YEAR BOOK
AMERICAN AMARYLLIS SOCIETY
1935

VOLUME 2

Dedicated to
Theodore L. Mead

With three portraits and eighteen illustrations.

Edited by
Hamilton P. Traub
Mira Flores, Orlando, Fla.

THE 1936

NATIONAL AMARYLLIS SHOW

sponsored by the

AMERICAN AMARYLLIS SOCIETY

will be held in Florida.

For details write to the Secretary,—

MR. WYNDHAM HAYWARD,

Winter Park, Florida

THE 1937

NATIONAL AMARYLLIS SHOW

sponsored by the

AMERICAN AMARYLLIS SOCIETY

will be held in

Southern California

This will be the year of the William Herbert Centennial and the William Herbert Medal, the highest annual award of the Society, will be awarded for the first time. For details write to

MR. RICHARD DIENER,

Southwest Regional Chairman

EXHIBITIONS AND AWARDS COMMITTEE,

Oxnard, California.

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Printed in the United States of America
Published November, 1935

Preface

The one just passed has been an eventful year from the standpoint of the advancement of the amaryllids. Prior to 1934 this group of plants was generally neglected excepting by a few faithful enthusiasts. The attempted revival looked apparently hopeless to many and a few predicted certain failure. However, revival of interest in amaryllids was spontaneous from the first and with the publication of the 1935 Year Book of the Society, their advancement looks bright. In two years' time two National Amaryllis Shows have been successfully staged, the vegetative method of propagating amaryllids has been generally accepted, and breeders have been encouraged to introduce named varieties in this group. There is now a lively interest in the introduction of species for the hybridizer. Ideas and plant materials are being freely exchanged between enthusiasts in various parts of the world.

This issue is dedicated to Mr. Theodore L. Mead, the venerated pioneer horticulturist of the Southeast, originator of the Mead Strain of hybrid Hippeastrums and a Fellow of the Society. Mr. Mead has kindly favored us with a most interesting autobiography.

We are sad to announce the loss of a friend and one of our most valuable members in the death of Dr. David Griffiths. His inspiring and stimulating presence will be greatly missed. He stuck to his post to the very last. On February 28 he wrote, referring to his impending hospitalization, "I will have to do it (send the article on daffodil breeding) before the middle of March because I am going away at that time", and in March the sad news of his passing reached us. Dr. Wm. A. Taylor, former Chief of the U. S. Bureau of Plant Industry, contributes a concise biography which traces in outline the useful and inspiring career of Dr. Griffiths.

The year 1934 is a land mark for those interested in amaryllids for Dr. J. Hutchinson's phylogenetic classification of monocotyledons appeared in that year. The system is original and stimulating and that portion relating to the amaryllids and related groups was officially adopted by the Board of Directors and reference to it made in the final draft of the constitution in place of Baker's classification, 1888.

The Alstroemeriaceae, now a separate family, have been retained in the field of the Society, and the Hemerocallideae were added as representing, in *Hosta*, the connecting link between the Amaryllidaceae and the Liliaceae. The members of the Society will therefore be given the benefit of a phylogenetic outlook on a great plant group. These relationships are discussed more in detail elsewhere in these pages, and the portions of Dr. Hutchinson's classification in the field of the Society. have been reprinted for your information by the kind permission of the Author and Publishers.

We are happy to announce that corresponding members have been elected in Australia, South Africa, British East Africa, Germany, England, Argentine and Holland. Mr. Cowlishaw gives a stimulating picture of amaryllid activities in Australia. In fact, Australia challenges the rest of the world to show what it has to offer in fine amaryllids. His article is bound to stimulate a healthy exchange of ideas and plant materials and we are greatly indebted to him for his excellent contribution.

The Lady Muriel Jex-Blake contributes a most interesting article on amaryllid culture in Kenya Colony. It comes as a surprise to most outsiders to hear of the gardening progress made in British East Africa. To their continued success we send our best wishes.

Kenya Colony, British East Africa, is to be congratulated on its talented workers in the horticultural field as judged by the delightful book which appeared in 1934,—"Gardening in East Africa"[1] edited by Dr. Jex-Blake. It might well serve as a model for regional texts on gardening in this country. It contains a chapter on indigenous bulbous plants including the amaryllids.

The Lady Muriel Jex-Blake and Mrs. Frank Joyce, of Kenya Colony, have the gratitude of the Society for their sympathetic cooperation with the officers in their attempt to introduce plant materials.

With the publication of this volume, general recognition of the value of the vegetative method of propagating amaryllids has been achieved. Many "Doubting

[1]Longmans, Green & Co., London; New York; Toronto. 1934.

Thomases" have been converted in the course of the past year. It is fitting and proper, therefore, that Miss Ida Luyten, as the pioneer in the field of vegetative propagation of amaryllids, was appropriately recognized by election to Fellowship in the Society. Her excellent article on the subject in the present issue is commended to all. It shows the true scientific attitude. The Society owes Miss Luyten a genuine debt of gratitude for her contribution on this important subject.

Lack of space forbids even touching on the more than sixty other articles in this issue. You will want to read them all. The contributors are to be congratulated, and deserve the thanks of the entire membership for sharing so generously of their experiences and time.

A few words about future issues of the Year Book are in order. The 1936 volume will be dedicated to Mr. A. Worsley, of Mandeville House, Isleworth, England, the Dean of the amaryllis fraternity. His autobiography has already been received, and its publication will be a most interesting literary event. A portrait of Mr. Worsley, and the description of a new amaryllid species, named for him, will also be included.

In recognition of the lasting influence of William Herbert's monograph on the "Amaryllidaceae" published in 1837, the Society will celebrate the William Herbert Centennial in 1937. The Year Book of that year will be dedicated to him and his work, and the William Herbert Medal, the highest award of the Society will be awarded for the first time.

In 1938, the Year Book will be dedicated to the venerable Mr. E. H. Krelage, and in the same issue the influence of Dutch and other European breeders on the development of the cultivated amaryllids will be adequately covered. Mr. Krelage will contribute his "Autobiography" and will also supervise the symposium on Continental European amaryllid culture.

All your officers have endeavored to serve efficiently and unselfishly, but an especially large bouquet of brilliant amaryllids should be handed to your Secretary, Mr. Wyndham Hayward, to match his faithful devotion and his indefatiguable zeal in the interests of the Society. The success of the Society has been in greatest measure due to his efforts; we who have had the opportunity to help, are glad of the privilege of serving along with him in the worthy undertaking.

On the usual weekly visits to his fine country estate, Lakemont Gardens, in Winter Park, the writer has had an opportunity of observing the excellent work he is doing in the field of amaryllid culture. It is not surprising to note that he is gathering together an outstanding collection of amaryllids as well as a great many other worthy plants.

The time has arrived when this preface must be submitted to the printers, and your editor is in Puerto Rico.

This beautiful Island with its varied tropical flora is a seventh heaven to the plantsman. The members will be interested in the list of indigenous amaryllids collected and sent to the Secretary for the trial collection,—*Hippeastrum equestre, Zephyranthes carinata, Z. tubispatha,* and a *Hymenocallis* species.

HAMILTON P. TRAUB.

Luis Munos Rivera Day,
July 17, 1935
Mayaguez, Puerto Rico.

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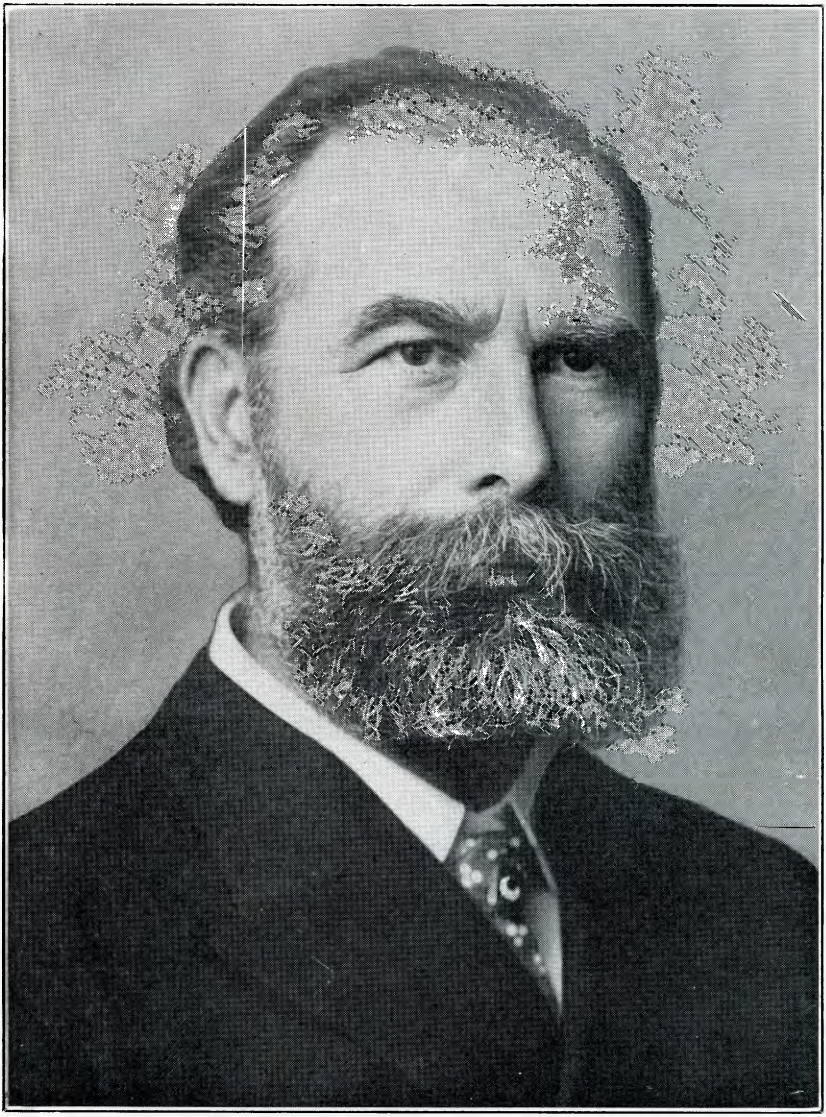


Victor Georg *Springfield, Ill.*

Theodore L. Mead

At the age of 51.

VOL. 2 YEAR BOOK 1935
AMERICAN AMARYLLIS SOCIETY

Theodore L. Mead

Naturalist, Entomologist and Plantsman

AN AUTOBIOGRAPHY

My ancestors on my father's side came from England in 1642, while my mother was of Huguenot extraction, her forebears having left France after the Edict of Nantes in 1685. They made their home in New York City but I was born at Fishkill, N. Y., February 23, 1852. The years from ten to twelve were spent with my parents and brother in Germany studying French and German. Upon returning home my education was continued in the public schools preparing for entrance to the College of the City of New York.

At that time the teaching, being given over to Tammany political appointees, was of no account, mostly parroting recitation by rote and many of the teachers were unable to pronounce unusual words. One "miss" was a failure and punished with a severe caning with a rattan in the hands of the principal. They never offered to give me a licking; I think they were rather respecters of persons and my parents would have removed me from the school rather than permit any assault and battery upon me. But some of them got thrashed and to see it done hurt almost as badly as if I had been beaten myself although none of my particular friends were involved.

In 1867 I entered the Introductory or Sub-Freshman class of the City College. I remember my rating in Science was about No. 35 and in Latin, etc., about No. 60 in a class of 500 students. I asked my father to take me out and to let me go to the French Exposition instead. He said if I could find another dependable boy to go along I could go, but not alone. I had found a couple of good friends in my class—otherwise an extremely mixed lot—and we were almost inseparable and they agreed to go but their parents backed out. My brother had entered the Columbia College of Mines and couldn't go but my mother offered herself as chaperon so I should not be disappointed and we had a great time. We spent about a week at the French Exposition, where I was greatly impressed by the mechanical exhibits. The Jacquard looms weaving damask and figured silks seemed wonderful, but on the whole the great variety of exhibits was rather confusing to a boy. From Paris we went to Rome, Naples and Vesuvius, then to Como and the Italian lakes. At Adelsberg, the grotto, like the Kentucky Mammoth Cave, with its eyeless fishes, was visited. A stop was made at Idria to see the mercury mines and at Cracow to see the slate mines that had been worked for a thousand years. Then on to St. Petersburg and Moscow.

Before leaving Russia I saw in a glass house the tallest coconut palm of Europe; it was pushing its fronds through the glass dome—they had already dug a hole 40 feet deep for its tub—but it continued to outgrow its space. After a little while at Stockholm and Christiana, now Oslo, and a peep at Copenhagen, it was time to be thinking of getting home.

At Dresden there was a specialist in the collection and sale of butterflies. My mother said if I would go straight to Paris and then home she would let me get a collection of butterflies valued at $50. Like John Gilpin, though I was on pleasure bent, I have a frugal mind and, knowing that there was a premium on gold, I told her that if she would make it $50.00 in gold I'd agree. We struck the bargain. When I got that collection, I had to have an insect proof cabinet to preserve it in and that I got from my dad. That was really the origin of my ability to collect scientifically and after a while with the aid of Mr. William H. Edwards, the chief authority on North American butterflies, my collection stood third among North American butterflies. The British museum stood first, having all the types from the arctic

regions. The collection was not so very important as it might seem as there were only some 600 species known north of Mexico. Nevertheless, it seemed a triumph to get a new one. A trip to Florida in 1869 gave me my most spectacular specimen, *Papilio calverleyi.* Only one other specimen of that type has ever been found. Mine, a female, the other a male from Long Island, New York. No duplicate has yet appeared although sixty-five years have elapsed. The female is still in the Carnegie Museum at Pittsburgh.

That summer (1869) I asked Mr. Edwards as to the best place to collect within 500 miles of New York. He said that West Virginia was worth while. I got a boarding place and was with him all summer. His son and I became the best of chums. I was able to help a lot in getting eggs and life histories of butterflies. Mr. Edwards' discovery was that if any mature butterfly was confined with its proper food plant, eggs would almost certainly be laid. After that their breeding was a comparatively simple matter though in some cases the hatched eggs refused to grow unless provided by refrigeration with an artificial winter season.

In 1868 I was elected a member of the American Entomological Society, afterward the Entomological Section of the Museum of Natural Science, and I usually attended the monthly meetings held in Philadelphia.

In 1871 Mr. Edwards, with whom I had become intimate, suggested a summer in Rocky Mountain country, sharing the expense and sharing the butterflies. In the Rocky Mountains I found twenty new species of butterflies, the best ones named by him *Argynnis Meadii, Colias meadii* and *Satyrus meadii.* Mr. Scudder named a moth *Heliothis meadii* and also a Geometer*(Scotosia meadii)* for me.

After the Colorado season was over we continued to California to visit the entomologists there. We returned via Panama by steamer. We did some collecting in Panama and I filled an empty trunk with orchids and a live Iguana or two.

My bother's hobby was astronomy, studying comets and double stars, and he got a 4½ inch Fitz lens mounted equatorially and later a six inch lens. He persuaded my father that although I was only a boy of 16 or so I ought to have a microscope of equal value and we ordered a binocular by J. & W. Grunow with objectives of 2 inch, one inch, one-half and one quarter and one-eighth inch focus, the last two being adjustable for the thickness of coverglasses, giving a magnification of from 20 to 1600 diameters. They were tested by the Columbia University authorities and pronounced good of their kind, and we added an achromatic condenser and a polariscope, bringing the cost of the apparatus up to about $400.00. I was just a boy and though I enjoyed the microscope, did not make serious investigations. I made a few fair photo-micrographs but at that time no dry plates were available and only the wet process could be used—troublesome and sloppy and the wet negatives had to be developed immediately. My most serious use of the microscope was in preparing a study of the generic characters given in Mr. Scudder's systematic revision. The numerical relations given as characterizing the different genera proved valuable beyond any expectation and the paper was published in the Canadian Entomologist in December 1876 with other notes at different times in the same publication.

In 1872 my time was mostly devoted to working over the Colorado butterflies and writing Chapter 8 in the Wheeler Expedition volume devoted to the insects collected by various biologists in which I included all my notes as to the species I had taken in Colorado.

University Days, 1874-77

Mr. Edwards' son, my chum, was very urgent that I should do something more practical than butterfly collecting. We were fond of each other and he had great influence with me and finally I told him if he would go to Cornell University I would go too and take the course in Civil Engineering. It was a great mistake as I should have specialized in biology where my inclination lay. I made a creditable record and received in 1877 a first degree in Civil Engineering followed by the full degree as Civil Engineer in 1890.

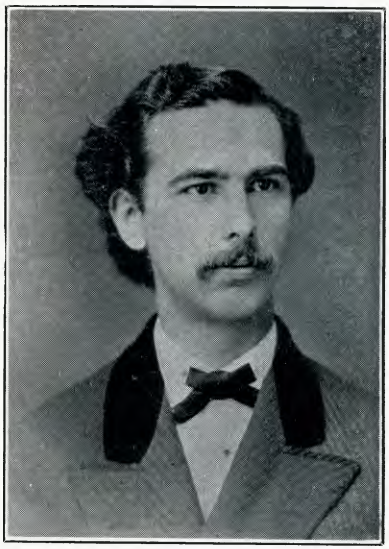
The engineering boys were kept hard at work at recitations and laboratory work. They boarded with citizens mostly. Although they had athletic diversions I knew almost nothing of them. I never had a baseball in my hand until over 22 years of age. My spare time was given to Natural History, and I had a good deal of leisure as I had had a good mathematical groundwork at the Columbia College

School of Mines. For me work in chemistry or any branch of Natural History was just play, but the higher mathematics courses were difficult. I did not have much contact with the Botanical Department under Prof. Prentiss where there were good facilities. Professor Fuertes, head of the Engineering Department, was most kind and always a friend. His youngest boy, Louis, the bird artist, was always one of the most valued of my friends and Fraternity brothers. Dr. Wilder in biology was helpful but would stand for only serious work.

I sold my butterfly collection to Carnegie Museum at Pittsburgh in 1877. Notes on Insects and Flowers were published in the Popular Science Monthly for May 1877.

One of my good friends among the Alpha Delta Phi boys was a genial Texan, afterward known to history as Colonel House, President Wilson's friend, who was the only one I know who could utilize energetic cuss words and make it sound as though he were pronouncing a benediction.

My initiation into Alpha Delta Phi seemed to me the most wonderful and the happiest thing that had ever come to me, the very ideal of brotherhood and fraternal



Theodore L. Mead as an undergraduate university student; at the age of 22 years.

love. As I wrote the boys nearly fifty years later, that day stood out as one of the three wonder days of my life, with my wedding day and the day of my confirmation in the Episcopal Church.

The Alpha Delta Phi boys were anxious to build a Chapter House of their own. They had then only a thousand dollars cash in hand but a graduate brother guaranteed their contracts for building a comfortable and suitable Chapter House costing $14,000.00. I wanted to do all I could to help but my means were limited. My mother who was anxious for my spiritual welfare wrote me that I could lend the boys $500.00 for their house if I would agree to attend one Orthodox Evangelical Church service every Sunday for a year. My father wrote on the envelope "Don't you do it, Ted. Charge $10.00 a time and stop when you get sick of it." I got the money for the boys. They insisted on crediting compound interest and twenty years later paid the debt in full with a thousand dollars which came in just right as the freeze of 1894-95 had destroyed our orange groves and incomes. The

old house was duly paid for and the present one is a beauty costing something over $205,000.00 besides a $15,000 lodge building erected as a memorial building, by his mother, to a boy who died while a member of the Chapter. The last initiation I was privileged to attend was in 1926. The boys invited me to come and give the "charge" to the initiates and added that it was customary to provide transportation both ways, in this case 3000 miles to Ithaca and return. Of course I accepted the invitation and the boys actually said "it was worth it." They presented me with the latest badge of the Fraternity and in it claimed me for not only my own class of '77 but adopted me into the class of 1926 as well.

Post Graduate Activities, 1878-82

In March 1878 my parents and I started for California having obtained authority to stop over one steamer between Panama and San Francisco at Colon, 1971 miles. As the train for Panama did not leave till the next morning we walked along the

House occupied by Mead party in Acapulco, Mexico, April, 1878 (Calle del Pacifica)
Reproduced from freehand pencil drawing by Theodore L. Mead

railroad tracks for three miles or more finding the ground much parched and overgrown with cattail-like rushes and papyrus reeds and great clumps of salt water ferns and morning glories. Orchids and epiphytes had a stunted and dried up appearance doubtless due to the drought. Butterflies were scarce and represented by only common species and insects of other orders even scarcer. Early in the morning of the 29th we had breakfast and took our places in the cars of the Panama railroad. These were very poorly and cheaply constructed, worse than emigrant cars I had seen at home. As we entered the country epiphytes became more abundant but there were many bromeliads and I noticed a few orchids growing. Many trees were leafless owing to its being the dry season. We were transferred to the steamer Colida and on the 31st we anchored at Punta Arenas and just before daylight on April 3 we passed a smoking volcano near La Libertad in San Salvador. We anchored off the town which is a surf port and receives the swell direct from the

Pacific Ocean and small boats cannot land except at the wharf. I walked through the town and up the hills. Even from the vessel there was no verdure to be seen. The ground was covered with dead leaves. Some of the orchids seemed deciduous but doubtless made their growth in the rainy season, and one species of orchid was in bloom. I followed a dry water course and saw one or two handsome butterflies *(Papilio* sp.). Along sandy and gravelly banks were prickly pears in bloom and fruit. *Cereus triangulars* grew here and was sometimes used for fencing but not like the columnar *Cereus* in Punta Arenas. "Resurrection Plants" *(Lycopodium)* grew along the hillsides away from the sea. April 3 to 8 was occupied by the trip to Acapulco which apparently was completely land locked. At a little distance from shore the mountains rise abruptly to a height of 2000 to 3000 feet. They are covered with vegetation but not so as to hide the many large boulders especially near the summit. About half the trees and bushes were leafless but here and there some leafless trees were in bloom. The Pacific Mail agent directed us to the house of Dona Rosa Clarke, the widow of an American. Don Rosa showed us a whole house which we could occupy and take our meals with her. The house was quite new and cost, with the grounds, $5,000. It rented by the year for only $12.00 or $15.00 a month which seemed like a small interest on the investment. Like the usual Mexican house, there was but one story. The house had two rooms, one 20x30 feet and one 20x20 feet. The floor was of common red tile 8 inches square laid in mortar. The roof which also was tiled is sloping and covered both house and a ten foot veranda on either side. The tiles were also laid in mortar, that is to say, a large dab of mortar at each tile kept out driving rains. The house was a plain parallelogram without break except for doors and windows. Each of the two rooms had a door facing the street and protected by wooden shutters and iron gratings. The walls were of adobe and about 20 inches thick. For mother there was a mosquito bar. The beds were very hard and by no means restful. Shortly after six o'clock we went to the casa of Dona Clarke for supper. The meals were of Mexican dishes except the bread which comes from the bakery in French style. At seven our breakfast was brought to us by Silverio, a serving lad, 12 years old. It consisted of excellent coffee with sugar and a little milk and fresh rolls. Sometimes we had mangoes and other fruit from the garden and Silverio was always ready to cut green coconuts for our refreshment.

Later in the day we went to the bay and examined the purple sea urchins and star fish and sea anemones and odd crustaceans looking like our pictures of trilobites. At noon we had dinner consisting of a thick soup and vegetables including ripe peas boiled and a dish of "roast beef and eggs" stewed with garlic, chicken stewed with garlic, onions stuffed with hard pot cheese and fried in batter, and boiled plantains and sweet potatoes. At all meals we had tortillas of the white Indian corn of the country soaked thoroughly and ground by hand on a stone having a slightly cylindrical shape by means of another stone rolled, grasped in both hands. The operation seems quite long and laborious as the corn is ground to a fine paste, pressed thin in the hands and cooked without further addition or preparation.

Captain Coffin of the Pacific Mail store-ship kept his ship anchored in the bay to avoid paying custom duties on the P. M. supplies. He took us on an excursion on the bay. The pelicans allowed us to approach within a few feet: they were very tame. Though occasionally shot for sport, the natives rarely molest them. He took us over the store ship and we visited the American cemetery where are interred the remains of those who have died at sea and a good many American settlers at Acapulco. It is just as well that our visit was during "las secas"—the dry season as Acapulco had the reputation of being a terrible yellow fever nest during the rains. We made many prospecting trips. April 14th I had collected some cacti and got a bag of Mexican matting to pack them in but a big scorpion soon crawled out. I exterminated him with fire and sword, i. e. my knife and lamp. April 19th the steamer started for San Francisco. On May 7 we left for Los Angeles and the San Gabriel valley. Los Angeles was not much more than a village then but it seemed attractive. I found a 40 acre tract near town with an orange grove and a house for sale for only $6,000 and my father said I could have it if I liked but at the Sierra Madre Villa the owner wished to borrow on mortgage at one per cent. a month. The Villa was a charming place with its own flowing water supply and my father thought the prospective income too attractive. A few months later the owner paid up the mortgage in full and I missed out as Los Angeles now has over a million of inhabitants and petroleum was

found all over the place. The acres of April and May flowers all the way to Los Angeles were a delight to the eye but there was almost no living vegetation in the Mojave desert by May 23. A week later we were in the Yosemite valley for a six weeks stay. Nearly everyone dashed in and left again in three days but we went first horseback over all the trails and then repeated the trips on foot, overpowered by the magnificence of the rocks and scenery. Every day of our stay they seemed more glorious and wonderful. We got tickets from San Francisco to New York allowing for indefinite stop-overs anywhere. Before leaving the Yosemite Valley I gave an illustrated lecture on insects at the local district school. The audience was small but seemed appreciative. After a very short stay at the Big Trees at the Mariposa station, we left San Francisco for Summit Station, Nevada and Lake Tahoe and Tallac Peak where I found a rare Alpine butterfly allied to the Mt. Washington and arctic species which I afterwards named *Chionobas ivallda* (Mead). We camped a couple of days near Freel's Peak and Tallac Mountain, to investigate the butterflies. We visited Virginia City and went down in the silver mines. Collected for a day or two at Cottonwood Canyon, Utah, visited Salt Lake City and had a dip in Great Salt Lake; visited Green River, Wyoming, noted for the fine thin shales containing impressions of leaves and insects. I visited entomologists near Chicago and Davenport, Iowa. In September I stayed for a couple of weeks with my future father-in-law, Mr. Edwards, at Ithaca. From Ithaca I visited most of the active chapters of my Fraternity in New York and New England and was received everywhere with affectionate regard. A few weeks were devoted to studying the Catskill butterflies as Mr. Edwards was anxious to trace the life history of *Limenitis arthemis* which was suspected of being a dimorphic form. After a few days visiting my friends in Newport I went to Martha's Vineyard and Nantucket.

In 1880 I spent some time in Ithaca, New York, visiting my Fraternity chapters from New Haven to Ann Arbor, Michigan, and Dr. Hagen at Cambridge with whom I dined. He showed me the biological collections which had constituted his life work. He spoke most kindly to other professors of my entomological work. I visited the Harvard Chapter which numbers among its graduate brothers both the Roosevelts—Theodore and Franklin D. In July I went to Newfoundland and got many of the local *Papilio brevicauda* at that time only as caterpillars which later hatched in New York giving a fine series of variations. The black flies of Newfoundland were a terrible handicap. They went through fine mesh tarletan like weasels through a rail fence. Soon after leaving the hotel one's face would begin dripping blood and the bites were very poisonous. I told my father that the next year we would go a thousand miles south instead of north to see if it could be any worse. We learned afterward that copious anointment with tar and lard would keep them off. In Florida, of course, we encountered redbugs but they were but a mild annoyance.

