. As they were not referred to any definite species it was not possible to identify them until a visiting Florida grower kindly informed us that they were apparently *Hippeastrum equestre.*

Only one of the bulbs produced a flower scape during the first year. This was used to best advantage by crossing with the *Mammoth Hybrids.* The result was quite pleasing as the seedlings grew like weeds and propagated very rapidly. This spring the third generation of these crosses are coming into flower which will include many crosses for all kinds of purposes. This should add to the present collection which contains colors not in the *Mammoth Hybrids* such as orange, salmon, copper red and some with yellow centers.

A PALE BLUE ZEPHYRANTHES FROM THE ARGENTINE

One of the chief objects of the American Amaryllis Society is the importation of promising Amarylleae species for the hybridizer. As a beginning in this endeavor we are happy to report that our correspondent, Sr. Jose F. Molfino, of the Argentine Ministry of Agriculture, writes under date of Sept. 18, 1933.—"The species, *Zephyranthes caerulea* is included in the Flora of Argentine, having been noted in the Province of Entre Rios by Helmberg and Pax . . . . the undersigned (Sr. Jose F. Molfino) and the other naturalists of the Laboratory will be glad to gather bulbs. . . . . on their botanical expeditions and will send them to the American Amaryllis Society for cultivation."

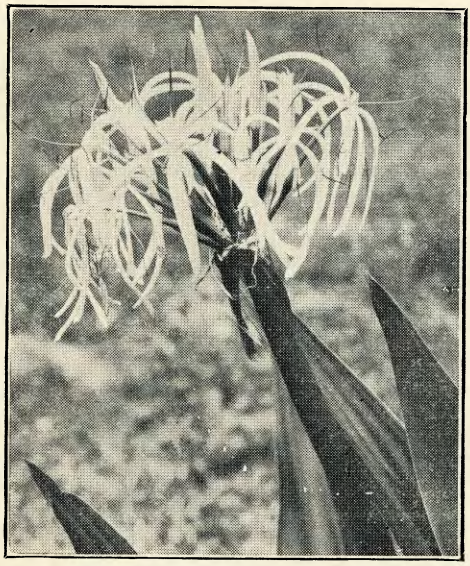
The species *Z. caerulea* is described as follows by Baker, 1888: *Z. caerulea* Baker. *Amaryllis* (*Habranthus*) *caerulea* Griesb.—Bulb under 1 inch diameter; neck 1-2½ in long. Leaves unknown. Peduncle 3-4 in. long. Pedicle as long as the bifid spathe. Perianth pale blue, an inch long; tube none; segments obovate-unguiculate, mucronate. Stamens unequal; 3 longer equalling the trifid style.

Hab. Entre Rios; Conception del Uraguay, flowering in March, Lorentz.

—HAMILTON P. TRAUB, *Florida.*

AMARYLLIDACEAE NATIVE TO JAPAN

BASIL N. IKEDA, *Japan.*



CRINUM ASIATICUM

Below is given a list of the Amaryllidaceae native to Japan. They are not widely cultivated except *Crinum asiaticum* var. *japonicum,* and *Lycoris squamigera.* These latter are grown outdoors in the garden or indoors in pots. There are hardly any horticultural varieties, and the trade in these two species is not extensive. However, some of the other species in the list have important possibilities if improved by scientific plant breeding.

The writer will submit photographs of some of the more important species for reproduction in a future issue of the Year Book.

Crinum asiaticum var japonicum. Native to Hondo (Central to South), Kiushu, Skikoku; habitat—sandy beaches; fragrant flowers produced in summer.

Crinum asiaticum var sinicum. Native to Taiwan (Formosa); habitat—near the seashore; flowers in summer; corolla tube and segments much longer than **var. japonicum.**

Curculigo orchioides. Native to Shikoku, Lukyu and Taiwan (Formosa); both bi—and unisexual yellowish flowers in summer.

Hypoxis aurea. Native to Hondo (Central to South). Kinshu, Shikoku, Lukyu and Tiawan (Formosa); habitat—mountains and fields; yellowish flowers in summer.

Lycoris albiflora. Native to Kiushu? White flowers in September; probably a white form of **L. radiata.**

L. aurea. Native to Shikoku; Lukyu, and Taiwan (Formosa); habitat—near beaches; flowers bright yellow.

L. radiata. Native to Hondo, Kiushu, and Lukyu; habitat—fields; vivid red flowers in September.

L. sanguinea. Native to Hondo, Shikoku and Kiushu; habitat—woodland, and field in mountains; bright red flowers in early summer.

L. squamigera. Native to Hondo (Central to South) and Kiushu; habitat—woodland and field in mountains; light purple or pink fragrant flowers from early to mid-summer.

GENETIC AND CYTOLOGICAL RESEARCH IN THE AMARYLLEAE*

THOMAS W. WHITAKER, *Massachusetts*

To those of us who use the microscope for the investigation of problems of heredity and associated cell phenomena, the members of the Amarylleae are an exceptionally attractive group of plants. The cells making up the various organs and

* Editorial Note—The work in which Mr. Whitaker is engaged is of very great importance to those interested in the Amarylleae. Some of the members have already taken steps to cooperate in this excellent work and are sending blooming size bulbs of species and varieties to be used in Mr. Whitaker's investigations. All are urged to cooperate to the fullest possible extent. His address is *Arnold Arboretum, Harvard University, Jamaica Plain, Massachusetts.* ——Ed.

tissues in plants of this group are, generally speaking, quite large. The tiny elements in which we are most interested, namely, the chromosomes, are comparatively large and with few exceptions, not numerous.

From the point of view of the theoretical plant breeder, there are several points of interest in the Amarylleae. Two deserving of mention are: (1) Interspecific crossing can be accomplished fairly easily in a great many species of this group. One needs only to mention the genus *Hippeastrum* to illustrate a well known example of this tendency. (2) There are a number of cases of bigeneric hybrids recorded in the literature. Two examples of wide crosses of this sort are the reported hybrids of *Amaryllis* and *Crinum; Amaryllis* and *Brunsvigia.*

In considering the genetic possibilities of a group of plants, the plant breeder always finds rather serious handicaps as well as certain advantages. This is true of the Amarylleae. Perhaps the most serious obstacle in the path of genetic research in this group is the *time element.* The period between germination and flowering is considerable in most species. In some cases the length of this period may be as much as 22 years (species of *Brunsvigia*). From a genetic standpoint the large number of seed, which, in most cases, can be secured from a single pollination, is a decided asset.

The above remarks convey some idea of the interesting problems in this group, awaiting investigation by those who are skilled in the use of the microscope and in the technique of plant breeding. It is practically a virgin field as far as this type of work is concerned. An investigation in these fields may be expected to yield worth while results, interesting to all those concerned with the Amarylleae.

The first problem to be met in undertaking a project of this nature is the assembling of authentic material of as many species as possible. By a study of such material it should be possible to determine, by cytological methods, the relations existing among the various genera and to form a background for future genetic research.

To make reasonable progress with such a project, the cooperation of a group of interested individuals is highly desirable, if not essential. It is to secure the cooperation of these who may be interested that the above project has been outlined at the present time.

AMARYLLEAE AND ALSTROEMERIEAE IN AMERICAN BOTANIC GARDENS

In the following list the species and horticultural forms of the *Amarylleae* and *Alstroemerieae* in the *Missouri (St. Louis) Botanic Garden* (M)*; the *Brooklyn (New York) Botanic Garden* (B)*; and the *New York Botanic Garden* (N.Y.)* are indicated. Several of the American private collections also contain valuable material of this nature.

The Northern botanic gardens are to be congratulated on their efforts since most of these plants must be grown under greenhouse culture with them.

There is a real need of bringing together representative collections in the South,—Florida, Louisiana, Texas, and other southern states, and also in California.

AMARYLLEAE

Coronatae

Narcissus species and hybrids. M; B; NY.

Amaryllеae Genuinae

Galanthus nivalis. M.
Cooperia drummondii. NY.
Lecucojum vernum. M.
Sternbergia lutea. B; NY.
S. clusiana. B.
Zephyranthes texana. B.
Z. atamasco. B.
Sprekelia formosissima. NY.
Lycoris squamigera. M.
Hippeastrum equestre. B.
H. brachyandrum. NY.
H. advenum. NY.
H. reticulatum. NY.
H. Hybrids. M;B;NY.
Vallota purpurea. NY.
Cyrtanthus spiralis. M.
Clivia miniata. M; B.
Haemanthus albiflos. B.
H. ratheri. NY.
H. puneceus. NY.
H. katherinae, NY.
Crinum longiflorum. M.
C. longifolium. NY.
C. longifolium album. NY.
C. giganteum. M; NY.
C. asiaticum. M; NY.
C. asiaticum sinicum. NY.
C. erubescens. NY.
C. roozenianum. NY.
C. podophyllum. NY.
C. pendunculatum. NY.
C. eleanorae. NY.
C. caribeaum. NY.
C. fimbriatulum. NY.
C. campanulatum. NY.
C. moorei. NY.

(Continued on page 98)

* Abbreviations used in the list

5. Amarylleae Propagation

THE GROWING OF AMARYLLIS FROM SEED

Bureau of Plant Industry, United States Department of Agriculture
Washington, D. C.

The seeds of amaryllis should be planted 1 inch apart each way in trays 3 inches deep, in a light soil consisting of three parts good friable loam and one part leaf mould with a sprinkling of clean, sharp sand, thoroughly mixed and screened. They should be placed in the light in a temperature of between 60 and 65° F. Immediately after planting they should be given a thorough watering. After the first watering, only sufficient water should be given to keep the soil moist. Care must be taken not to apply water too freely as it is liable to cause the development of a fungus which would destroy the seeds.

When the seedlings have developed two leaves about 3 inches long, they should be potted in 3-inch pots in a soil consisting of three-fourths good friable loam and one-fourth well-rotted cow manure, with a good sprinkling of sharp sand, thoroughly mixed. The seedlings can now stand a temperature of from 50 to 65° F. When the 3-inch pots are filled with roots, the plants should be shifted into 5-inch pots, and from the 5-inch to 7-inch or 8-inch pots, in which size the bulbs are flowered. When the seedlings are shifted into pots larger than 3-inch pots, the pots should be well drained with an inch of clean cinders about the size of small marbles, clean gravel, or broken flower pots. Over the hole in the pot should be placed a piece of the material used for drainage of a size sufficiently large to cover the hole. When the seedlings are shifted from 3-inch to 5-inch pots and into the larger sizes, care should be exercised to leave at least two-thirds of the bulblet above the surface of the soil.

Each time the bulblets are repotted, immediately sufficient water should be applied to penetrate all the soil in the pot. After this water should be withheld until the soil becomes dry. After each shift into larger pots the bulblets will not require a great deal of water until the root systems are developed and established, which will usually be in about three weeks. After that time a thorough watering should be given every day. The plants are grown on without a check or rest until the bulb reaches the flowering stage.

After the bulbs have been shifted into the pots in which they are to flower, an application of a well-balanced fertilizer every ten days will be beneficial. The amount of fertilizer to be used will depend upon the size of the pot in which the bulb is placed and upon the nature of the fertilizer. Fertilizer should be withheld from the time the flower bud shows color until the blooming period is over and the flower stem has been removed. When the flower has withered, the stem should be cut with a sharp instrument about 2 inches above the bulb.

After the bulb has flowered, the offsets which have developed around it should be removed. To accomplish this, the bulb should be knocked out of the pot and all soil removed from it, care being taken not to injure the root system. The offsets should not be cut off but should be very carefully pulled off by hand. The offsets should be handled in accordance with the Department's instructions for the treatment of amaryllis offsets. The bulb should be repotted in the same pot and continued in active growth with applications of fertilizer every 10 days.

In early autumn, when the foliage begins to turn yellow, all fertilizer should be discontinued and watering gradually decreased until the soil has become entirely dry at which time the foliage will have entirely dried back. The bulb should be left in the pot and stored in a dry place in a temperature of between 40 and 50° F. The pot should be placed on its side. No water should be given during the dormant period. The potted bulb should be left in this condition until the bulb of its own accord shows a flower bud. The bud usually emerges from the side of the bulb and not from the center and generally appears in the late winter or early spring. When the flower bud appears the pot should be set upright and placed in the light in a

temperature ranging from 50 to 65° F. A thorough watering should be given at this time and continued each day until the dry soil has absorbed sufficient water to expand and hold moisture. After this the watering each day should not be quite so heavy. After the flower bud has emerged entirely from the bulb, fertilizer should be applied every 10 days until the bud shows color when it should be discontinued until after the flower stem has been removed. Following the blooming period, the application of fertilizer should be resumed and continued through the summer. When the foliage turns yellow, the bulb should be rested in accordance with the instructions given above.

Once in about five years, immediately after the bulb has gone out of flower, the bulb, soil, and drainage should be removed from the pot, care being taken not to injure the roots of the bulb. The pot should be thoroughly cleaned and clean drainage placed in it. The bulb should be repotted in fresh compost prepared in the proportions given above for the potting of amaryllis.

THE TREATMENT OF AMARYLLIS OFFSETS IN THE HOME

Bureau of Plant Industry, United States Department of Agriculture
Washington, D. C.

Amaryllis offsets should be firmly potted in a soil consisting of three-fourths good friable loam and one-fourth well-rotted cow manure, with a good sprinkling of sharp sand, thoroughly mixed. The size of the pot used will depend upon the diameter of the offset. The pot should be large enough to allow a space of from 2 to 2½ inches all around between the offset and the edge of the pot. The pots should be well drained with an inch of clean cinders about the size of small marbles, clean gravel, or broken flower pots. Over the hole in the bottom of the pot should be placed a piece of the material used for drainage of a size sufficiently large to cover the hole. In potting the offset, care should be exercised to leave at least two-thirds of it above the surface of the soil.

Immediately after potting, sufficient water should be applied to penetrate all the soil in the pot. After this, water should be withheld until the soil becomes dry. The offset will not require a great deal of water until the root system is developed and established. This will usually be in about three weeks. After that time, a thorough watering should be given every day. The bulb should be placed in the light in a temperature ranging from approximately 50 to 65° F.

The plants should be allowed to grow through the summer and early autumn until they have ripened their growth which will be marked by the leaves turning yellow. At this time the watering should be gradually decreased until the soil has become entirely dry at which time the foliage will have entirely dried back. The offsets are now entering their dormant period. During this time they should be left in the pots and stored in a dry place in a temperature of between 40 and 50° F. The pots should be placed on their sides. No water should be given. The potted offsets should be left in this condition until they start into active growth of their own accord.

The starting of the offset into active growth will be marked by the appearance of leaves from the center of the offset and will usually occur in late winter or early spring. The pot should then be set upright and placed in the light in a temperature between 50 and 65° F. A thorough watering should be given and continued each day until the dry soil has absorbed sufficient water to expand and hold moisture. After this the watering each day should not be quite so heavy. Application of a well-balanced fertilizer every ten days will be beneficial. The amount of fertilizer to be used will depend upon the size of the pot in which the offset is placed and upon the nature of the fertilizer. The offset should be continued in active growth throughout the summer and early fall. When the growth is ripened the applications of water and fertilizer should be discontinued and the offset should be rested in accordance with the instructions given above for the dormant period.