I attended Columbia University Law School in 1879 as my Dad said "You must know law to keep out of it".

In 1881 in collaboration with an English entomologist we published an illustrated magazine called PAPILIO, devoted to lepidoptera exclusively, which appeared in four volumes in 1881-1884 and then was continued as Entomologica Americana now being printed by the Brooklyn Entomological Society.

In 1882 I was married to the daughter of William H. Edwards, the author of "The Butterflies of North America", whose publication began in 1868 and continued till 1884. We took our wedding trip to the English cathedrals with incidental studies at Kew where I reveled in the wonderful collections.

FLORIDA IN THE 80'S

In 1881 my father bought an orange grove for me at Eustis, Florida. After our return from Europe in 1882 my wife and I made our home at Eustis for six years. The Eustis groves grew well but were slow in producing fruit. After a minor frost or two, my father took the property off my hands and enabled me to buy twenty acres of bearing trees at Lake Charm, near Oviedo, producing up to five thousand boxes at a crop. This was in 1886 and in that year my long hoped for baby arrived. She was charming and strong and robust and it seemed as though my every wish were to be fulfilled. When she was four years old she contracted scarlet fever and after seventeen dreadful days and nights she was gone.

In the 1880's in Florida there was almost a certainty of fair crops but no certainly of fair returns. Men like Mr. E. S. Hubbard and Mr. W. S. Hart of Hawks

Park had their regular customers for fruit and little people like myself depended on the Fruit Exchange and sometimes got a fair price for their fruit. Cooperation was among few, and far between, and jealousy and doubt were the rule among those handling our products on commission or otherwise. A little example in my own experience of one of the most esteemed among those handling fruit and vegetables for us was illuminating. We customarily marketed our crops at the Farmer's exchange. Our friend asked us to let him have 500 crates of fine lettuce and said he could get $5.00 a crate for it and we reluctantly consented. They went by express on his order. Ten days later we inquired and were told that returns had come in. Three months afterwards we received a settlement at nine-tenths of a cent per crate for the 500 crates. The check was $1.38 and no explanation was forthcoming. Our friend had doubtless "taken a chance" and turned them over to some irresponsible commission house in New York and, having been "stung" could do no less than transfer the sting to the grower. An auction house made a specialty of oranges for export. A special fee of ten cents a box was charged for selecting fruit specially suitable for export. He sent 200 boxes of my oranges to Paris and collected 200 francs for loss on the next carload I shipped. I argued that if his judgment were as poor as that he should rebate the $20.00 fee I had paid him and he saw the point and returned it.

The crop of 1889 on 20 acres at Lake Charm yielded 3698 boxes and the return F.O.B. was $6,526. The cost of picking and packing at that time averaged not more than 33 cents a box. The crop was packed in my own packing house; the cost included labor and all materials. We saved and sold 2132 boxes before "the big freeze" in 1894-95 from our 20 acres but nothing more for 20 years.

My venture in vegetable growing had its ups and downs. I put a $1200 cover on an acre of cucumbers. The December 1894 freeze had destroyed every cucumber in Florida and by replanting during Christmas week my crop on one covered acre was 1474 baskets of cucumbers which sold for $2254. The second covered acre suffered from cold winds and downy mildew and produced nothing.

Collecting Palms

I had come in contact with English and Italian collectors of palm seeds and had contracts to be supplied with every lot or kind brought in by the collectors. We had an infinite amount to learn as to Florida climatic conditions . . . . still at the time of the Great Freeze in 1894-95, I had 250 species in pots or planted out.

In the early years at Oviedo I used to import great quantities of palm seeds from foreign dealers abroad. One day I received as many as 80 registered packages of seeds in the mail. On receipt of the seed, I would open them up carefully, and plant the palm seeds in a mixture of crushed charcoal and chopped sphagnum moss, in pots in my shaded greenhouse. I marked them with zinc labels and watered them carefully until the seed sprouted. When the seeds began to sprout I would take them out of the sprouting medium and pot them up in rich earth as soon as possible, the remaining unsprouted seeds being left in the pots of charcoal and moss until all chance of their growing was gone. This was necessary because of the uneven habit of sprouting that some of the seeds have.

One of the slowest palms to come up in my experience was *Acrocomia totai,* one of the spiny species, the seeds of which stayed in my sprouting pots for four years and three months before the first seedling shoot appeared. After five years a number of others germinated in the same lot of seed.

I got the majority of my palm seeds through Dammann & Co., Mr. Sprenger, Chief Collector at San Giovanni a Teduccio, Italy, and whatever I was able to get through Benary & Co. and Haage & Schmidt, Erfurt, Germany. I was to have samples of every palm seed brought in by Mr. Sprenger and any other seed thought to be interesting. All plants were immediately planted in pots of crushed charcoal and sphagnum, labeled, and the pots imbedded in a zinc box. There were many *Phoenixes, Chamaedoreas Arecas,* and *Elaeis,* colored *Latanias* like "rubra" and "Commersoni" and *Caryotas* and species of *Cocos,* but hardly any examples of the rattan palms offered to sprout. I kept samples of many but the names often seemed doubtful. For example, I had seven alleged species of *Phoenix,* varying in size from my little finger to the size of coffee berries and all as *"Phoenix siamensia".*

A good many of the more delicately leaved species were attacked by fungi and bacteria making black lines along their principal nerves. It was told to persons to

whom I tried to dispose of them that these were diseased and worthless and could not be brought back to health. None of the *Cocos* or *Phoenix* suffered in this way. I planted out most of the *Cocos* and *Phoenix*. Many of the *Caryotas* and *Chamaedoreas* and also the *Latanias* froze. After the big freeze it seemed useless to continue with tender things. As my mother had better water protection at Eustis than I had at Lake Charm, I sent most of the species to her but most of them died. If I had had any correspondents on the lower east coast I should have sent the supposedly tender things to them but there seemed nobody specially interested.

The Great Freeze, 1894-95

In 1894-95 came the great freeze destroying the Eustis property and my groves at Lake Charm beyond repair and reducing my income from about $100.00 a week to almost the vanishing point. On this reduced income my wife and I lived for the next year owing no man anything except debts of love and affection; although things became easier afterward, experimenting mostly had to be given up. The 200 acre lake-front and residence at Eustis had cost about $40,000. After five years the best offer for the property was one dollar an acre for the 100 acres of uncut pine land, but I later sold it for $5000.00. Twenty years afterwards the purchaser showed me a contract to sell it—during the "boom"—for $300,000. but the boom soon faded out.

During the freeze of 1894 the temperature went to about 17°F at Lake Charm and the citrus leaves and the largest twigs were destroyed. No very serious damage would have ensued if it had not been for the second freeze in February 1895, six weeks later. In the meanwhile, the trees being full of sap, made a tremendous growth from all the unfrozen limbs and branches making shoots of from one to two feet long covering every tree. Then came the second freeze destroying all this material and the trees had no remaining stored up material to make new growth so that the injury was great. Numerous subsequent freezes destroyed most of the new growth that the trees were able to put out. It seemed to me that the trees might better begin new tops from near the ground but that was a mistake owing to the numerous minor freezes that kept coming for several years. The most successful growers sawed off or chopped off everything down to the size of a man's arm and the new shoots from the body of the tree stood the frost better than smaller ones from near the trunk. My nearest neighbor and friend borrowed $10,000, spent for cultivation and fertilizer; the other sufferers did the best they could, using muck for bedding the animals in the stables. With such fertilizer some of them were successful in bringing their trees back. Without some sort of fertilizing the task was hopeless.

At the time of the 1894-95 freezes I had stoves in my greenhouses to protect my orchids and other tender plants, but everything outside, that was not hardy, was hard hit. My orange grove which was of some 20 acres in extent, on the slope at the rear of my house, was equipped for irrigation with a hydrant every 40 feet. On cold nights I ran the water with a 20 horse power engine. Between the first "freeze" of December 1894 and the later one of the following February, which totally destroyed the trees, I saved and marketed 2200 boxes of oranges. The grove was of old trees, some of them giant size, and all heavy bearing. The crop had netted me $7200.00 some years. The two successive freezes killed my trees down to the ground, and they never came back in a satisfactory manner. At present all the site of the old grove is a dense woodland. I planted small trees a number of times after 1895, to get a new start, but a few winter frosts cut them down and I gave up the attempt.

Central Florida was nearly deserted after the "Big Freeze". Many of the grove owners left the state for good, abandoning their properties without any precaution for their maintenance.

Orchid Breeding

I had accumulated a pretty good collection of orchids not hurt by any freeze and for years the one thing I did was to study out the means of raising these from seeds. Hybrid seeds were available by millions from fine pollen supplied by Northern experts. Aseptic methods of culture had not yet been invented. The more natural methods of growing on suitable bark and fern roots stripped from the trees were subjected to a terrible handicap due to the devouring propensities of tiny midge larvae which ate the compost together with the tiny plants from the thalloid stage

on literally by the thousands of millions. No adequate protection seemed possible. As the natural propagation of seedlings seemed more successful up in more breezy places, or at least at higher elevations, I installed a water ram with finest cyclone nozzles forty feet up among the live oak branches but without much avail.

My best results were from a case about 30 feet long covered with glass containing live sphagnum and supplied with currents of moist air on which pillows of cheese cloth containing ground up decaying oak leaves with sphagnum, first sterilized by heat and then infected with symbiotic fungi obtained from the little orchid plants that had come up among my experiments. A friend permitted me to divert his four-inch flowing well giving about 100 gallons a minute to a water wheel which ran a fan blower at about 1000 revolutions per minute. The plantations were protected from the weather by a greenhouse cover. The air was passed through a cheesecloth filter and I had little trouble from molds and none from insects, though afterwards in my regular greenhouse the midge larvae were most destructive. The air was moistened by a case containing live sphagnum and pots of it through which the moistened air circulated. This case was mostly of glass to make sure of the proper condition of the sphagnum. As there was a constant strong current discharge outward from the case there was no trouble from the access of insects. A lamp stove in the moistening case kept the air warm on cold nights without the products of combustion entering the case. Among the pillows in the case were many plantations from mixed seeds of every available kind so that if conditions proved favorable there should be innumerable plants available. A typical successful plantation gave several hundred leafy rooted plants averaging half an inch across of *Cattleya trianae* x *Laelia flava* between February 12, 1903 and June 16, 1904.

During my temporary absence in the north this case and all the glass covering my plantations were stolen and carried away and I never got any trace of the thieves. Although most of the machinery was left intact, I was so discouraged that I had to give up the plan as there was no certainty that the thieves would leave anything portable. They began with the oil cups and the glass and all my reserve bulb boxes from the packing house and then all the window sashes from the building.

I had intended to leave all my orchids and greenhouse plants to the Royal Palm Park but the December 1934 freeze was so destructive and the damage was so severe here, that I expect to send what is left to Mr. Clifford C. Cole of Coconut Grove who has means to care for them and is, himself, expert in their care, to be kept as the Mead collection at his home.

As to helpful orchid experts I was greatly indebted to Oakes Ames, Esq., of North Easton, Mass. for advice and assistance, and to Mr. E. O. Orpet, now of Santa Barbara, Cal., formerly gardener at S. Lancaster, Mass., for fine pollen and to Mr. Robert Grey with whom I exchanged orchids.

From time to time my orchid notes were published by the London "Orchid Review" describing among others *Cattleya oviedo* and *Cattleya meadii* (Rolfe).

Amaryllis Breeding

After saving what I could of the young orchid plants, I gave most of my attention to the breeding of Amaryllis *(Hippeastrum)* bulbs, being greatly helped by Mr. Henry Nehrling allowing me to take whatever I wanted from his fine pollen. Besides the extremely dark and almost or even wholly white shades there were encouraging rosy pink ones and I found two specimens with just a hair line color around each petal, and intercrossing these I laid a foundation for nearly white varieties with a narrow border around each petal. My sales were mostly confined to seedling bulbs at ten cents for mixed and fifteen cents for those under color. I tried for a market for cut spikes but though the dealers said they bloomed perfectly, instead of offering them for sale they dumped my boxes refusing to attempt sales in competition with their own flowers. Perhaps a little more persistence would have found a market for cut spikes as they were most gorgeous. One serious mistake was to allow visitors to select any seedling flowering plant at 50 cents, although reserving anything that seemed rather extraordinarily fine for breeding. Meanwhile I had a partnership Market Garden at Sanford for the sale of vegetables with varying results.

I suggested to my business partner as a worthwhile venture, five acres,—four acres of paper white *Narcissus,* then the most promising of bulb speculations, and one acre of my fine crossbred Amaryllis.

My partner seemed to think there were too many diseases among the young Amaryllis plants to make them worth bothering with and refused to concede that my crossbred seeds had any market value whatever; but when we had raised a million Paper Whites and one acre of fine Amaryllis, Mr. Drewry of Daytona Beach purchased our five acre crop for $16,000.00. The remaining Amaryllis at Lake Charm were included in the sale, at various prices according to size from 2 cents to 15 cents each but Partner said they were of no value and that I was welcome to whatever I could get for them. As near as I can figure it out, they brought around $3,500. which was by no means a negligible item.

"While the quitting was good" I sold at cost my 5 acre plot at Sanford and closed my chapter of Amaryllis culture except for a reservation of about 700 specially fine bulbs. I cleaned them all and soaked them in semesan bel as a fungicide, retiled the land and put in new water pipes and grew a crop of celery to refresh the land but they began to do very badly in too sour soil and if not removed to a new location they would have all perished miserably. They are now being cared for in an entirely new location near Orlando by Mr. John R. Springer, and seem to be recovering in the new soil from all their troubles. In their first location they had grown and bloomed magnificently for twenty years or more.

Crinums, Daylilies, Gladioli, Cacti, etc.

When I first came to Florida there were very few crinums growing in the state to any extent. Besides the native *C. americanum* there were *Crinum amabile* and its related *C. augustum,* which the early British settlers had brought in from Jamaica, *Crinum kirkii, C. asiaticum* and a few others of the "Milk and Wine" type. In the early days, sometime around 1890 or before, I obtained a large and extensive collection of crinum species from an English collector named Lancaster at Lucknow, India, who made a specialty of crinums and allied plants. He sent me nearly 80 species and varieties of crinums besides a number of alocasias and other plants.

I drained a small muck pond in front of my house, and grew the crinums there, endeavoring to raise as many and as varied hybrids as possible. Unfortunately the complete collection, with the exception of a few bulbs that I had in another location, and others that I had given away, was lost when my drainage tiles stopped up and flooded the old pond area again. I often wondered what became of the Lancaster collection in India.

When I first planted seeds of my crinum hybrids, I lost most of them by setting them out in the high, sandy orange land, where they grew slowly indeed, and it was fifteen years before they were as big as carrots. However, I replanted them later down on my sub-irrigated celery land, in the low hammock section, and the bulbs rapidly grew to blooming size in this rich, moist location. The best results of the hybridizing work was my named hybrid crinum *"Peachblow".* As I have no records of the crosses made, and it was 17 or 18 years after the cross was made that the plant bloomed, I have no idea what species were used in it. Possibly *C. moorei* was one of them. It is a free blooming crinum of vigorous growth under good conditions, and has a delicate perfume. The color is light pink, nearly white, when open, but more intense pink on the reverse side of the petals before the flower has opened.

The late Mr. Nehrling was another sincere crinum enthusiast in Florida at that time and later, and we cooperated in this work to some degree.

At present I have in my collection a large stock of the *"Peachblow", "Ellen Bosanquet", Crinum amabile, C. scabrum, C. virginicum, C. giganteum,* and a fine type of the *"giganteum"* which may be a hybrid, but is smaller in size.

More than 10 years ago I entered the hybridizing of *Hemerocallis* or Day Lilies to see what could be done in them. I obtained crosses, growing numbers of seedlings to blooming size. Out of these I have introduced only one variety, my *"Chrome-Orange",* as outstanding. It is a handsome flower, of slightly different color than any other *Hemerocallis* that I have seen.

These Day Lilies are very easily grown in Florida and elsewhere, and are easy to hybridize, the difficulty being to originate new types of sufficient novelty or improved characters to make it worth while to introduce them.

My efforts at hybridizing with the gladiolus began about 18 years ago when I bought a single bulb of the variety *Golden Measure,* which was new and sold at $5.00

each at that time. I also obtained some of the best primulinus varieties I could buy and a few species, crossing them on *Golden Measure* for the first generation. Later I crossed the results back on *Golden Measure* again. I obtained, in time, a selection of choice seedlings, with five inch golden yellow flowers, growing 5 and 6 feet tall, and which proved admirably adapted to our climatic conditions. Some of them were fine yellows, some had flecking and dotting with orange and coppery red. Within a few years I accumulated quite a stock of the best types, and a dealer in Deland, Florida, made an arrangement to grow them on and introduce them. This was about the time of the Florida "boom" which drew men from all trades into the real estate business. The dealer suddenly left his bulb business and after they had been growing on for another year in Deland I went over to investigate the situation. I found the bulb man's foreman had let them become crowded with grass and eventually all I obtained from the lot was half a bushel of the bulbs out of the 2½ bushels I had supplied in the first place. This discouraged me in any future attempts to introduce the types I had originated.

Among the species I used in crosses, the most interesting results were obtained from *Gladiolus quartinianus,* a vigorous, blood-red species from tropical Africa. This species has too long a growing season, I understand, to make it practical for growing outdoors in the northern states, and I hoped to develop a strain of gladiolus suited especially to the Florida climate and similar sub-tropical areas. I have a number of these types still growing in my garden and have distributed bulbs to friends for trial. The hybrids are quite distinct. I consider gladiolus breeding as perfectly feasible in the Florida climate and having the possibility of producing some wonderful things, because of our excellent growing conditions and long season.

The humming birds gave me trouble in hybridizing gladiolus. There were hundreds of them around the flowers in the evenings and I could not see that they missed poking their way into a single bloom. Outside of bagging the individual blooms I found it was necessary to make the crosses very promptly, as soon as the pollen and pistil were ready for effective hybridization.

I obtained numerous shipments of cactus seed from Germany during the early years of the century. I have always had an admiration for this group of plants and have trained them in the trees and let them climb over palms and shrubs around my house. I can report a few hybridizing attempts, at least three of which were successful and resulted in important hybrids. I crossed a *Schlumbergera* species on a *Zygocactus,* and also produced another hybrid in the *Phyllocactus* group, crossing *P. latifrons* on *P. phyllanthus.* One of the most interesting hybrids was a bi-generic one between a pink-flowered *Zygocactus* or Christmas cactus, with short flat pads, and the well known climbing cactus, *Cereus boeckmannii,* sometimes classed as a *Selenicereus,* which is white-flowered and is native to south Florida and the West Indies. This cross gave a plant similar to the *Cereus boeckmannii* in character of form and growth, but with delicate pink flowers. The hybrid is not nearly as large as the *"Boeckmannii"* parent, however, having much more slender proportions. It has bloomed once for me.

I have performed numerous experiments in the grafting of cactus, both in the greenhouse and under open air conditions.

Work with Bromeliads and Caladiums

The Bromeliads interested me greatly and over a period of years I introduced many representatives of several genera, viz., *Aecmea, Ananassa, Billbergia, Cryptanthus, Guzmannia, Hohenbergia, Nidularium,* and *Tillandsia.* Work with these gave many interesting crosses of rare beauty in leaf forms and markings and in their gorgeous flower spikes.

Caladiums, because of their lush growth, tropical appearance, and the gay colorings of many forms, have always been favorites. I crossed *C. albanense,* a small thick leaved species with two other nearly plain leaved sorts from Sanders & Co. These hybrids again were crossed with Brazilian varieties resulting in a race with leaves of a different shape which I named "Arrow and Lance". The extreme variation in these was shown by some having nicely variegated leaves three quarters of an inch wide and a foot or more in length. Nearly all seedlings could be recognized as belonging to one or the other of the two races, no matter what the parentage. Unfortunately these new forms have never made much impression on the trade.

The list of sub-tropical plants, bulbs, trees, palms and shrubs that I have imported, introduced, grown from seed, experimented with, or otherwise had in cultivation during the more than 50 years of my life in Florida is too long to give even a small part of it here. It would be only rather dry reading, like a nursery catalogue, and the majority of them, while novelties then, are now so common as to arouse little interest in a native of the sub-tropics.

I understand that in some quarters I am credited with introducing the valuable ornamental bush, *Carissa grandiflora,* which has handsome edible fruits, into Florida in the 80's. Perhaps this may be so, but I have no record of it, although I was importing hundreds of packages of plants, seeds and bulbs every year in those days. I rather think, in the case of carissa, I obtained it from some northern greenhouse or firm specializing in hot-house exotics. I used to buy every sort of plant or bulb that was offered in the northern catalogues as suitable for the sub-tropics. Many of them I lost, from freezes, insects, animals, storms, droughts, and even from human thievery. Many others have now become commonplace things in our Florida life. For instance, I imported many nerines from various sources, and those that survived did well under our climate until one night they were stolen in entirety and I never saw them again. I imported a bulb of the rare *Ismene* type of yellow *Hymenocallis,* known as *H. Amancaes,* from Haage & Schmidt, at Erfurt, Germany, one of the rarest bulbs known, only to have one of our huge Florida grasshoppers devour it entirely as it hung curing in my bulb house. I never had the temerity to attempt its introduction into Florida again, and so far as I know it is still non-existent here. From the firm of Benary, also at Erfurt, I obtained many of my rare plants. In those early days there was no difficult matter of quarantines to bother the importer of bulbs and plants.

In the fifth issue of the Florida State Horticultural Society there are three pages containing my report as to Ornamental Plants. May 1892, two pages in 1910, in 1897 a paper on orchids, 12 pages, 38 to 50.

L'Envoi

In 1927 came the end of forty-five years of loving companionship with my wife. The doctors said it was cerebral hemorrhage but she knew what was coming and the last thought was for me as she said lovingly "I am sorry to have to leave you this way, Teddy".

As I look back on four score years, the retrospect seems chiefly jewelled with happy friendships for young and old in all parts of the world. The things of the heart are the permanent ones in my life and nearest to what we creatures of a day may dream of as immortality.

Loving labor is never quite lost though sometimes results may seem almost infinitesimal but I feel that warm friends in Florida and elsewhere are ever ready to carry on.

Dr. David Griffiths*

WM. A. TAYLOR,

Bureau of Plant Industry, U. S. Dept. of Agric.

BORN at Aberystwith, Wales, on August 16, 1867, son of David and Rachel (Lewis) Griffiths, he died at Emergency Hospital, in Washington, D. C., on March 19, 1935.

He came to the United States with the family when about three years of age, settling on a farm in South Dakota, his early education being in the local schools, including Groton, S. Dak., Academy and Aberdeen, S. Dak., High School. Having taken a general scientific course, majoring in botany, he was graduated from the South Dakota Agricultural College in 1892, receiving his M.S. in 1893. During his attendance in college he taught school in winters, and from 1893 to 1898 taught

Harris & Ewing

Dr. David Griffiths

biology, physics and chemistry in the Aberdeen, S. Dak., High School. Specializing in botany and zoology at Columbia University, he received his Ph.D. in 1900. At this time he was interested in the study of fungi, publishing contributions on powdery mildews, smuts, ergots and others in *Asa Gray Bulletin, Torrey Botanical Club Bulletin* and elsewhere.

He was professor of botany and botanist of the Experiment Station of the University of Arizona in 1900-01, there beginning the studies of grasses and other

*Reprinted from Science, 81:426-427. 1935.

range plants and range management which continued through the first fifteen years of his service in the Federal Bureau of Plant Industry, which he entered in 1901 as expert in charge of field management in the Office of Grass and Forage Plant Investigations. This work involved extensive travel and field studies of native pasture grasses, salt bushes and cacti, from the Canadian border southward well into Mexico. These studies resulted in numerous department publications in which, along with other conclusions of scientific interest and practical importance, the imperative necessity for avoidance of overstocking the ranges with resultant depletion of plant cover and destructive erosion was emphasized. In these studies he became impressed with the economic importance of the cacti as forage plants, and through utilization of native stands and experimental plantings in Texas and California established the usefulness of some of these as emergency forage reserves to tide over drouth shortages. His published results of experiments with "spineless" prickly pear constituted the most important stabilizing factor during the extravagantly optimistic exploitation of this plant which occurred during the first decade of the present century, and served effectively to warn the public against the indiscriminate extensive planting of the spineless forms in climates to which they are not adopted because of their susceptibility to injury by cold.

Appreciating the possibilities of cacti as ornamental plants, he early assembled a comprehensive collection of species and varieties at the Plant Introduction Garden at Chico, Calif., which afforded material for the preparation of a fine collection of colored illustrations, unfortunately as yet unpublished. Close to 3,500 numbers of Opuntia were included in the Chico collection. From these experimental studies of the cacti resulted a steady flow of papers on taxonomic, agronomic and horticultural phases, published by the Department of Agriculture, the Missouri Botanical Garden, with which close cooperation existed, and in various scientific and popular journals from 1905 to about 1920. These materially enlarged available knowledge of cacti and were of particular importance because of their timeliness in relation to the development of the wide-spread and intensive interest in them as agricultural and horticultural plants.

His steadily increasing interest in the horticultural field resulted in his eventual assignment to the bulb production project of the Bureau of Plant Industry, to which approximately his last twenty years were devoted. Some preliminary experimentation in the commercial production of Dutch bulbs, in distinction from the flowering of the imported bulbs both out of doors and under glass, had previously been done, with results which indicated probabilities of developing satisfactory production of some species. Economic conditions differed so widely from those in the European countries from which the imported supply came, and the lack of training and experience in the art of bulb growing among American growers was so obvious that the pioneering of the industry along lines technically efficient and economically sound was a difficult undertaking. Though the funds available were woefully inadequate for the purpose, Dr. Griffiths entered the field with such enthusiasm of spirit and tenacity of purpose, and so promptly devised scientifically sound and practical methods of procedure that he soon became recognized as the unquestioned leader in this field. Maintaining experimental plots and to some extent variety collections at Arlington Farm, Va., Bellingham, Wash., Willard, N. C., and cooperative tests with interested amateurs and commercial growers in many sections, his leadership was largely responsible for the progress thus far made in commercial bulb production in the United States.

Even as senior horticulturist much of his field work was of necessity done with his own hands, frequently under weather and soil conditions which involved physical hardship and hazard to health which would have discouraged one less resolutely persistent and determined to carry through the undertaking. His sustained enthusiasm and courage under such conditions inspired loyalty in his assistants and encouraged them to do their very best.

Dr. Griffiths' most extensive and immediately important bulb work from the economic standpoint dealt with the devising of practical methods of growing and handling the bulbs of narcissi, tulip, hyacinth, as well as Easter, Madonna, Henry, Speciosum and Tiger lilies and other already widely grown and extensively imported Dutch bulbs, upon most of which he published extensively and usefully through the Department of Agriculture. He was at the same time intensively interested in the newer and less well-known bulbous plants, notably the Regal, Nankeen and other

foreign lilies, and especially in such potentially important lilies as the Leopard, Lemon, Humboldt, Columbia, Martagon, Turk's-cap, Canada and other native species. He worked out and published practical methods of propagation of these and many other bulbous plants. Determination of the economic value of the American grown bulbs in contrast with the imported product necessitated intensive experimentation in their curing, transporting and storing, and especially the effects of storage temperatures upon their reaction to the forcing house conditions under which they are extensively utilized by florists. He had much hybridization of bulbous plants under way, particularly lilies and daffodils and had named and described a considerable number of promising new varieties, some of which are in process of dissemination.

His technical articles on bulb subjects, which comprise many papers in the proceedings of scientific societies and bulletins of the department, were effectively supplemented by a steady flow of less formal articles addressed mainly to a rapidly increasing audience of actual and potential bulb growers who could best be reached through such representative horticultural trade periodicals as *Florists' Exchange, Florists' Review, Seed World, etc.*, in which more than one hundred articles were published. His crisp and lucid style of presentation added greatly to the practical value of these communications, for he possessed in marked degree that informal clarity of expression which while sometimes vexatious to editors is the joy and satisfaction of the lay reader.

Reared, and in the main schooled, close to the agricultural frontier of that time Dr. Griffiths developed a rare combination of scientific accuracy in his research, and sound common sense in the practical application of his discoveries. Indefatigably industrious and efficient, the work which progressively he undertook on fungi, grasses, cacti and bulbs he put his whole soul into.

Dr. Griffiths married Miss Emigene Lily in 1905, who died in 1909. A daughter, Mrs. Elizabeth Griffiths Lash, and a son, John D. Griffiths, survive, together with his widow, Mrs. Louise Hayward Griffiths, a sister and a brother.

Dr. Stout's "Daylilies"

"DAYLILIES" by A. B. Stout, Ph.D., subtitled "The Wild Species and Garden Clones, Both Old and New, of the Genus Hemerocallis.". New York, 1934, The MacMillan Company, 119 p., ($3.00).

Here is the last word, for many years to come, at least, on those popular garden favorites, the Daylilies, which Dr. Hutchinson, the Kew botanist and systematist, now places in such close relationship with the *Amaryllidaceae*.

Dr. Stout, distinguished plantsman, hybridizer, and Director of the Laboratories of the New York Botanical Garden, proves himself an entertaining, painstaking and reliable author in this more or less popular treatment of his subject. The book will be of never failing interest and endless value to the confirmed *Hemerocallis* fancier, and should also produce a host of new converts to this most attractive garden perennial. The technical treatment in the book never becomes downright tedious or dull, and the general material on the history and evolution of Day Lilies, ancient and modern, carrying the annals of these plants from the late Renaissance on through to the new developments of such striking beauty as both Dr. Stout and Mr. Carl Betscher of Dover, Ohio, have produced, makes the reading matter as absorbing as many a novel.

Hemerocallis has a particular appeal to the flower loving world. The flowers are outstandingly beautiful, and yet somewhat ephemeral, hence their name, "lilies for but a day". They are one of the few perennials that thrive from Canada to southern Florida, and while being of reasonable hardiness in the northern states, they bloom earlier in the year and stay nearly evergreen in the sub-tropics.

Dr. Stout is chiefly known in the field of Day Lilies for his five hybrids, "Mikado", "Cinnabar", "Soudan", "Vesta", and "Wau Bun", named varieties of his creation through many generations of crossings, and all regarded as triumphs of the hybridizers art. "Mikado", in fact, is sometimes called the "world's best Day Lily". It is a fine orange with mahogany red-brown blotches which distinguishes it among hundreds of other varieties.

Dr. Stout shows photographs of two other varieties of his hybridizing, "Theron" and "Vulcan", in the book, which are not yet generally distributed, and which every *Hemerocallis* fan will find most captivating.

The author's best results in his hybridizing seem to be the variations in the fulvous or mahogany-red coloring obtained as the results of his crossings of many varieties and species. "Cinnabar", "Theron" and "Vulcan" show this to advantage.

Besides the list of natural species with full descriptions, Dr. Stout provides an invaluable check-list of all named varieties of Day Lilies recorded to the time of publication. This is very complete, and helpful in checking collections and trade lists, besides forming in itself a minor history of the cultivated plant in recent years. A Hemerocallis Breeders' "Who's Who" ends the book.

There are chapters on the Botanical Characteristics of Daylilies; Names of Daylilies; The Natural Distribution of Daylilies; Daylilies in Historical Retrospect; Species of Daylilies; The Horticultural Clones of Daylilies; An Evaluation of the Daylilies; The Uses of Daylilies; Culture and Care; and Propagation, Seed Production and Breeding.

The excellent illustrations, some of them in color, help to make the volume more important to the plant enthusiast and breeder. The book is an ornament to any garden lover's library table, and will fill a distinct want which has existed for many years, there having been previously no comprehensive treatment of *Hemerocallis*.

Besides Dr. Stout, perhaps the leading Hemerocallis breeder in the United States is Mr. Betscher, of Dover, Ohio. A number of his new varieties are described in the checklist of this book, and we wish that Dr. Stout had given us a little more data on the Betscher varieties and breeding history besides the brief note in the Appendix.

The author of "Daylilies" has had the advantage of the purely scientific approach to the study of *Hemerocallis* species and varieties, and the results obtained both in his breeding and the final appearance of this admirable study indicate that the time and money which the research has cost over a number of years have been well spent. His work has brought to our gardens a number of remarkably beautiful Day Lilies, and he has enriched horticultural literature with an interesting and useful treatment of the Genus which leaves us with the hope that even greater things are to be forthcoming before many more years in the field of fine, hybrid *Hemerocallis*.

June 1, 1935 WYNDHAM HAYWARD
Winter Park, Florida

American Daffodil Year Book

The members of the Society are familiar with the valuable Daffodil Year Book issued by the Royal Horticultural Society, London, and we are indeed glad to welcome the American Daffodil Year Book, 1935, published by the American Horticultural Society[1]. It appears in practically the same style and format as the four numbers which comprise each volume of the National Horticultural Magazine.

It contains a preface by Mrs. Francis King, an appreciation "To the Daffodil" by Richardson Wright, and 16 articles by competent authorities. This is a genuine contribution to daffodil literature from the American viewpoint.

Mira Flores HAMILTON P. TRAUB
Orlando, Fla.

[1] American Horticultural Society. The American Daffodil Year Book. 1935.

Greetings to the Members of the American Amaryllis Society

On May 21st, 1933, in the City of Orlando, Florida, four men met by appointment and at the close of the meeting your Society, The American Amaryllis Society, was born.

The four men were Dr. H. P. Traub, Wyndham Hayward, R. W. Wheeler and the writer. In two years the Society has grown from a membership of four to quite a strong healthy child, and while its membership is not the largest, it is of the highest quality and international in scope. To Dr. Traub and Mr. Hayward we are greatly indebted for the Society and its healthy growth, and too much praise and thanks cannot be given them for their unceasing labor in behalf of our Society.

The First National Amaryllis Show was held last year in Orlando, Florida and the second this year in Montebello, California, both of which were a great success, as was also the Southeastern Regional Fiesta held here this year. The United States Department of Agriculture sent very fine flowers to all three shows. I wish that each member could have attended and I feel that each Regional Division should put on a show each year which would stimulate interest in the growing of better amaryllids. The Year Book of the Society has merited the highest praise from everyone interested in the advancement of the amaryllids, and a respectable number of species, new to culture in America, have been introduced.

Your President has grown amaryllids for twenty years or more, not for profit, but for pleasure and the love of the flower. I wish it were possible to meet each member personally and thank each one for the interest shown in the Society. It is hoped that each member will consider him or herself a committee of one to secure at least one new member before January 1936, so that we may start the coming year with a still more prosperous Society.

With the best of wishes for each member, I remain

Yours to command,

June 1, 1935
Orlando, Florida

E. G. Duckworth,
President.

Report of the Secretary

By the time this Year Book reaches the membership, the American Amaryllis Society will be well on its third year of progress. One may well challenge any other plant society to have shown the same degrees of successful achievement in its early stages.

With the cooperation of Year Book advertisers and active members, as well as the distinguished contributors to our publication, our first year was ended with all accounts paid and a small balance left for the 1935 season. The Society has made a name for itself with its first Year Book, under the able editorship of Dr. Hamilton P. Traub of Orlando, Florida, and your Secretary foresees an even better reception for the present number.

The Amaryllids as a class are of so much interest in ornamental horticulture that it now may seem remarkable that no previous organization was formed to study the group. For greenhouse and conservatory as well as the window garden in the north and for general outdoor plantings in warm climates, there is no family of plants having a greater variety of types of culture, colors and shapes of flowers and foliage possessing the most pleasing and decorative qualities imaginable.

In the past year the Society has made valuable new contacts with Amaryllid lovers in East and South Africa, Australia, South America, especially Argentina, England, Germany, Denmark, Holland, Italy and Japan.

Many new friends in the United States have added their sincere enthusiasm to our efforts, and have been kind enough to say that they have found our first publication, the 1934 Year Book, both intensely interesting and distinctly valuable.

In addition to Mr. A. Worsley and Mr. Theodore L. Mead, the Directors have elected as Fellows of the Society: Miss Ida Luyten, of the Laboratory for Plant Physiological Research, Wageningen, Holland, in recognition of her original researches in the vegetative propagation of *Hippeastrum;* Prof. Ferdinand Pax of Breslau, Germany, the venerable botanical systematist and lifelong student of the *Amaryllidaceae,* in recognition of his work in this field; Dr. J. Hutchinson, of Kew Gardens, England, for his progressive and inspiring revision of the *Amaryllidaceae.*

Since the publication of the 1934 Year Book the Society has held three Amaryllis exhibitions, two of them National Shows and all of them most successful. Full accounts are available elsewhere. Flower lovers have thus been enabled to view the hybrid Amaryllis and allied types at their best, and the message of beauty inherent in this royal family has been carried by direct visual means to thousands of people.

The Secretary has written more than 2,500 letters, supplying information, circulars, and other material in the last two years and a half, and does not regret this expense of time and effort. The Society's business is already of considerable scope and the volume of correspondence compels recourse to nearly-forgotten training in varied linguistics. It is not unusual to receive letters in Italian, German, French, Spanish and Portuguese, not to mention Dutch, English and French in the same week.

Scientific, botanical and horticultural journals throughout the world accorded our 1934 Year Book a very friendly and favorable reception. There seems to be a very decided rising tide of interest in the Amaryllids and the Society hopes it may fill a real place in supplying accurate information.

The appeal of the Amaryllis is to all walks of life, the learned and the amateur gardener. The letters from members to the secretary indicate clearly the genuine feeling for the Amaryllids that has such a strong hold on nature lovers all over the world whenever they come into contact with them. How many times have I read various versions of the line "I fell in love with the Amaryllids the first time I saw a gorgeous hybrid Amaryllis in bloom"!

Some have a strong leaning toward the dainty *Zephyranthes,* others like the more robust crinums, some are fascinated by the graceful nerines, *Hymenocallis* or *Lycoris;* a few prefer the native species as they grow in the wilds. Many are working zealously to improve on nature's work with the magic of the hybridizer's art.

A large number of the genera are still neglected, despite their interest and value. These include *Haemanthus,* nerines, more or less, and *Lycoris, Vallota, Pancratium, Buphane, Crytanthus, Brunsvigia, Calostemma* and *Eurycles.* Let us hope these will become more readily available to plant lovers for trial in the future. Many other genera remain practically unknown.

The Society has sponsored and encouraged the commercial growers in efforts to introduce named varieties of hybrid Amaryllis, nerines, etc., believing that still greater popularity will come from the availability of standard varieties of the bulbs, so that a customer may know in advance what he or she is getting, as prevails already in the case of peonies, iris, gladoli, etc. Research has been undertaken by members on the thorny subjects of forcing, curing and storing amaryllis bulbs.

If the depression has proved anything, it has shown the value to the commercial grower of quality stock over an unknown mixture of orphaned origin, every time. There have never been too many high quality hybrid amaryllis, nerines, etc.

Personal acknowledgements of all the favors and assistance received, the cooperation freely given and the information gladly supplied would fill many pages but the secretary cannot let slide the opportunity of mentioning a few of the names of persons and organizations to whom he is in some way indebted,—President E. G. Duckworth, who has proved himself a worthy head of a worth-while organization; Vice President, Dr. H. P. Traub, the never-tiring editor and patient worker in pure and applied science; Theodore L. Mead, Lord Aberconway, Harry L. Stinson, Basil N. Ikeda, Mrs. John H. Churchwell, Richard Diener, Al. G. Ulrich, Mrs. William Lyman Carter, the late Dr. David Griffiths, W. L. Fulmer, Mrs. Frank Joyce, D. C. Royer, Pierre S. duPont, W. A. Percy, I. W. Heaton, E. H. Krelage, C. W. Hall, Frank Vasku, C. G. van Tubergen, Ltd., E. P. Zimmerman, Cecil H. Houdyshel, Fred Howard, J. Wise Byrnes, A. Worsley, George W. Mitchell, R. E. Morrison, Arthur R. King, Mrs. B. A. Dominick, Rev. J. W. Ischy, Russell S. Wolfe, Arno H. Nehrling, A. C. Splinter, John R. Springer, Dr. S. C. Harland, E. O. Orpet, Alexander Steffen, Mrs. Emma M. Foster, William T. Walke, Robert F. Ruthruff, The Massachusetts

Horticultural Society, the New York Botanical Garden, Kew Gardens, Jose F. Molfino, Camillo Schneider, Miss Ida Luyten, and Treasurer R. W. Wheeler.

These are just a few of the "most active" members and cooperators who have assisted the secretary in his efforts. There are many others equally as deserving of mention, but lack of space forbids.

In the year to come the Society hopes to continue its work of introducing promising species for the gardener and hybridizer. It will hold its third annual National Amaryllis Show in central Florida, some time between March 15 and April 15, 1936. The Secretary will endeavor to answer all his mail promptly as long as the "Royal" and his two good forefingers hold out. Members near and far are urged to write of their experiences and problems in connection with Amaryllid culture, and last but not least, pay their dues early in the year. It takes money to publish a Year Book, and the information in a single issue is worth many times the cost of an annual subscription, $2.00. The more memberships we receive, the better Year Book we can put out. A membership with its accompanying Year Book would be a most suitable birthday or Christmas gift to a plant-loving friend, and it is to be hoped that many of the friends of the Society will take advantage of this idea. Tell your friends of the Society's work.

In the future issues of the Year Book we want to publish more illustrations of fine specimen plants, perhaps even a color plate or so. Any special donation for this purpose will be most sincerely welcomed.

The Secretary acknowledges with thanks the receipt from Prof. F. Pax of a "separate" of his monograph on the *Amaryllidaceae* which appeared in 1930 as a part of Vol. 15 of the great Engler and Prantl "Pflanzenfamilien". Dr. Pax and K. Hoffman collaborated on the monograph. Under date of Dec. 2, 1934, Dr. Pax wrote: "The *Liliaceae* and *Amaryllidaceae* are very closely related, as I stress in the introduction to both families in the publication. The *Agaveae* and *Hypoxideae, Alstroemeriaceae,* as well as the *Conostylideae* are a little more removed from the typical *Amaryllidaceae* and therefore are treated by me as sub-families. The *Velloziaceae* are treated by me in the "Pflanzenfamilien" as a special family. The *Agapantheae, Alliae, Gillesiae,* which are included in the *Amaryllidaceae* by Dr. J. Hutchinson, I should prefer to leave among the *"Liliaceae."*

Special mention should be made of the assistance of two members of the faculty of Rollins College, Winter Park, Florida, in some of the problems coming to the attention of the secretary during the last two years, Dr. Richard Feuerstein of the Department of Modern Languages, and Prof. J. C. Th. Uphof, of the Department of Botany, an internationally known scientist in his field.

Your editor-in-chief, Dr. Traub, is too modest to say anything about it, but he is attempting a marvelous naturalistic landscaping of his new country estate near Orlando, Florida, "Mira Flores", which bids fair to rival the efforts of the English specialists in this line. Bulbs of the Amaryllis family will form the keynote of his scheme, and I suppose, in ten years or so the outcome will be a new revision of the *Amaryllidaceae,* based on modern phylogenetic principles and observations of the living plants under all conditions. Your Secretary humbly suggests that interested members of the Society communicate with him direct if they have any spare material of rare species available for exchange in the cause of science.

The best bit of humor of the year was the plight of a member who bought a volume entitled "Amarilis" through his bookseller, after much searching, only to find it was a short novel of artist life in a California coast city.

So now, *vale atque vale* until another twelvemonth, and I close with three lines from Spencer's "Colin Clout's Come Home Again" (1596)

"No less praiseworthy are the sisters three.....
Phyllis, Charyllis and sweet Amaryllis.....
But Amaryllis highest in degree."

Winter Park, Florida
June 3, 1935.

WYNDHAM HAYWARD,
Secretary.

Report of Trial Collections Committee

The Trial Collections Committee of the American Amaryllis Society reports the receipt of the following material during the period of 1934-35, to the time of publication of the Year Book. Contributions have been in the form of seeds and bulbs which will be grown under careful supervision with the aim of eventual distribution to interested members when sufficient supplies are available.

The catalogue follows:

No. 1, *Zephyranthes Ajax,* handsome variety with straw-colored flowers, and round, rush-like foliage. Reported to be a hybrid between *Z.candida* and *Z.aurea,* or between *Z.candida* and *Z.citrina.* Packet of seed received from James L. Gebert, New Iberia, Louisiana.

No. 2, *Hippeastrum* species or variety, received from Robert D. Mitchell, Orlando, Florida; possibly *Hippeastrum solandriflorum, var. conspicuum.* Vigorous red-flowered type similar to what is in the trade as *H. Johnsonii.*

No. 3, *Hippeastrum equestre, var. major,* collected in old Florida gardens. Fine species, of earliest culture, with free blooming habit in spring. Bright orange-red blooms with yellowish throat, fast multiplier and thrives under poor soil conditions in Florida. Donated by I. W. Heaton.

No. 4, *Crinum americanum,* collected in swamps of central Florida, by Dr. Hamilton P. Traub. Fine white-flowered species, very difficult to bloom in cultivation. A real aquatic plant.

No. 5, *Crinum* species, possibly *C.zeylanicum* or *C.sanderianum,* collected in old Florida gardens by Wyndham Hayward. Handsome reddish-pink and white flowers. Vigorous summer bloomer.

No. 6, *Hymenocallis* species, from old Florida gardens, possibly *H.keyensis (caribaea).* Large white sweet-scented blooms. Flowers in summer. Donated by Wyndham Hayward.

No. 7, *Hymenocallis* species, possibly *H.rotata,* from swamps of eastern Orange county, Florida. Dainty white flowers. Aquatic plant. Collected by Dr. H. P. Traub and Wyndham Hayward.

No. 8, *Hippeastrum rutilum fulgidum,* red-flowered species, received from James L. Gebert.

No. 9, *Cooperia drummondii,* Texas Rain Lily, pinkish white flowers, after the summer rains. Seed received from James L. Gebert, New Iberia, La.

No. 10, *Zephyranthes robusta,* free-flowering pink and white species with glaucous foliage. One of the best of the genus. Easy culture. Donated by Wyndham Hayward.

No. 11, *Haemanthus coccineus,* rare South African "Blood Lily". Seed received from E. O. Orpet, Santa Barbara, Calif.

No. 12, *Zephyranthes rosea,* dainty rose-colored flowers with flat leaves. Smaller than carinata. One of the most beautiful species. Donated by Dr. Hamilton P. Traub.

No. 13, *Crinum* species, unknown, from British Guiana, contributed by Windham Hayward.

Nos. 14 and 15, *Hippeastrum* species, unknown, from British Guiana, donated by Wyndham Hayward.

No. 16, *Hippeastrum* species, Habranthus type, pink flowers, contributed by Rev. C. W. Hall, Austin, Texas.

No. 17, *Haemanthus multiflorus* (?) bulb cuttings, contributed by R. E. Morrison, Tavares, Florida. Handsome species of South and Central African "Blood Lily", with globular heads of fine scarlet blooms in an umbel 9 inches in diameter. Bulb is dormant in winter. Naturalizes in Florida.

No. 18, *Amaryllis belladonna* variety, received from E. O. Orpet.

No. 19, *Crinum scabrum,* fine red and white flowered species. Sets seed freely. Contributed by T. L. Mead of Oviedo, Florida.

No. 20, *Hieronymiella clidanthoides,* interesting and rare amaryllid from Argentina; seed received from Sr. Alberto Castellanos, Buenos Aires, Argentina. Bulb with white flowers.

No. 21, *Hippeastrum* species, seed received from Sr. Alberto Castellanos, Buenos Aires, Argentina; Possibly *H.ambiguum.*

No. 22, *Zephyranthes* species, bulbs collected as *Z.caerulea* in Entre Rios Province, Argentina, by Sr. J. R. Baez, for Sr. Jose F. Molfino, of Botanical Laboratory, Argentine Ministry of Agriculture. Received from Sr. Molfino, (10 bulbs in all, seven of which proved to be corms of *Calydorea campestris* (Klatt) Baker. This is a rare South American irid.) The first of the three remaining true *Zephyranthes* bulbs bloomed *white* in spring, 1935, indicating it was not *Z.caerulea*, which had been offered members of the Society, when available, in the 1935 membership circular. *Z.caerulea* is reported to have "pale blue" flowers. New attempts to import the true *Z.caerulea* are being made with the cooperation of Argentine officials.

No. 23, *Zephyranthes treatiae*, native Florida species, of difficult culture, received from Mrs. W. A. MacArthur of Jacksonville, Florida.

No. 24, *Zephyranthes texana*, received from H. B. Parks, San Antonio, Texas. Excellent small yellow flowered species native to Texas.

No. 25, *Zephyranthes longifolia*, bulbs received from H. B. Parks, San Antonio, Texas, and also from H. Harold Hume, Gainesville, Florida. Handsome yellow-flowered species, native of Texas and New Mexico. Found growing in highly calcareous land.

No. 26, *Hymenocallis* Sulphur Queen (Ismene group) yellow flowered Ismene, of easy growth, a hybrid originated in England as a cross between *H. calathina* and the rare yellow flowered species, *H. amancaes*. Bloom similar to Ismene, with slightly larger cup. Delicate yellow coloring with greenish throat. Contributed by Dr. Hamilton P. Traub.

No. 27, *Zephyranthes atamasco*, bulbs contributed by Russell S. Wolfe, Orangeburg, S. C.; native species of difficult culture.

No. 28, *Zephyranthes carinata*, received from Russell S. Wolfe, Orangeburg, S. C. The usual large pink "Fairy Lily".

No. 29, *Nerine sarniensis*, the Guernsey Lily. Contributed by Wyndham Hayward. Scarlet flowers, spidery in form, blooming in late summer after foliage has died down.

No. 30, *Crinum parvum*, seeds received from The Lady Muriel Jex-Blake, of Nairobi, Kenya Colony, East Africa, in February, 1935, and fair germination obtained. Strong possibility of important future for this species as an ornamental house or conservatory pot plant exists because of its small size and handsome flower and foliage. Lady Muriel writes that it is "small but charming". The small size of this plant may serve to make this species popular with flower lovers who have found the usual run of crinums too large and awkward for ordinary culture. It is reported to be the smallest crinum known.

No. 31, *Hippeastrum* equestre bulbs contributed by Hon. E. B. Martyn, Govt. Botanist, Georgetown, British Guiana.

WYNDHAM HAYWARD,
Chairman.

Winter Park, Florida,
July 1, 1935.

The Secretary's Mail Bag

The Dominion Government greenhouses at Ottawa, Canada, can show some large-flowered hybrid amaryllis. Photographs of some of the choice blooms which were submitted to President E. G. Duckworth of the A. A. S. show numbers of unusually large flowers, one of them described as being 13 inches across. One of the California growers claims to have them up to 16 inches. That must mean a long "duck bill", which is what the Florida growers call an extended narrow lower petal on a hybrid bloom. Twelve-inch blooms are reported from the collection of the Bureau of Plant Industry, U. S. D. A., at Washington, D. C., but 8 to 10 inches remains a very large bloom in Florida plantings.

Many amateur growers call special attention to the number of blooms in the umbel on a single scape of their amaryllis, when this exceeds four, which is the usual number for a well-bred bulb. Occasionally six, seven or even eight blooms on a

spike are to be seen, and the writer has seen one instance of nine. However, a little study soon convinces the flower lover that more than four is little but an oddity, and six becomes usually grotesque.

One of the most distinguished new members that our Society has enrolled this year is Major Albert Pam, O. B. E., of England. Major Pam is a dyed-in-the-wool follower of Dean Herbert, a genuine amaryllis fan, as we would say in America. He writes under date of June 14: "I shall be very pleased to cooperate with your Society in any way possible, as I have a good collection of Amaryllidaceae from all parts of the world, but especially from South America. I could often send you seeds of species which have flowered with me and sometimes even bulbs . . . . " The foregoing speaks for itself and the Society extends to Major Pam its sincere appreciation for his willingness to cooperate with us so whole-heartedly.

The recently discovered South American Amaryllid, *Pamianthe peruviana,* was named after Major Pam, who imported the bulbs from Peru several years ago. This plant is close to *Hymenocallis (Ismene)* and is illustrated in this Year Book. Dr. Stapf described this plant in the Botanic Magazine. Major Pam writes: "It is a marvelous plant with very large strongly scented flowers . . . . . the only trouble with this plant is that the seeds remain fertile for but a few days, and I very much fear that if I sent them to you even by post they would not germinate readily after a transit of a week. However, it might be better if I could send you a complete seed pod as soon as I notice the first crack in the pod while it is attached to the plant. Then I believe the seeds would probably retain their fertility and would germinate readily."

Major Pam informs us he will "have at least 100 of these plants *(Pamianthe peruviana)* in flower in February and March next, but the seed pod takes 12 months to ripen, and I should therefore not be able to send it to you for distribution until early in 1937. The plants raised from seed will flower in 3 or 4 years."

Readers are advised not to miss the 1936 Year Book, with its Autobiography of Mr. A. Worsley, Dean of the Amaryllis fraternity in England. Although now past 70 years and not so actively engaged in the field, he still retains his sincere interest and enthusiasm. It is the story of the life and career of an English gentleman, a scholar, an eminent horticulturist, and a keen-minded business man with far-flung interests.

All members are invited to contribute plant material to the Trial Gardens Collection of the Society. When sufficient material becomes available it is intended to place the collection in the care of a scientific institution, a college horticultural department, or a municipal park board, for purposes of permanent preservation, with the Society having full rights to the distribution of seeds and natural increase of the bulbs.

The New York Botanical Garden, by action of the Board of Directors of the A. A. S., has been appointed an official cooperator of the Society in the study and identification of rare and unknown plants of the Amaryllis Family, with the aim of ultimately making accurately listed specimens available, through increase, to interested members. Persons having rare or unidentified bulbs of the Amaryllis family may send them to the New York Botanical Garden, Bronx Park, N. Y., in the name of the Society or to the Chairman of the Trial Collections Committee.

This is the intriguing description of the diminutive *Crinum parvum* which the Lady Muriel Jex-Blake of Nairobi, Kenya Colony, East Africa, helped the Society to introduce this year, (The words are Lady Muriel's) "The bulb is small, as crinums go, a little larger than a very big daffodil bulb; leaves perhaps half inch wide, to three-quarters of an inch, and 18 inches long. They rather lie on the ground, or at least are upright for a very short way, and then turn over. They come alternately from the bulb, with an effect of 'plaiting' which is attractive. The flowers are on

short, moderately thick stems, and about 4 to 6 scented white flowers, turning pink with age. These flowers are from two to three inches long, quite small, more the shape of a cyrtanthus flower,—long, narrow and tubular, but very charming. The bulbs establish themselves quickly, and then flower frequently through the year". The above is dated May 29, 1935 at Nairobi. This does not exactly coincide with the official description of the *"Crinum (Codonocrinum) parvum,* Baker, (Amaryllideae-Amarylleae) ex affinitate X. pauciflori, Baker", as kindly furnished by Dr. A. D. Cotton, Keeper of the Herbarium at the Royal Botanic Gardens, Kew. It may be an entirely new species.