At the end of the second dormant season the offsets will usually have developed into flowering bulbs. This will be indicated by the appearance of a flower bud from the side of the bulb. The bulb should then be brought into the light, watered and handled in accordance with the instructions for the second season of active growth given above. When the flower bud shows color however, fertilizer should be withheld until the blooming period is over and the flower stem has been removed. When the flower has withered, the stem should be cut with a sharp instrument about 2 inches above the bulb. After this the application of fertilizer should be resumed and continued until the foliage has ripened its growth. The bulb should then be rested until the appearance of next season's flower bud.

Once in about five years, immediately after the bulb has gone out of flower, the bulb, soil, and drainage should be removed from the pot, care being taken not to injure the roots of the bulb. The pot should be thoroughly cleaned and clean drainage placed in it. The bulb should be repotted in fresh compost prepared in the proportions given above.

EXPERIMENTS IN THE PROPAGATION OF AMARYLLEAE BY CUTTAGE

HAMILTON P. TRAUB, *Florida*

The literature on the vegetative propagation of the Amarylleae is not very extensive. In 1926, Miss Luyten (*1*)* in Holland, reported successful experiments with the propagation of hybrid amaryllis by placing bulb scales in a propagation medium and keeping the temperature at approximately 80 degrees F. The Missouri Botanic Garden (*2*) repeated part of Miss Luyten's experiments and reported encouraging results in 1927. Traub, in 1933, reported success in the propagation of hybrid Amaryllis by partially or completely quartering the bulbs vertically and planting the fractions in pots under ordinary slat shed propagation conditions in Florida (*3*). Mr. I. W. Heaton, of Orlando and Mr. Wyndham Hayward of Winter Park, Florida, have also experimented with the propagation of amaryllis by cuttage. Mr. Hayward used chiefly *Hippeastrum equestre,* and Mr. Heaton made use of hybrid amaryllis. It is reported that Mr. Bender of Sanford, Florida, has also used the cuttage method. Possibly still others have experimented in this field.

This paper is in the nature of a progress report since the experiments reported on are not completed. In the case of the experiments previously reported (3), the Nehrling-Mead strain of hybrid amaryllis (Hippeastrum) was used. As indicated in Table 1, blooming size bulbs were cut (a) lengthwise into quarters as far as the middle of the root base, and (b) into quarters. A variation was introduced in each of the two types, consisting of cutting off a little less than half of the top of the bulb before making the lengthwise cuts.

The two "callusing-sprouting" media used were sand and loam. The partially quartered bulbs, and the quarters were planted in these media contained in clay pots. Moderate water was applied until growth had definitely started. Any flower buds already formed in the fractions expanded and flowered, and leaf growth appeared above the surface in some cases in less than 30 days. In three months the original ten bulbs had given rise to 15 new bulbs, an increase of 50 per cent. In another month the number of new bulbs had increased to 43, an increase of 330 percent as shown in Table 1.

On inspection it was noticed that new bulbs had been formed at the leaf axes. The roots, however, issued from the root base fraction of the mother bulb. Roots were more abundant and longer in case of partial quartering. Complete serving apparently retards root formation. The partially quartered bulbs had entirely or practically broken into quarters by the pressure of the developing new bulbs. Where still slight connections were present, these were broken at transplanting time. The sand "callusing-sprouting" medium gave disease-free plants, as contrasted with some red rust on plants propagated in loam.

*Reference is made by number (Italic) to Literature cited at end of article.

Table 1. Vegetative propagation of hybrid Amaryllis; Nehrling-Mead Strain; Cuttage in spring, 1933.

Treatment	Sprouting Medium	Date set up	No. Bulbs	Sprouts above ground 6-19-33	6-30-33	8-10-33*
Upper part of bulb cut off cross-wise, a little above center, and lower half cut lengthwise into quarters half way thru root base; all cut surfaces covered with paraffin	Orlando sandy	3-24-33	2	4	5	7
	loam			1	2	2
Bulb cut lengthwise into quarters half way thru root base; stem and root base only covered with paraffiin	Orlando sandy	4-6-33	2	1	1	4
	loam			0	0	3
	Sand	4-6-33	1	1	2	5
	Total		5	7	10	21
Upper part of bulb cut off cross-wise a little above center, and lower half cut lengthwise into quarters; all cut surfaces covered with paraffin	Orlando sandy	3-24-33	2	3	3	3
	loam			3	4	5
Bulb cut lengthwise into quarters; stem and root base only covered with paraffin.	Orlando sandy	4-6-33	2	0	1	3
	loam			2	5	7
	Sand	4-6-33	1	0	1	4
	Total		5	8	14	22
Grand Total			10	15	24	43

* Average bulb diameter 2.2cm; average leaf diameter 2.1cm., leaf length 14 inches.

The main objectives in further work are to determine the maximum number of increase which may be secured by the cuttage method, and also the most favorable season of the year in which to carry on the work under Florida conditions. As shown in Table 2, bulbs were cut lengthwise into fractions and these were again cut crosswise into fractions each with a portion of the stem and leaf scales. Table 2 shows that between December 5 to 14, five bulbs were cut into 32 fractions, and the same number each into 96 fractions.

Table 2. Vegetative propagation of Hybrid Amaryllis; Nehrling-Mead Strain; Cuttage in fall, 1933.

Treatment	No. of bulbs	Date set up	Total No. of Divisions	Number of Sprouts 12-15-33
Check A; cut lengthwise into ¼'s to root base.	1	11-12-33	4	0
Check B; cut lengthwise into quarters.	1	11-12-33	4	4
Cut lengthwise into 1/16's and crosswise into ½'s.	5	11- 5-33	32*	0
		11-12-33	32	0
		11-14-33	32	0
		11-14-33	32	1
		11-14-33	32*	0
Cut lengthwise into 1/16's and crosswise into 1/6's.	5	11-12-33	96	0
		11-12-33	96	0
		11-12-33	96	0
		11-14-33	96*	0
		11-14-33	96	0

* Bulb had relatively small stem.

As check treatments one bulb was partially quartered to the root base and one bulb was quartered lengthwise. The fractions were planted in a propagating medium of half sphagnum peat and half sand contained in 18 x 24 x 4 inch cypress flats. A similar experiment will be set up in the spring of 1934. The results from both the fall and spring trials will be reported in a future paper.

A small number of trials with propagation by cuttage in other genera of the Amarylleae have also been made as shown in Table 3.

Table 3. Vegetative propagation of Amarylleae; Cuttage in fall 1933.

Genus and Species or Variety	Treatment	No. of bulbs	Date set up	Total No. of Divisions	Number of Sprouts 9-29-33	10-29-33	12-15-33
Crinum fimbriatulum	Cut lengthwise into ¼'s	1	8-25-33*	4	2	3	8
Hymenocallis caribaea	Cut lengthwise into ¼'s	1	8-25-33	4	1	3	3
Narcissus Grand Soleil d'Or	Cut lengthwise into ¼'s	1	11-21-33	4	-	-	4**
	Cut lengthwise into ⅛'s	1	11-21-33	8	-	-	5#
	Cut lengthwise into ⅛'s and crosswise into ½'s.	1	11-21-33	16	-	-	3**

*One section flowered soon after planting.
** Fractional leaves have elongated.
# In 4 fractional leaves have elongated; in 1 a strong new shoot has developed with whole leaves.

In the case of *Crinum* and *Hymenocallis* the response was quite rapid. These attempts will be expanded considerably during the present year.

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PROPAGATION OF AMARYLLIS BY SEEDS IN CALIFORNIA

RICHARD DIENER, *California*

The seeds are planted in flats with sandy leaf mold soil about three inches deep. The seeds are covered just enough to hold them down, and are usually up in three to four weeks. Afterwards they are transplanted into boxes two inches apart and when about six months old are planted in the lath house. Many plants start flowering when from fifteen to eighteen months old, depending on the strain.

VEGETATIVE PROPAGATION OF AMARYLLIS

I. W. Heaton, *Florida*

The practice of vegetative propagation of Amaryllis is frowned on by the commercial grower as a rule. He takes the stand that as long as the trade will take seedlings,—why bother. However, it is worth while to consider the other side of the question. The main drawback to the more general use of the amaryllis as a forcing flower by the florist is the fact that it does not bloom evenly,—one bulb blooming in January and another in July. This can be regulated to a degree by root-binding in a pot and resting, but this takes time—more time and space than the florist feels he can give.

The selection of stock for vegetative propagation requires much more attention to detail than seed stock as a whole. Generally speaking, the bulbs of the *Leopoldi Type* hybrids are shy on eyes or offshoots. The rate of growth in vegetative propagation is even more important than in seedlings for a year's difference in growth may mean four years in reaching a commercial supply of bulbs. In the method which we use, dependance is placed upon the eyes which would form offshoots as they became exposed on the basal ring. If the bulb does not have these eyes and there is no way of telling—even the microscope does not show them—rapid multiplication is impossible.

Bulbs for propagation should be selected when in bloom; mark each bulb by number, giving age, size, number of offshoots and a description of color, shade, etc. If the bulb has produced a crop of seed it will be ready to cut 30 days after the flower scape has dried.

The sprouting medium used consists of one-half each sharp coarse sand and German peat, well mixed. A 20 x 30 flat will hold divisions from 6 to 7 bulbs. Wash the bulb; trim the roots to ¼ inch and cut off the neck. Split the bulbs from top to bottom parallel with the leaf and cut each piece in half. Now you have four quarters. With the point of a sharp knife gently loosen three layers of scales from inside or center of each quarter, cutting down and inward to sever the solid base attached to each piece, 4 divisions. Now peel off two-layer pieces, 4 divisions. Then cut the remaining portion of the quarters in halves and remove three three-layer pieces from each (24 divisions). The basal sections, if the bulb is a large one, may each be split into halves (16 divisions). This makes a total of 48 divisions.

The pieces are placed in rows with the sand and peat covering all but ½ inch of the top. Watering must be carefully done, as an excess will rot the fractions. In six weeks a small white shoot will be seen forming between the scales at the junction of the base. When this shoot comes above the surface it will have the appearance of a three months old leaf. In February or March these shoots are ready to transplant and the treatment is the same as for transplanted seedlings.

If proper care is used every eye will become a plant. Do not be disappointed if only 6 or 8 shoots appear. Any bulb which has a rapid growth and the inherent characteristics to form eyes, together with a good bloom, is worth $1,000.00 to any commercial grower.

In August 1930 we cut two bulbs without knowing the rate of growth. One a dark wine color, blooming in December every year—a beauty. This bulb cut to 36 pieces, sprouted 18, yet today none of them are larger than 1½ inches. The next one a good dark red, produced forty 3-inch bulbs which all bloomed last Spring, and have been cut again, making a stock of over 1200, which will bloom in the spring of 1935—one bulb a failure, another a grand success. Of four additional varieties, a large white one with faint pink markings, shows commercial possibilities from the standpoint of rapid vegetative propagation capacity.

From the florists viewpoint vegetative propagation is the best method to secure uniform blooms, and there is a great need for uniformity and standardizing. One good rapidly propagating variety will make a fortune for any man. The commercial grower has not the time and patience required to secure this result and looks to the amateurs to produce the standard stock.

6. Amarylleae Culture

Regional Adaptation, Soils, Fertilization, Irrigation, Disease and Insect Control, etc.

SUCCESSES AND FAILURES WITH AMARYLLEAE IN MISSOURI

AL. G. ULRICH, *Missouri.*

The writer's experience with Amarylleae covers a period of over thirty-five years. During that time he has grown and tried to grow some species in each of the sixty one genera of this interesting family of plants. His successes have about equaled the failures. Here in Missouri there is a great deal to contend with, especially in the way of climate. In summer the conditions are ideal, very hot with good showers now and then and, if they fail, our water supply is sufficient to apply every day. It is necessary, in the spring of the year, to locate the bulbs in a favorable position, some requiring shade and others full sun. Some are planted out in beds, dug up in the fall and dried off completely, while others must be kept evergreen. This means a great deal of work. At the approach of cold weather these bulbs must be taken indoors, either in the conservatory or a situation suitable for their resting period.

HIPPEASTRUM ADVENUM

VALLOTA PURPUREA

You who grow these bulbs in the South can hardly imagine the amount of labor and time required to do this work. All bulbs must be properly labeled and care exercised not to mix them.

Years ago when it was possible to import bulbs of all kinds, the writer's collection consisted of a great many species of *Hippeastrum* such as *H. rutilum, H. aulicum, H. psittacinum, H. reginae, H. equestre, H. leopoldi, H. pardinum, H. reticulatum, H. solandriflorum* and *H. vittatum.* Owing to the different latitudes, altitudes and situations in which these species grow there is quite a difference as to their cultural requirements. With the exception of *H. rutilum, H. aulicum, H. solandriflorum* and *H. equestre,* our conditions were not suitable. In a few years the other species were lost. In the meantime, however, the writer succeeded in using them as the foundation for his hybrids. His collection at the present time is not as representative as formerly, owing to lack of space. As with other collectors, his trouble probably arises from always adding new subjects.

Hybrid *Hippeastrums* require small pots. If they are pot bound they are almost sure to bloom. Be sure to have the drainage perfect for this is essential to the health of the bulb. Do not disturb the roots any more than is necessary. In repot-

ting use one size larger pot and a compost of sod soil, some sand and a good portion of rotted cow manure. The potted plants should be plunged in the soil in a semi-shaded place. The leaves are formed in the spring and continue to grow more or less throughout the summer. It is absolutely necessary that the growth be as thriving as possible in order to obtain flowers in the spring. In fall the plants should be taken indoors and rested. Early in the spring, if the summer growth has been good, the flower bud appears, sometimes before the leaves and sometimes with the leaves. In the crossing of species, the hybrid *Hippeastrum* has, in many cases, become almost leafless and it is rather difficult to know which to dry off and which to keep evergreen. Those which have a tendency to remain evergreen should be given water sparingly during their resting period, just enough to keep the leaves from drooping. All *Hippeastrums* should receive a fair amount of water during their growing period. Be careful to apply the water directly to the soil. A disease called "Red-rust," easily recognized by red streaks and spots on the leaves, is often caused by wetting the center of the leaves. Toward fall, when growth has been completed, less water should be given. After the leaves have turned yellow, the bulbs should be stored in a dry place at a temperature of about 50 degrees Fahrenheit, care being taken not to disturb the roots. This applies to varieties that have a tendency to dry off.

In large collections, thrips and mealy bugs sometimes prove very troublesome. Spraying with a tobacco solution (Black Leaf 40) or fumigating, will control thrips. Mealy bugs are rather hard to exterminate. A solution of equal parts of water and denatured alcohol, applied with a long brush, directly on the pests is about as effective as anything. They have a way of protecting themselves with a cottony web and spraying with tobacco has no effect on them. Liquid manure, about every two weeks, is beneficial to growth.

The narrow leaved, small flowered sections of *Hippeastrums* such as *H. advenum* and *H. roseum* are hardy in my garden, with protection. They multiply rapidly and are very effective in large clumps. This section blooms in the fall and then makes leaf growth. In the spring, after protection has been removed, they make another leaf growth. Then they die down in August, before flowering.

Next in importance are the *Crinums*, of which the writer's collection is very extensive. *C. amabile, C. pedunculatum, C. asiaticum,* and *C. giganteum* must be kept evergreen in the conservatory after blooming during the winter. *Crinum americanum* is hard to manage in pots. It multiplies by means of underground runners or stolons forming near the bulbs but often two or more feet from the parent bulbs. This method of propagation and conditions under which they grow in their native habitat is probably the cause of my failure with them.

Crinum longiflorum, both pink and white, are hardy in St. Louis. One should protect them with ashes. *Crinum powellii* and its varieties are also hardy. *Crinum scabrum* and *C. zeylanicum* must be dried off in the fall with just enough water to keep them plump in a warm atmosphere, about 60 degrees Fahrenheit. *Crinum yemense* and *C.. abyssinicum* can be dried off entirely. The writer has used these two extensively in hybridising. *Crinum moorei* is one of the most satisfactory *Crinums* to grow. Use good sized pots with a soil mixture of two thirds rotted sod soil and one third cow manure. They can be rested in their pots and kept perfectly dry. Such *Crinums* as *C. pratense, C. lineare* and *C. kirkii* require pot culture and must be kept evergreen in winter.

This does not constitute the extent of the *Crinum* collection. A great many of the writer's own hybrids, some from other hybridizers, and also quite a few rare species, make the collection a very representative one. Sometime the writer hopes to discuss *Crinums* more fully. His notes, covering a period of over twenty five years, are very interesting and include entries on various phases of culture, habitat, date of introduction, successes and failures, hybrids raised and their parentage.

Next in importance in the collection are *Hymenocallis,* commonly called Spider or Spirit Lilies. This class of plants lends itself readily to culture. *Hymenocallis calathina, H. amancaes, H. concinna, H. harrisiana* and a number of hybrids, are easily grown. Planting out after danger of frost, encouraging their growth in summer, ripening them off in the fall and keeping them dry throughout the winter, will insure plenty of flowers in the summer. *Hymenocallis caribaea, H. littoralis* and *H. macrostephana* must be grown in pots and kept evergreen throughout the winter. The latter is one of the most beautiful of the species. The writer also has quite a few raised from seed obtained from a collector in Mexico. He hopes someday to be able to identify them.

Zephyranthes, or Wind Flowers, are charming. The flowers of most species are small and a large number in a pot in full bloom is a sight never-to-be-forgotten. The only species successfully grown in beds and dried off in fall is *Zephyranthes carinata.* The other *Zephyranthes,* such as *Z. candida, Z. rosea, Z. atamasco, Z. treatiae, and Z. texana,* must be grown in pots and kept in a growing condition throughout the winter. At one time *Z. erubescens, Z. verecunda, Z. lindleyana* and *Z. longifolia,* were grown by the writer but at present these interesting species are not members of his collection, but he hopes someday to acquire them again.

The *Pancratiums, such as P. illyricum* and *P. maritimum* are hardy here with protection. *Pancratium canariense, P. parviflorum, P. zeylanicum* and *P. sickenbergii* were rather hard to manage. They did not survive under St. Louis conditions.

Amaryllis belladonna and its varieties can be grown at the foot of a south wall or in cold frames where frost can be excluded. When planted in the open, fall rains induce leaf growth and later, the leaves are damaged by a freeze. In frames, weather conditions can be regulated so as to promote an uninterrupted growth of foliage during the winter months. This is an essential in bringing this bulb into flower. The flower scape appears in September before the leaves.

Vallota purpurea, Scarborough Lily, is an excellent plant for pot culture. The foliage is evergreen and the plant must be wintered in a frost free, well ventilated place. It resents repotting. Allow offsets to remain until you have a pot full of bulbs. The writer has had as many as eight scapes of blooms from one pot, which presented a wonderful sight.

Sprekelia formosissima, Jacobean Lily, a native of Mexico, is an old garden favorite, interesting and worth growing. Flowers are brilliant crimson, attractive and oddly formed. Plant the bulbs in the open in the spring and encourage growth during the summer. In the fall, after the foliage has ripened, dig and store them in a cool, dry place. They can be kept perfectly dry during their resting period.

Chlidanthus fragrans from the Andes of Peru, produces pretty yellow flowers. However, the bulbs increase so rapidly by splitting and offsets that it is difficult to keep them of a size to flower. Their constitution is very much like that of the tender narcissi. The bulbs should be planted in the garden in fertile loam in summer and at the approach of winter should be taken up without disturbing the roots, placed in dry sandy soil and kept in a dry situation in a temperature of about 60 degrees Fahrenheit.

Lycoris squamigera, from Japan, puts forth leaves in early spring, matures in June and blooms in August without leaves. The flower scape appears suddenly and in a few days attains a height of from two to two and a half feet. The flowers are rose lilac in color, fragrant and four to seven in an umbel. A large clump of this species in bloom is a wonderful sight. It is absolutely necessary that the leaf growth should be perfect or there will not be any flowers in August. They require at least two years to become established. The shock of transplanting and the lack of roots on the bulb tends to weaken the growth the first year. *Lycoris aurea, L. sanguinea* and *L. radiata* are tender here. At present they are missing in the collection.

The *Clivias,* from South Africa, make excellent house plants. The foliage is attractive and evergreen. The showy, red-yellow flowers are borne in umbels. The plants require considerable water when growing but during their resting period they should be kept in a temperature of about 50 degrees F. and receive just enough water to keep the leaves in health. *Clivia miniata, C. nobilis, C. cyrtanthiflorum (C. miniata* x *C. nobilis)* are the best and most easily managed and *C. speciosa, C. gardneri,* and *C. lindeni* are rather difficult to grow.

COMMERCIAL PRODUCTION OF AMARYLLIS IN FLORIDA

I. W. Heaton, *Florida*

After four years effort in raising 10 Acres of Hybrid Amaryllis we feel we have mastered the cultural problems in regard to types of soil, cultivation methods and fertilizing. We will briefly cover the salient points which we have discovered to be essential:

Seed

The first problem is good seed. It is difficult to purchase good seed in the United States, a broad statement, but from a commercial standpoint, a true one for the commercial Amaryllis is a hybrid, a combination of several species which have different inherent characteristics. The selection of seed stock is of the utmost importance. In our seed bed are no bulbs which did not reach the size of 3 inches in 2 years from seed. This we will call rate of growth, or vitality and which we rank as of first importance.

Large bulbs in a short time is our aim for the market is each year demanding larger sizes. A point in which they are mistaken. An old 2½" bulb will produce as much bloom as a 5" bulb, but the buyers will pay more for large sizes, so we must breed them.

Type of Bloom

Our experience shows us plainly that the large open face, well formed *Leopoldi* type is generally desired. The shape must be perfect, texture velvety and the color clean and true to base of throat. Extremely large size is not essential, 7 to 9 inches across the face of the bloom is enough. The lower petal must be as wide as the others—making a perfect triangle at the intersection of each set of three petals. The bulb must have produced at least 3 offshoots in the 2 years, showing the ability to form eyes for vegetative propagation.

Seed from bulbs fulfilling this description are difficult to obtain. Our seed stock is grown in a half shade slat house. We find the production of seed to increase nearly 50 per cent under shade, also less damage from natural causes to seed stock bloom.

Seed Beds

For two years we used standard celery seed beds, 1000 seed to 8 feet of bed, planted in rows 6 inches apart. Even when treated with standard formaldehyde solution the red root fungus caused enormous damage,—56,000 seedlings one year. There is no chemical cure for this fungus. After two years' experimenting, using every known method, we accidentally discovered a simple preventative. Changing our entire methods, we adopted the florist 20x30x4 inch cypress flat painted with crank-case oil. In this flat we use a soil mixture of rotted oak leaves, German peat, and local muck, screened and steam sterilized. The soil is then tested for acidity and enough hardwood ashes added to bring the pH reading to 6.80. No fertilizer is used before planting. Twenty rows of fifty seed are planted in each flat. The soil is covered with muslin, with a piece of glass fitting closely over the top. With this covering and the soil moist no additional water is required until the seedlings are up. The glass and muslin are removed as soon as the seedlings break through the soil—about 7 to 9 days in Florida. When 30 days old the first fertilizer is added. Three table spoonsful of calcium nitrate to 5 gallons of water is applied with a sprinkling can and washed in. Five gallons will suffice for 10 flats. The calcium will offset any carbonic acid formed since planting, and the nitrate gives the plants the needed push. A week later this is followed with an application of Nitro Phoska No. 3, a teaspoon to each flat, and this is continued every 10 days. No nitrate of soda or any organic fertilizer is used.

If planted in May and early June, by February the seedlings are ready for the field. They then will be ½ to ¾ inches in bulb diameter with leaves 10 to 14 inches long.

The land we use is flat-woods with the hard pan within two feet of the top of the soil but is well drained by tiling. The pH of the soil should be near 6.80. The seedlings are planted in rows two feet apart and 8 inches in the row.

As soon as growth starts a fertilizer mixture is added at the rate of 500 pounds per acre:

50 lbs. Calcium Nitrate
100 lbs. 10 percent tankage
50 lbs. Goat manure
50 lbs. Castor Pomace
200 lbs. 18 percent Phosphoric Acid
50 lbs. Sulphate of Potash.

We use no Sulphate of Ammonia on Amaryllis.

The more plowing with hand tools that is given, the better. The soil should be worked to the bulb rows. The bulbs are fertilized again in March and a drill of *Crotalaria* is planted between each row. Plowing is continued until July when the first cutting of *Crotalaria* is made. The *Crotalaria* is cut to one foot of the ground, and the cuttings are allowed to remain as a mulch. This early cutting makes some of the cover crop available quickly, at the same time mulching the soil and reducing the soil temperature. In September the *Crotalaria* is cut again and fertilizer is applied. In November the *Crotalaria* is pulled out and piled in rows between every fourth or fifth row of bulbs. At this time fertilizer is again applied and the ground cultivated. By January the *Crotalaria* stalks are chopped up with a hoe and scattered back over the field, where several cultivations will turn them under ground.

The more cultivation that is given between November and June the better for this will induce increased growth of the bulbs. The last fertilizer application is made in May and *Crotalaria* is again planted. Under this system of culture fifty percent of your bulbs should reach 2½ inches in diameter and up by November in the second year. An application of 1000 pounds of hardwood ashes after the summer rains will be found very beneficial.

AMARYLLEAE CULTURE IN EAST FLORIDA

Mrs. Edith Fletcher Churchwell, *Florida*

The various species of the Amaryllis family comprise some of the most valuable possessions of our gardens in East Florida. Almost every month of the year we can have blossoms from some member of this family. There are so few true lilies that we can grow successfully, and we turn to this group which is closely allied to the lilies. We find that they thrive much better in our climate and soil, and flower very freely.

The *Hippeastrum* group includes the *H. equestre* or Orange Amaryllis; *Johnsoni* (Johnson, 1810) and the many large flowered hybrids, which have a wonderful range of color. *Johnsoni* grows especially well with us and is usually blooming at Easter time. The hybrids commence to bloom in March and continue for a month or so. I fertilize my *Hippeastrums* immediately after blooming with a balanced bulb fertilizer. In the autumn I mulch them with half-rotted leaves, cow manure, bone meal and wood ashes. After the buds are about two inches high, I give them a top dressing of bulb fertilizer. If they are to be moved, or offsets removed, I do this in October. When grown in pots, I also repot or renew soil at this time. Care must be taken, not to keep soil wet when first transplanted, as it causes the bulbs to rot. They like a sandy soil containing leaf mold and are gross feeders.

The Eucharist Lilies, *Eucharis grandiflora*, are mostly grown in pots in our section, however, I have a friend, Mrs. A. C. Knight, who has them naturalized at her doorway and at Christmas they present a beautiful sight. Gardeners here have not been very successful in growing *Amaryllis belladonna.*

The *Crinums* thrive wonderfully with us. I have many varieties. My favorite is the *Crinum longifolium album.* Its glaucous green foliage and pure white flowers are very lovely and it is our earliest bloomer among the *Crinums.* They are always in bloom at Easter, when our real Easter Lilies fail us. Another interesting *Crinum* is one which presents a gorgeous spectacle in June. This one is shaped like a tulip, pure white with black stamens, several blossoms clustered on one stem. It has a vanilla like fragrance and the blossoms are very fragile. It is known locally as the "Christopher Lily". It was introduced into Jacksonville many years ago by the Christopher family, and is said to be a South American bulb. It has to be established to bloom and doesn't like have its roots disturbed.

The *Zephyranthes,* or "Flowers of the West Wind," have a dainty and fragile beauty. They are also known as Fairy or Rain Lilies since the buds shove up suddenly in large numbers following rains. They are especially adapted for border planting or in edges of shrubbery borders and in the rock garden. They make the best effect when planted in masses. We have the native *Zephyranthes treatiae* growing in our flat woods and they appear in large numbers in the early Spring.

They have been transplanted successfully to our gardens. *Zephyranthes candida* is most commonly seen and blooms in October. It looks like the *Crocus*.

I have a white Zephyranthes with miniature flowers—even smaller than the *Z. rosea*—also a large flowered white, tinged lavender on outside. It is a sturdy grower, and seeds abundantly. These two varieties were sent by Dr. Small of the New York Botanical Gardens to Mrs. Didell of Jacksonville. Of the pink flowered sorts, *Zephyranthes rosea* is my favorite. Though small, its flowers are a bright vivid pink and when massed make a striking effect. These bloom in early August. *Zephyranthes carinata*, the largest flowered pink, comes into bloom in May and blooms intermittently all through summer. I have never known this variety to produce seed.

In September and early October, our garden beauty is enhanced by the *Nerines* and *Lycoris aurea*. *Nerine sarniensis* is the commonest variety. It is best to let bulbs remain undisturbed for years, in fact, until they are crowded. Immediately after flowering they should be fed, as the bloom for next year depends upon foliage development and ripening of bulbs. If they are to be transplanted, do so when foliage begins to die down. I have several hybrid *Nerines*, shading from dark red, vivid crimson, scarlet pink, and mauve. Many have a glistening lustre which in sunlight or electric light gives the appearance of being dusted with gold or silver. The cut spikes of the *Nerines* stay fresh for a long time and are very lovely for table decoration when combined with silvery *Artemisia* or Maiden Hair fern.

LYCORIS AUREA

MRS. ELIZABETH W. MACARTHUR, *Florida*

LYCORIS AUREA

Lycoris aurea is native to the Orient. Botanically, the genus *Lycoris* is placed next to *Hippeastrum* an American genus in which the seeds are numerous in the locule and usually flat while in *Lycoris* the seed are few in a locule and turgid. Horticulturally *Lycoris* is most nearly comparable to the *Nerine*, but the seeds of *Lycoris* are black while the seeds of *Nerine* are green. There is also quite a difference in formation of blooms with their conspicuous white filaments and yellow anthers and the sword like foliage of these two genera when closely compared. However, the flowering season and manner of blooming are similar.