By announcement of Dr. Lee A. Strong, Chief of the Bureau of Entomology and Plant Quarantine, U. S. D. A., previous restrictions against the wholesale entry of narcissus bulbs, including daffodils, paper whites, etc., into the United States, will be lifted December 15, 1936. After this date the bulbs will be admitted from abroad under Regulation No. 3 of the Nursery Stock, Plant and Seed Quarantine No. 37, without limitation as to quantity and utilization. This change of policy by the Bureau, on grounds that the pests on which the old quarantine restrictions were based have become so widespread that nothing is served by keeping out the bulbs any more, has aroused considerable discussion pro and con among the amateur narcissus fans, professional growers, dealers, etc. Increased tariff protection to safeguard in some degree the investments of American narcissus growers has been proposed as a partial solution of the problem.

Amaryllis fanciers should not neglect the little orange-flowered *Hippeastrum equestre major,* just because the bulbs are common, and quite inexpensive. It takes the place of tulips in Florida gardens in the spring, and blooms unfailingly, unless given too much attention. It makes the best bulbs if left alone in sandy soil and also blooms well in such a location. If fertilized heavily, it seems to put its efforts into forming offsets, and may forget to bloom at all. It is probably without doubt the most prolific of *Hippeastrums.* It is very difficult to set seed on a *Hippeastrum equestre major,* with its own pollen or with pollen from hybrid amaryllis. Out of more than 100 crosses in one experiment, less than a dozen seed have been obtained. It is apparently useful in crossing on the hybrids, however, and in this way the salmon and orange shades may be introduced. A yellow shade might well be derived from this species, as it has a distinct yellow throat.

Crinum giganteum is an important and distinct white, winter-blooming type, for outdoors in warm climates. It likes a little shade, but will do well in the sun with rich soil underneath. It produces magnificent umbels of white cup-shaped blooms, even in January, which are often used by gardeners, to replace lilies at that time of the year when occasional white blooms are wanted in planting effects.

Pancratium maritimum is an easy seeder. It is an interesting plant for the subtropical garden, and the greenhouse. It blooms in Florida mostly in late May and June, just as the foliage dies down. The foliage makes its growth during the winter months, and is of a handsome glaucous green shade. The bloom is similar to a glorified *Hymenocallis* with a handsome serrate-edged cup, as in the daffodil. The color is white, and the bloom has a delicate perfume.

Lovers of the narcissi should not fail to try other varieties of this bulb in the winter-flowering section, than the usual "Paper White" and "Grand Soleil d'Or." Several other types are available in the trade.

Pure whites in hybrid amaryllis (with no markings of any other color, except light green in the throat) are known in quantity in Europe in the trade, having been reported from England, Holland and Germany. The United States Department of Agriculture has developed a small stock of the pure whites, in the Bureau of Plant Industry greenhouses at Washington, D. C. It is expected that the bulbs will be offered at reasonable prices in the United States before many years, in quantity. At this time they are largely in the hands of private collectors and fanciers. The average price for good specimens in Holland and England is about $5.00 each. In the United States they have been offered for $10.00 each. The flowers usually have a light greenish throat, which some growers believe sets off the crystal purity of the petals to better advantage.

All efforts to obtain the rare yellow-flowered species, *Hippeastrum rutilum citrinum*, reported as native to Brazil, and illustrated in color in Mrs. Bury's great monograph on Hexandrian Plants a hundred years ago, have been unsuccessful to date. One member, Mr. Pierre S. du Pont, reports receipt of a supposed specimen of the bulb, which bloomed a brownish color to his disappointment.

No one seems to know just what species of crinum is the one called "Milk and Wine Lily", and found growing in great clumps or rows around old homesteads in the deep South. It probably includes one or more of the following kinds: *Crinum zeylanicum, C. kirkii, C. fimbriatulum, C. erubescens,* or *C. sanderianum.*

A European horticultural agent has offered American collectors part of a collection of new hybrid nerines developed by the late Florentine naturalist and plantsman, Dr. Attilio Ragionieri. These are said to be exceptional, for their late-blooming habits, some of them offering the possibility of being actual winter-blooming types, with their flowering period as late as December.

"Attilio Ragionieri—Medico-Naturalista—(1856-1933)" is the title of an interesting brochure issued by the family of the noted Italian hybridizer who received first recognition for a *Crinum moorei-amaryllis belladonna* hybrid, and who died in October, 1933. The brochure contains reprints of various eulogies and obituary notices with interesting biographical details of his plant achievements, published in Italian, English, American and German magazines, among others. A copy of this brochure was presented to the American Amaryllis Society by the Ragionieri family.

Hybrid Amaryllis—"Due to ease of culture, and wide range of colors, the hybrid forms are very suitable for commercial culture, either as pot plants or for cut flowers." This is the comment by Messrs. Alex Laurie and L. C. Chadwick, Ohio State University authorities on floriculture, in their new and admirable work, "Commercial Flower Forcing", which has rapidly taken foremost rank among books for the professional greenhouse grower. The book is published by P. Blakiston's Son & Co., Inc., Philadelphia, Pa. It has much of value for the flower and bulb gardener wherever he may be. The quotation brings up a fine point about hybrid amaryllis, its use and place as a cut flower. Unfortunately, hybrid amaryllis are unjustly neglected by the American florist, and the use of the blooms in cut flower work is almost unknown.

I. W. Heaton, as designer, was awarded second prize ribbon for a basket arrangement of hybrid Amaryllis blooms, exemplifying the use of this flower in floral design work at the 1934 Spring Flower Show, of the Orlando, Florida Garden Club Circles. His entry was in competition with Watsonias, Gladiolus and Snapdragons.

Class No. 15 of "Foliage and Flowering Plants", open to amateur and professional competition, will be for "Nerines, collection to cover 50 square feet, decorative foliage plants permitted", at the 28th Annual Autumn Exhibition of The Horticultural Society of New York, which will be held in the American Museum of Natural History, 77th Street and Central Park West, New York City, on November 7 to 10 inclusive, 1935. There are two cash prizes offered in this class, $50.00 and $30.00, for first and second places respectively. Members of the Society are invited to view this class at the New York Fall Show if they are interested in the finest devlopments in nerine hybrids. The show is otherwise devoted mainly to chrysanthemums. Mr. Henry F. du Pont, a member of our Society, is president of The Horticultural Society of New York. The du Pont family is outstanding in America for its interest in hybrid amaryllis and allied bulbs.

Two of the best trade catalogues devoted to amaryllids and also many other bulbs, that have come to the attention of members of the Society, are those of Philip Montague, Humphries road, Frankstown, Victoria, Australia, and C. G. van Tubergen, Ltd., Zwanenburg Nurseries, Haarlem, Holland.

Important awards for exhibitions of choice hybrid amaryllis at the Decennial International Flora Show in Holland in the spring of 1935, were won by the firms of Ludwig & Company, and W. Warmenhoven & Zonen, both of Hillegom, Holland. *The Gardeners' Chronicle,* (England), published a large illustration of the Warmenhoven exhibit, in part, on page 223 of issue No. 2519, Vol. XCVII, dated April 6, 1935.

Zephyranthes robusta is the newest of these beautiful "Fairy", or "Rain Lilies" to come into real prominence for pot or garden culture. The flower is not quite as large as that of *Z. carinata,* but is more trumpet shaped, and more abundantly produced. The species sets seed easily, which *Z. carinata* does not do, and may be useful in hybridizing. The color of the bloom is a delicate orchid pink and white. A single bulb may send up five bloom spikes in a month under garden culture. The bulb is probably tender in the north. It has handsome foliage. It is the most vigorous of all *zephyranthes* yet observed and of exceptionally easy culture, taking kindly to naturalizing, in warm climates.

Zephyranthes citrina, is a handsome yellow type, with dainty grassy foliage, and a habit something like *Z. texana.* It was located some years ago in an old garden at Daytona Beach, Florida, and the bloom is golden-yellow inside and out, and sets seed readily. It is larger and more vigorous than *Z. texana.*

Crinum moorei is an absolute failure, so far as observed in outdoor culture in Florida, unless given partial shade. It also wants rich, permanently moist soil. The handsome foliage is badly burned by strong sunlight. It remains one of the most beautiful *Crinum* species. It sets seed readily, and was the stand-by of all the hybridizers for many years until the "Milk and Wine" group came in.

Mr. Cecil E. Houdyshel reports that his admirable free-blooming hybrid crinum, "Cecil Houdyshel" was produced by using pollen of *Crinum moorei* on *Crinum longifolium (capense).* He does not recall whether the seed parent was "longifolium alba" or "rosea", but thinks it was "alba." More than 600 of such crosses were made, according to Mr. Houdyshel, and the named hybrid is the darkest and most floriferous of the lot. His latest named hybrid, "Virginia Lee" is a seedling of crinum "Cecil Houdyshel", and shows partial reversion in the bloom type to its grandparent, *C. moorei.* Crinum hybrids are usually not fertile, as Mr. Houdy-

shel points out, but "Cecil Houdyshel" bears a few seeds, especially after hand pollenization. It is interesting to note that "Cecil Houdyshel" is the result of the same crinum cross as was employed to create *C. powelli,* although the latter is inferior in its ordinary varieties to Mr. Houdyshel's variety. There are improved varieties of *C. powelli* offered in Europe, called "Krelagei," and "Haarlemense."

Crinum zimmermani, according to its originator, Mr. E. P. Zimmerman, of Carlsbad, Calif., is the hybrid of *Crinum giganteum X Crinum powelli. Giganteum* was the seed-bearing parent as "Powellii" does not set seed. It bloomed for the first time in Mr. Zimmerman's nursery, "Ramona Nursery", at Alhambra, Calif., in 1914. Mr. Zimmerman describes the plant as growing 6 to 8 feet tall under best cultural conditions. The growth, he says, is inherited from the mother plant, while the color came from the male parent. The flower is a delicate light pinkish white, with long pointed petals. It is nearer "Powelli" in shape of the bloom.

June 15, 1935,
Lakemont Gardens,
Winter Park, Florida.

WYNDHAM HAYWARD,
Secretary.

Notice of 1936 Nominations

To the members of the American Amaryllis Society:

As provided by Article 5, Section 1, of the By-Laws of the American Amaryllis Society, which specifies that the secretary shall send to all voting members, not less than 90 days before the date of the annual election, a list of the offices to be filled and the names of those whose terms expire, this information is hereby incorporated in the data below, and same will take the place of a mailed notice to the members to this effect for the 1936 election:—

President	Mr. E. G. Duckworth
Vice Presidents	Dr. Hamilton P. Traub
	Mr. Gordon Ainsley
	Mr. James L. Gebert
Secretary	Mr. Wyndham Hayward
Treasurer	Mr. R. W. Wheeler
Director-at-large for 3 years	Mr. Walter J. Guille

Article 7, Section 1 of the Constitution, provides that any voting member may submit to the Secretary, not less than sixty days before the annual meeting, nominations for officers and directors. These shall be submitted to a nominating committee, who shall select the candidates for the final ballot.

The Annual Meeting of the Society in 1936 will be held on the second Wednesday in April, as provided by Article 10, Section 1, of the Constitution, this being April 8, 1936. Therefore the names of nominees must be submitted by the voting members to the Secretary before February 12, 1936.

WYNDHAM HAYWARD,
Secretary.

June 8, 1935,
Winter Park, Florida.

The Secretary would like to take this opportunity of calling to the attention of members again the desirability of adding new members and enlarging the field of the Society by bringing it to the attention of horticulturists and garden lovers everywhere. The 1935 Year Book, we hope, will be considered a notable example of the Society's constant efforts to bring together the latest research, the newest accurate and useful information and interesting illustrations concerning the important amaryllis family. The income of your Society is used solely for the publishing of its Year Book, the holding of Amaryllis exhibitions, and generally supporting the other worthy aims of the organization.

This useful work can only be carried out in the future and expanded by the continued support of all present active members and the steady growth of the membership. The number of pages of the Year Book, the number and size of the illustrations, and the quality of the format are strictly regulated by the funds available. Any contributions for specific or general improvements or for additional illustrations will be deeply appreciated. By giving your cooperation in this way and in the obtaining of new members you will be helping the Society to expand its many services and to bring you a Year Book of ever-increasing value and interest.

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 obtained in any one year); Patrons, $200.00 and upwards. All remittances should be made payable to the American Amaryllis Society and sent to the Secretary.

Copies of the 1934 Year Book are still available, and will be sold to new members at $2.00 per copy. Extra copies to old members at same price.

Send in nominations for new members at an early date.

Constitution and By-Laws

of the

American Amaryllis Society

As Finally Adopted, December, 1934

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 the Hemerocallideae, the Alstroemeriales, and the Amaryllidales (J. Hutchinson, Families of Flowering Plants. II. Monocotyledons. Macmillan, London, 1934).

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 amendments 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, ETC.

SECTION 1. All classes of members shall be entitled to vote, and 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 members 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 Hemerocallideae, the Alstroemeriales and the Amaryllidales, 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 Hemerocallideae, the Alstroemeriales, and the Amaryllidales.

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. Regional Activities and Exhibitions

Notes on Amaryllid Activities in Australia

G. K. Cowlishaw, *F. R. H. S.*
New South Wales, Australia

1. The Cultivation of Amaryllids in Australia.

Australian climatic conditions favour the culture of most of the temperate and sub-tropical amaryllids in the open garden. In the Northern part of the Continent, tropical species, such as *Eucharis* flourish in the open garden, though in the South, they need, at least, the protection of a greenhouse.

Outstanding among the various genera of amaryllids that are cultivated here, are the *Hippeastrums*. These take kindly to our climatic conditions, and it is the general opinion of the enthusiasts in this class of amaryllids, who have seen the best of the oversea collections, that those strains, raised by Messrs. P. V. McCullock of Warrawee and E. McCullock of Mosman, in this State, are the best in the world.

These strains are more or less intermingled, though the latter possesses the greater range of colour, and are the result of many years of careful cross breeding and selection. The commencement of the strain was from plants of the once famous Bradley collection, in its day as outstanding as are those of the McCullocks today.. Bradley was a very keen hybridist specialising in *Amaryllidaceae,* and he raised some very beautiful flowers. In the *Hippeastrum* he aimed at large regular flowers, with equal perianth segments, clear colours and well reflexed petals.

On Bradley's death Mr. P. V. McCullock took up the work from where he left off, and gradually by patient work and always following the ideals laid down by Mr. Bradley, achieved the wonderful strain he possesses today. His nephew, Mr. E. McCullock, who always took a keen interest in these plants, and the work of his uncle, during the past ten years or so, has made a good collection of plants, all seedlings of either P. V. McCullock's raising or his own.

The method adopted in their culture, is to set out the bulbs in a fairly light soil, deeply worked and well enriched with manure. The bulbs are set out in rows about 2 feet apart and about 18 inches between the bulbs in the rows. Planting is done in February, the 1st month of Autumn, when the roots are making the Autumn growth. This means that the plants, already fully leaved move off as if nothing had happened. We find that if the bulbs are lifted in the winter as is the practice with most commercial houses, that they are very slow in starting and in many cases will rot with the spring rains.

Most *Hippeastrum* bulbs in the Sydney districts go to rest about May, and the new leaves appear just before the flowers in the spring. As many as 5 flower scapes are produced on large bulbs. Just before the flowers and leaves appear, the beds are given a dressing of fresh manure, horse manure for preference, and even if hot it goes on to the beds. The manure is applied as a mulch 2 to 3 inches thick. About this time too, a screen of scrim is thrown over the beds, so that the garden appears as being set with large tents. This has the effect of protecting the giant flowers against the winds and the scorching mid-day sun. It permits of them retaining their colours longer, and keeps the flowers in the pink of condition for a long period.

The flowers of these strains are in the main of a deep self crimson for it was this colour for which both Bradley and McCullock bred, most of these possess a black eye and do not show one particle of green. Others have white grounds marked with red, brick red, and reds in many shades, selfs and mottled or striped, and of recent years some particularly good salmon shades, and deep pinks. It is only during the last four or five years that any foreign strains have been introduced.

The flowers themselves are perfect. Large ones up to 14 inches across each individual flower being common, and very few are less than 10 inches across. The plants are very rigorously culled at flowering time, and many a plant is consigned to the dust bin, which, if it occurred in another raisers seed bed, would call forth exclamations of delight.

There are many other breeders of these flowers, the best of whom is Mr. W. Hawes of Gladesville. Mr. Hawes has been breeding *Hippeastrums* for the past 25 years, and has created a very worthy strain. During the past few years marked strides have been made in their form and shape. There is possibly a larger range of colour in these than in the McCullock's strain.

I have raised a number of good seedlings myself, working pollen from the McCullock's flowers upon bulbs imported from England. The latter though on the small size, the largest never attaining to a diameter of more than 9 inches, are very symmetrical and possess good colour. The crosses have given some very good things. I imported some bulbs from the U. S. A. from time to time about 6 or 7 years ago, but have discarded them all, as they are far too rough and ragged, and have a very narrow lip petal, and in addition the flowers were decidedly pointed. I should say that the illustration on p. 99 of the 1934 Year Book was quite typical of those imported by me. Owing to lack of space I have not raised any seed during the past three years.

There are a number of growers both in this State and in the other States who raise a number of seedlings, most of them commercially, but seem to work in a happy-go-lucky manner, making crosses without any consideration of what the result may be. Needless to say, they are creating nothing worth while, and making no progress towards the ideal flower.

The rate of increase is somewhat slow, and candidly is not much worried about. As the Amateur growers who possess the best collections do not worry so long as they possess the stock and a few bulbs every year or so to breed from, and the commercial growers have found it cheaper to grow the plants from seed. Seedlings take 30 months to flower with us, and give their best flowers in their 4th or 5th year. Plants are lifted every four or five years. The soil is thoroughly manured, and dug, and the bulbs are replanted. So far as I know they are subject to the attacks of no pests or diseases.

We find that the pollen parent gives colour and the seed parent shape and size.

Narcissi in their various forms are very popular, particularly in the Southern States, where there are many wonderful varieties raised each year. Messrs. West & Fell of Casterton, Victoria, Mr. H. A. Brown of Camberwell, Victoria, and Mr. Alister Clerk are all noted raisers of these wonderful flowers in their State, and one can confidently say that their new creations will hold their own with the best produced anywhere in the world. Mr. H. A. Brown is the most recent recruit of the three, but without doubt his productions are the most outstanding, particularly in the red cupped Incomparablis varieties. Mr. Alister Clerk's varieties include some very wonderful Leedsii types, and Messrs. West & Fell have given us some of the best Trumpet sorts we possess.

In Tasmania there are a number of growers who have raised many beautiful sorts. As these growers are all amateurs none of their creations have as yet found their way into commerce, and we have seen none of them on the mainland.

In this State, Messrs. Holloway Bros. of Brookvale have about the largest commercial collection. They raised, in the past, some very wonderful flowers, but during the past 10 years practically none. Their giant Trumpets are particularly outstanding, but are now being superceded by still better varieties. One C. W. Holloway won the champion prize at the Royal Horticultural Societies show here in Sydney 7 times in the years 1922-1932.

Dr. H. R. G. Poate, who grows his bulbs in the congenial climate of Bowral, has a wonderful collection of imported varieties, and is raising seedlings on a large scale. Already, those which have flowered show great promise. As he is using the best of the new varieties imported from the United Kingdom, as well as those of local production, some great things should come from his garden in the next few years. Mr. Hawes of Gladesville has been raising seedlings for very many years and in the past has introduced many very beautiful varieties.

The writer has been raising seedlings for the past twelve years and has had some very good results. One seedling Trumpet received Champion honours at R. H. S. Show in 1926, and another in 1927. As I was carrying on a series of experi-

G. K. Cowlishaw

Hybrid Belladonna Lily: Alabaster

Colour: pure white with yellow eye; height, 27 in.; 23 flowers on scape; individual flowers, 7½ in. (Maximum). Breeding history:—

f-1 B. multiflora rosea (Bidwell) x A. belladonna

x

f-2 B. Haythor (Bradley)

x

f-3 Self

ments in line- and in-breeding I did not expect wonderful results in the first generation or so, but am now concentrating on the production of high class show flowers. Next year I should flower some 2,500 seedlings of first class percentage, and the year following twice as many. This year I produced more seed than I knew what to do with.

While the climatic conditions of Victoria and Tasmania, and the highlands of this State, are ideal for Narcissi culture, we in the Sydney districts, and along the coastal belt, have a climate just too warm for them. We are quite 3 to 4 weeks earlier than Dr. Poate on the highlands at Bowral, where he possesses the ideal Daffodil climate.

The early workers here in New South Wales in the Daffodil field aimed at the production of early flowers and the late Mr. H. Selkirk one of the earliest workers had Trumpets opening in May (the first month of winter) and the late Mr. H. B. Bradley had Trumpets opening in the last week in April.

They fixed their Show for the second week in August and set out to breed flowers to show at it. Flowers which appear in the second week of September onwards are too late with us and only last a few days as they are soon scorched by hot westerly winds.

When I first commenced hybridizing, I too, adopted this ideal of the early flower, but soon becoming interested in the showing of blooms concentrated on the production of mid-season flowers. During the past 5 years however, I have again returned to the old ideal and am endeavouring to produce a series of first class flowers in June and July, at which time of the year, they will last about 3 to 4 weeks on the plant. Using "Fortune" as a parent and the other good things of July and August flowering, one should gain this objective in a generation or two.

There are a number of other growers who raise a few seedlings each season, but they are not working along any set lines.

The scope of this paper is too wide for me to go into detail of the culture of Narcissi here in Australia, but I must mention that only one real pest worries the Narcissi grower and that is the eel worm, which plays havoc with all collections not regularly steralised.

Next in importance are the true *Amaryllis,* or as some few call them "Belladonna Lilies", and their close relations, the *Brunsvigias.* About 1870 one Bidwell, a noted horticulturalist of his day in this country, raised a series of hybrids between the *A. belladonna* and *Brunsvigia grandiflora.* and these are the most widely grown of all Amaryllids today, under the name of *"Brunsvigia multiflora", "B. multiflora alba"* and *"B. multiflora rosea".* They are all good seeders and as one can quite well imagine, their offspring does not come true.

A well grown specimen will carry a head of thirty to forty flowers, *B. rosea* giving the largest heads, and *B. alba* the smallest. These have become widely dispersed throughout New South Wales gardens, and on account of the rapidity of their increase, and their taller stems and larger flower heads, are much more widely grown than *A. belladonna.* Of the "Belladonna Lily" proper we possess many forms of which "Rubra" is the brightest. The late Mr. H. B. Bradley raised a very fine seedling of the "Multiflora" type viz., "Haythor", pure white with an orange yellow eye. This is very quick in increase and is becoming widely spread throughout Sydney gardens.

Of recent years many seedlings have been raised by the trade from self set seeds of the "Multifloras", and presumably a number of crosses between the various varieties have taken place. Messrs. Holloway Bros. have given us "Harboard", a good white, and "Ovieto", a deep pink.

I myself have raised many thousands of seedlings of these beautiful plants and will deal with them in a later part of this paper. These plants make very good growth with us, making most of their foliage in the Autumn and winter, and early spring, the wettest period of the year. In Sydney the bulk of our 46 inch rainfall occurs in that period. They flourish in any sort of soil, and I find that full sunshine or partial shade suits them very well indeed.

In planting we set the bulbs about 2 feet apart each way and with their neck and shoulder projecting above the soil. As a group, they resent interference in a very marked degree and seem to flower best when crowded. I am quite positive that with these plants the same bulb does not flower year after year, but say once in every two or three years. Deep digging of the soil before planting, and a dress-

ing of manure just as the bulbs push through the ground helps materially in building up large bulbs and consequently in flower production.

Where they have been left alone in old gardens they quickly spread on account of the production of seed. Cross fertilization produces far more seed than self fertilized flowers. This I have carefully noted over a number of years. A cross fertilized seed pod will average 40 to 50 seeds and I have seen as high as 70, while a self fertilized seed pod will average not more than 20. The white varieties are the shyest seeders and the seedlings are the poorest growers of all, though, after their first three years they settle down and there is not much difference between the white and coloured forms. Colour is the dominant characteristic of the pollen parent. "Haythor" particularly transmits it in a marked degree.

Clivias are popular as pot plants, and are always at their best as such on account of their flowering best when pot-bound. Quite a number of good hybrids were raised 20 to 25 years ago by Messrs. Selkirk and Arthur Yates, but never in any great quantity. The late Mr. Selkirk thought it wonderful if he got from his plant half a dozen seeds. I get from some of mine 300 seeds per head.

A number of hybrid forms were imported from England, and from them the Clivias sold today were derived. There are practically no pure *C. nobilis* or *C. miniata* to be had in the trade today. The few which exist are to be found in old gardens.

C. cyrthanthiflorum is also scarce. This is a so called hybrid of a reputed parentage, *C. nobilis* x *C. miniata*. I have raised hundreds of this cross and have never had a seedling yet with flowers in narrow drooping umbels as in *C. cyrthanthiflorum*. It only survives in old gardens today.

Mr. R. M. Finch has raised some very fair varieties, and had some very good pale ones. One in particular was almost a white. Holloway Bros. of Brookvale purchased a lot of Mr. R. M. Finch's stock and have raised a number of seedlings of merit. In the Sydney Botanical Gardens there are a number of seedlings of rather dubious merit. Of my own experiments and their results you will read later in this paper.

Crinums are not widely grown, except in a few species. Our native *C. pedunculatum* is found in many gardens, as are also *C. powelii, C. moorei, C. latifolium* and *C. capense*. In the past a number of hybrids of the *C. moorei* type were raised by the late Mr. H. B. Bradley; some of which are very vivid pink, but all totally infertile. Messrs. Holloway Bros. had a very beautiful hybrid *C. pedunculatum* x *C. moorei* of a brilliant pink. I know of another seedling of this cross in an old garden which is a delightful pale pink. In a period of 15 years this plant has only made two bulbs. It is quite infertile. Other than these I know of no hybrid *Crinums* raised in Australia except the few raised by myself and of which more later. There are of course a number of named forms of *C. moorei*.

All the above do well in good garden soil. They seem to prefer full sunlight, though many are grown in shade and semi-shade but these do not flower as well as they might if set in the open. Plenty of water while growing is a necessity.

Nerines are good plants for our conditions, though I find that they do very much better in Tasmania and Victoria. A number of hybrids have been raised here in Australia, but not one grower seems to have raised any number or to have recorded their parentage. I have raised a few, some of which are quite interesting as hybrids. They like to become crowded before flowering freely.

Zephyranthes do very well though not grown to any extent. *Z. candida* used to be commonly used as a border for many gardens, but recently it has almost disappeared. *Z. ajax* is a variety which does well with me, also *Z. texana, Z. rosea* and another pink variety, and the *Cooperias*. I have raised many seedlings, *Z. candida* x *Z. ajax; Z. candida* x *Z. texana* (known here as *Z. sulphurea*) and *Z. rosea* x *C. drummondii*. I find that *Z. candida* is the dominant parent in the two former crosses. In the second generation some good cream coloured flowers appeared, and also some good pale yellow ones. By inbreeding the second generation I procured a good number of deep yellows, and one or two with bronze outside and a deep buff inside. Seedlings flower in about the second year. In the cross *Z. rosea* x *C. drummondii* some very fine flowers were produced, mostly of a very large size and of a pink or salmon pink shade, though one or two almost pure white ones appeared. They multiply fairly rapidly, and seedlings flower about the second year. The cross is quite fertile and seeds freely. The seedlings themselves of the

second generation give no marked improvement. A number of interesting forms have been isolated and are being grown on.