The sword like leaves of variable silvery, glaucous green, spring up and grow luxuriantly for a few months after the bulbs stop blooming and make a very attractive border plant for Florida winter gardens. Then the summer rains and hot dry winds sweep away all trace of this spring growth until there is no sign of plant life to be seen. It is a wise gardener that marks the exact spot of these sleeping lilies.

In Florida, *Lycoris aurea* remains dormant until September when suddenly a bloom stalk shoots up nearly two feet and magically the buds unfold into a glorious cluster of bright yellow blossoms. A large clump of *Lycoris aurea* in full bloom is a compelling sight.

The bulbs should be transplanted in late spring after foliage dies down naturally, and even so, the shock of transplanting may delay the bulb from blooming until second year. This golden Spider Lily is temperamental, therefore, don't be discouraged should the bulb refuse to bloom the first year. You will rejoice in a finer bloom and an increase in bulbs the second year. *Lycoris* seems to be happier if let alone until clumps grow large enough to make division necessary.

Lycoris aurea does not produce fertile seeds abundantly. When they do set seeds, the flower scapes may be bent over into soil and the seeds will produce bulb-

lets without further effort on the part of the gardener, or the seeds may be sown in pots and the seedlings repotted as soon as they are large enough. Care should be taken to provide protection against grasshoppers and the inquisitiveness of squirrels.

Lycoris seem to be free from attacks of insects generally, however, they are very much enjoyed by lubber grasshoppers who may gnaw down many bud stalks during the night and early morning.

Lycoris aurea has been cultivated in American gardens for many years with increasing enthusiasm. Just when and how it was brought to St. Augustine, Florida, seems to be shrouded in mystery, but certainly the enchantment of four centuries of impressive historical background have endowed St. Augustine with an inheritance of age and charm unrivaled by any other city in America and make it a proper setting for this highly esteemed Golden Lily of the Orient. It is greatly cherished by the people of St. Augustine along with other plant treasures. The Spanish tradition and influence of beauty and romance still linger within the quaint, lovely walled-in gardens filled with rare plants and bulbs.

The old coquina houses with their beautiful arched doorways, the enclosed patios, bubbling fountains and long narrow streets continue to delight and interest beauty loving people from the four corners of the world.

St. Augustine seems to be the location of the first introduction of *Lycoris aurea* in Florida and has more of these rare bulbs than any other section of the state but how and when it was imported to St. Augustine remains unsolved at this writing.

In search of reliable information relative to *Lycoris aurea* in St. Augustine, Mrs. F. W. Kirkland, No. 7 Carrera Street, was interviewed by the writer. Mrs. Kirkland purchased her present home twenty-five years ago from the Flagler Hotel Properties, Inc., and after living in this home some time, Mrs. Kirkland discovered a great many *Lycoris aurea* bulbs blooming under the house. The botanical name she did not know at the time. Mrs. Kirkland gave freely of these lovely golden lilies to her friends and noted that they seemed to flourish in shade and that they procured their own sustenance from air and the shell-impregnated sandy soil.

The Flagler Hotel Properties, Inc., employed an expert horticulturist, the late Mr. Richard Dale of Cleveland, Ohio, to landscape the grounds of the Ponce de Leon Hotel, one of the most beautiful structures of its kind in the world, and it is supposed that Mr. Dale with his knowledge and love of rare bulbs and plants was responsible for these choice bulbs being brought to St. Augustine and this seems to be a plausible conclusion.

Fine old clumps of *Lycoris aurea* are growing in the charming walled-in garden of the oldest house on St. Francis Street.

Many natives of St. Augustine call these lilies the HURRICANE LILIES and just as the Seminole Indian heed the warning that the saw-grass (*Claudium effusum*) bloom foretells them of approaching storms, they, too, have faith in the gift of prophecy, these mystery lilies seem to hold in their hearts of gold and prepare for storms—no blooms means St. Augustine will be free from storms, if there are many blooms St. Augustine prepares for storms—Therefore the common name the HURRICANE LILY. The people of Nassau also hold this supposition of *Lycoris aurea* and it is known by the same name there.

TENDER AND HARDY AMARYLLEAE IN KENTUCKY

Mrs. William Lyman Carter, *Kentucky*

The frost tender Amarylleae in my plant collection are grown either in pots the year around or are planted like gladioli outdoors in summer and dug up and stored in a frost proof place in winter.

Several years ago when I began cultural experiments with the half hardy and hardy members of the Amarylleae, I was reminded of the warning received from the Editor of the Old Garden Magazine about 1917,—"I do not think you will be successful in growing the Munstead Wood strain of primroses developed by Miss Jekyll in your capricious, unconquerable climate". Mr. Barron was referring to the sudden freezing, quickly rising of temperature, all within a few days, even hours, that we in Kentucky are subjected to.

The experiments with both the hardy Amarylleae and primroses, I am glad to report, have been successful to a marked degree. The cultural requirements for the Amarylleae are different than those of the hardy, semi-shade loving primroses, but both are definitely established in my garden. The half hardy, summer-flowering Amarylleae need deep planting, a winter mounding of soil and good drainage. Our limestone soil is to their liking and the climatic conditions, in the Blue Grass Section of Kentucky, are conducive to their general health and profuse flower development.

AMARYLLIS BELLADONNA

TENDER AMARYLLEAE

Amaryllis belladonna. I planted my first bulb of *A. belladonna* one January of long ago in an ordinary six inch clay flower pot which was kept in a sunny window in the parlor, heated with an open grate fire. Today I grow them in a window of the living-room, where the temperature ranges from 60 to 70 degrees F. during the winter.

The first week in May the pots are sunken in a flower bed outdoors. These are lifted the latter part of September and set on a bench in full sun in the flower garden. Water is gradually with-held and the foliage begins to dry and bulbs enter the dormant state. In the latter part of October the pots are put on a shelf in the cellar vegetable room with two windows to give light and air, and a closed door to keep out the heat from the furnace room. The temperature ranges from 38 to 40 degrees F. when it is zero outside, and around 48 to 58 degrees F. at other times during the winter storage period from November to the middle of February.

A Christmas gift of one copious watering is given, and no further attention is bestowed until the middle of February when some of the top soil is removed and replaced with fresh. The pots are then brought to the living room and are well watered. Soon growth begins, and by March flower stalks push through the soil, and soon we enjoy superb, glowing blossoms of Belladonna Lily.

Amaryllis (Hippeastrum). I grow only the hybrid *Johnsoni* (Johnson, 1810). It is planted in the garden in full sunshine and is stored through the winter like gladioli and other tender summer flowering bulbs in boxes of equal parts of sand and dry loam.

Hymenocallis calathina. Last spring I experimented in an attempt to extend the flowering season of *H. calathina.* Five plantings were made at intervals of about two weeks from the first week in May to the end of June. All bulbs except the last planting flowered normally.

Zephyranthes—In pots I grow six species of *Zephyranthes* the year round,—*Z. atamasco, Z. treatiae, Z. rosea, Z. texana, Z. candida* and the hybrid variety, *Ajax.* The bulbs are rested during the winter months in the cellar, and the pots containing them are sunken in the rock garden during the summer. This procedure I find better than planting in the open and treating them like gladioli. The potting soil should consist of two parts loam, one part well rotted cow manure and one part sand and a generous sprinkling of charcoal. I have recently received *Z. robusta,* which for the present is treated like a summer flowering bulb of the gladiolus type.

HYMENOCALLIS CALATHINA

HARDY AMARYLLEAE

Crinum. At present I grow only the hybrids *Powellii Alba* and *Powellii Rosea,* which are outstanding not only for their beauty but for hardiness as well. I discarded *Crinum longifolium* some time ago to make room for another plant. However this was a poor exchange and I hope to restore the former to its place of honor.

Zephyranthes and Cooperia. I grow only one species of hardy *Zephyranthes* in the rock garden, *Z. carinata.* This has proven hardy for the past three years. A 25 foot border of this species has also flourished in a Lexington garden for the same period with only a protection of leaves in the winter. This species blooms more profusely over a longer period of time when planted in the open than in pot culture. The increase in offsets is beyond expectation.

A twenty-seven years quest for the Texas Rain Lily, *Cooperia drummondii* and *C. pedunculata,* was ended last year when I secured these species from Mr. Ramsey of Austin, Texas. Was I happy? Everyone who collects plants knows the answer.

Hymenocallis. Only two species of this Genus are known to be hardy here. An old garden in Grayson County has a Spider Lily bed planted forty years ago. A garden enthusiast in Lexington reports that he collected a *Hymenocallis* species in Western Kentucky which he now has overwintered for three years.

This season I am experimenting with *Hymenocallis caribaea.* Two bulbs are reposing under five inches of soil in the garden with another five inches of soil mounded over them for winter protection. What has spring in store for me?

Lycoris. Three species of *Lycoris, L. squagmigera,* with lavender flowers, *L. purpurea* and *L. aurea,* have proven hardy in a garden twelve miles north of here.

STERNBERGIA LUTEA

Sternbergia. The yellow crocus-like blossoms of *S. lutea* appear in October, each bulb sending up several flowers. These have greater substance than crocus and last longer.

Galanthus. The giant snowdrop, *G. elwesii* in my opinion surpasses *G. nivalis.* They cheerfully announce spring by blooming the latter part of February in my garden.

Leucojum. The Spring Snowflake, *L. vernum,* has always been in my garden. It was transplanted from grandmother's to mother's and from her's to my garden forty years ago. About five seasons ago I planted some in the rock garden. They follow the Snowdrops, and are in the lead of a great ever changing promenade of blossoms which gladden the whole growing season in my flower garden.

ZEPHYRANTHES LONGIFOLIA

REX D. PEARCE, *New Jersey*

Zephyranthes longifolia comes from semi-arid regions of Arizona, New Mexico, and Texas and favors rather dry calcarious soils. The bulb is rather large for a *Zephyranthes* and ripens off completely and stores well. Seed germinates freely and quickly. However, the flowers, pale primrose in color, are rather small and fugitive, and it is likely the species will arouse more of a botanical than a horticultural interest, unless it should prove of value in breeding.

EUCHARIS AND CLIVIA CULTURE IN FLORIDA

WYNDHAM HAYWARD, *Florida*

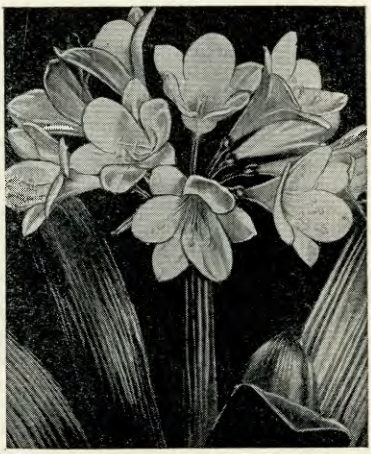
Eucharis is the pot plant par excellence for the porch or the shady patio in Florida. The only species ordinarily seen in the state is *Eucharis grandiflora,* Planch., commonly known as the Amazon Lily, a native of Colombia, South America.

The bulbs are grown in pots or tubs of rich soil and are allowed to become pot-bound, as in this condition they flower more profusely. As this is written, in January, *Eucharis* are to be seen blooming on hundreds of steps and front porches throughout every city in peninsular Florida.

The bulbs propagate slowly by offsets and the clumps may be broken up and repotted every few years when they begin to crowd the container. The flower is crystal white, star-like, and borne on stems one to two feet long, with several blossoms to the umbel. They have a pleasant perfume, and somewhat resemble a giant narcissus in appearance.

The bulbs need good drainage in the pots, and should have an abundance of water during the growing season. The foliage is rich dark green in thrifty plants and altogether decorative, with broad oval leaves narrowing to a short, stocky petiole. Experiments are being made to try the possibility of naturalizing *Eucharis* in good soil.

EUCHARIS GRANDIFLORA



CLIVIA MINIATA

Clivia miniata, Regel, listed in some catalogues under the old generic name of *Imantophyllum,* is another aristocratic plant of the Amaryllis family, requiring similar treatment to that accorded *Eucharis.* It is not strictly speaking, a bulb, but has a bulb-like base from which spring the dark-green strap-like leaves, which closely resemble those of *Hippeastrum,* except that they are smaller, stiffer and darker in color. The plant has abundant thick white roots, and requires to be potted in rich soil with good drainage.

As in *Eucharis,* the best blooms are produced by pot-bound plants established for two or more years. It takes a year or so, for a *Clivia* to become well established after repotting. The plant is increased by planting seed and divisions, after over-crowding in the pot is apparent. In the latter case the plant is removed from the pot, the earth washed from the roots, and the divisions separated and repotted.

A clump of *Clivia* with several bloom stalks appearing at the same time is an imposing sight. The flowers are borne in clusters, at the end of a stalk, and are like a small amaryllis, and the color is red-yellow.

NOTES ON AMARYLLEAE CULTURE IN TENNESSEE

HUBERT F. FISHER, *Tennessee.*

Many of the bulbous plants included under Amarylleae are freely used in the flower gardens of Tennessee. Those most commonly used both as house plants and in gardens are *Hippeastrums* and *Amaryllis belladonna.* When grown outdoors they are usually given for the winter months a cover of leaves and soil, or soil alone, for we sometimes have zero weather.

In planting these bulbs the holes are dug 14 to 18 inches deep and these are filled with a mixture of rich earth, bone meal and coarse sand. The bulbs are then mulched with rotted manure. The best method is to plant so that the neck of the bulb will be even with the surface of the soil. Many of the new hybrid amaryllis with their enormous highly colored blooms grow out doors if given careful protection.

About six varieties of *Crinum* are grown to a considerable extent. They are given much the same culture as amaryllis. In several towns in this section there is a most liberal use of *Crinums.* In gardens frequently they are seen in the sidewalk strips.

Two different types of *Hymenocallis* are native in this section. They grow easily in gardens.

Zephyranthes,—the large pink, *Z. carinata;* white, *Z. atamasco,* and *Z. candida,* are popular bulbs. They are planted about two inches deep and it is best to give them a covering of rotted manure and oak leaves for the winter. The large pink, *Z. carinata,* is the most desirable. It is used in pots, boxes and small tubs where it soon is crowded and then blooms best. It seems to like a slightly acid or neutral soil.

Nerine Sarniensis, Guernsey Lily, is seen in many gardens and in some in great numbers. They refuse to bloom well for gardeners who plant them too deeply or separate them nearly every year. Fertilizer is given them, either bone meal or rotted manure, when the leaves begin to sprout.

A favorite bulb is *Lycoris squamigera,* sometimes called Hall's Amaryllis and Magic Lily. *Lycoris,* like *Amaryllis belladonna, Nerines* and other similar bulbs bloom before foliage appears which makes necessary a precaution to protect them prior to the blooming season. There are four or five varieties of *Lycoris* but I have grown only *L. squamigera, L. aurea* and *L. radiata.* The bulbs should be planted like amaryllis, but fertilized like *Nerines* when the leaves appear. It is more certain to have blooms if the bulbs are planted shallow. In colder climates it may be necessary to plant the bulbs four inches deep. *Lycoris squamigera* is hardy over a wide section of our country into northern Ohio and New England. With no foliage in evidence, in July or early August, *L. squamigera* sprouts a long sword like scape 2½ to 3 feet with most unusual rapidity. There are frequently six to ten flowers of a beautiful light lavender tinted pink. In a nursery bulletin from England the blooms are described as a bright blue, light purple and bright pink. An interesting story about the growing of both *L. squamigera* and *L. aurea* in a cold climate is found in the *National Horticultural Magazine* for July, 1929. In the same magazine for July 1933, there is a beautiful picture of *L. squamigera* and a recommendation as to deep planting given by a distinguished Horticulturist.

Lycoris aurea is given the same culture as *L. squamigera* but its leaves appear just after it has flowered in the fall and unless protected, cold badly injures the foliage. If planted in a cold frame the foliage can mature and the bulbs are more certain to bloom. The blooms are of an unusual shade of golden yellow with a reddish tinge.

Even though Tennessee has severe weather at times, the Amarylleae are well represented in our gardens, adding greatly to their beauty, color and fragrance at intervals from April to October.

ZEPHYRANTHES CULTURE IN LOUISIANA

JAMES L. GEBERT, *Louisiana*

ZEPHYRANTHES CARINATA

Among the most interesting and beautiful members of the Amaryllis Family are the *Zephyranthes*. In different localities they are known under various names,—Zephyr Lily, Autumn Crocus, Fairy Lily, Fire Lily and Rain Lily. In the lower South these charming plants are often seen. They seem to be able to stand up better under abuse and neglect than any of the other Amarylleae. Neither heat, drought, excessive moisture nor poor soil apparently affect them very much. They will stand more abuse than most bulbous plants and at the same time give the greatest reward for care and attention.

Zephyranthes are natives of the tropics and subtropics. The range extends from the Argentine into the southern part of the United States. In Texas there are a number of native species and Florida has the Atamasco Lily, *Zephyranthes atamasco* and *Z. treatiae*. The Genus *Cooperia* is so closely related to the *Zephyranthes* that crosses between species from the two have been made. It has been suggested by Worsley (1913, 1928) that these two Genera should be merged into one. In Texas the writer has seen *Cooperia drummondii* growing so abundantly that he could not put a foot down without crushing the dainty, perfumed flowers. The members of most species will lose their leaves during the dry season but with the first rains blooms will appear in such a short period that they come as a surprise, hence the name, Fairy Lily.

These bulbous plants are very easily raised as they can be propagated either from divisions or seeds. They may be transplanted at any season of the year and clumps of some of the species should be divided every year or so. When grown from seed they will bloom in about a year. The seed, however, should be planted as soon as mature for viability is very quickly lost. In sowing seed use a light porous soil, in boxes or pots with good drainage for the young seedlings cannot stand as much moisture as the mature plants. Transplant the seedlings into the open ground when they have three or four leaves. Some of the species, such as *Zephyranthes texana* multiply very slowly from offsets, but are very easily raised from seed, which is produced in abundance. *Zephyranthes candida*, the common white evergreen species, multiplies so rapidly from the mother bulbs that the clumps should be divided very often, in fact every year for the best results.

Zephyranthes should be planted close together so that they will make a mass of color and bloom. They are especially lovely in large groups of one kind in the rock garden. They should be planted among large plants for they will soon be lost. Planted by themselves they thrive and show off their delicate beauty to the best advantage. *Zephyranthes* can be planted either in sun or half shade. They bloom usually after a rain. During the dry season they remain dormant and lose their foliage in some cases. The common white species, *Z. candida*, is often used as a border plant. The leaves are evergreen and look well at all seasons.

The following are most generally met with and are considered by the writer the pick of all he has had any experience with. All of these are easily handled either in the open or indoors in pots or window boxes. The classification under Sub-genera is according to Baker, 1888. *Cooperia* is tentatively treated as a "Sub-genus" following the suggestion by Worsley (1913, 1928).

SUBGENUS ZEPHYRANTHES PROPER. Flower erect; tube short. Stamens inserted near its throat.

[This section includes 18 species of which the following five are considered.]

Z. atamasco. A native of southeastern United States, especially Florida. It has a large, white flower and blooms in the early spring, occasionally also during mild winters. There are several varieties, differing in blooming season, color and also in the width of foliage.

Z. carinata. Flat, pink blossoms at various times through the spring and summer. One of the species which is most generally cultivated. It does not produce seed but multiplies rapidly from offsets. Very hardy. Native of Mexico.

Z. rosea. A small, rose colored species with crocus-shaped blossoms. It is a native of Cuba. With the writer in Southern Louisiana it is not as hardy as some of the others. A good seeder and multiplier by offsets.

Z. texana. A native of Texas and the western part of Louisiana. It is very hard to find in Louisiana because it grows in the tall grass. In parts of Texas, Brazos County, it is very abundant and easily found. The flowers are yellow on the inside and copper colored on the outside. It produces seed in abundance which are smaller than those of the other species mentioned.

Z. candida. This is the most widely known species. It is white in color and the blossoms appear in the late summer and fall. It has round, rush-like foliage which is evergreen. I find this species a poor seeder but a good multiplier by offsets. It is native to the Argentine.

SUBGENUS ZEPHYRITES (Herb.) Flowers slightly inclined; tube short. Stamens inserted near its throat. Style more declinate than in the two other Subgenera.

[This section includes eleven species, one of which is here considered. **Z. caerulea,** a pale blue flowered species from the Argentine, belongs in this section. this is being imported by the American Amaryllis Society.]

Z. robusta. Native of Buenos Aires. In color it is reminiscent of the orchid. The writer has two types of this species differing in the depth of the pink color. The deeper colored form is more vigorous and produces larger flowers. This species is a persistent bloomer and has promise as a cut flower since blooms have been kept in a living room for three days in good condition. It increases rapidly from seeds and offsets, and is very hardy.

SUBGENUS PYROLIRION (Herb.) Flowers erect; tube longer, dilated in upper half. Stamens inserted at middle of the perianth tube.

[This section includes five species, one of which is here considered.]

Z. aurea. Golden yellow in color. A slow multiplier by offsets. It produces seed, however, in abundance. Native of Peru.

"SUBGENUS COOPERIA" (Worsley); Flower tube relatively long; anthers erect as contrasted with tube shorter; anthers dorsified, versatile in the preceding three subgenera.

[This section includes two species, both of which are here considered.]

"C. drummondii"; a native of Texas, New Mexico, and North Mexico. Very tall blossoming stem but the flower is not as large as *C. pedunculata.* It seems to be a late summer and fall bloomer following the rains that come after the summer drought. Alternate drying and wetting usually results in flowers anytime from early June to first fall frosts.

"C. pedunculata". A native of Texas and Western Louisiana. Very fragrant, solitary, white flowers about two inches across. Flowers open only in the late evening and the next day or so, depending on the weather, they turn gradually to

a pinkish color. Blooms after rains and is sometimes called Rain Lily for that reason. Plant multiplies very rapidly from seed and bulbs.

HYBRID ZEPHYRANTHES

Ajax (....., 18....) This is a cross between *Z. aurea* and *Z. candida,* and the writer considers it the finest of the whole group. It has round, rush-like foliage and straw colored blossoms. A very free bloomer and rapid multiplier.

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CRINUMS IN THE SOUTHEAST

WYNDHAM HAYWARD, *Florida*

HYBRID CRINUM—CECIL HOUDYSHEL

The Crinum Lily, in its many species and varieties, is one of the most popular ornamental bulbous plants of the Amaryllis family found in dooryards over the Southeastern states, particularly the lower South, along the Gulf Coast and in Peninsular Florida. Most *Crinums* are not paricularly hardy, although *C. longifolium* is reputed to be able to withstand the cold as far north as Washington, D. C.

The bulbs, many of which are very large at maturity, are usually grown with little care or cultivation, and show a remarkable power of multiplication and survival even under the most unfavorable circumstances.

The plants are commonly known as "Milk and Wine Lilies", and sometimes may be seen in rows of hundreds around the older houses in sub-tropical regions. When well cared for, the varying types of foliage are interesting and handsome, and the flowers ranging from pure white to deep rose-purple, with many intermediate stripings and shades, are attractive and striking.

Apparently a very few species comprise the list of dooryard *Crinums*. These are usually of the less attractive species. When some of the new hybrid *Crinums* become better known, the plant will undoubtedly attain increased popularity among discriminating people. The common types may then be disregarded as too ordinary.

The common practice is to plant a *Crinum* bulb by merely digging a hole for it, in poor ground or rich, with the result that it grows and flowers, in spite of all difficulties, and produces a clump of the bulbs in a few years by the formation of offsets. When the clump begins to be crowded, the bulbs are divided and planted farther apart. With adequate fertilizer and moisture, the *Crinum* succeeds in becoming a more handsome plant than the specimens ordinarily seen.

Large clumps of some varieties may send up a number of bloom stalks at the same time, and *C. asiaticum,* for instance, under this treatment, may well be described as ever-blooming. *Crinum amabile,* with huge leaves and flower stalks, *C. longifolium,* the pink and white varieties, *C. fimbriatulum, C. giganteum, C. kirki, C. moorei, C. powellii, C. scabrum, C. virginicum, C. asiaticum and C. augustum* are among the species noted in the Southeast, and some of these are not as common as others. Among the hybrid varieties of note are *Ellen Bosanquet, Cecil Houdyshel, Peachblow, J. C. Harvey, Sophia Nehrling,* and *Mrs. Henry Nehrling.*

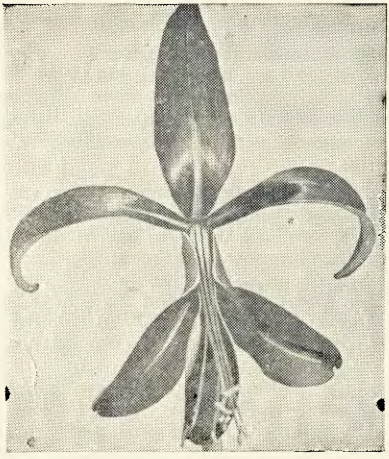
The late Henry Nehrling discusses nearly 30 kinds of *Crinums* in an article in the Standard Cyclopaedia of Horticulture, which he had at one time or another in his collection in Florida, and it is hoped that some of these may have passed to other hands and have thus been preserved. Mr. Theodore L. Mead of Oviedo also had an extensive collection of *Crinums* some years ago.

Some of the *Crinums* are popularly known as Tiger Lilies, or even Spider Lilies, in the case of *Crinum asiaticum,* which has a white flower with slender delicate petals. Most of the common Milk and Wine Lily type bloom in the warm season. A few varieties need support for their long bloom spikes to obtain best results.

One of the most chastely beautiful of the *Crinums* is native to this country, and should be in every collection of Southern plants for its simple elegance and delicate perfume. *Crinum americanum* is the only species native to the United States, and is found in marshy or swampy places along roadsides where it sends forth its white, star-like flower to delight the observant motorist. One needs a shovel to dig the bulbs, however, it may be said from sad experience, in order to get the entire plant, roots and all, out of the mud. Although found growing in wet places, it seems to adapt itself with ease to high land conditions.

THE AZTEC LILY, SPREKELIA FORMOSISSIMA

REX D. PEARCE, *New Jersey*



SPREKELIA FORMOSISSIMA

Sprekelia formosissima, known in the horticultural trade as *Amaryllis formosissima,* and officially designated, Aztec Lily, by the American Amaryllis Society, thrives very satisfactorily in the North as a summer-flowering garden bulb. Planted out as soon as the soil is warm and danger of hard freezes is past, it will begin flowering in the Philadelphia area by late May and will continue all through June, an occasional bloom being thrown even during July and August. The large velvety crimson blooms have much the form of fantastic fleur-de-lis, and grown in beds or border clumps the rich brilliance of its coloring will be appreciated. *Sprekelia* also cuts well and while I do not know that any fair trial has been made of its value for the purpose, in the way of commercial marketing, it has potentialities in this respect that are worthy of investigation.

As to cultural requirements, it is tolerant of varying soil conditions, but prefers high fertility. I have grown it successfully on drained peaty muck and on heavy clay, but it seems to prefer a medium light loam. In autumn the bulbs should be dug and the leaves removed above the neck of the bulb, but the roots left on. My own practice is to stack the crates containing the bulbs out of doors for a few days, letting the air draw through them until they are surface dried and the cut stems and broken

roots have seared. Then they are stored in a dry bulb cellar, maintained during the colder months at a temperature range of 45° to 50° F. So handled there are no storage losses.

Sprekelia naturally propagates through basal offsets. Any offsets that are well split from the parent bulb may be removed in the spring and lined out for further growth, but care should be taken not to force separation of offsets that are still closely attached.

If hand pollinated, Sprekelia will seed freely, and the seed, unlike that of Hippeastrum, retains its biability well into the second year. Sown in open ground seed beds when the weather is settled in the spring, it germinates quickly and strongly. Seedlings usually flower the third year. I have noticed some slight variation in seedlings; also mutations have appeared in stock propagated vegetatively. I have segregated a type with glaucous foliage and flowers of paler coloring, indeed almost a rose shade. Also I have segregations that show a much increased rate of offset production but seem identical in other characteristics with the regular stocks.

Sprekelia forces readily enough for early spring flowering, but one should not attempt to hurry it too much, and it is quite useless to pot the bulbs up until they have had a rest period of at least two months after digging.

The often repeated statement in books of reference that *Sprekelia* is a greenhouse bulb, or for outdoor planting in warm climates, has doubtless kept it from being more widely grown. Such statements are misleading. This bulb will thrive anywhere that Gladioli can be grown, and it may be handled and stored in very much the same manner. In growing it for more than fifteen years, under both Middle Western and Atlantic Coast climatic conditions, I have not found that it was subject to any diseases or insect pests.

CHLIDANTHUS FRAGRANS

REX D. PEARCE, *New Jersey*

CHILDANTHUS FRAGRANS

Chlidanthus fragrans, a dainty little Argentina Amaryllid with sweetly perfumed trumpet-shaped flowers of deep golden yellow, may be easily grown as a garden bulb, North or South. By late May it is producing blooms and while the flowering season extends only for two or three weeks, the blossoms are most attractive. The bulbs store well in a cool dry cellar, but start into growth early and must be planted just as soon as the ground has stopped freezing a crust in the spring. Only well grown fairly large bulbs will flower, and it needs high fertility and ample moisture. It is hard to get the soil too rich. The bulbs make offsets profusely, and these should all be taken off before replanting, otherwise one will simply have clusters of bulbs too small to bloom. When one gets the knack of handling it so that a high percentage of flowering bulbs is produced, it is an altogether likeable plant.