In addition to the above we have a great number of amaryllids of all sorts growing in our gardens, and all doing well.

2. Raising Seedling Clivias, Amaryllis, and Crinums.

Some fourteen years ago, I possessed several plants of *Clivia nobilis* and a plant or two of *C. miniata.* The former were orange red, and the latter were orange. In September of 1920 I crossed the flowers of these plants both ways. The resulting seedlings, to the number of 73, grew steadily but slowly. The first flowered in August 1925. All were vigorous, and on the whole, far more robust than their parents. The flowers produced in quite 90 per cent. of the plants were decidedly larger than those borne by either of their parents. The colours varied very little being mostly orange red.

One might suppose that from this generation would have come some little colour variation, as quite a range of colour is found in these plants in their native habitat. But both parents being of the same shade almost, no colour break occurred.

The flowers that appeared, as compared with those I now possess were decidedly ugly, and with very narrow perianth segments with pointed tips as in their parents. From these were selected those with the widest segments, the roundest tips, the largest flowers, and most robust in growth. These were intercrossed.

The seedlings resulting from these secondary crosses were decidedly an improvement on their parents. Not only was there a marked increase in their vigor, but they attained to a flowering state in four years, from the sowing of the seed.

Some of the flowers in this batch, compared with those of their grandparents, were truly remarkable. From some three hundred seedling plants 25 were selected of exceptional horticultural merit. Among them were to be found the perfectly symmetrical flower, with large broad overlapping perianth segments, all of the same size, and with nicely rounded and reflexed tips. The range of colour or rather shade has increased, but not to the extent I had anticipated. No pale flowers had appeared as was confidently expected, though one of a deep brick red colour of somewhat poor shape stood out as a decided acquisition. For the most part they were all deep orange red with deep yellow eyes, though in some few the yellow was more or less replaced by white and in others had advanced up the perianth segments at the expense of the orange colour.

The best of this batch had a head of flower standing last season 32 inches high, and was composed of 23 perfect flowers in a globular head. The individual flowers were 5 inches across, perfectly round and reflexed. It has caused no little comment when exhibited at the R. H. S. Show in August during the past three years.

From the second generation, I raised a third batch all of which were "selfed". Whereas I had no difficulty at all in obtaining seed berries containing as many as 10 seeds from flowers fertilized with the pollen from another plant, I discovered that the "selfed" flowers set seed badly, and where they did set it, I did not obtain more than 2 seeds from any one berry. Some of the seedlings flowered in the third year from sowing. And last season, the 4th from the sowing, some 125 flowered leaving but few still to flower. Those which flowered early were dwarf plants with a slender flower stem, and pendulous starry flowers all much alike.

They attain a height of 15 inches and make excellent pot plants. They increased little in size for the second season's flowering. So the new type appears fixed. Is it possible that the *Clivia* species as we now know them are of hybrid origin, and that these are throwbacks to an older and now lost species?

Many of the others of this batch reverted to the starry form of *C. nobilis,* and one can hardly tell them from the original plant from which they sprung. Variation in foliage is very marked, and it is particularly noticeable that whereas the original species possessed foliage 1½ inches wide some of the seedlings of this batch which are some 4 feet high, possess foliage quite 4 inches across. The flowers of these broad leafed sorts are invariably large, round and reflexed.

Another feature is that many are rapid in increase. All the former were slow, no plant after seven years flowering had more than 4 new growths, but some of

the new seedlings even before they flowered had three or four growths breaking away, and one in particular (a poor flower type it is true) has in its third year of flowering, made upwards of 15 new growths.

Seedlings have already been raised from these. Selected seedlings were again intercrossed with the idea of securing colour variation for in the colour range no pale variety was found, though the number of deep brick red ones had increased in a marked degree. It should also be noted that greater areas of white appeared in those varieties where the white was apparently displacing the yellow; and in cases where the yellow was displacing the orange, this colour had crept up the perianth segment nearer the top. Perhaps the next generation will give (a) a red flower, (b) an orange and/or a white one, and (c) a yellow one. These are my present objectives.

I find *Clivias* the easiest of plants to grow, and one can justly say that the seemingly the worse they are treated, the better they respond. Mine are all growing in bush houses in pots, for I have found that when their roots are pot bound they flower the best. One is astonished at the small quantity of soil necessary to support them, and the amount of dry conditions they will stand. They thrive equally well out in the garden, though the plants will not push their flower spokes well above the foliage.

Seed takes a year to ripen, and when ripened will stay quite twelve months on the plant if not harvested. When ripened, the berry, as large as a walnut, contains upwards of 10 seeds. The bright scarlet berries, are, to many, equally attractive as the flowers. By the way, I find a variation in the colours of the berries in the newer hybrids, for whereas in the old species they were scarlet, those of some of the new seedlings are a deep cerese pink.

Germination after sowing is slow but sure. Once sown the plant will eventually appear and make rapid growth. Any soil seems to suit them well though one on the light side possibly is best. If grown in a pot perfect drainage is essential. Potting on from size to size should be done as soon as the plants have become too large for their pots. A final potting is recommended the year after flowering into 10 inch pots in which they can remain until they need dividing.

About the same time that I became interested in *Clivias,* I commenced raising seedling *Amaryllis, Brunsvigias,* and *Crinums.* As a start I possessed an *A. belladonna,* a good pink variety; *Brunsvigia multiflora, B. multiflora alba,* and *B. multiflora rosea.* Later on *B. josephinae* and another of the "Multiflora" type viz., "Haythor", raised by the late Mr. H. B. Bradley, and reputed to be a seedling between *A. belladonna* and *Brunsvigia multiflora alba.* This I doubt for the reason that will later appear.

Of *Crinums* I possessed *C. capense* and *C. moorei* and *C. latifolium,* all African species, and *C. pedunculatum,* our native *Crinum,* a number of hybrid forms of *C. powellii,* and some seedlings of the late H. B. Bradley. The so called *Brunsvigia multiflora* and its varieties are in fact bigeneric hybrids between *A. belladonna,* and in all probability *Brunsvigia grandiflora.* These were raised by Mr. Bidwell, a well known florist in this city, about 1870, and owing to the vigor of their growth their large heads of flowers, and the rapidity of their increase, they are as widely grown about Sydney as the "Belladonna Lily" itself.

Seedlings from any of the "Multiflora" types do not come true if the flower is selfed, some diverging to *A. belladonna* and some reverting to the lowly stature of *B. grandiflora.* This also occurs in breeding. I found that these and *A. belladonna* would intercross in any way and would all produce fertile seed. But the variety "Haythor", a beautiful pure white with a small yellow eye, raised by Mr. Bradley, would not give me any seed at all, though its pollen is extremely potent. Thus we have a plant of a reputed parentage similar to some five hundred seedlings I have raised, not one of which has refused to set seeds, which over a period of some 12 years with me has not given the slightest indication of even a swollen ovary. Unlike the seedlings of *A. belladonna* x *B. multiflora* which I have raised, "Haythor" has ruffled petals, with crimpled edges.

All the seedlings from its pollen are somewhat weak in growth, mostly white with an eye of yellow, and will not set seed though in almost every case their pollen is extremely potent. I am rather inclined to think that Mr. Bradley was mistaken in its parentage, and that it is a particularly good form of *B. josephinae* x. *B. multiflora alba.*

The first crossings were *A. belladonna* with each of the three varieties of *B. multiflora* which I possessed. The quantity of seed obtained was very great in the case where the "Multiflora" varieties were the seed parents, and not so great in the case where "Belladonna" was the seed parent. In the former case, I have had as many as 105 fertile seeds from one pod, and over a season have averaged 70.

The resulting seedlings flowering some four years later were more or less disappointing, mostly taking after *B. multiflora* (which at that time I considered to be a true species of *Brunsvigia*), and a very few after "Belladonna." The colour variation was not great, and one would have had great difficulty in finding more variation in these than in any batch of "Multiflora" or "Belladonna" seedlings. But I found that all the seedlings on flowering were fertile and set seed with the utmost freedom, and were particularly rapid in their increase.

Accordingly I selfed those which possessed good form, and other promising characteristics, as I could see no advantage to intercross them. The results were extremely interesting. Some have attained to great size of flower stalk, size of flower and number of flowers in a head. The colour variation is considerable. Some are of the deepest carmine pink, others of a pure glistening white with a yellow eye, like "Haythor", but without the wavy petals of that variety. Amongst these I selected many as being worthy of propagation. The segments of the perianth in those selected are equal in size, round and slightly reflexed.

Some of these are of a delightful blend of pink and orange. The latter colour which is present in all the seedlings in the form of an eye, has in these examples, run almost to the tip of the segments. Others are of shades of pink inside, but with the exterior of the segments picked out and stained bronze. Still others are of a small stature attaining to a height of not more than 15 inches with small flowers of a soft self pink shade. This latter type, while strong growing and vigorous, is easily smothered in a seed bed and needs isolating as soon as discovered.

Another interesting type has appeared in these seedlings perhaps forming 5 per cent. of the whole. These possess no flower stalks at all, but have large pink flowers of excellent form carried on long peduncles and as the leaves appear with the flowers give the plants the appearance of a giant pink crocus. So far I have been unable to secure any seed from these plants as the ovaries are situated down among the base of the leaves, and so apparently cannot swell. Their pollen, is, however, fertile, and seedlings from it are now being grown on.

At present all breeding being done is aimed at (a) larger flowers, (b) perfection of two types, large and small, (c) larger colour range by endeavouring to (1) exclude the yellow eye, (2) increase the yellow eye so that the whole flower becomes yellow, (3) produce a bronze flower, (4) produce a red flower; (d) produce large symmetrical flowers on large globular heads; and (e) rapidity of increase.

Some surprising results have been had in intercrossing *Crinums*. As mentioned in the former part I have been somewhat restricted in cross breeding in this genus on account of the few species I have been able to procure.

I find that *C. moorei* seeds well, with the exception of one group of plants which were produced from an old garden. These are not entirely infertile but from over 300 flowers pollinated, either with their own pollen or from other species, only three seeds were obtained. There is little difference between this and the usual type, with which we are so familiar, except that perhaps, the perianth segments are just a little wider.

From *C. moorei* I have raised many seedlings, for every flower which is not cut, in some seasons, sets seed. And in spite of claims to the contrary, I have found no more variation in its offspring than one would expect in a species. I am quite at a loss to understand how some claim that *C. moorei* is not a true species.

On the other hand, the seedlings I have obtained from the *C. moorei* which does not set seed freely, and which for purposes of identification I will designate as *C. moorei* II, have shown considerable variation in the few raised even where self fertilized. Is it not possible that hybrid forms such as this undoubtedly is, going under the name of *C. moorei* have given rise to the belief that *C. moorei* varies from seed?

I find variation in *C. capense*. From the same seed pod I have had flowers ranging from white to deep pink. Some forms are at first glance difficult to separate from *C. latifolium*.

Even in our native species *C. pedunculatum*, I find variation, though it is here regional. Some have long segments, others short, some long peduncles, and others

short, and still others have purple filments and anthers. As already mentioned I have seen hybrids between *C. pedunculatum* x *C. moorei* in deep and pale pink. In 1924 I raised a seed from this cross, the only one in the pod. This grew rapidly, and increased by offsets in an amazing manner in the style of *C. moorei.* In 1929 at Christmas time it flowered for the first time. I then possessed some 9 bulbs. The growth of the plant was intermediate between the two parents, more massive than *C. moorei,* and not so tall as *C. pedunculatum,* with its foliage appearing much like the latter. It is deciduous like *C. moorei.* The flowers, which are highly perfumed, are of perfect *C. moorei* shape, and of a pure glistening white like *C. pedunculatum.* One might say that here we have the pure white *Crinum* inheriting all the good qualities of both parents and none of their faults. It is intermediate between the two and, in spite of numerous attempts to obtain seed or use its pollen, completely infertile.

The two other hybrids of this same cross referred to, while possessing the pink coloured flowers, had much the growth habit of "Pedunculatum", and were evergreen like that species. The flowers however were ugly. In one case they were intermediate between the two parents, and the other had starry flowers after the style of "Pedunculatum", but with broader perianth segments. I have quite a number of this cross growing on.

C. capense x *C. latifolium* offspring give flowers much like their parents, for there is very little dissimilarity between these two species. They, however, take after the yellowish green foliage of the latter and not after the blue green foliage of the former. "Capense" is a good seeder with me to either its own pollen, or that of "latifolium", but to any of the "Moorei" group or to "Pedunculatum" a peculiar thing takes place. The seed pod swells to an immense size, and in due course like all other seed pods it bursts and reveals a mass of seeds within and to all appearance perfect. On examination, however, we find that they are all so grown one into the other that they cannot be separated without injury and even when separated would not grow, rotting in a few days. This has occurred on every occasion, and there have been some hundreds, upon which I have attempted to raise seed upon "Capense" by either "Moorei" or "Pedunculatum."

Two years ago I determined to germinate some of these seeds, and separated them as carefully as possible with a sharp knife, sealing the wound where it occurred with paraffin. Some 800 seeds were separated in this manner and of these some 50 germinated, and though very weakly in their young period, some 20 still remain alive and are making sure but slow progress. I trust that they will flower in due course, and not be like a series of seedlings raised by me in 1923 from 'Moorei" x "Magnifica", a variety raised by Mr. H. B. Bradley of the "Moorei" type, and from which although they increase in a most wonderful manner I have only had one flower in 8 years.

By crossing "Moorei" and "Capense" I have raised "Powelii" on many occasions. However, the pollen of this variety on either of the parents has never led to seed production. "Pedunculatum" x "Capense" has given me a few seedlings which have not yet flowered.

In *Nerines* I have raised a few seedlings. One of these is outstanding from a horticultural and scientific point of view,—*N. bowdeni* x *N. ficifolia.* This was the only one of this cross which attained to flowering size, although some forty were raised. It is extremely interesting, having the foliage of *N. bowdeni* and the late flowering properties of that variety, but the shape of the flower is like *N. ficifolia,* though much larger and of much the same shade. The flowers are carried on three foot stems, in large numbers in May of each year, some bulbs having three or four flower scapes. Although raised in 1925 I already possess not less than 300 bulbs, so one can realize the rapidity of its increase. In 1929 I succeeded in seeding to its pollen *N. sarniensis* and this year one of the progeny produced flowers of a beautiful salmon pink shade, three scapes to the bulb!

I have raised a number of *Nerine* seedlings from hybrid varieties imported from time to time, but I am concentrating now upon the "Bowdenii" x "Ficifolia" crosses as they are the ideal florist flower.

These few notes summarize my hybridizing experiments among the *Amaryllidaceae.*

3. **Australian Amaryllidaceae.**

The following is a list of the *Amaryllidaceae* native to Eastern Australia arranged according to Dr. Hutchinson's system. It is not a complete list, though representing most of the recorded species. There is some slight confusion in the identity of a few species, especially those recorded from the West. I will endeavour to have a complete list with descriptions for the 1936 Year Book.

TRIBE 6. CRINEAE

Crinum pedunculatum
C. douglasii
C. venosum
C. brachyandrum
C. brevestylum
C. uniflorum
C. angustifolium
C. pestalentis
C. brishanicum
C. flaccidum

TRIBE 10. EUCHARIDEAE

Calostemma luteum
C. album
Eurycles amboenensis
E. cunninghami

Indigenous and Cultivated Amaryllidaceae in Kenya Colony

THE LADY MURIEL JEX-BLAKE
Kenya Colony, British East Africa

Kenya Colony, for the information of those whose geography is vague, lies across the Equator in Africa, from the Indian Ocean on the east to Lake Victoria Nyanza on the west; with a climate which varies from a tropic heat at the Coast, to temperate coolness in the Highlands, where the majority of White settlers have made their homes and gardens, at an altitude of from 5,000 ft. to 8,000 or even 10,000 ft. above the sea.

At these altitudes the climate is as nearly ideal as is possible in this world, and, far from being tropical, is cool and pleasant, while frosts occur only at the higher altitudes.

The Colony possesses an interesting indigenous flora, which includes a fair number of Amaryllidaceae, headed by a good selection of *Crinums*. *C. kirkii* is the most common, occurring all over the Colony, and is a handsome species, large and vigorous with striking flowers that are white, striped down each petal with varying shades of purplish pink or red. *C. giganteum*, from the western side of the Colony, is even more beautiful, larger, taller and pure white, but less easy to grow, and not very free flowering. It is sweetly scented, whereas *C. kirkii* has a heavy and almost unpleasant scent. *C. ammocharoides* is less widely distributed than *C. kirkii* and is a very different plant; the leaves lie on the ground almost flat, alternate leaves turning alternate ways, giving an appearance of plaiting which is most attractive; while the far smaller long-tubed flowers vary from pink to white and are very sweet. An even smaller species is *C. parvum*, with the same habits

of growth as the last, and most charming delicate white flowers turning to pink as they grow older. Both these smaller species are easy in cultivation, and bulbs of *C. parvum* sent to Kew, flowered the year after.

One beautiful species of *Cyrtanthus, C. sanguineus,* grows fitfully through the Colony, on dry plains, bearing one to two large flowers of a beautiful blood red. But it does not flower every year, and only for very short periods when it does, and is not fond of being tamed.

Haemanthus multiflorus is a charmingly common plant all over the country, and seems specially brilliant as it chooses to flower annually at the end of the dry season and just before the long rains, and the gay scarlet puffs of flowers are almost startling when the grass and bush are dry and brown. The large leaves do not show till the flower is over. *H. filiformis* is another species, less common than *H. multiflorus.*

An even larger red ball of flowers is produced by *Buphane sp. nr. disticha,* which grows on rocky dry hills in various part of the Colony, and again produces its flowers before the leaves. It is less brilliant than the *Haemanthus,* being a pinky red, but the flowers are so large that they look quite impossible coming out of the dry neck of the large bulbs, which show well above the surface of the ground. In this species the leaves, when they grow after the flower has finished, are packed tight together, and suddenly expand like the old-fashioned Japanese fans which delighted one's childhood.

The only other members of the Amaryllidaceae indigenous to this country are species of *Hypoxis,* of which *H. angustifolia* is the best known. This, though a little "weedy" for the garden, is a very cheery plant when in bloom, with lots of bright golden stars, which continue for a very long time. *H. urceolata* is larger, with hairy leaves, and several others, mostly smaller, such as *H. engleriana var. Scottii, H. villosa, H. gregoriana,* and *H. obtusa,* are found in different districts. This completes the list of native Amaryllidaceae at present, but it must be remembered that Kenya Colony is still so "new" that its Flora is by no means yet entirely classified; new species are continually being found, and the Botanist of the Coryndon Memorial Museum at Nairobi is being kept constantly busy by specimens sent in from all over the Colony.

When we turn to the "exotic" side, and consider the imported Amaryllidaceae grown in our gardens, the same fact must be remembered, that this is a "new" Colony. Forty years ago most of it was a savage country and during the dozen or so years before the War, it was only a few very keen people who had the time and energy to make gardens, and the real "spate" of gardening has only come since the War. Gardening is still almost entirely an amateur's hobby, nurserymen are few, paid white gardeners fewer, and the native garden boy is more interested in edible plants than in flowering ones. The country has infinite possibilities—a rich soil, a wonderful climate where it is never really cold, except at the higher altitudes, and never unduly hot; in Nairobi, for example, at 5,500 ft., the shade temperature does not go above 85° or below 45° F. The fact that there is no winter makes the propagation of bulbous plants from seed a more rapid matter than in colder countries, and as *Lilium* bulbs grow to a very large size in a very short while, it is likely that *Hippeastrums* would do likewise, but seed of the better strains of these is neither easy to come by nor cheap to buy. Of the cultivated bulbs grown in gardens, the true *Amaryllis, A. belladonna,* and its varieties, only do well at over 7,000 feet, refusing to flower lower down. *Hippeastrums* on the contrary are magnificent nearly everywhere, grown in the open ground with no trouble at all.

The species, such as *H. equestre* and *H. pratense,* do just as well as the hybrids. The imported *Crinums* flourish as happily as the indigenous ones, and *C. powellii* and its *var. album, C. capense,* and *C. longifolium* are among those established in the country.

Clivias do well in some places, and flower splendidly, but are more difficult to cope with, requiring special root-confining beds if grown in the open ground. *Eucharis grandiflora* is perhaps most successful as a pot plant on a veranda, but also grows and flowers planted out in shady places. A few *Bomareas* are being grown; *B. lehmannii* is so far the most successful, producing its orange-spotted flowers very freely. *Hymenocallis tubiflora,* the "Spider Lily", is very popular and grown in every garden; *H. littoralis* grows well, and so does *H. Calathina. Narcissus* in many forms grows and flowers freely at 8,000 feet and over, but is useless at lower altitudes.

Nerine undulata is the only member of its family to do well and persist, and is a very charming little bulb producing its pink flowers in quantity whenever there is much rain.

Another particularly successful bulb is *Sprekelia formosissima,* which increases at an amazing pace and is free with its wonderful flowers on and off the whole year through. It is quite one of the most beautiful of garden plants, and one of the most decorative for cut flower work. Two colour varieties are grown, one a deeper crimson than the other, besides the rarer pale red flowered *S. karwinskii.*

Vallota purpurea is magnificent at the higher altitudes, but sulks under 6,000 feet. *Zephyranthes* luckily are better tempered, and *Z. atamasco, Z. carinata, Z. rosea, Z. ajax,* and a deeper yellow one with the suggested name of *Z. flava,* but which might be *Z. texana* or *Z. aurea,* are all grown, and all do well. The subgenus *Cooperia* has not so far reached us, but should do well, judging by the description in the 1934 Year Book.

Chlidanthus fragrans is growing and blooming happily in at least two parts of the country, and is increasing so fast that it will soon spread further; while *Bravoa* and *Beschorneria* are both on trial and have so far done hopefully. The *Cyrtanthus* group is with us in many coloured varieties, and doubtless in time we shall procure a greater number of species from South Africa; they are charming plants, and the freshness of their scent is particularly pleasing.

The First National Amaryllis Show at Orlando, Florida, April 3-4, 1934

The first National Amaryllis Show sponsored by the American Amaryllis Society has passed into history and marks a milestone in the advancement of this high quality flower in popular favor in America. The Show was held in cooperation with the Annual Florida Amaryllis Fiesta in an appropriate sub-tropical setting, the utterly beautiful city of Orlando, in the charming lake region of Orange County, April 3 and 4, 1934.

The Show was opened to the public in the Chamber of Commerce Building at noon and more than five thousand visitors attended during the first day. This was increased to a total of over 15,000 at the end of the second day.

The Show was managed by Mr. I. W. Heaton, Chairman of the Exhibition and Awards Committee, assisted by Mr. Wyndham Hayward, Secretary, and Mrs. E. G. Wheeler.

Among the first to visit the show was Mayor S. Y. Way, followed by the City Commissioners, and practically the entire membership of the nine Orlando Civic Clubs, and the Greater Orlando Chamber of Commerce. Many out of State visitors viewed the exhibits, including Mr. Cornelius Zandbergen of New York; Mr. and Mrs. Robert Wayman of New York; Miss Mary Yates, past president of the Ontario Horticultural Society of Toronto. Members of the Society resident in Florida were much in evidence including Dr. A. E. Conter of Appalachicola; Mesdames J. H. Churchwell and W. E. MacArthur of Jacksonville; Mrs. W. W. Owens of Frostproof; Mr. J. A. Peterson of Lakeland; Mrs. W. G. Tilghman of Palatka; Mr. Frank Vasku of Winter Park; Mr. and Mrs. E. G. Wheeler; Pres. and Mrs. E. G. Duckworth; Mr. T. P. Robinson of Orlando; Mr. and Mrs. Arthur R. King of Zellwood; Mrs. B. A. Dominick of Conway, and many others.

The guest of honor at the Show was Mr. Theodore L. Mead of Oviedo. Mr. Mead has been elected a Fellow of the Society in recognition of his meritorious work in Amaryllis hybridizing. The Society will honor him further by dedicating the 1935 Year Book to him. Mr. Mead is in the 80's but he is still active in mind and body. Mr. Mead made a profound pronouncement after viewing the Show. In his opinion the future development of the amaryllids is bound up primarily with their propagation by cuttage, a viewpoint which was endorsed by other prominent visitors at the Show.

The show included more than 10,000 blooms. Exhibits were received from Mr. Richard Diener of Oxnard, California; the U. S. Department of Agriculture, Washington, D. C. and from the growers in various sections of Florida.

The writer was appointed to judge the Show which turned out to be a very difficult task. The tentative standards adopted by the Society were put to the severest test. The classes in which the writer had entries were judged by Mr. Wyndham Hayward.

The practicability of shipping amaryllis blooms great distances was demonstrated. The U. S. Department of Agriculture blooms were received in bud on April 1st and were immediately set up in water. They were in full bloom by the morning of April 3 and in perfect condition. The Diener blooms were sent by express on account of the uncertain condition of the air mail service. They arrived at noon of April 3. The flowers were somewhat dehydrated and were laid in the cool fountain for an hour. By late afternoon the flowers were beginning to open. All buds which were not too far advanced when the scapes were cut opened normally. In future national shows there is no reason why there should not be complete exhibits from all the chief growers.

Florist's Exchange

Hybrid Hippeastrum: President Roosevelt

The best bloom at the First National Amaryllis Show. Variety introduced by I. W. Heaton, 1934.

The exhibits were grouped according to the Fischer Color Chart under the tentative classification of flower types. This chart is not entirely perfect for Amaryllis colors but is without doubt one of the greatest aids in popularizing intelligent color descriptions. The Society owes a debt of gratitude to the New England Gladiolus Society for making this chart available.

The entries were arranged in tiers on two sides of the 50 x 40 lobby with two tables at the two other sides of the room, and one at each side of the fountain in the center. The decorations were beautifully executed by Mrs. Arthur R. King and Rev. and Mrs. J. W. Ischy. The pots were covered with *Asparagus plumosus* and Spanish

Moss. The backgrounds were built up with potted palms, and brilliant cut amaryllis blooms were used with great abandon.

The number of entries was far greater than was expected which necessitated crowding. This was the only noticeable defect in their arrangement. This was hardly noticed for the whole presented a riot of color and cheerfulness.

The flower types represented included the *Psittacinum, Equestre* and *Leopoldi* for hybrid *Hippeastrum;* The *Solandriflorum* type was not in evidence. Crinum Lily, Zephyr Lily, Polyanthus *Narcissus* as well as *Hippeastrum* species were also shown.

The *Equestre* type classes were fully represented, but not so the *Psittacinum* and *Leopoldi* classes. Blooms of the Nehrling-Mead and Heaton Strains were shown in great abundance, and the U. S. Department of Agriculture, Diener and Peterson Strains were represented to a sufficient extent to make comparisons possible. The Nehrling-Mead Strain as exhibited at the Show was rich in reds, dark reds, darker reds and orange reds. Pale, lighter and light reds were relatively scarce. This led to a lack of balance in the effect. The reds, many of them not especially good, gave the impression of lack of care in selection. This was especially true in contrast with the delicate and refined reds found in the U. S. Department of Agriculture and Diener Strains. The Heaton Strain contained some striking dark reds and orange reds of great brilliance as shown in the variety, *President Roosevelt.* The Peterson Strain which is an American selection of the Veitch hybrids contained some unusual patterns and fine color shades.