HIPPEASTRUM EQUESTRE

REX D. PEARCE, *New Jersey*

Hippeastrum equestre is the one *Hippeastrum* species that seems capable of flowering freely under open garden conditions in th North, and the salmon orange blossoms are rather long lasting. The bulbs are not difficult to store in winter, nor to grow, although they tend to make an excessive quantity of offsets.

BELLADONNA LILY, NERINE AND CRINUM CULTURE IN ENGLAND

THE HON. HENRY D. MCLAREN, *North Wales, Great Britain*

England is a country with a cool summer, and a substantial rainfall, and in many parts of it there is a stiffish soil which is retentive of moisture. England therefore as a whole is a bad country for the hardy *Amaryllidaceae,* which for the most part rejoice in hot sunshine and sharp drainage.

In the South and West however both the lovely Belladonna Lily, and *Nerine bowdeni,* do well, especially if planted at the foot of a South Wall; and the former is seen in many an old garden—very often growing in the border outside a greenhouse. In a very few gardens the better forms of the Belladonna Lily are grown. It is a variable plant and the one with a narrow petalled flower should be discarded in favour of that with a broad deep pink petal. There are bi-generic crosses or reputed crosses too with *Brunsvigia josephinae—"Brunsdonnas"* or *A. belladonna "parkeri"*—which are much superior to the parent; the best of them is the very scarce *A. belladonna parkeri alba*—a lovely thing recently honored with a First Class Certificate by the Royal Horticultural Society.

Nerines from South Africa are not generally fitted for outdoor culture in England. They want to grow in winter and to rest in summer, and the climate forbids this. *N. bowdeni* which starts later into growth and continues to grow in Summer is the exception and this is fairly often seen in the open. The other *Nerines* —much crossed and in shades from scarlet through pink to white—are frequently grown under glass. A cold frame will do unless the winter is very severe, but a cool house is better. They are easy to cultivate provided only that they are kept bone dry and in full sun from May to September. The late Mr. Henry Elwes was a great raiser of hybrid *Nerines* and had a fine collection, but perhaps the finest hybrids known are two named *Aurora* and *Hera* raised by a Mr. Rose near Oxford and bearing amazingly large umbels of flower. They are reputed to be hybrids of *N. bowdeni.*

Of the *Crinums*— another branch of the Family—the hardy species are very satisfactory for outdoor cultivation in England. Their foliage may be cut by winter frost, but if they are planted fairly deep they flourish in spite of it and flower freely. *Crinum* longifolium has a poor flower and is quite outclassed by the hybrid *Powelli;* especially in its white variety, *Powelli Alba,* and in the superior forms *Krelageii* and *Haarlemense.* There are of course many greenhouse and stove *Crinums*—fine things but taking much room for the quantity of flower they give, and they are only grown nowadays in a few gardens other than those devoted to botanical collections.

In one or two gardens there is grown that grand bi-generic hybrid raised by Mr. Fred Howard, of Los Angeles, California, known as *"Amarcrinum,"* the progeny of *Amaryllis belladonna* and *Crinum moorei.* It is a free growing, free flowering, hardy plant whose blooms are far ahead of those of its parents—pink with a cream coloured centre, deliciously scented, twenty or thirty to a head—an absolutely first class plant.

THE RED LEAF SPOT OR "RUST" OF AMARYLLIS

DR. FREEMAN WEISS, *Pathologist*

BUREAU OF PLANT INDUSTRY, UNITED STATES DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

The presence of red spots and streaks on Amaryllis leaves is not symptomatic of a particular disease, but represents the characteristic response of this plant to several types of injury. Among the inciting causes diverse agents such as fungi, thrips and mites are known. Fungous parasites are usually visible to the eye only when they form their reproductive bodies (various types of spore aggregations), and even the insect and related pests that may cause red spotting of Amaryllis are not conspicuous,—often can not be found in close proximity to the spots. It is not surprising that only the symptoms and not the real cause of the injury attract the

eye of the grower, and that he has erroneously supposed that he had a simple and specific condition to deal with. Because the different agents that are capable of inducing this disease are not susceptible to any one type of control, it is essential that the Amaryllis grower learn to recognize the different kinds of red spot or rust disease, and to apply the appropriate control measures accordingly.

Fungous "red spot", "red burn", or "rust"

Several kinds of fungi have been reported in different countries to cause a disease of this type in Amaryllis. In 1929 three nearly simultaneous accounts of a new Amaryllis disease were published in Germany and in Holland, which was ascribed in each instance to a differently named fungus. One of these was considered indentical with a fungus that had previously been described on a *Crinum* (Amaryllis family). At about the same time, a similar disease was reported to occur on cultivated Amaryllis in California, and the causal fungus in this case was shown to be identical with a parasitic fungus of which the earliest scientific record was a collection made on naturalized narcissus in the Carolinas nearly a century ago. Still another collection of apparently the same fungus, though again differently named, was made in Hungary in 1906. The confusion regarding the identity of these several collections has not yet been fully resolved, but it is now quite certain that the various fungi which have been associated with this disease of Amaryllis differ only in very minor details, if at all, and that the same fungus also causes a widespread, occasionally serious disease (leaf scorch) of narcissus. The proper botanical name of this fungus is *Stagonospora curtisii.* A probably identical fungus may also infect Crinum, Zephyranthes and Nerine of the Amaryllis family, and possibly Lachenalia of the lily family. Several species of Crinum and Zephyranthes are native to the southern United States ranging from Florida to Mexico. There is not sufficient evidence to show whether the fungus is also native to this region, but at any rate, it is known to occur on naturalized plants and escapes from cultivation of Narcissus and Crinum in the Southern States. The common occurrence of the fungus on naturalized plants is an important factor in control of the disease in cultivated narcissus and amaryllis.

On amaryllis plants the effects of this fungus are most familiar on the leaves and flower stems, where numerous small red or reddish brown spots appear. The spots are at first separate, and typically circular or elliptical in form, usually with an indistinct margin, and sometimes surrounded by a greenish brown halo. Later the spots increase in length, forming streaks and often coalescing. When a considerable part of the leaf surface is infected, or especially when the flower stem is attacked early in its development, the affected parts are more or less deformed and stunted and the flowers are crippled. The fruiting bodies of the fungus on amaryllis leaves are not conspicuous, and they are not formed until the leaf tissue is thoroughly invaded by the fungus and killed. These bodies consist of minute cushions of spores formed beneath the leaf epidermis and extruded through minute pores. The pustules do not have, as is the case with many leaf-spotting fungi, a color (usually black) that contrasts with the dead leaf tissue,—they are brown or reddish brown. In damp weather the spores may be seen emerging in minute tendril-like masses from inside the leaf, but these details can be satisfactorily made out only with a hand lens.

The fungus may also invade the bulb, especially the apical part of the outer scales. Rather large lesions are formed here, and the infected areas may be subsequently invaded by bulb mites which further enlarge them. Eventually the bulb may be rendered worthless for flowering, but this is not a typical effect of the fungus alone.

In the narcissus, control of the primary or bulb-borne phase of the leaf scorch disease has been accomplished by soaking the dormant bulbs in a strong disinfectant solution, e.g. in ½ per cent formalin (1 pint to 12 gallons of water) or in 1/10 per cent mercury bichloride (1 ounce to 7½ gallons of water) for at least 2 hours. It appears to be equally effective to soak the bulbs in water alone for about 2 hours, then in the respective fungicide for 30 minutes; this reduces the likelihood of any injury to root or shoot growth. Only a few experiments have been made with amaryllis bulbs, but the benefit of the formalin soak has been demonstrated in some instances, and there is no risk of serious plant injury even from treatments prolonged considerably beyond 2 hours. Control of the second phase of the disease in narcissus, that is, the spread of the fungus from plant to plant that occurs when

the leaves are wet, depends partly on the thoroughness with which bulb-borne infections are eliminated and on the absence or scarcity of naturalized plants which may serve as sources of infection. Control of this phase by spraying with bordeaux mixture (4:6:50 formula, with a resin sticker added to promote adhesion) or dusting with copper lime dust, has been shown possible, but is of doubtful practicability, because of the comparatively low value of narcissus bulbs. With amaryllis, spraying should be profitable but it must be begun with the first appearance of shoots and continued, at least during rainy weather, until leaf growth is complete.

Control

The measures by which fungus (Stagonospora) red spot may be controlled are summarized as follows:

1. Avoid planting sites for amaryllis bulb production that are near ornamental or naturalized plantings of any of the other hosts (narcissus, especially Paperwhites and Soleil d'Or, Amaryllis, Crinum, Zephyranthes and other members of the Amaryllis family).
2. Keep the plots (of seedlings and young plants) as free as possible from spotted and aged foliage by periodic picking over and at least one thorough annual cleaning.
3. In setting out bulbs for increase, segregate those that are known to have come from a previously diseased stock, or that show even slight scale lesions typical of this disease. Such bulbs should be treated with a disinfectant as indicated above, and had best be planted at some distance from the bulbs that appear wholly free from disease.
4. The practicability of spraying during the growing season has not yet been demonstrated, but it may be useful as a supplement to other control measures. Bordeaux mixture of the 4:6:50 formula (with hydrated lime, or 4:4:50 with quick lime) to which a resin sticker is added, is recommended for trial.
5. In indoor or greenhouse culture of amaryllis, a fair degree of control may be attained by watering the pots by subirrigation if practicable, or at least by avoiding wetting of the foliage. Excessive shade and a damp atmosphere are also to be shunned.

INSECT AND MITE ENEMIES OF AMARYLLIS AND THEIR CONTROL

DR. FLOYD F. SMITH, *Entomologist,*

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The amaryllis plant is subject to attack by a number of pests, including both insects and mites. Often, however, it is grown relatively free from attack. Little is known about some of the ills that beset these plants. For instance, reddish spots and streaks often appear on the leaves and the flower stems. This condition may be caused either by the feeding of red spiders, thrips, aphids, or mealybugs, or possibly by some disease. Besides foliage injury of this type, the flowers, bulbs, and roots may also be damaged. Several of the pests, such as red spiders, mites, thrips, and mealybugs, are general feeders and a knowledge of their habits is at hand through a study of these pests on other plants. An attempt has been made to set forth here the information that is available on the insect pests of amaryllis, and this information has been grouped according to the type of injury or the part of the plant fed upon.

Insects Causing Spotting of Leaves and Bulbs

Injuries to the surface layers of cells on the leaves and bulb scales, whether caused by feeding of insects with sucking mouth parts or mites, are usually followed by reddening of the areas attacked.

Thrips—In both greenhouse and field several species of thrips, including the thrips *Heliothrips femoralis* Reut. the greenhouse thrips (*H. haemorrhoidalis* Bouche), *H. cestri* Perg., and the gladiolus thrips (*Taeniothrips gladioli* M. & S.), feed on the leaves and flower stems by puncturing or rasping the surface cells and sucking up the juices. Adults of these thrips are slender-bodied insects one-sixteenth

the leaves are wet, depends partly on the thoroughness with which bulb-borne infections are eliminated and on the absence or scarcity of naturalized plants which may serve as sources of infection. Control of this phase by spraying with bordeaux mixture (4:6:50 formula, with a resin sticker added to promote adhesion) or dusting with copper lime dust, has been shown possible, but is of doubtful practicability, because of the comparatively low value of narcissus bulbs. With amaryllis, spraying should be profitable but it must be begun with the first appearance of shoots and continued, at least during rainy weather, until leaf growth is complete.

Control

The measures by which fungus (Stagonospora) red spot may be controlled are summarized as follows:

1. Avoid planting sites for amaryllis bulb production that are near ornamental or naturalized plantings of any of the other hosts (narcissus, especially Paperwhites and Soleil d'Or, Amaryllis, Crinum, Zephyranthes and other members of the Amaryllis family).
2. Keep the plots (of seedlings and young plants) as free as possible from spotted and aged foliage by periodic picking over and at least one thorough annual cleaning.
3. In setting out bulbs for increase, segregate those that are known to have come from a previously diseased stock, or that show even slight scale lesions typical of this disease. Such bulbs should be treated with a disinfectant as indicated above, and had best be planted at some distance from the bulbs that appear wholly free from disease.
4. The practicability of spraying during the growing season has not yet been demonstrated, but it may be useful as a supplement to other control measures. Bordeaux mixture of the 4:6:50 formula (with hydrated lime, or 4:4:50 with quick lime) to which a resin sticker is added, is recommended for trial.
5. In indoor or greenhouse culture of amaryllis, a fair degree of control may be attained by watering the pots by subirrigation if practicable, or at least by avoiding wetting of the foliage. Excessive shade and a damp atmosphere are also to be shunned.

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inch or less in length and are light brown to nearly black; the larvae are orange to pale yellow. The gladiolus thrips, which is differentiated from the others by the cream-colored band across the middle, apparently feeds to only a slight extent on the foliage, but causes such severe injury to the bud and flower that the latter opens imperfectly.

The following insects puncture the tissue and suck out juices from beneath the surface: In the field one of the plant lice, the pink and green potato aphid (*Marcrosiphum) Illinoia solanifolii Ashm.*, is sometimes found on young leaves and buds. In the greenhouse the citrus mealybug (*Pseudococcus citri* Risso) and the grape mealybug (*P. maritmus* Ehrh.) are often found in cottony masees, particularly in the crevices between the leaf bases and on the bulbs. A third mealybug (*Trionymus lounsburyi* Brain) has been found on amaryllis from Pennsylvania. The hemispherical scale (*Saissetia hemisphaerica* Targ.), which is smooth, brown, and oval, and the soft scale (*Coccus hesperidum L.)*, which is also brown but longer, are sometimes found on the foliage and on other parts of greenhouse-grown amaryllis.

Red spider mites.—The common red spider (*Tetranychus telarius* L.) and the two-spotted mite (*T. bimaculatus Harvey*) pierce the epidermis of the leaf and draw out the liquid contents of the cells. Areas so injured at first become pale, later turn rusty red, much as when injured by thrips. The color of the oval-shaped, eight-legged mites ranges from yellow to red; they are about one-fiftieth inch in length, and are usually found in large numbers. Their shining, round eggs are found on the under sides of the leaves, covered with protecting webs.

Another mite, known as *Tarsonemus hydrocephalus* Vitz., has been recently discovered to be injurious to amaryllis in certain greenhouses in Germany. The mites are white when young, but caramel-colored when adult. They are oval in shape and practically invisible without the aid of a magnifying lens. The mites feed in large numbers in the neck of the amaryllis bulb and injury becomes evident on the leaves and scape as these elongate. The flower buds may be crippled, the bulbs and roots may be injured and become reddened, or, when severely infested, the bulbs may disintegrate. This pest is not known to occur in America, but a related form is rather widespread on narcissus in this country, and may also attack amaryllis.

The bulb mite (*Rhizoglyphus hyacinthi* Bdv.) frequently occurs on many kinds of bulbs, including amaryllis. It causes injury by burrowing into the roots and stems, or works on the surface of the scales, causing reddish spots. Leaves of heavily infested plants become yellow and sickly and the flowers may fail to develop. Although bulb mites are capable of living on diseased bulbs, there is evidence to indicate that they prefer to feed on healthy tissue and that they disseminate the organisms causing decay. The mites are pearly white and, when working in the bulb, may be barely seen with the naked eye.