The best pure white variety was in the U. S. Department of Agriculture display. The two Nehrling-Mead whites were smaller by comparison. The socalled yellow entries were a disappointment. These were all of a greenish-yellow and really not beautiful. This points to the desirability of importing for the hybridizer from Brazil the species *Hippeastrum rutilum citrinum* which is reported as bright yellow.

The greatest range and the most refined shades of color are found in the U. S. Department of Agriculture Strain,—from pure white, thru white with red markings, to cerise, bright and dark red, vinous red and copper-gold. Bright orange, a color quite characteristic of the Nehrling-Mead Strain, was not included in the display exhibited by the Department.

The Diener Strain is notable for clean, brilliant colors.

The first prize for the best display went to the U. S. Department of Agriculture with 94 out of a possible 100 points; the second and third prizes to I. W. Heaton and Richard Diener; and honorable mention to J. A. Peterson.

First Class certificates were awarded to the U. S. Department of Agriculture, Nehrling-Mead, Heaton and Diener Strains.

The variety, *President Roosevelt,* propagated by cuttage and exhibited by I. W. Heaton, was designated the best bloom of the *Leopoldi (Reginae sub-type);* No. 6, vinous red with darker throat, exhibited by the U. S. Department of Agriculture, was chosen as the best bloom of the *Equestre type;* a white copiously dotted red, shown by I. W. Heaton, was selected as the best of the *Psittacinum type.*

First class certificates were awarded for several hybrid amaryllis; *Hippeastrum equestre major; Hippeastrum rutilum fulgidum; Crinum asiaticum; Crinum longifolium; Burbank Hybrid Crinum; Zephyranthes treatiae* and *Naricssus tazetta, Grand Monarque.* The grand award for most points went to I. W. Heaton.

The three outstanding facts brought out by the Show are a demonstration that there is a lively interest in the amaryllids; that cut bloom can be sent safely great distances and that the future development of Amarylleae lies in propagation by stem cuttage.

SECTION A. AMARYLLIS (Hippeastrum)

Class 1. Species. *Hippeastrum equestre major*—1st. Mrs. J. L. Anderson, 2nd. Frank Vasku, 3rd. Wyndham Hayward.
Hippeastrum rutilum fulgidum—1st. Hamilton P. Traub.
Hippeastrum johnsonii—1st. Mrs. D. T. Knappenberger.

Class 3. Best collection of 5 to 10 named Grandiflora varieties—1st. I. W. Heaton, *President Roosevelt, Edward Hall, Eola, Orlando* (white with lighter red markings) and *Rosemarie* (lighter red with yellowish star).

Class 5. Best Display—1st., U. S. Dept. of Agriculture, 94 points out of a possible 100; 2nd. I. W. Heaton; 3rd. Richard Diener; Honorable mention: J. A. Peterson.

Class 6. Best blooms in the Show—(Hybrid Amaryllis)
Psittacinum type: I. W. Heaton with *Ridgewood,* white minutely dotted with red.

Equestre type: U. S. Dept. Agriculture, with an unnamed variety, a clear vinous red with darker red throat.
Leopoldi type: I. W. Heaton with *President Roosevelt,* deep orange red with a delicate white star in center.
Hippeastrum species: Mrs. J. L. Anderson for *H. equestre major.*

STANDARD GRANDIFLORA VARIETIES

PSITTACINUM TYPE:

Class 138. Red—1st. I. W. Heaton, Ridgewood.

EQUESTRE Type:

Class 161. White without markings—1st. I. W. Heaton, 2nd. H. E. Searles.

Class 162. White with light markings—
1st. I. W. Heaton, 2nd. No award, 3rd. Frank Vasku.

Class 163. Yellow—
1st. No award, 2nd. I. W. Heaton, 3rd. No award, Honorable mention, Arthur King.

Class 164. Orange—
1st. Arthur King, 2nd. No award, 3rd. Mrs. B. A. Dominick, Hon. mention, I. W. Heaton and J. W. Ischy.

Class 165. Pale Red—
1st. Hamilton P. Traub, *"Bert Merrill"*, 2nd. I. W. Heaton, 3rd. No award, Hon. Mention, Mrs. B. A. Dominick.

Class 166 (a) Lighter Red—
1st. I. W. Heaton, 2nd. D. E. Anderson, 3rd. No award, Hon. mention, Mrs. B. A. Dominick.

Class 166 (b) Lighter red with white star—
1st. E. A. Peterson, 2nd. I. W. Heaton, 3rd. J. W. Ischy, Hon. mention, Arthur R. King and D. E. Anderson.

Class 166 (c) Lighter red with white stripes—
1st. J. A. Peterson.

Class 167. Light red—
1st. I. W. Heaton, 2nd. No award, 3rd. No award, Hon. mention, E. A. Peterson and D. E. Anderson.

Class 168 (a) Red—
1st. I. W. Heaton, 2nd. Arthur R. King.

Class 168 (b) Red with large white star—
1st. Mrs. Frank Spreen.

Class 168 (c) Red ruffled—
1st. I. W. Heaton.

Class 169. Dark Red—
1st. Mrs. B. A. Dominick, *"Anne Lindbergh"*, 2nd. J. W. Ischy, 3rd. I. W. Heaton.

Class 170. Darker Red—
1st. I. W. Heaton, 2nd. No award, 3rd. H. E. Searles, Hon. mention, E. G. Duckworth.

LEOPOLDI TYPE:

Class 192. White with light markings—
1st. Frank Vasku.

Class 196. Lighter Red—
1st. Mrs. B. A. Dominick, *"Eleanor Roosevelt."*

Class 198. Red—
1st. I. W. Heaton.

FIRST CLASS CERTIFICATES FOR HYBRID AMARYLLIS:

Strains—
Richard Diener; U. S. Department of Agriculture; Theodore L. Mead; I. W. Heaton.

Hybrid Varieties—
Richard Diener, one unnamed variety. U. S. Dept. of Agriculture, No. 1—pure white; No. 2—bright red with white star; No. 3—white with cerise lines; No. 4—white minutely dotted & striped red; No. 5—Copper-gold.
I. W. Heaton, nine certificates including the varieties, *Eola, Edward Hall,* and *President Roosevelt.*
Hamilton P. Traub, one named variety, *"Bert Merrill."*
D. E. Anderson—one unnamed variety.
E. A. Peterson—one unnamed variety.
Mrs. B. A. Dominick, two named varieties—*"Eleanor Roosevelt,"* and *"Anne Lindbergh."*
J. W. Ischy—one unnamed variety.
J. A. Peterson—two unnamed varieties.
Frank Vasku—one unnamed variety.
Wyndham Hayward—one variety of Howard and Smith Strain, an unusual strawberry red.
Mrs. W. G. Tilghman—three named varieties—*"Palatka,"* a 9½ inch bloom; pink & white; *"Helen Tilghman,"* an 8 inch, red with white star; and *"Helen Jane,"* a clear light red.

Species—
H. equestre major—Mrs. J. L. Anderson; *H. rutilum fulgidum*—Hamilton P. Traub.

SECTION B. CRINUM LILY (Crinum)

Class 501 (a) *Crinum longifolium rosea*—1st. Mrs. Eliza V. Baker.
Class 501 (b) *Crinum longifolium alba*—1st. Theodore L. Mead.
Class 501 (c) *Crinum virginicum*—1st. Theodore L. Mead.
Class 501 (d) *Crinum amabile*—1st. Mrs. Susie Mathews.
Class 501 (e) *Crinum asiaticum*—1st. No award; 2nd. Wyndham Hayward.
Class 501 (f) *Crinum hybrid (Burbank)*—1st. Mrs. W. W. Owens.
Class 503. Best bloom in show—Mrs. W. W. Owens, *Burbank Hybrid Crinum.*
First Class Certificates—Burbank Hybrid Crinum—Mrs. W. W. Owens.

SECTION C. ZEPHYR LILY (Zephyranthes)

Class 603, Best bloom, Hamilton P. Traub, *Z.treatiae,* from the Suannee River of Florida.
Class 651, White, Hamilton P. Traub, *Z.treatiae.*
Class 656, Light red, 1st. No award. 2nd. Wyndham Hayward, *Z.carinata.*
First Class Certificate—*Z.treatiae,* Hamilton P. Traub.

SECTION D. NARCISSI AND RELATIVES (Coronatae)

Class 1003. Best bloom in any Genus—Bennie Green, *Narcissus tazetta, Grand Monarque.*
Class 1077 (b) *Grand Monarque*—1st. Bennie Green.

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Awards of Merit for floral arrangement of Amaryllis were given to Rev. and Mrs. J. W. Ischy and Mrs. Arthur R. King.
The Grand Prize for most points was awarded to I. W. Heaton.

Orlando, Fla.
April 5, 1934.

HAMILTON P. TRAUB.

A Visit to the First National Amaryllis Show

Mrs. W. E. MacArthur, *Florida*

The Amaryllis joins the garden aristocrats for belated, coveted honors, and its value as a show flower has been successfully demonstrated by the Second National Amaryllis Show, and the Second Southeastern Amaryllis Show under the auspices of THE AMERICAN AMARYLLIS SOCIETY.

Orlando, Florida had the unique distinction of putting on the First National Amaryllis Show, April 3 and 4, 1934 in the fine Chamber of Commerce Building which provided an ideal setting for this amazing assortment of masterpieces of the hybridizers wonderful achievement of color and form in this special class of plant life. The result was extremely effective.

Particular attention was paid to the art of placing the amaryllis with regard to color and form so as to provide an attractive ensemble of carefully blended shades of the rare white through the exquisite pinks to the crimson velvety open-faced beauties arranged in stately rows on both sides of the building presenting a gorgeous display of the best strains of hybrid amaryllis in this Country for the delight of thousands of interested amaryllis enthusiasts and all flower lovers in general.

These sun-worshipers, showing few leaves make ample amends by their profusion and reliability of bloom, their range and brilliancy of color, the certainty of performance, the length of time these gorgeous beauties continue to bloom, the keeping quality, and the ease of cultivation. All of these qualities make them valuable acquisitions to the home garden and the commercial grower.

In viewing this glorious all-Amaryllis show, forceful realization of the great amount of tedious, meticulous work done by hybridizers to bring these marvelous creations to a standard of perfection was acknowledged by fifteen thousand enthusiastic spectators.

Probably no exhibit created more wonder and excitement than the pure white amaryllis exhibited by the United States Department of Agriculture.

A special feature of the show was the air-mail delivery of specimens of the famous Diener strain of amaryllis which were placed to share honors with their Florida relatives, none the worse for their long journey across the United States.

Usually the outstanding feature of a show of this magnitude is difficult to judge but spectators and judges were unanimous in their approval of the new varieties—"President Roosevelt," (Heaton, 1934) and "Eleanor Roosevelt" (Dominick, 1934).

The kinds of flowers, that lend themselves to the staging of a show in their sole honor and which remain a major attraction for two days to thousands of interested spectators, are limited. Therefore, the value of the amaryllis especially as a Florida and California show feature simply cannot be estimated too highly.

The 1935 National Amaryllis Show at Montebello, California

E. P. Zimmerman, *California*

The 1935 or Second Annual National Amaryllis Show of the American Amaryllis Society was held at Montebello, Calif., on the premises of the Howard & Smith nursery establishment, April 12-14. As one approached the immaculately-kept lawn, colorful beds of flowers greeted the visitor in front of the main administration building, while stately rows of Cocos Plumosa palms waved their leaves.

The show brought out an attendance of more than 25,000 on the three days, and opened in brilliant sunshine after several weeks of cloudy weather. At the entrance to the patio on both sides of the buildings were groups of cinerarias, some of them with flowers five and six inches in diameter. Both flowers and plants indicated a high standard of culture.

At the base of the Cocos palms, near the flagstone walk, were beds of novelty colors of geraniums, contrasting with the other flowers in the landscape scheme. Against the outside wall of the patio were two tables, six by ten feet, upholding some 120 potted hybrid amaryllis (Hippeastrum) plants in full bloom, some with four to six flowers on two stalks. These were tastefully arranged with maidenhair fern edgings.

Stepping inside, through the door into the showrooms, a bowl of 20 large flower-scapes of snow-white, perfect blossoms, admirably arranged, was the most immediately arresting display. These were hybrid amaryllis from the plantings of Richard Diener, Oxnard, California, internationally known plant breeder and seedsman. This bowl received a first prize. On both sides of the bowl were Howard & Smith exhibits of sixty pot plants of choice hybrids, in all shades, with blooms from 6 to 10 inches in diameter. These were displayed on tables six by eighteen feet, and the borders of the tables were neatly edged with three-inch pots of Bird's Nest Fern *(Asplenium Nidus-Avis)*. This display also received a first prize in its class.

To the left against the wall and also on a settee in the center, there were other groups of amaryllis, mostly in shades of red. On the right was a display of 100 plants in six-inch pots on a terrace-like table against the wall. Among these amaryllis plants was one with two bloom stalks, four eight-inch blooms to the stalk, of a perfect dark rose color rarely seen in hybrid amaryllis. The judges awarded this bloom the first prize for outstanding color. The competition in this class was keen, and the choice of the judges difficult, as a high standard was evident in all the exhibits.

Grouped around a column at the right was the display from the Washington, D. C., greenhouses of the Bureau of Plant Industry, United States Department of Agriculture, which arrived by air mail. The colors, and shapes of the flowers were distinctive and unusual. This display was credited with an award of merit.

In the center of the show room, opposite the entrance, there was a well arranged display by Richard Diener, on a table 10 feet wide and 30 feet long, with a thousand flower spikes of amaryllis in vases. The spikes had from two to four flowers, in various shades, and some of the blooms ranked with the largest in the show, being 10 inches in diameter across the face. This table received the award of first prize for hybrid amaryllis as cut flowers.

On the same table to the right was a small display of hybrid crinum blooms on cut spikes, shipped by air mail from Winter Park, Florida, by Wyndham Hayward. These arrived in good condition and gradually opened during the Show. The pink-flowered hybrid "Cecil Houdyshel" was much admired. The display received an award of merit. Maidenhair and Bird's Nest ferms were an added decoration at this table.

On the right again, around the column from the United States Department of Agriculture group, was an exhibit from the Heaton Bulb & Palm Co., of Orlando, Florida, also sent to Montebello, by air mail. The blooms were newly opened, and seemed as if they had been just cut in the greenhouse. Their fine appearance was an indication that long distances mean little in shipping cut amaryllis blooms, and that every city in the country could be supplied with the spikes in season without difficulty.

At the same location were two exhibits of cut blooms of fine hybrid Amaryllis, entered by Mrs. Emma M. Foster, of Covina, Calif., and Mrs. J. H. Linkletter, of Whittier, Calif. One stalk of flowers in Mrs. Linkletter's exhibit was outstanding, with four flowers 10 inches in diameter, of an attractive purple color, which drew the attention of every visitor to the Show. Mrs. Linkletter won first prize for amateurs.

Above in the alcove of the show room were numerous potted Amaryllis in niches in full blooming splendor. To the right toward the office a table-like terrace, 6 by 24 feet, had been arranged with a handsome display of some 100 potted plants of the best selected Howard & Smith blooms. In this group was a plant with two flower scapes, and four 10-inch blooms to a spike wide open. The flowers were of a dark brownish red, rarely seen in hybrid amaryllis, and shading to nearly black at the base of the petals. This exhibit won a first prize.

The verdict of all show attendants was that the 1935 National Show had brought together the finest assemblage of choice hybrid amaryllis in the history of horticulture on the Pacific Coast. Real credit for the success of the event belongs to Mr. Fred H. Howard and Mr. Richard Diener, veteran plant breeders and hybridizers

both, with a world-wide reputation in other plant fields, but both having a strong fancy for the finest hybrid amaryllis. As the result of 30 to 40 years of continuous selection and breeding, these two Californians have developed strains of high average quality, and with a stock of many thousands of blooming size bulbs, they are able to make a wide selection of the best types from all their seedlings for exhibition purposes. The result is "hard to beat."

Outside of his hybrid amaryllis, Mr. Howard is perhaps best known for his roses and the bi-generic cross *Amarcrinum howardii*. Mr. Diener has specialized on the giant-flowered double and ruffled petunias for many years. Mr. Diener was working under difficulties of weather conditions and distance in entering his exhibits at the 1935 Show, most of his stock being grown outdoors. The Howard & Smith exhibits were largely from pot plants forced in their own greenhouses.

On leaving the 1935 Show the visitor approached a long pergola bowered with climbing roses, bright yellow, dark crimson and pink, while brick red and magenta colored bougainvilleas also gleamed above. On the floor at both sides were additional thousands of flowering amaryllis pot plants in every possible shade of color, besides new creations in roses, not yet released to the public, in full bloom as potted specimens. Among these amaryllis sighted on the way out was one of rather spectacular coloring, a golden-salmon shade, beautiful beyond compare, and which should have been given a place of honor in the main Show, according to judgment of many fanciers.

The judges of the show were Mr. Donald James, Santa Barbara; Mr. E. O. Orpet, Santa Barbara; and Mr. E. P. Zimmerman, Carlsbad.

Fine Display of Amaryllis Wins Acclaim *

ZOLA V. COTTON

The 1935 National Amaryllis Show, held April 12, 13 and 14 in the administration building of the Howard & Smith Nursery, 1200 Beverly Boulevard, Montebello, was one of the finest floral displays ever held on the Pacific Coast, in the opinion of many Southland plant authorities.

A huge double red hybrid amaryllis, grown and exhibited by an amateur, Mrs. J. H. Linkletter of Whittier, and competing with thousands of other gorgeous blooms, was declared the best and largest flower in the show by three of the Southland's leading horticulturists acting as judges of the show.

In the array of exhibits by commercial and amateur growers from various parts of the United States, Mrs. Linkletter was also awarded the blue ribbon for the best collection of ten or more Grandiflora amaryllis.

FROM FLORIDA

A collection of compact amaryllis in the cut-flower display from Florida proved to be an attraction of the show. An unusual display of crinums, seldom seen on the Pacific Coast, but a decided favorite in the East, was awarded a first ribbon. These flowers were also from Southeastern States.

A large display of select blooms from the United States Department of Agriculture in Washington, D. C., received a ribbon of merit. The varieties had been produced by the Federal Department by scientific breeding methods.

All eastern exhibits were sent by airplane and were received in excellent condition.

The show, which was under the auspices of the American Amaryllis Society, was managed by Richard Diener of Oxnard and Fred Howard of Montebello and drew large crowds each day.

The judges who passed on the exhibits were Donald James, Santa Barbara; E. O. Orpet, Santa Barbara; and E. P. Zimmerman, Carlsbad.

* Reprinted from "Southland Homes and Gardens," April 28, 1935.

Sidelights on the Second National Amaryllis Show at Montebello, Calif., April 12-14, 1935*

C. E. Houdyshel—April 13, 1935.

"Perhaps the highest honor was won by Mrs. J. H. Linkletter, of Whittier, California, for the largest flower exhibited. It was probably also the best, for the form was excellent. It was a four flower umbel, and the color pure dark red. The open flower was quite flat across. This flower was quite double, having 10 petals. Mrs. Linkletter showed about five other varieties."

E. O. Orpet—April 18, 1935.

"Howard & Smith must have had 10,000 flowers open not only at the show but in the other greenhouses and show places. I never saw such a display of all good kinds and perhaps never will again. There were some pink shades they are working up that are very promising. The best flower in the show (professional exhibits) was one of a decided deep rose shade, wonderful form, in Howard's exhibit."

Richard Diener—April 19, 1935.

"The Amaryllis show has come and gone and was a very good show. Most of my Amaryllis were outdoors and on April 7 we had two inches of rain in twenty-four hours. Monday morning I went out and looked at the Amaryllis and they appeared as if hail had gone through them and there was not a single bud in shape. I immediately cut all the buds that might have had a chance to open out by the time of the Show (April 12-14). I placed them in pails in the greenhouse and let it get as hot as possible. By the 11th we had a nice bunch in shape . . . The Show made a great hit with all who attended."

D. M. Falconer—April 30, 1935.

"The Show was very successful, from the standpoint of attendance . . . We estimate that between twenty and twenty-five thousand people attended the Show and it received very favorable comment from everyone."

Fred H. Howard—May 9, 1935.

"It was a very successful Show from every standpoint except that the number of exhibitors was limited. It is estimated that on the three days we had some twenty to twenty-five thousand people through the buildings. Cars were parked for half a mile on either side of the nursery on the boulevard, and at certain periods the congestion in the main lobby was very bad, but we handled it in good shape . . . The display as a whole was magnificent and I do not believe there was a single criticism made by anyone of the people who saw it. We had our own stock in the neighborhood of some 2,000 selected plants in pots. Mr. Diener brought down a truck load of cut Amaryllis but no pot plants."

*** * * —May 20, 1935.**

"There is no doubt about the success of the Show. It was acclaimed in all quarters."

* Excerpts from letters received by the Secretary, Mr. Wyndham Hayward.

Southeastern Regional Amaryllis Show, Orlando, Florida, April 3-5, 1935

WYNDHAM HAYWARD, *Florida*

The 1935 Southeastern Regional Amaryllis Fiesta and Exhibition of the American Amaryllis Society was held in the Orlando, Florida, Chamber of Commerce Building April 3-5, and the estimated attendance for the three days was 15,000. From all parts of the state came the exhibitors and spectators, and acclaimed the quality of the blooms on display as vastly superior to those shown the year before.

The number of blooms was less than the year before, due to unseasonable warm weather. Among the features of the Show were a table of 24 named varieties displayed by an Orlando firm, the Heaton Bulb & Palm Company, a large exhibit of choice blooms from the Washington greenhouses of the United States Department of Agriculture, entries of various Zephyranthes, pure white types of hybrid Amaryllis, and double-flowered Amaryllis. I. W. Heaton of Orlando was manager of the Fiesta.

The Fiesta was held with the cooperation of the Greater Orlando Chamber of Commerce, and proved again an outstanding winter visitor attraction. In 1936 the Southeastern Regional show will be combined with the National Amaryllis Show for the year. Mayor V. W. Estes, the City Commissioners, and leading horticultural authorities and flower fanciers were honored guests at the exhibition during the three days. Many bulb specialists from distant points made special trips to Florida to see the latest progress in hybrid Amaryllis developments. The grand award of the Show to the winner of the most points was awarded to the Heaton Bulb and Palm company. Final awards in the classes were made by a committee of judges headed by Dr. Hamilton P. Traub of Orlando, assisted by a committee including Mr. Knowles A. Ryerson, A. R. King, I. W. Heaton, E. G. Duckworth, W. Hayward and J. W. Ischy. Judges were not allowed to act in any classes in which they had entries.

Awards

Best bloom in show: Heaton Bulb & Palm Co.; Best Bloom in Leopoldi class, first, Mr. Heaton; second, Mr. Heaton. Best Bloom in Reginae A. class, first, Mrs. W. G. Tilghman, Palatka. Best Bloom in the Reginae B. Class, First, Mr. Heaton.

Awards of Merit: to Mr. Heaton for display of 24 named varieties of hybrid Amaryllis; to U. S. Department of Agriculture for display of hybrid Amaryllis from Washington, D. C.

First Class Certificates: to all winners in "best bloom" classes; U. S. Department of Agriculture exhibit for color; John Springer, Orlando, Fla., for display of original Mead strain blooms; John Springer, for display of double-flowered *Hippeastrum equestre alberti;* W. Hayward, Winter Park, for display of most species of Amaryllis family; Mr. and Mrs. John W. Ischy, Windermere, Fla., for arrangement and display of hybrid Amaryllis; 17 certificates to Mr. Heaton for new seedlings; Mrs. J. A. Sewell, Winter Park, for *Hippeastrum equestre major;* Harry E. Searles, Orlando, for one variety; Mrs. W. G. Tilghman for two varieties; John W. Ischy for two varieties; W. Hayward for three varieties; W. Hayward for hybrid Crinum *"Cecil Houdyshel"* exhibit; Arthur R. King, for *H.equestre* hybrid bloom; Frank Vasku, for one variety; Marinello Shop, Orlando, for exhibit of *Eucharis grandiflora.*

Individual Class Awards Were:

Reginae Type A, compact petals—Class 303, white with lighter red markings, first, Mr. Heaton; Class 317, lighter red to light red without markings, first, Mrs. W. G. Tilghman; second J. W. Ischy; third, A. R. King; Class 319, lighter red to light red with distinct markings, first, Mr. Heaton, second Mrs. W. G. Tilghman; third, W. Hayward. Class 320, red without markings, first, Mr. Heaton. Class 321, red with slight markings, first A. R. King; second Mr. Heaton. Class 322, red

with distinct markings, first, Mrs. W. G. Tilghman; second, Mr. Heaton; fourth, Mr. Hayward. Class 325, violet red, first, Mr. Heaton.

Reginae type B, pointed petals—Class 401, white without markings, first, Dr. H. P. Traub; second, Frank Vasku; third, H. E. Searles; fourth, Mrs. W. G. Tilghman. Class 402, white with slight pale red markings, first, Frank Vasku; second, Mr. Heaton. Class 403, white with slight red markings, first, Mr. Heaton; second, Frank Vasku; third, D. E. Anderson; fourth, Peterson & Riedel. Class 404, white with light red stripes, etc., first, W. Hayward; second, H. E. Searles. Class 407, yellow with markings, third, J. W. Ischy. Class 411, orange without markings, first, Mr. Heaton; second, J. W. Ischy. Class 412, orange with light markings, first, A. R. King; second, Mr. Heaton. Class 413, orange with distinct markings, first, Peterson & Riedel; second, D. E. Anderson; third, Albert Stuckie. Class 414, pale red without markings, first, Mr. Heaton. Class 415, pale red with light markings, first, Mr. Heaton, second, Mrs. Tilghman; fourth, Peterson & Riedel. Class 416, pale red with distinct markings, first, Peterson & Riedel, second H. E. Searles; third, Albert Stuckie. Class 417, lighter red to light red without markings, first, Mr. Heaton; second, Peterson & Riedel. Class 420, red without markings, first, Mr. Heaton; second, Mrs. W. G. Tilghman. Class 421, red with slight markings, first, Albert Stuckie. Class 422, red with distinct markings, first, J. W. Ischy; second, D. E. Anderson; third, Mr. Heaton. Class 423, dark red, first, Peterson & Riedel; second, A. R. King; third, Frank Vasku; fourth, H. E. Searles. Class 425, violet red, first, Mr. Heaton. Class 429, violet red with markings, first, Mr. Heaton. Class 430, light violet red, first, Mr. Heaton. Class 431, dark red novelty, first, Mr. Heaton.

Leopoldi types A and B—Class 501, white without markings, first, W. Hayward; second, Mr. Heaton. Class 503, white with lighter red markings, first, Mr. Heaton. Class 514, pale red without markings, first, Mrs. W. G. Tilghman. Class 523, dark red, first, Mr. Heaton. Class 524, darker red, first, Mr. Heaton. Class 526, rainbow, pale red type, first, Mr. Heaton. Class 529, dark red novelty, first, W. Hayward.

Hippeastrum species, Johnsonii, first, Frank Vasku; second, W. Hayward; equestre, first, Mrs. J. A. Sewell, Winter Park; second, W. Hayward; *H.equestre alberti,* (double-flowered) first, John Springer; Crinum species, first, *Crinum Asiaticum,* Mrs. John List, Winter Park; second, *Crinum amabile,* W. Hayward; *Crinum* hybrids, first, W. Hayward, for "Cecil Houdyshel." Other species, *Sprekelia formosissima,* first, W. Hayward; *Chlidanthus fragrans,* first, W. Hayward; *Zephyranthes treatiae,* first, Dr. H. P. Traub; *Cooperia pedunculata,* first, W. Hayward; *Eucharis grandiflora,* first, Marinello shop.

The 1934 and 1935 Amaryllis Shows of the Bureau of Plant Industry, U. S. Department of Agriculture

The twenty-first annual Amaryllis Show of the U. S. Department of Agriculture, which was held at the Department Greenhouses, Fourteenth Street and Constitution Avenue, N. W., Washington, D. C., was opened March 26, 1934. The public was admitted from 9:00 a. m. to 9:00 p. m. daily through April 2 when the show closed at 9:00 p. m. The display was viewed by 19,840 people.

The exhibition comprised 1,200 amaryllis bulbs, each of which bore two or three flower stems with from two to seven flowers on each stem. The result was that there were displayed several thousand flowers ranging in color from dark velvety red through various shades of red, pink, orange, yellow-orange and striped types to pure white. The bulbs were arranged in the exhibition house of the Department Greenhouses on two side benches and on a center elongated pyramidal staging. Small pots of *Vinca major,* with rounded grey-green leaves edged with white, were placed between the pots of amaryllis to form a pleasing combination with the pointed dark green leaves, thick silvery green flower stems and clear bright blossoms of the amaryllis.

The Department's twenty-second annual Amaryllis Show was held from March 29 to April 5, 1935, inclusive, being open each day from 9:00 a. m. to 9:00 p. m.

The exhibition was attended by 28,325 visitors, some of whom travelled a long distance to see the display. Classes from public and private schools and members of garden clubs viewed the show in groups. Out-of-town, as well as local, florists and commercial growers were interested visitors.

The same general arrangement was followed for this exhibition as for the one of the previous year. Several large pots, each containing a group of bulbs in flower, were placed along the ridge of the center staging to provide accent notes. The most striking of these was a pot with seventeen blooms which were a vivid scarlet-red with white stars in the throats of the flowers.

The bulbs in the Department's collection of amaryllis are hybrids resulting from many years of breeding conducted by Department of Agriculture experimenters since 1909 when twelve varieties were imported from England. The Amaryllis Shows are exhibitions of the results achieved by the Department in one of the many phases of its work to produce improved plant forms. Department workers with amaryllis have successfully endeavored to obtain longer stems, new shades and larger flowers. The white amaryllis was produced through successive selection and cross-pollination of striped flowers showing the most white. The 1935 exhibition contained flowers measuring eleven inches from tip to tip. Some of the flower stems were over two feet long. A group of seedlings, flowering for the first time this spring, revealed new subtleties of colors, particularly in the orange shades.

The Department has held an Amaryllis Show each year since 1912 with the exception of the years 1914 and 1915.

Amaryllids at the New York Flower Show 1935

At the 1935 New York Flower Show in March prizes to private growers were awarded for amaryllis *(Hippeastrum),* clivias and narcissi (on March 19) as follows—

Amaryllis (12 plants, one bulb in a pot) Mrs. Roswell Eldridge, Great Neck, L. I., first; Miss Marie L. Constable, Mamaronek, N. Y., second.

Amaryllis (6 plants, one bulb in a pot) Mr. J. P. Morgan, Glen Cove, L. I., first; Mr. Marshall Field, Huntington, L. I., second.

Clivia (Imantophyllum) (6 plants, not less than 8-inch pots) Mrs. W. R. Coe, Oyster Bay, L. I., first; Mrs. H. M. Tilford, Tuxedo Park, N. Y., second.

Clivia (Imantophyllum) (Specimen) Mrs. W. R. Coe, first; Miss Marie Constable, second.

Narcissi (in variety, large trumpet types, six 8-inch pots or pans) Mrs. C. R. Holmes, Port Washington, L. I., first; Mr. Samuel A. Salvage, Glen Head, L. I., second.

Narcissi Poetaz (in variety, six 8-inch pots or pans) Mrs. E. Marshall Field, Syosset, L. I., first; Mrs. C. R. Holmes, Port Washington, L. I., second; Mr. Samuel A. Salvage, third.

Narcissi Incomparabilis (in variety, six 8-inch pots or pans) Mrs. Samuel A. Salvage, first; Mrs. C. R. Holmes, second.

Narcissi (all other types, six varieties) Mrs. C. R. Holmes, first; Mr. Samuel A. Salvage, second.

Some Notes on European Flower Shows

RUSSELL S. WOLFE, *South Carolina*

Official Delegate of the American Amaryllis Society

The Decennial International Flower Show at Heemstede, Holland this spring was an extensive affair and quite a complete education in the newest and best, and the old standbys of Holland Bulbs, and, their proper culture and uses.

The area covered by the flower show was 46 acres of outdoor plantings, Flora's Palace, 27,000 square feet, and the "Ware House" 8,600 square feet.

Mass plantings were arranged for the Main Section.

The crocuses and other early blooming bulbs, as well as most of the narcissi, were over when we arrived; but, the tulips were certainly in their prime and in numbers too great to estimate. There were 500,000 tulips in the space in front of the main hall. These were planted mostly in beds of separate varieties, and very artistically arranged for wonderful effect. Also the arrangements permitted of practical approach by those interested in obtaining names of varieties, everything being plainly marked.

Other outside plantings consisted of effective arrangements of bulbs along with other spring flowers and shrubbery in many and varied types of old Dutch gardens, rockeries, formal and informal plantings and borders.

In the Main Hall (or Flora's Palace) were shown the special exhibits of new or special varieties, mostly cut flowers, very artistically arranged. The show in the Main Hall was continually changing. We attended the opening of the fifth indoor show which was officially opened by the American Minister. Most of the exhibits were of gladioli, dahlias, roses, iris, and other forced flowers.

The Ware House (with glass roof only, no sides at all) was a treasure house of some 70,000 bulbs (mostly tulips) of 800 or more varieties, all new developments of the last ten years; a very valuable planting, worth more than $250,000.

A rather thorough search of the entire show revealed no amaryllis and upon inquiry we were informed that amaryllids *(Hippeastrum,* etc.) were very beautifully displayed in Flora's Palace a short time previously and they had finished blooming.

The amaryllis exhibit was covered by articles in the Gardeners' Chronicle of March 30, 1935 and April 6, 1935.

In order to obtain information concerning the amaryllis in Holland, I visited two of the most famous growers—Messrs. Warmenhoven & Zonen at Hillegom and Van Tubergen's Nursery at Haarlem; where I was graciously received, shown over their plantings and given all information requested.

There were only a very few blooms left, but, those few had good style and some of Warmenhoven's showed a distinct curling of the petals at the throat creating a nice effect.

Messrs. Warmenhoven & Zonen specialize in amaryllis *(Hippeastrum)* hybrids; Messrs. C. G. Van Tubergen Ltd., in addition to the hippeastrums, have quite a number of other Amaryllids; some very rare types. Both firms issue catalogs listing the items grown.

The methods of propagation used are by seed and offsets. All the hippeastrums are grown inside under glass. The seeds are planted in raised beds or benches from June to August. Potted in December and January; pots being usually sunk in the beds or benches; size of pots being increased as the bulbs develop. The bulbs reach blooming size from seed in three years, and are usually flowered in 6-inch to 8-inch pots. A temperature of 70 degrees is used for forcing, after the bloom spike appears.

These firms both state that they have the hippeastrum hybrids in almost all range of colors, including pure whites.

These plantings were all in excellent condition and it was very interesting and entertaining to be shown the plantings by the Dutch growers.

To obtain further information concerning the hippeastrum in Holland I visited the Research Laboratory at Wageningen, where Miss Ida Luyten is doing some wonderful experimental work with bulbs.

Miss Luyten proved a most charming hostess. She stopped all of her work to very patiently show me and tell me about her experiments in detail, especially concerning the vegetative propagation of hippeastrum. Miss Luyten informed me that she is to publish an article in the American Amaryllis Society's Year Book giving her experiments in detail; therefore, the information received from her will not be included in my article. Miss Luyten is certainly doing some wonderful work, and should receive all encouragement and aid possible in the furtherance of her experiments.

The Hollanders seem very thorough and painstaking in keeping their plantings in a high state of cultivation and cleanliness and deserve the successful results obtained.

The Royal Horticulture Society's Chelsea Great Spring Flower Show in London was quite a sight to behold. After visiting this show all day long, I found that short time entirely too inadequate to take it all in. There were many thoroughly planted gardens of all kinds. All sorts and types of cut flowers, and many extensive

trade exhibits. There was one big circus tent just packed with orchids of all imaginable types.

The crowd of visitors was so great that it was very difficult to obtain much information from the exhibitors or stop long enough to properly view or study an exhibit.

There were quite a number of amaryllis *(Hippeastrum)* and kindred bulbs in the private and trade exhibits. There was one private exhibit that displayed quite a number of beautiful pure whites of fine form and style, in fact the best whites I have ever seen.

At the Royal Botanic Gardens, Kew, England, we had a very interesting and instructive visit. The Assistant Curator was good enough to show us and give us information concerning the amaryllis and kindred bulbs. It seems that there is very little variation in the growing of the hippeastrum hybrids in England from the method already mentioned in this article.

Interesting hybridizing work with the hippeastrum, and clivia is being carried on at Kew. There was a fine batch of *Clivia miniata* in various shades in bloom and they were a very effective sight. *Haemanthus katherinae* were blooming to perfection, as well as several types of *Clivia (gardneri, nobilis).*

Kew Gardens is a very wonderful place and could not be properly "covered" in any small article; and, I feel sure that much of the success of Kew Gardens is due to the efforts and ability of the Assistant Curator, Mr. Raffill.

Amaryllis Culture in the Pacific Northwest

HARRY L. STINSON, *Washington*

In many respects few regions are so favorable for general bulb culture as the Pacific Northwest, and under the able direction of the late Dr. David Griffiths, the bulb industry has made rapid progress, especially in the production of the hardier bulbs. Unfortunately the climate is a little too severe for the outdoor cultivation of the tender or half-hardy amaryllids.

Our growing season between frosts varies from one hundred and twenty to one hundred and thirty-five days. The autumn seasons are usually open and warm causing the half hardy bulbs to make rapid growth which is too succulent to withstand the freezing weather in January. Seldom do we have heavy snowfall except in the mountains, and when the thermometer does drop to 8° or 10° F. the ground is bare and no protection is afforded the tender growth.

The amaryllids as a group, are very little known with the exception of the narcissi which are grown by the trainload. In all probability the reason for the limited culture of the various members of the family is the lack of local advertising and display, and the scarcity of reliable cultural information for our climatic conditions. Another reason is possibly the long period between blooms during which the bulbs must be given special care.

In an attempt to gain some idea of the extent of general amaryllis culture we took a trip through the four Northwest states last summer. We found no extensive plantings anywhere along the line of travel.

Apparently none of the various kinds are listed by local seed and bulb dealers except *Amaryllis belladonna* which is offered in some of the chain stores. The people who pass the counter see the large bulbs and the attractive picture, in many cases, stop to buy. The clerk assures them that the bulbs are hardy and beyond that she cares nothing for the results as to bloom production or future sales. Many hundreds of bulbs are sold in this way but I have never seen or heard of a single one that ever lived to bloom.

Hippeastrum hybrids are more generally known, in a small way, by practically all leading florists; who apparently do not push their sale but use them mostly for the color they lend to their establishments. Mr. Dunlap of Rosaia's, in Seattle, states that they sell quite well if they are displayed and advertised as they

should be. The two best collections found are in Seattle,—one at the residence of Mr. W. L. Fulmer and the other at Volunteer Park Conservatory.

Alstroemeria aurantiaca was found in several places in Seattle, in Portland, Oregon; and on Vashon Island. In fact we saw a float decorated with them in a parade at Kent, Washington. The late Dr. Griffiths informed us that *A. Chilensis* is grown at Bellingham, Washington, and does splendidly there.

Clivia miniata is best represented in Volunteer Park Conservatory in Seattle, and is also found in private homes here and there. A few may be seen also in florist's collections.

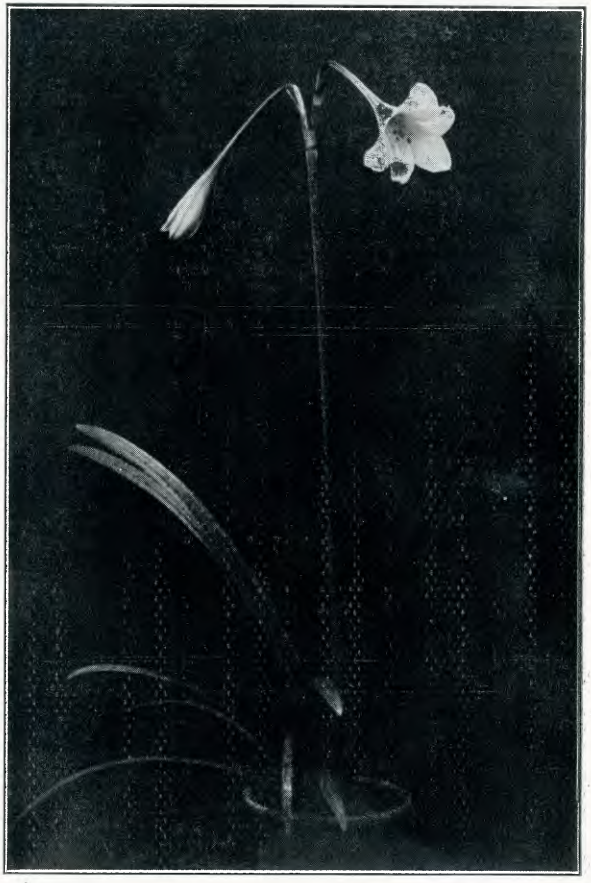
Lycoris squamigera is seldom met with, although we heard of a grower in Weiser, Idaho, who was reported growing them on a large scale. I have not had the opportunity of verifying this report.

The hardier species of *Zephyranthes* are found more frequently. We find them in many rock gardens, and since Seattle is a city on hills, rockeries are in high favor. Here also are found various species of the hardy *Galanthus* and *Leucojum*. We have heard humors that species of *Sternbergia, Nerine, Vallota,* and a few other types have been seen, but nothing definite has been learned about them.

Since the Board of Directors has placed me on the Trial Collections Committee, we have added to our collection as rapidly as possible. To date we have growing either in the small greenhouse or in the open a number of species and hybrids. These are arranged below according to Dr. Hutchinson's system,—

Order	Family	Tribe	Species
Liliales	Liliaceae	Hemerocallideae	1. *Hemerocallis* (named varieties)
Alstroemeriales	Alstroemeriaceae	.....	2. *Alstroemeria aurantiaca*
			3. *A. lutea*
			4. *A. chilensis*
			5. *A. psittacina*
	Petermanniaceae	.....	Not represented.
	Philesiaceae	.....	Not represented.
Amaryllidales	Amaryllidaceae	Agapantheae	6. *Agapanthus umbellatus*
		Allieae	7. *Allium* (various species)
		Gillieseae	Not represented.
		Galantheae	Not represented.
		Amaryllideae	8. *Amaryllis belladonna*
			9. *Nerine sarniensis*
		Crineae	10. *Crinum* (seven species)
			11. *Vallota purpurea*
		Zephyrantheae	12. *Zephyranthes rosea, lutea* and *alba.*
			13. *Z. robusta*
			14. *Z. atamasco*
			15. *Sternbergia lutea*
			16. *Cooperia drummondii*
		Haemantheae	17. *Clivia miniata*
		Ixiolirioneae	Not represented.
		Eucharideae	18. *Hymenocallis* (two species)
		Eustephieae	Not represented.
		Hippeastreae	19. *Hippeastrum* (five hybrid strains)
			20. *Hippeastrum advenum*
			21. *Lycoris squamigera*
		Narcisseae	22. *Narcissus* (various varieties)

This is a short list but we hope to add to our Pacific Northwest Trial Collection as opportunity offers. Contributions for trial in our northern climate will be gladly received, and we also invite correspondence.



R. de Kersting

Hippeastrum solandriflorum

This is Solandriflorum Type A under the tentative classification on page 70; for Leopoldi Type A see page 91.

Tentative Classification of Amaryllis (Hippeastrum) Flower Types for Exhibition Purposes

Revised for 1935 and 1936 shows: For exhibition purposes amaryllis shall be placed tentatively into the (1) Grandiflora, and (2) Miniature groups on the basis of the characters indicated below,—

Grandiflora Group

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

A. Flowers distinctly drooping, tube long (over 3 inches long)
  B. Tube very long (over 4 inches) *Solandriflorum Type A*
  BB. Tube shorter (3 to 4 inches) *Solandriflorum Type B*
AA. Flowers slightly upright, horizontal or slightly drooping, tube short
  C. Tube narrow, (1 to 3 inches)
    D. flower compact, *Reginae Type A*
    DD. flower pointed, *Reginae Type B*
  CC. Tube open (to 1 inch)
    E. flower compact, *Leopoldi Type A*
    EE. flower pointed, *Leopoldi Type B*

Miniature Group

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

A. Tube narrowly funnel-shaped, *Phychella Type*
AA. Tube openly funnel-shaped, *Habranthus Type*

Classes and Awards (Prize Schedule)

At the annual National Amaryllis Show, and at other exhibitions, as voted by the Board of Directors, the Society will award its First Class Certificate for meritorious new and standard varieties; its award of merit; and its first, second, third and fourth prize ribbons, in the classes indicated below. Any money prizes offered shall be authorized by action of the Board of Directors.

Each species or varietal exhibit shall consist of one or more potted flowering plants, or one or more flower scapes up to and including 1938; after which date three potted flowering plants or three flower scapes shall be required in each case.

SECTION A. AMARYLLIS (Genus Hippeastrum)

Class 1. Single entries of Hippeastrum species.
Class 2. Best collection of botanical species and varieties.
Class 3. Best collection of 10 or more Grandiflora varieties.
Class 4. Best collection of 5 to 10 Grandiflora varieties.
Class 5. Best collection of 5 or more Miniature varieties.
Class 6. Best display.
Class 10. Best bloom in Show.

STANDARD GRANDIFLORA AND MINIATURE VARIETIES

The score card, and Prize schedule follow on pages 71 and 72.

Score Card—Exhibition Type Hybrid Amaryllis (Hippeastrum)*

All flowers to be expanded in ½ or more direct sunlight.

Color Class No..... Exhibitor's No.....

Flower Type.....

Character to be Scored	Method of Rating	Possible Score
Color and texture	No flower of inferior color to be considered; the full 50 points to be deducted for major color defects; dark green in combination with medium and dark red is especially objectionable.	50
Form	Except in the case of Solandriflorum types, preference is to be given to flowers with regular petals; the typical amaryllis flower shape however is to be recognized by allowing from 5 to 10 points depending on the merits of each particular case.	15
Size	Except in the case of Solandriflorum types, the following shall rule (diameter across face): 6″ to 7″, allow 5 points; 7″ to 9″, allow 10 points; 9″ and above, allow 15 points	15
Habit	For Solandriflorum types the drooping habit is normal; but for Reginae and Leopoldi types, horizontal and slightly erect carriage are to be favored, although slight drooping is allowable.	5
Number of flowers to scape	For less than 3 or more than 5 allow 2 points; for 3 to 5 allow 5 points	5
Length of scape	The length should be considered in relation to size of flower; scapes too short or too long should be penalized	5
Character of scape	Scapes should not be so coarse as to be conspicuous, but should be sturdy enough to hold up flower well	3
Fragrance	Should not be too faint or too strong	2

* NOTE: No entry is to receive first prize unless a rating of a least 86 points is merited; second and third prizes may be awarded to entries rating from 76 points up. A separate Score Card for the Decorative Type will be adopted later.

Classes of Grandiflora and Miniature Varieties (Prize Schedule)

Color Classification (Fischer Color Chart)	Standard Grandiflora Varieties						Standard Miniature Varieties	
	Solandriflorum Type A	Solandriflorum Type B	Reginae Type A	Reginae Type B	Leopoldi Type A	Leopoldi Type B	Habranthus Type	Phychella Type
White without markings	101	151	201	251	301	351	401	451
White with slight pale red markings	102	152	202	252	302	352	402	452
White with lighter red markings	103	153	203	253	303	353	403	453
White with lighter red stripes, keels, stars, tips, etc.	104	154	204	254	304	354	404	454
White with red stripe, keels, stars, tips, etc.	105	155	205	255	305	355	405	455
Yellow without markings	106	156	206	256	306	356	406	456
Yellow with markings	107	157	207	257	307	357	407	457
Bronze without markings	108	158	208	258	308	358	408	458
Bronze with slight markings	109	159	209	259	309	359	409	459
Bronze with distinct markings	110	160	210	260	310	360	410	460
Orange without markings	111	161	211	261	311	361	411	461
Orange with slight markings	112	162	212	262	312	362	412	462
Orange with distinct markings	113	163	213	263	313	363	413	463
Pale red without markings	114	164	214	264	314	364	414	464
Pale red with slight markings	115	165	215	265	315	365	415	465
Pale red with distinct markings	116	166	216	266	316	366	416	466
Lighter red to light red without markings	117	167	217	267	317	367	417	467
Lighter red to light red with slight markings	118	168	218	268	318	368	418	468
Lighter red to light red with distinct markings	119	169	219	269	319	369	419	469
Red without markings	120	170	220	270	320	370	420	470
Red with slight markings	121	171	221	271	321	371	421	471
Red with distinct markings	122	172	222	272	322	372	422	472
Dark red	123	173	223	273	323	373	423	473
Darker red	124	174	224	274	324	374	424	474
Violet red	125	175	225	275	325	375	425	475
Rainbow and tri-color types, excluding green	126	176	226	276	326	376	426	476
Any other color	127	177	227	277	327	377	427	477
Best bloom of type	149	199	249	299	349	399	449	499

SECTION B. HEMEROCALLIDEAE

Class 501 Hemerocallideae

SECTION C. AMARYLLIDALES (except Genus Hippeastrum; See Section A, above)

Class 551. Agapantheae
Class 601. Allieae
Class 651. Gilliesieae
Class 701. Galantheae
Class 751. Amaryllideae
Class 801. Crineae
Class 851. Zephyrantheae
Class 901. Haemantheae
Class 951. Ixiolirieae
Class 1001. Eucharideae
Class 1051. Eustephieae
Class 1101. Hippeastreae (Except Genus Hippeastrum; See Section A, above)
Class 1151. Narcisseae
Class 1155. Polyanthus Narcissus (*N. tazetta)*

SECTION D. ALSTROMERIALES

Class 1201. Alstroemeriaceae
Class 1251. Petermanniaceae
Class 1301. Philesiaceae

2. Description and Phylogeny

The Hemerocallideae, Alstroemeriales and Amaryllidales*

DR. J. HUTCHINSON, *Kew Gardens, England*

Order 89. LILIALES

* * * * * * * *

293. LILIACEAE

* * * * * * * *

Tribe 8. *HEMEROCALLIDEAE.*—Rootstock a *rhizome* or the latter *bulb-like;* leaves all *basal* or towards the base; flowers usually racemose or paniculate; perianth-segments *connate* into a funnel-shaped tube, erect or pendulous; corona absent; stamens hypogynous or on the tube; anthers dorsifixed, introrse; ovules numerous; fruit a loculicidal capsule.

Distribution.—Eastern Asia, N. America.

Further development, to TULIPEAE and AMARYLLIDACEAE.

A. Leaves petiolate; rhizome woody....HOSTA (***Funkia***) (China, Japan). *AA.* Leaves strap-shaped. *B.* Rootstock a rhizome; roots often thickened: *C.* Flowers in a panicle....HEMEROCALLIS (E. Asia). *CC.* Flowers from the axils of radical bracts ....LEUCOCRINUM (N. Amer.). *BB.* Rootstock bulb-like ...HESPEROCALLIS (Calif.).

* * * * * * * *

Order 90. ALSTROEMERIALES

Rootstock a rhizome with *fibrous* or *tuberous roots;* stems *leafy, erect* or *climbing;* leaves alternate, linear to ovate; flowers showy, in a terminal cluster or raceme; perianth-segments 6, free or partly connate, equal or sometimes *one somewhat dissimilar;* stamens 6, free or partly connate; ovary *superior or usually inferior;* 3-celled with axile placentas, or 1-celled with parietal placentas; fruit a capsule or berry; seeds with copious endosperm.

Mainly Southern Hemisphere.

A. Ovary inferior:

B. Fruit a capsule; inflorescence terminal, often surrounded by a whorl of leaves; stem herbaceous and erect or woody and climbing; Central and S. America
ALSTROEMERIACEAE

BB. Fruit a berry; inflorescence leaf-opposed; ovary 1-celled, with parietal placentas; woody climber with reticulately veined leaves; Australia
PETERMANNIACEAE

AA. Ovary superior; fruit a berry; flowers axillary or terminal; herbaceous or woody, often climbing; Southern Hemisphere . . . . . PHILESICEAE

*Reprinted with kind permission of the Author and Publishers of "The Families of Flowering Plants. Vol. II. Monocotyledons; arranged according to a new system based on their probable phylogeny." By J. Hutchinson. Macmillan & Co., London, 1934. 243 pages with illustrations by the author.

299. Alstroemeriaceae[1]

Rootstock a *rhizome* with fibrous roots sometimes bearing tubers; stems erect, ascending, or climbing, leafy. Leaves alternate, crowded or scattered, entire, the petiole usually twisted and reversing the surfaces. Flowers in a terminal cluster or irregular raceme, rarely solitary, showy, hermaphrodite, more or less actinomorphic but often one segment of the perianth different from the others and more spotted. Perianth-segments *free to the base,* inserted on an epigynous annulus, in two series, often narrowed to the base or spathulate. Stamens 6, inserted on an annulus at the base of the segments; filaments free; anthers introrse, oblong or ovoid, *basifixed,* opening lengthwise. Ovary *inferior,* 3-celled with axile placentas or 1-celled with parietal placentas; style filiform, shortly 3-lobed. Ovules numerous in each cell or on each placenta, anatropous. Fruit a *capsule,* more or less truncate, loculicidally 3-valved, crowned by the persistent epigynous annulus or by the persistent perianth-segments. Seeds numerous, with a small embryo in copious endosperm.—B.H. 3:735, tribe *Alstroemerieae* (in greater part); Rendle, 308.

Confined to Central and South America.

A. Ovary 3-celled, with axile placentas: *B.* Perianth-segments of the two series similar in size but often not in colour; roots not tuberous .. Alstroemeria (S. Amer.). *BB.* Perianth-segments dissimilar, the outer shorter than the inner; roots often tuberous .. Bomarea (Cent. and S. Amer.). *AA.* Ovary 1-celled, with parietal placentas: *C.* Inflorescence capitate, several flowered; perianth-segments spathulate, persistent and erect-patent in fruit Leontochir (Chile). *CC.* Inflorescence 1-flowered .. Schickendantzia (Andes).