Insects Devouring Foliage and Flowers

In the southeastern part of the United States grasshoppers, particularly the eastern lubber grasshopper (*Romalea microptera* Beauv.), feed on the foliage and exposed bulbs of amaryllis.

Certain brownish or grayish, velvety-smooth caterpillars, belonging to the cutworm family feed on field-grown amaryllis. Among these the caterpillars of the *Spanish moth* (*Xanthopastis timais* Cram.) devour the foliage. This insect occurs from Maine to Brazil and is common in our Southeastern States. In Brazil a related form, *X* (*Glottula*) *heterocampa* Gn., is also a pest of amaryllis. In Australia and the Far East two other species of cutworm caterpillars, *Brithys crini* Fab. (*Glottula dominica* Cram.) and *Calogramma festiva* Don., cause considerable damage to leaves of amaryllis and lilies. In Germany the privet sphinx (*Sphinx ligustri L.*), a large, light-green caterpillar striped with violet and white and attaining a length of 4 inches, devours foliage of amaryllis and other plants.

The lean blister beetle (*Epicauta strigosa* Gyll.) feeds on amaryllis flowers in Florida. This insect, together with other related forms, injures many crops. Blister beetles have slender bodies and are black, or black striped with gray or dull yellow. They appear suddenly in large numbers in midsummer and, after causing severe damage for a short time, disappear just as quickly.

Insects Burrowing in the Bulbs

The narcissus bulb fly (*Merodon equestris* Fab.) has been known as a narcissus pest for nearly 200 years and as an amaryllis pest for over 35 years in Europe, Eng-

land, and North America. Bulbs are attacked both in the field and in the greenhouse. The larvae feed in the interior of the bulbs, only one or two larvae in each, and their presence is not readily detected unless the bulbs are handled, when they usually "give" to pressure of the hand, or the base is found to contain an entrance hole. Foliage of infested plants usually becomes sickly and the whole bulb may disintegrate. Usually the infestation is discovered in field stocks at digging or cleaning time or by the sickly appearance of plants when forced under glass. The legless maggots are dirty white or yellowish and about three-fourths inch long; the pupae are oblong, brownish capsules; and the adults are large, hairy, yellow and black flies superficially resembling bumblebees. Adults appear in the spring and lay eggs that hatch into larvae. These enter the bulbs and grow until the following spring. In Germany a related species of bulb fly (*Merodon clavipes* Fab.) is also a pest of Amaryllis and apparently causes similar types of injury.

The lesser bulb flies (*Eumerus spp.*) are apparently widespread in America and Europe. Their size approximates that of the housefly, and they are black with a metallic luster. The larvae are dirty white and considerably smaller than those of *Merodon equestris*. The larvae occur in large numbers in a single bulb. They seem to prefer weakened bulbs as food, whether weakened by the large bulb fly, nematodes, mites, or disease. Heavily infested bulbs usually disintegrate completely, but those containing only a few larvae may be detected only by pressure with the hands.

In Africa and Europe, large fleshy, whitish grubs of a weevil, *Brachycerus* sp., have been found hollowing out the interior of amaryllis and other bulbs.

Control

Control practices may be divided into two types—prevention of infestation and direct control.

Prevention—As many of the pests affecting amaryllis also attack other bulbous crops, the amaryllis plantings should be segregated as much as possible; also sites recently used for planting such crops should be avoided. Weeds serve as food for such pests as thrips, grasshoppers, cutworms, and red spiders, therefore the plantings and surrounding areas should be kept as weed-free as possible.

Direct control—Where pests have gained a foothold, the following treatments may be used for the pests named:

1. In greenhouses fumigation with calcium cyanide, using low dosages one-fourth ounce per 1,000 cubic feet for aphids, and higher dosages (one-half to three-fourths ounce) for mealybugs, scale insects, and thrips—is effective if repeated at weekly intervals. Fumigation with naphthalene will kill red spiders and thirps.

2. Through syringing with water will dislodge and kill large numbers of red spiders, thrips, and mealybugs, and may be the only treatment required for these pests. This practice may be inadvisable, however, where the problem involves disease control.

3. Where spraying is resorted to for control of the above pests either in the field or greenhouse, use 1¼ teaspoonfuls of nicotine sulphate and 2 tablespoonfuls of soap chips in 1 gallon of water. For more effective control of thrips a spray containing 1 tablespoonful of paris green and 2 pounds of brown sugar in 3 gallons of water has been used, but the possibility of injury to amaryllis where the material collects in the crown of the bulb has not been fully tested.

4. In small collections of plants it may be practical to control mealybugs by wetting them with a small brush dipped in a 70 percent solution of alcohol.

5. For control of blister beetles, protect the plants by covering them with cheesecloth, or dust them with a mixture consisting of equal parts of sodium fluosilicate and hydrated lime.

6. Grasshoppers and the leaf-eating cutworm caterpillars may be controlled by spraying with 3 teaspoonfuls of lead arsenate in 1 gallon of water, or with Bordeaux mixture, or by poisoning with bran bait. This bait is made up by mixing in one container 4 ounces of paris green and 5 pounds of dry bran, and in another 1 pint of molasses and 4 quarts of water. Slowly add the liquid to bran mixture as it is stirred. After this material has stood for several hours to allow the bran to take up the poison, scatter it sparingly among the amaryllis plants at sundown.

7. The bulb mites, tarsonemid mites, and bulb flies are killed by immersing the dormant infested bulbs in hot water for 1 hour at a temperature of 110 to 111½° F. After treatment, the bulbs should be dried and planted in an isolated location to prevent reinfestation. Severely damaged bulbs should be burned to destroy the contained pests.

7. Curing, Storage and Forcing of Amaryllis Bulbs

CURING HYBRID AMARYLLIS

I. W. Heaton, *Florida*

Commercial amaryllis in Florida are generally dug in early November, although they may be lifted and cured at any time. A spading fork is the most satisfactory tool for hand work. The bulbs must be placed in the shade shortly after being dug as the hot sun will quickly burn through several layers of scales. Care must be taken to prevent mechanical injury with tool or bruising. Never leave freshly dug bulbs in boxes as they will sweat and heat quickly. Any tray will do for curing. We find a tray four by eight feet with one inch mesh chicken wire bottom and six inch legs the most satisfactory. This permits the maximum circulation of air around the bulbs. With foliage and offshoots attached the bulbs are spread six inches deep over the tray. Three to four weeks are required to properly cure bulbs. When dry trim the foliage only to the solid part of the neck; remove offshoots and trim the roots to one and one half inches of the base. The shrinkage during curing generally ¼ to ½ inch, depends upon the condition of the bulb when dug.

RESEARCH ON THE FORCING OF AMARYLLIS BULBS

The Boyce Thompson Institute for Plant Research at Yonkers, New York, is undertaking preliminary experiments on the subject of forcing amaryllis bulbs. Under date of December 7 and 23, 1933, Dr. F. E. Denny writes that the extent of future work undertaken on this subject will depend upon the outcome of these preliminary experiments. Three methods of breaking dormancy will be tried in the first attempts,—(a) the use of vapors of ethylene chlorohydrin, (b) the use of warm temperatures, and (c) the use of cold temperatures.

——Ed.

FORCING HYBRID AMARYLLIS

I. W. Heaton, *Florida*

The physical characteristics of the Amaryllis bulb must be considered in determining a successful method of forcing. The relation of the flower sheath to the leaf growth cannot be overlooked.

Splitting the bulb from neck to base at 90 degrees to the axis of the leaf, reveals the physical formation of the bulb. On the base extending below the scales is the scar of last year's scape. Beginning at the outside, we find the old leaf scales, which constituted last year's leaf growth. Next toward the center is the scape from last spring's bloom, and the scales from the current leaf growth. Directly inside of the current leaf scales is the sheath containing the beginning of

the next season's bloom. Near the apex of the base will be found the leaf formation for next year's leaves, and at the apex a careful examination will show a small white knot, which will develop into the second year's bloom.

The cross section of the bulb shows a three year growth cycle, except for the extreme base we have an entirely new bulb every three years, growing from the center to the outside in that period. The normal formation being, the leaves with the bloom formed outside the current leaf growth,—i.e., one set of leaves and one bloom, generally 3 to 5 leaves on each side of the axis. From the foregoing two methods of forcing are evident. One consists of delaying blooming, or suspending the normal process of the bulb until wanted. This method will only produce bloom after the normal period. Blooming may also be delayed by the use of cold storage, but little is known regarding the correct temperature. We have held bulbs in our electric refrigerator at a temperature range from 38 to 45 degrees F. from February to July and had splendid bloom in four weeks from potting, at an average temperature above 80 degrees.

In a second method the semi-dormant period is reduced by drying out the bulb. We used the following method with good success and can produce bloom at any time by careful handling and timing. We potted several hundred bulbs in the late fall, with a good soil in six inch pots. After blooming in the spring, when the leaf growth was fully matured, the pots were laid on their sides under the bench and permitted to dry out thoroughly. This required about 75 days or 4 months from blooming time. In late July they were brought back on the bench, watered lightly until growth started, then fertilized heavily with liquid guano. Inside of two weeks the new bud could be felt at the neck above the bulb. Six weeks from benching over 80 percent were in full bloom. This process was repeated and the bulbs brought into bloom again in early February, three weeks ahead of the normal time in a cold frame. We found the **Vittatum Type** the most successful as they became dormant more quickly than the evergreen species, some of which never lost their foliage, during the rest period. The bloom will be produced at the expense of the bulb unless the bulb is root-bound. A supply of potted bulbs properly timed will produce a succession of bloom the year around. It is reasonable to assume in the north during the winter, the rest period could be greatly reduced. This method I understand was developed years ago by gardeners.

(Continued from page 69)

C. americanum. NY.
C. Powellii. B.
C. Ellen Bosanquet. NY.
Amaryllis belladonna. NY.
Crinodonna memoria corsii (Amarcrinum howardii). NY; M.
Nerine sarniensis. B; NY.

Pancratiae

Urceolina microcrater. M.
Eucharis grandiflora. B.
E. subedentata. B.
E. punctata. NY.
Pancratium maritimum. B.
Hymenocallis occidentalis. M.
H. calathina. M; NY.
H. littoralis. M.
H. speciosa. B: NY.
H. harrisiana. B.
H. pedalis. NY.
H. expansa. NY.
H. caymansis. NY.
H. collieri. NY.

Alstroemerieae

Alstromeria aurantiaca. B.
A. aurantiaca lutea. B.
A. chilensis. B.

8. Marketing of Amarylleae

THE MARKETING OF AMARYLLIS BULBS

WALTER J. GUILLE, *New York*

HYBRID HIPPEASTRUM

Prior to June 30, 1919 when Quarantine 37 went into effect most of the amaryllis (*Hippeastrum*) and related bulbous plants used in this country were imported. From Bermuda came rather liberal yearly shipments of *Johnsoni* (Johnson, 1810) where this variety had long been grown and known there as the "Spice Lily." Bermuda also sent over a strain of *Hippeastrum vittatum* hybrids which varied little from the *Johnsoni* for red was the dominant color and was present in practically all the flowers. These Bermuda importations, at their peak, amounted to about 25,000 bulbs annually and from this same source came an approximate equal quantity of *Zephyranthes Lycoris squamigera* bulbs were imported from Japan—I would say 5000 to 10,000 annually. At that time small quantities of greenhouse-grown hybrids were beginning to arrive from Robert P. Ker & Sons, and other of the European hybridizers. Together with a small constant supply of *Amaryllis belladonna* from California these then constituted the major part of the amarylleae business of this country.

Quarantine 37, as everyone knows, shut out all these importations and left this country dependent upon such stocks as could be produced here.

As far as *Lycoris* is concerned, the story has been and still is a sad one. The Government was not liberal in allowing importations of propagating stock under special permit and consequently this has been a most difficult subject with which to work up an adequate commercial supply. I believe I can safely say that such a supply does not now exist and this is a great pity for it is truly a worthwhile subject. The few bulbs that are being used every year are obtained principally from the private estates adjacent to New York.

The sale of *Zephyranthes* has declined for lack of a sponsor or of someone to give them the prominence they deserve for it has been demonstrated very conclusively that their production, in adequate quantities, is a simple matter. I feel quite sure that a good volume can soon be worked up of this item. The trade should then be informed that a dependable supply of the leading varieties exists and should be furnished with definite information with respect to flowering dates and the best time to handle the dormant bulbs.

It is of course on the hybrid amaryllis (*Hippeastrum*) that the main interest is centered. After the quarantine, some of the Bermuda growers moved their supplies to Porto Rico and while these cultures did not persist, they did aid in maintaining some semblance of supply for the years when our local crops were inadequate. At that time Florida was gradually getting into the picture and some of the early workers with the hybrids had already begun to ship limited quantities to the northern markets.

I believe that it was about 1923 that the "Plant Amaryllis" Campaign got under way in Florida. Aided by the speculative boom that was then raging in that State, it was comparatively an easy matter to get many growers to make the plantings. Apparently every seed pod was saved in an attempt to increase the acreage as quickly as possible and millions of seeds were planted. To a great extent these plantings were made by those with no prior horticultural experience and this probably accounts not only for the unequal quality of stock but also for the fact that the market for the bulbs was not developed to the same extent as the supply.

A great many of these new plantings were induced by reason of some vague promise on the part of the seed sellers to provide a market for the bulbs when they attained salable sizes. This supposed centralization of selling effort left the growers with a false sense of security for when the large quantities of salable sizes had arrived, it developed that only a limited market existed. While not questioning the advisability of cooperative marketing for many crops, I feel sure that if the individual growers had, on their own initiative, sought to develop new outlets, the results would have been much more satisfactory.

When the supply of hybrid amaryllis was small, practically the entire output was consumed by seed houses through their catalog trade. A big disappointment to the growers of and dealers in these bulbs has been the failure of commercial greenhouse men to handle them in any perceptible quantity and later in this article I will attempt to give an apparent reason. The demand with the seed houses failed to keep step with the rapidly increasing supply, largely due to the fact that the bulbs were then not available in time for the usual fall bulb selling season and were finished before the bulk of the spring business got under way. Without question the bulbs can be cold-storaged and held dormant over a much longer period than now prevails and by so lengthening the season, the demand will be much increased.

To take care of the rapidly increasing quantities, new outlets had to be provided and as the prices became more reasonable a new field was opened. Chain stores and department stores were at the time becoming serious factors in the sale of horticultural products and to this field the amaryllis grower and dealer turned and these outlets have provided the largest market for such bulbs as are now being sold and will unquestionably continue to be the leading final distributors.

But even with this large new outlet, the supply continues to be larger than the demand and prices have fallen to where the profitable production is now very questionable.

In considering ways and means to broaden the market and correct the price evil, we must have the ultimate consumer very much in mind. I think it is safe to say that over 75 per cent of the bulbs now being marketed are finally bought by amateur home gardeners who purchase the dry bulbs and attempt to flower them under home conditions. What induces these sales and how can they be increased?

A display of dry amaryllis bulbs on a counter does not, in itself, make an appeal. It is true that the size of the bulbs is sometimes impressive but unless people know what they are and what they will produce, few sales are made. Some of the largest distributors have very sensibly provided large display cards with colored reproductions of amaryllis flowers and these have been a big help. When coupled with growing-instruction leaflets, many new buyers have been secured.

In the early spring, it is possible through the North to obtain flowering plants of amaryllis and when these are displayed with bulbs, the sales increase enormously.

Then there is the time element that is most important. When home gardeners plant anything, they usually want action and they do not get action with amaryllis bulbs when they are planted in the early fall months. A few years ago the bulb dealers did not expect deliveries until November but the constant clamor for earlier delivery has stepped up the shipping date to where some are now asking for them as early as the first week in September. While appreciating the fact that more bulbs can be sold in two months than in one, I still believe that it is a mistake to ship amaryllis bulbs before November, and prefer to lengthen the season by cold storage rather than trying to anticipate it by sending out unripened bulbs.

Of course the quality of the flowers produced from the bulbs has an important bearing on the subsequent demand. When buyers secure bulbs that produce one or two scapes with large flowers of an acceptable color, they become most enthusiastic and not only are larger buyers the following year, but very likely induce many others to try them also. If, on the other hand, small, poorly colored flowers are produced, the effect is just the opposite. And so the importance of producing only the finest stocks cannot be too highly stressed. I am not in favor of sending out unbloomed seedlings but rather favor a thorough selection at flowering time and a separation of grades and colors. This can be easily accomplished by labelling each plant as it blooms. A satisfactory method of doing this is to use a wire meat skewer to which is attached a metal tag which can have a significant letter or number. Both of these are stocked by dealers and can be bought at reasonable prices.

And there is another important point to be borne in mind when considering the consumer's angle and that is the advisability of maintaining bulbs in a dry state

over an extended period. Personally, I incline to the belief that these bulbs do not take kindly to this treatment and consequently reflect it in the blooms they produce. I think experiments should be conducted to ascertain definitely: First—When should bulbs be harvested to produce the best flowers and at the same time provide the longest selling season? Second—Should the bulbs be shipped in a dormant condition or do they flower better when treated as live plants?

Finally, a determination should be made of the best sizes of bulbs to be marketed and in doing this the producer's side of the problem shall be kept very much in mind for it is economically absurd to put the producer to the extra expense of growing oversize bulbs unless it can be demonstrated that the size, number and quality of the blooms show a definite relation to the size of the bulbs. Each year sees a call for bulbs of a larger size and this condition will continue to exist because our horticultural buyers are accustomed to believe that the largest is always the best.

And now a word as to why the hybrid amaryllis have failed to register to a more satisfactory extent with commercial greenhouse men. As a cut-flower, a very limited demand exists for the flowers are difficult to handle and to pack and their stiff form does not lend to a great many floral uses. When used as a pot plant, the absence of foliage and this same packing problem have proved stumbling blocks. Then again some of these florists have had disappointing experiences with the receipt of poor strains. Unquestionably the selection of better types is to be considered as the main point in developing this outlet. I am encouraged to believe that the propagation by cuttage is now to be undertaken in a serious way and when named kinds are produced and become known, this trade will undoubtedly expand enormously.

And what of the future? I have always been a booster for hybrid amaryllis and feel today, as I felt many years ago, that they offer the outstanding possibility in the whole bulb line. Their size, beauty and the ease with which they can be so readily flowered under average home conditions is going to put them over in a big way. In this field they have no competition, for there is not another item that has all of these fine qualities.

The formation of the American Amaryllis Society will, I hope, coordinate the efforts of those who are working with amarylleae and be another big factor in their development.

R. G. HILL'S "A SURVEY OF THE UNITED STATES BULB INDUSTRY, 1931"*

Styled "A Preliminary Report," the survey covers briefly the following subjects,—sources of supply, consumption, areas of production, estimates of planting and production by growers and State officials, marketing and distribution.

The *Amaryllideae,* except *narcissi,* are dismissed in a very short section entitled, "Miscellaneous Bulbs" from which the following excerpts are taken,—

"There is a small domestic production of what may be classed as Miscellaneous bulbs . . . such as begonia, tigridia, muscari, ornithogalum, ranunculus, scilla, anemone, hyacinth, tuberose, fancy-leaved caladium, tritonia, calla, calochortus, *Galanthus***, ixia, sparaxis, *Nerine***, oxalis, *Zephyranthes***, and watsonia.

"The figures shown in Table 10 (Miscellaneous bulbs)** include Amaryllis (*Hippeastrum*)** in California and Florida . . . . "

*A mimeographed bulletin published by the U. S. Dept. of Agriculture, Bureau of Agricultural Economics, Washington, D. C.

** Italics and words in parenthesis are ours.—Ed.

HYBRID AMARYLLIS
AND ALLIED BULBS

Nehrling-Mead Strain of *Hybrid Amaryllis;* bulbs of good flower types, selected from thousands in the field, flowering size $1.00 each. Small offset bulbs of same quality, 50 cents each, $5.00 per dozen. These bulbs available in March, April and later. The large bulbs will all bloom well in 1935 with proper care, and the small bulbs in one or two years.

Select flowering size bulbs, by color shades; dark red, light red, red and white, pink and white; $1.50 each.

Mixed bulbs, Nehrling-Mead Strain, field run, flowering size, four for $1.00. Small bulbs, offsets and seedlings, $1.00 per dozen.

Nehrling Strain, mixed bulbs, small sizes, seedlings and offsets, 50 cents each.

OTHER STRAINS

Small seedling bulbs of other strains of *Hybrid Amaryllis,* including strains of California, Dutch, English, French and German growers available later in the year.

Hippeastrum equestre, the "Florida Red Amaryllis", blooming size bulbs, five for 1.00; small bulbs, 20 for $1.00.

THREE CHOICE HYBRID CRINUMS

Peachblow (Mead origination) ----------$1.50
Ellen Bosanquet (Bosanquet origination)----$1.50
Giganteum Hybrid; white cup-shaped flowers $1.00

Also *Crinum* americanum and other *Crinums, Hymenocallis, Eucharis, Clivia, Polyanthus Narcissus, fancy leaved caladiums, Gerbera Jamesonii hybrids, palms,* and other greenhouse and conservatory specialties. Express or postage extra on bulbs. *Hybrid Amaryllis* seed in season.

WYNDHAM HAYWARD
West Fairbanks Avenue, Winter Park, Florida, U. S. A.

APPLICATION BLANK FOR MEMBERSHIP IN THE

American Amaryllis Society

WYNDHAM HAYWARD, Secretary
2240 Fairbanks Ave.,
Winter Park, Florida

.....193....

Please enroll me as a ..... member in the American Amaryllis Society, and send me a copy of the 1934 Year Book; I enclose $2.00 to cover 1934 dues.

(PLEASE PRINT NAME AND ADDRESS)

Name..... Professional / Amateur (mark out one)

Street and Number .....

Post Office ..... State .....

Membership in the Society is open to all persons or organizations, including libraries, interested in the advancement of Amaryllis culture. Paid up members are entitled to all the benefits offered by the Society including one copy of the current issue of the Year Book. Dues are as follows: Annual members, $2.00; Life members, $100.00 or as a reward for 50 new members secured in any 12 months period; Patrons, $200.00 and upwards. All remittances should be made payable to the American Amaryllis Society and sent to the Secretary.

HEATON STRAIN OF HYBRID AMARYLLIS

Years of careful study and attention have been given our strain for clean color, shape, vitality and rapid propagation.

We exercise the greatest care in selecting and tagging the bulbs while in bloom, to insure your complete satisfaction.

Two and three year old bulbs 2¾ to 5 inches in diameter, in the following colors and grades, ready for delivery in March.

EXHIBITION STOCK

	Blooming Bulbs	1" Offshoots
No. 1 Dark Wine	$12.50	$3.00
No. 2 Dark Red	10.00	2.50
No. 3 Light Red	10.00	2.50
No. 4 Rose	12.50	3.00
No. 5 Salmon	12.50	3.00
No. 6 Pink	12.50	3.00

SELECTED STOCK

	Blooming Bulbs	1" Offshoots
No. 1 Dark Wine	$ 5.00	$1.50
No. 2 Dark Red	5.00	1.50
No. 3 Light Red	5.00	1.50
No. 4 Rose	6.00	2.00
No. 5 Salmon	6.00	2.00
No. 6 Pink	6.00	2.00

The above grades and numbers are all solid colors, to base of tube.

No. 7 White on Dark Red	$ 7.50	$2.00
No. 8 White on light Red	7.50	2.00
No. 9 White on pink	7.50	2.00
No. 10 White small Red Markings	7.50	2.00
No. 11 White small Pink Markings	7.50	2.00
No. 12 Clean White	12.50	3.00

No. 7 White on Dark Red	$ 4.00	$1.00
No. 8 White on Light Red	4.00	1.00
No. 9 White on Pink	4.00	1.00
No. 10 White small Red Markings	4.00	1.00
No. 11 White small Pink Markings	4.00	1.00
No. 12 Clean White	6.00	2.00

Exhibition Stock will produce bloom 8½ inches and up in diameter. Three or more bloom to the scape and at least two scapes, blooming for thirty days at cool temperatures.

Selected Stock will produce flowers over 6½ inches, three or more bloom to the scape and two scapes. Texture and shape not quite as fine as the Exhibition stock, but very good bulbs.

POLLEN

Pollen to produce 1,000 seed from 10 inch Exhibition stock, delivered Air Mail to continental United States, $2.50 per capsule. Three colors $5.00 Order by color number above.

SEED

Seed from 10 inch Leopoldi Type Bloom $2.50 per pod, over 60 seed. Will produce 90% true to color. Seed produced only to order, which should reach us early in March for full selection.

Terms: Cash with order. Please remit by check, or money order.

Orders will be filled promptly. Postage prepaid.

References: Florida Bank at Orlando, Fla.
Orlando Chamber of Commerce.

Heaton Bulb and Palm Co.

ORLANDO, FLORIDA

1934 INTRODUCTIONS

By Heaton Bulb and Palm Co.

PEACE A vigorous evergreen Equestre Type. An easy, rapid propagator, producing 30 to 1 in two years. Bloom 8", white with delicate pink markings and a faint spicy perfume. Three scapes carrying four bloom are produced by mature bulbs. A mid season bloomer, producing 70 to 120 seed per pod. This is a high grade variety.

Blooming Bulbs $5.00; Offshoots 1" and up $1.00; Plants from flats, three for $1.00

MOTHER A slow growing perfect Leopoldi Type. Evergreen in Florida. The bloom is 8½ inches in diameter, a dark burgundy wine color, veined with rich purple. This variety if rested in the fall will bloom for Xmas. Three to four wide petaled bloom are produced on a short scape. This will always be scarce as the growth is very slow. Rich green drooping leaves. There is a place for this bulb in any collection.

Blooming Bulbs $25.00; No offshoots; Small plants $5.00

HELEN A fast growing evergreen Leopoldi Type; good multiplier making 40 to 1 in two years. Bloom is a bright scarlet red with a clean white corona, slightly veined, and trimmed with a narrow edge of white. Mid-season bloom. At two years of age this bulb produced 27 bloom on four scapes, in flower for six weeks and made over 2000 seed. Bloom 9 inches in diameter. This variety will be among the winners at any show, it is the best one we have produced. Mature bulbs measure 5 inches.

Blooming Bulbs $25.00; 1" Offshoots $12.50; No small plants for sale.

WAR An evergreen dark red Equestre Type. The fastest multiplier we have, making over 1200 in four years. Clean dark red, heavily veined 6" bloom, two and three to the scape. Mature bulbs produce two and often three scapes. This is an ideal bulb for forcing.

Blooming Bulbs $5.00; Plants three for $1.00.

MARIE A slow growing Leopoldi Type; evergreen in Florida. This variety produces 8 bloom on two scapes which measure 11" across the face. Wide rounded petals, a soft delicate pink with small white markings. This will always be in great demand.

Small Bulbs only $12.50; No small plants.

DAWN A deciduous True Leopoldi Type. A very flat open faced bloom, pure white except for faint pink veins on the lower petals. This variety produces two scapes with three 10" bloom. *Dawn* is one of the best near whites we have seen.

Small Bulbs only $5.00.

FAITH At last a clean winter blooming red. This bulb blooms in early January. Producing three 7½ inch bloom on a short scape. A wide petaled, bright red, veined with darker red and showing a red keel. Color true to the base of the tube. Foliage drooping and evergreen. A good multiplier and a rapid grower making a three inch bulb and two scapes in 19 months from seed.

Offshoots $12.50; Advance orders will be accepted for plants, delivery when ready.

Other vegatative propagations at prices ranging from $1.00 to $10.00 for blooming bulbs. Complete list ready in May 1934.

Heaton Bulb and Palm Co.

ORLANDO, FLORIDA

Diener's Hybrid Amaryllis

Two Fine Strains That Should Be in Every Amarylleae Collection

DIENER'S MAMMOTH AMARYLLIS

Amaryllis have always been highly favored by myself and consequently I have applied special attention in improving them as much as possible. Among my early crossings there appeared a few which flowered two times in one year, so I crossed them together, which gave me seedlings flowering even oftener than twice a year. Those I used for my stock of Amaryllis which I am now offering. Many flowers are over ten inches in diameter and have four to six flowers to the spike. The colors run from nearly white through all shades of pink into the deepest fiery scarlet. These Amaryllis always attract a great deal of attention. They are very valuable as cut flowers and are destined to be a wonderful show flower.

Price: In five or six-inch pots, **$2.00** to **$10.00,** according to quality. Extra fancy varieties with giant size flowers from **$10.00** to **$25.00,** according to quality.

Small bulbs taken from the large size bulbs which will make flowering plants in six months.

Per dozen $1.50 **Per 100 $10.00**

Prices for larger amounts on request.

In ordering less than one dozen Amaryllis plants add 25 cents for packing.

HYBRID EQUESTRE AMARYLLIS

These hybrids are most gorgeously colored and are of easy culture. The size of the flower is nearly as large as my Mammoth Strain. I exhibited flowers of this type at the Southern California Spring Flower Show at Pasadena in April, 1930, and they made a decided hit. The colors are soft and clean. They run from flesh pink to salmon, orange, copper and red to the deepest scarlet. They have as many as six flowers to a stem. The main crop is around Easter, but they flower several times through the year. They should be watered continually and not rested, but they can be rested if desired. They will flower from 15 to 18 months after sowing from seed.

Price: In five to six-inch pots, **$2.00** to **$10.00,** according to quality. Extra fancy varieties with giant size flowers from **$10.00** to **$25.00,** according to quality.

Small bulbs taken from the large size bulbs which will make flowering plants in six months.

Per dozen $1.50 **Per 100 $10.00**

Prices for larger amounts on request.

Seeds: 20 seeds 50c. **100 seeds $1.50.** **1000 seeds $12.50**

RICHARD DIENER, Oxnard, Calif.