300. Petermanniaceae

A tall *woody climber*; stem more or less *prickly.* Leaves alternate, shortly petiolate, lanceolate, acuminate, with numerous sub-parallel nerves and *reticulate veins.* Flowers hermaphrodite, in lax few-flowered cymes; cymes *lateral or leaf-opposed,* sometimes modified into a *branched tendril.* Perianth 6-partite; segments oblong, spreading or at length deflexed, subequal. Stamens 6, inserted at the base of the perianth; filaments erect; anthers oblong, extrorse, cells contiguous, the connective not produced. Ovary inferior, 1-celled *with 3 parietal placentas;* style slender, with a terminal capitate stigma; ovules numerous. Fruit a many-seeded *berry.*—B.H. 3:746 (under *Dioscoreaceae*).

Australia.

Genus Petermannia; species 1.

Bentham and Hooker f. say of *Petermannia* in the Genera Plantarum (l.c.):[2] "genus habitu perianthio et staminibus potius Liliaceis (Smilaceis) quam Dioscoreaceis accedit, sed ovarium distincte inferum, et in utroque ordine insigne est placentis parietalibus multiovulatis".

301. Philesiaceae

Shrubs, undershrubs or tall climbers, sometimes semi-epiphytic from a slender branched rhizome. Leaves alternate, oblong to ovate, with prominent parallel nerves and reticulate or with prominent transverse veins between the nerves. Flowers terminal or axillary, pendulous, solitary, fasciculate or cymose-racemose, white, greenish or red, hermaphrodite, actinomorphic. Perianth at length deciduous; segments free or connivent or connate into an urceolate tube, subequal or the outer calyx-like and the inner petaloid; no corona. Stamens 6, hypogynous or at the base of the segments or on the perianth-tube; filaments free or partly connate into a tube; anthers dorsi-fixed in the middle or near the base, introrse or sublaterally introrse, opening by slits lengthwise. Ovary superior, 3- or 1-celled, with axile or parietal placentas; style 1, with a capitate or shortly 3-lobed stigma. Ovules numerous to few. Fruit a *berry.*—B.H. 3:766, as greater part of tribe *Luzuriageae.*

[1]Dumort. Anal. Fam. Pl. 57, 58 (1829).

[2]"A genus with the habit, perianth, and stamens rather of Liliaceae (Smilaceae) than of Dioscoreaceae, but the ovary distinctly inferior, and remarkable in either family in having parietal multiovulate placentas."

Southern Hemisphere; New Guinea, Pacific Islands, New Caledonia, Australia, New Zealand, Temp. S. America, S.-E. Africa.

Philesiaceae is a very distinctive group of the *Liliales*, usually included in the family *Liliaceae* as a tribe or subfamily under the names *Luzuriageae* or *Luzuriagoidaea* respectively. Although Lindley[1] knew only the genera *Philesia* and *Lapageria*, he considered the group to be worthy of family rank, a status maintained for it here, which it seems to require. The woody stems, reticulate-veined leaves, simple or slightly lobed style, and baccate fruit, coupled with the distinct geographical distribution, provide a combination of characters separating it from other families of the *Liliales*. The stems are woody and either climbing or suffruticose and sometimes semi-epiphytic, often growing on old rotting tree-stumps in forests.

The family as constituted here is found only in the Southern Hemisphere, one monotypic genus, *Behnia* (*B. reticulata* Didr.), being in South-Eastern Africa, from Uitenhage through the eastern provinces as far north as Gazaland. The link with this region and Australia is provided by *Elachanthera*, a monotypic genus which occurs at Nikol Bay, in North-Western Australia (20° 35′ S., 116° 5′ E.). The genus *Luzuriaga* connects very closely the floras of Subantarctic South America and New Zealand, *L. marginata* Benth. and Hook. f., and *L. parviflora* Kunth, occurring in these respective regions, having even been regarded as the same species.

A. Erect under shrubs: *B*. Perianth-segments subequal, spreading; habit of a *Phyllanthus*; ovary 3-celled LUZURIAGA (Chile and N. Zeal). *BB*. Perianth-segments very unequal, erect, the inner much longer than the outer; leaves 1-nerved; ovary 1-celled, with parietal placentas PHILESIA (Chile, Magell.). *AA*. Climbers: *C*. Perianth-segments free or nearly so: *D*. Perianth-segments erect, thick; leaves 3-5-nerved; ovary 1-celled, with parietal placentas LAPAGERIA (Chile). *DD*. Perianth-segments spreading; ovary 3-celled: *E*. Inner perianth-segments fimbriate-ciliate EUSTREPHUS (Austral.). *EE*. Inner perianth-segments not ciliate: *F*. Perianth-segments nerveless; anthers rounded-ovate ELACHANTHERA (N.-W. Austral.). *FF*. Perianth-segments distinctly nerved; anthers oblong-linear GEITONOPLESIUM (Austral., N. Caled., Pacif. Isl.). *CC*. Perianth-segments united into a campanulate tube; transverse veins prominent; ovary 3-celled... BEHNIA (S.-E. Afr.).

* * * * * * * *

Order 93. AMARYLLIDALES

Herbs with a tunicated bulb (very rarely a rhizome); leaves radical, usually linear; flowers mostly showy, umbellate or rarely solitary on a leafless stem (scape) and subtended by an involucre of 1 or more mostly thin bracts; stamens generally 6; corona present or absent; ovary superior or inferior, mostly 3-celled with axile placentas; fruit a capsule or berry.

Temperate and warm-temperate regions, rarer in the tropics.

One family . . . . . AMARYLLIDACEAE

306. AMARYLLIDACEAE

Herbs with a tunicated bulbous rootstock or very rarely a rhizome. Leaves few from the base of the stem or bulb, more or less linear, with parallel nerves and transverse secondary nerves. Flowers usually showy, hermaphrodite, actinomorphic, solitary to many and umbellate at the top of the scape, subtended by an involucre of two or more (rarely only one) usually membranous bracts. Perianth inserted below or usually above the ovary, petaloid, often withering and persisting, with or without a tube; segments or lobes 6, in 2 series, all equal and similar or the inner smaller or larger than the outer; corona often present. Stamens 6 (rarely more), opposite the segments or lobes of the perianth, hypogynous or inserted on the tube or towards the base of the segments; filaments free or expanded at the base and connate and forming a "false" corona; anthers 2-celled, introrse, basi-fixed or versatile, opening by slits lengthwise. Ovary superior or inferior, 3-celled (or rarely by abortion 1-celled), with

[1]Lindley, Veg. Kingd. 217 (1841).

axile (rarely parietal) placentas; style slender, with a capitate or 3-lobed stigma. Ovules mostly numerous in each cell and superposed in 2 series, anatropous. Fruit a capsule, or fleshy and indehiscent. Seeds usually numerous, with fleshy endosperm surrounding the small embryo, sometimes angular or compressed and winged.—B.H. 3:811, partly (as to tribe *Amarylleae* only), and incl. greater part of tribe *Allieae* of *Liliaceae;* E.P. 2, 5:97 (1887); ed. 2, 15A:391 (partly); Baker, Handbook of the Amaryllidaceae (1888).

Temperate and warm-temperate regions, rarer in the tropics.

Useful Products: Onion (Allium Cepa *L.*).

The old distinction between the *Liliaceae* and *Amaryllidaceae*—"stamens 6, ovary superior" in the one, "stamens 6, ovary inferior", in the other,—was too simple, and separated genera which are otherwise very closely related. I have, therefore, taken a somewhat drastic step in including in the *Amaryllidaceae* certain groups formerly placed in the *Liliaceae*. These are the African tribe *Agapantheae*, the South American tribe *Gilliesieae*, and the widely spread tribe *Allieae*. As stated in the preface to this book, I consider in this case the type of inflorescence, *umbellate*, with an *involucre of bracts*, to be of greater taxonomic importance, and giving a more natural grouping than the superior or inferior ovary, the only character formerly separating the families *Liliaceae* and *Amaryllidaceae*. Although it is admitted that in many groups of plants the character of the superior or inferior ovary may be of fundamental importance for distinguishing families, its value in the petaloid Monocotyledons has been much over-emphasised, and has led to artificial classification.

But I have excluded the tribes *Hypoxideae, Alstroemerieae, Agaveae*, and the *Velloziеae*, included in the family by Bentham and Hooker, and I can even less admit the *Conostyleae*, Bentham and Hooker's second tribe of the *Haemodoraceae*, transferred to the *Amaryllidaceae* by Pax in Engler's Pflanzenfamilien.

As here delimited *Amaryllidaceae* may have either a superior or an inferior ovary; they have nearly always 6 stamens, and the flowers are umbellate and subtended by an involucre of two or more bracts, or rarely the flowers are umbellate with a reduction to one bract or even one flower.

Except for the first and most primitive tribe, the *Agapantheae*, the rootstock is a corm or bulb; in *Agapantheae* it retains the rhizomatous character of the more primitive ancestral family *Liliaceae*, in which the rhizome has remained dominant. *Agapanthus*, a South African genus commonly grown in our gardens, is thus a link between the two families.

From these we pass to other two tribes which are more familiar to students in boreal countries, the *Allieae* and *Gilliesieae*. Here the bulb has become a fixed character. In *Allieae* there is no true corona; a "false" corona is sometimes present, for example in *Brevoortia*, in which there are only 3 fertile stamens, the others being petaloid and connate. In the tribe *Gilliesieae* there is a remarkable development of the androecium, which has become zygomorphic, whilst there is often a corona of scales quite apart from the six or more stamens. There is a decided orchidaceous look about the flowers of this tribe, especially of the genus *Gilliesia*, and it represents the most advanced type of flowers met with in those genera with a superior ovary.

The second half of the family, characterised by having an inferior ovary, may be divided primarily on the absence or presence of a corona. The more primitive types are without a corona, the *Galantheae, Amaryllideae, Crineae, Haemantheae, Ixolirieae*, and *Zephyrantheae*, the more advanced with a corona, the latter either "false" and formed by the united and often petaloid bases of the filaments, or a "true" corona separated from the filaments, formed either of separate teeth or scales or these united into an annulus or tube.

In both these divisions the most advanced tribes, the *Zephyrantheae*, in the group without a corona, and the *Narcisseae*, in the group with a corona, the umbel is often reduced to a solitary flower. There seems a close affinity between the tribe *Hemerocallideae*, in the *Liliaceae*, especially between the genus *Hosta (Funkia)*, and tribe *Eucharideae* of the *Amaryllidaceae*, the latter tribe probably representing epigynous types of the former.

Key to the Tribes[1] *of* AMARYLLIDACEAE

A. Ovary superior: *B.* Rootstock a rhizome; corona absent or present... 1. *AGAPANTHEAE. BB.* Rootstock a corm or bulb: *C.* Androecium actinomorphic; corona absent... 2. *ALLIEAE. CC.* Androceium more or less zygomorphic, the filaments connate; corona usually present; mostly Chile... 3. *GILLIESIEAE.* AA. Ovary inferior: *D.* Corona absent; no scales or teeth between the filaments; filaments not or rarely thickened at the base: *E.* Scape leafless except at the base: *F.* Ovules numerous: *G.* Perianth-tube absent or very short; stamens epigynous or inserted near the base of the segments: *H.* Perianth actinomorphic; flowers solitary or few together... 4. *GALANTHEAE. HH.* Perianth more or less declinate or zygomorphic, flowers usually several in an umbel... 5. *AMARYLLIDEAE. GG.* Perianth-tube distinct; stamens inserted on the perianth-tube: *I.* Flowers several together, usually large and showy... 6. *CRINEAE. II.* Flowers solitary or paired... 7. *ZEPHRYANTHEAE. FF.* Ovules few... 8. *HAEMANTHEAE. EE.* Scape leafy in the lower part; umbel subcompound... 9. *IXOLIRIEAE. DD.* Corona present, either formed by the expanded petaloid filaments ("false corona") or of teeth, scales, or an annulus or tube: *J.* Corona "false", usually large and conspicuous, formed of the expanded filaments, the latter often connate at the base into a tube... 10. *EUCHARIDEAE. JJ.* Corona of separate teeth or scales between the filaments: *K.* Corona of small teeth; perianth-lobes not spreading... 11. *EUSTEPHIEAE. KK.* Corona of scales; perianth-lobes spreading.... 12. *HIPPEASTREAE. JJJ.* Corona "true", of separate scales apart from the filaments, or annular or tubular and separate from the filaments.... 13. *NARCISSEAE.*

Tribe 1. *AGAPANTHEAE.*—Rootstock a *rhizome;* stem scapose; inflorescence an umbel, subtended by an involucre of 2 or more bracts; perianth-segments similar, united; corona present or absent; stamens 6, inserted on the perianth-tube; anthers dorsifixed; ovary superior; fruit a loculicidal capsule.

Distribution.—Tropical and S. Africa.

A. Perianth without a corona; stamens exserted... AGAPANTHUS (S. Afr.). *AA.* Perianth with an annular corona or the latter of entire or 2-fid free scales; stamens included in the tube.... TULBAGHIA (Trop. and S. Afr.).

Tribe 2. *ALLIEAE.*—Rootstock a bulb or corm; stem scapose, leafless; leaves radical; inflorescence an umbel, subtended by an involucre of 2 or more bracts; perianth-segments similar, free or united; no corona; stamens 6 or 3; anthers dorsifixed; ovary superior; fruit a loculicidal capsule.

Distribution.—Almost all American, except *Allium,* widely spread in N. Hemisphere.

A. Perfect stamens 6:*B.* Perianth-segments free or united only below the middle: *C.* Rootstock a fibrous-coated corm: *D.* Filaments dilated at the base into scales surrounding the ovary... BLOOMERIA (Calif.). *DD.* Filaments only slightly thickened below the middle... MUILLA (Calif.-Mexico). *CC.* Rootstock a tunicated bulb: *E.* Perianth-segments free or united only at the very base; strongly odorous... ALLIUM (N. Hemisph.). *EE.* Perianth-segments distinctly united towards the base; not odorous... NOTHOSCORDUM (Amer.). *BB.* Perianth-segments united to above the middle: *F.* Stamens free from one another: *G.* Stamens included in the perianth-tube, 2-seriate: *H.* Perianth-tube free from the ovary: *I.* Perianth-tube cylindric... TRISTAGMA (Chile). *II.* Perianth-tube campanulate... STEINMANNIA (Chile). III Perianth-tube funnel-shaped... BRODIAEA (Amer.). *HH.* Perianth-tube partly adnate to the ovary and ventricose... DIPHALANGIUM (Mex.). *GG.* Stamens shortly exserted... MILLA (Mex.). *FF.* Stamens united into a tube: *J.* Flowers mauve or blue... ANDROSTEPHIUM (N. Amer.). *JJ.* Flowers red: *K.* Filaments united only at the base... BEHRIA (Calif.). *KK.* Filaments united to the middle... BESSERA (Mex.). *AA.* Perfect stamens 3: *L.* Stamens included in the perianth-tube: *M.* Perianth-tube cylindric... LEUCOCORYNE (Chile). *MM.* Perianth-tube funnel-campanulate...

[1]Descriptions only of those tribes now transferred for the first time to this family are given in the following enumeration.

BRODIAEA (Amer.). *LL.* Stamens exserted from the tube: *O.* Perianth-tube subglobose... STROPHOLIRION (Calif.). *OO.* Perianth-tube broadly cylindric... BREVOORTIA (Calif.).

Tribe 3. *GILLIESIEAE.*—Rootstock a tunicated bulb; leaves radical, linear; flowers in a terminal umbel; involucre of 2 bracts; perianth-segments subequal to unequal, free or united into a short tube; corona absent or present, of separate scales; stamens 6 or 13; filaments usually more or less connate, and often oblique; anthers dorsifixed, introrse; ovary superior, 3-celled; style entire or shortly lobed; fruit a loculicidal capsule.

Distribution.—Mostly Chile.

A. Corona absent: *B.* Filaments free from one another... ERINNA. *BB.* Filaments connate at the base: *C.* Perianth-segments 6; Perianth-segments united at the base... SOLARIA. Perianth-segments free to the base... SPEEA *CC.* Perianth-segments 3... TRICHLORA (Peru). *AA.* Corona present, of separate scales: *D.* Filaments 6: *E.* All 6 filaments bearing anthers... MIERSIA. *EE.* Three of the filaments without anthers: *F.* Perianth-segments unequal... GILLIESIA. *FF.* Perianth-segments subequal... GETHYUM. *DD.* Filaments 3, only 2 bearing anthers... ANCRUMIA.

Tribe 4. *GALANTHEAE.*—*A.* Perianth-segments unequal... GALANTHUS (Eur., W. Asia). *AA.* Perianth-segments equal or nearly so: *B.* Flowers erect: *C.* Anthers sagittate at the base... LAPIEDRA (S. Spain). *CC.* Anthers not sagittate at the base, dorsifixed: *D.* Scape 1-flowered... [STERNBERGIA]. DD. Scape several-flowered... [STRUMARIA]. *BB.* Flowers nodding; anthers not sagittate at the base... LEUCOIUM (Mediterr. Reg.).

Tribe 5. *AMARYLLIDEAE.*—*A.* Filaments free and not swollen at the base: *B.* Ovules closely sessile on or sunk in the placentas; perianth-tube curved... AMARYLLIS (S. Afr.). *BB.* Ovules more or less stalked on the placentas: *C.* Anthers attached in the middle... BRUNSVIGIA (S. Afr.). *CC.* Anthers attached at or towards the base; capsule 3-lobed... UNGERNIA (Persia). *AA.* Filaments swollen at the base and continued beyond the point of insertion down to the ovary; perianth-segments narrow... NERINE (S. Afr.).

Tribe 6. *CRINEAE.*—*A.* Anthers subbasified... CHLIDANTHUS (S. Amer.). *AA.* Anthers medianly dorsifixed: *B.* Ovules closely sessile or immersed in the placenta: *C.* Flowers subsessile or very shortly stalked... CRINUM (Trop. and Subtrop.). *CC.* Flowers long-stalked: *D.* Perianth straight... AMMOCHARIS (S. Afr.). *DD.* Perianth declinate; tube short... [AMARYLLIS] *BB.* Ovules not immersed in the placentas; seeds winged; flowers sessile or stalked: *E.* Flowers more or less curved; perianth-lobes not connected at the base by a callus: *F.* Perianth-limb much shorter than the tube... CYRTANTHUS (Trop. and S. Afr.). *FF.* Perianth-limb nearly as long as the tube... STENOLIRION (E. Afr.). *EE.* Flowers straight: *G.* Perianth-lobes connected at the base by a callus... VALLOTA (S. Afr.). *GG.* Perianth-lobes not connected at the base by a callus... UNGERNIA (Persia).

Tribe 7. *ZEPHYRANTHEAE.*—*A.* Perianth-segments broad, more or less elliptic or obovate: *B.* Perianth-tube short... ZEPHYRANTHES (Trop. and Subtrop. Amer.). *BB.* Perianth-tube elongated: *C.* Anthers basally dorsifixed... COOPERSIA (Mexico, Texas). *CC.* Anthers medianly dorsifixed: *D.* Filaments free, short: *E.* Scape very short... HAYLOCKIA (Extratrop. S. Amer.). *EE.* Scape long... ZEPHYRANTHES (Trop. and Subtrop Amer.).*DD.* Filaments expanded and united into a tube in the lower part... CROCOPSIS (Peru). *AA.* Perianth-Segments more or less narrow: *F.* Stamens arranged in 2 series at different levels... APODOLIRION (S. Afr.). *FF.* Stamens in 1 series inserted at the same levels: *G.* Filaments filiform... STERNBERGIA (Cent. Eur., Mediterr.). *GG.* Filaments very short, not filiform... GETHYLLIS (S. Afr.).

Tribe 8. *HAEMANTHEAE.*—*A.* Anthers basifixed: *B.* Perianth-segments free to the base; flowers several or numerous in an umbel... HESSEA (S. Afr.). *BB.* Perianth-segments united into a fairly long tube; flowers few (1-5) in an umbel... CARPOLYZA (S. Afr.). *AA.* Anthers dorsifixed: *C.* Fruit a capsule: *D.* Ovules 6 or more in each cell;

style 3-angled or winged... STRUMARIA (S. Afr.). *DD.* Ovules 1-2; style not angular: *E.* Leaves sessile, linear... BUPHANE (Trop. and S. Afr.). *EE.* Leaves stalked... GRIFFINIA (Braz.). *CC.* Fruit a berry: *F.* Ovules 6 in each cell... CLIVIA (S. Afr.). *FF.* Ovules 2 in each cell... HAEMANTHUS (Demensea) (Trop. and S. Afr.). *FFF.* Ovule solitary in each cell... CHOANANTHUS (East Afr.).

Tribe 9. *IXIOLIRIEAE.*—One genus IXIOLIRION (Cent. and W. Asia).

Tribe 10. *EUCHARIDEAE.*—*A.* Leaves *narrow,* linear or oblong-linear or lanceolate: *B.* Ovary 3-celled: *C.* Ovules numerous: *D.* Seeds flat: *E.* Seeds not winged: *F.* Corona very inconspicuous... HYLINE (Braz.). *FF.* Corona very conspicuous... STENOMESSON (Trop. Amer.). *EE.* Seeds winged at one end... PAMIANTHE (Trop. S.-W. Amer.). *DD.* Seeds angular... PANCRATIUM (Canaries to Eastern Tropics). *CC.* Ovules 2 in each cell: G. Perianth-tube very short... ELISENA *(Plagiolirion). GG.* Perianth-tube long: *H.* Staminal corona-cup rather large; free part of filaments short, incurved... ISMENE (S. Amer.). *HH.* Staminal corona-cup small; filaments long, not incurved. . HYMENOCALLIS (Amer.). *BB.* Ovary 1-celled. . CALOSTEMMA (Austral.). *AA.* Leaves broad or broadish and petiolate: *I.* Ovules superposed: *J.* Membranes of filaments not connate or only slightly so... CALLIPHRURIA (S. Amer.). *JJ.* Membranes of filaments connate. *K.* Perianth-tube cylindric with an expanded throat... EUCHARIS (Andes). *KK.* Perianth-tube narrowly funnel-shaped... STRICKLANDIA (Andes). *II.* Ovules ascending from the base (middle)... EURYCLES (Malay Archip., N. Austral.). Imperfectly known genus... KLINGIA (Namaqual.).

Tribe 11. *EUSTEPHIEAE.*—*A.* Perianth-tube much longer than the lobes: *B.* Filaments not winged beyond the corona... URCEOLINA (Andes). *BB.* Filaments winged to beyond the apex... HIERONYMIELLA (Argent.) *AA.* Perianth-tube shorter than the lobes: *C.* Filaments winged beyond the middle: wings of filaments not united... EUSTEPHIA (Peru). Wings of filaments united upwards... EUSTEPHIOPSIS (Argentine). *CC.* Filaments not winged: *D.* Filaments declinate: *E.* Filaments not connate at the base... CALLIPSYCHE (Andes). *EE.* Filaments connate at the base... EUCROSIA (Andes). *DD.* Filaments straight... PHAEDRANASSA (Andes).

Tribe 12. *HIPPEASTREAE.*—*A.* Ovules numerous in each ovary-cell: *B.* Perianth at most more or less declinate; flowers usually several together: *C.* Corona-scales very conspicuous; flowers rather small... PLACEA (Chile). *CC.* Corona-scales very small; flowers large... HIPPEASTRUM (S. Amer.). *BB.* Perianth bilabiate, solitary... SPREKELIA (Mexico). *AA.* Ovules 2-3 in each cell; seeds angular: *D.* Stamens exceeding the perianth-segments... LYCORIS (E. and E. Cent. Asia). *DD.* Stamens shorter than the perianth-segments... VAGARIA (Syria).

Tribe 13. *NARCISSEAE.*—*A.* Corona divided into lobes or scales: *B.* Corona of 12 scales; fruit a berry... CRYPTOSTEPHANUS (W. Trop. Afr.). *BB.* Corona of 6 small scales; fruit a capsule... TAPEINANTHUS (Spain, N. Afr.). *AA.* Corona often trumpet-like, sometimes a mere rim; fruit a capsule... NARCISSUS (Eur., Mediterr., W. Asia).

A Check List of the Bulbous Amaryllidaceae Native to the United States[1]

By C. V. MORTON, *U. S. National Museum*

The following check-list has been prepared at the request of the Secretary of the American Amaryllis Society, and is essentially a compilation of published data. It does not represent a critical estimate of the group, but is intended nevertheless to include all species that have been reported as native to the United States.

The plants of this family are exceptionally difficult of study from herbarium material only, particularly in the case of *Hymenocallis*, in which the species are based largely on slight differences in the shape and toothing of the corona. In this genus there is great diversity of opinion regarding the species, and it is quite likely that the number here recognized will be considerably reduced when more study has been given to the living plants. Such a reduction can scarcely be made from herbarium material. The ranges stated are those commonly ascribed.

I. **COOPERIA** Herbert

1. *Cooperia Drummondii* Herbert, Botanical Register, *22*: *pl. 1835*. 1836.
   SYNONYMY:
   Cooperia chlorosolen Herbert, Botanical Register, *22*: *pl. 1835*. 1836, in note.
   Cooperia Drummondiana Herbert, Amaryllidaceae, 178. 1837.
   Cooperia Drummondiana var. *chlorosolen* Herbert, Amaryllidaceae, 178. 1837.
   Zephyranthes Herbertiana D. Dietrich, Synopsis Plantarum, *2*: 1176. 1840.
   Zephyranthes chlorosolen D. Dietrich, Synopsis Plantarum, *2*: 1176. 1840.
   RANGE: Southern Kansas, Oklahoma, and central Texas between the 95th and 100th meridians, southward to Tamaulipas, Nuevo Leon, and San Luis Potosi.

2. *Cooperia pedunculata* Herbert, Amaryllidaceae, 179, *pl. 42, fig. 3-5*. 1837
   SYNONYMY:
   Sceptranthes Drummondii Graham, Edinburgh New Philosophical Journal, *40*: 413. 1836.
   Zephyranthes Drummondii D. Don in Sweet, British Flower Garden, Ser. II, *pl. 328*. 1836.
   RANGE: South-central Texas, Coahuila, Tamaulipas, and Nuevo Leon.

II. **CRINUM** Linnaeus

1. *Crinum americanum* Linnaeus, Species Plantarum, 292. 1753.
   RANGE: Florida and along the Gulf Coast to eastern Texas. Doubtfully recorded from Arkansas. West Indian records for this species are probably erroneous.

III. **HYMENOCALLIS** Salisbury

Hymenocallis was segregated in 1812 from the Linnaean genus *Pancratium* by Salisbury, chiefly on the basis of its few-seeded capsules. It is a fairly uniform genus, despite the adoption by some authors of several segregated genera such as *Ismene* and *Choretis*, and its validity has never been questioned.

1. *Hymenocallis bidentata* Small, Manual Southeastern Flora, 323. 1933.
   RANGE: Alabama.
   NOTE: See remark under *H. mexicana*.

2. *Hymenocallis Collieri* Small, Manual Southeastern Flora, 322. 1933.
   RANGE: Florida.

[1]Published by permission of the Secretary of the Smithsonian institution.

3. *Hymenocallis coronaria* (Le Conte) Kunth, Enumeratio, *5*: 855. 1850.
SYNONYMY:
Pancratium coronarium Le Conte, Annals Lyceum New York, *3*: 145, *pl. 4, fig. 7-9*. 1836.
Tomodon coronarium Rafinesque, Flora Telluriana *4*: 22. 1838.
RANGE: Known only from the region of the Fall Line in Georgia and South Carolina. A photograph of a plant supposed to be of this species was published by R. M. Harper (Torreya, *14*: 153. 1914), but the herbarium material collected at the same time does not seem to be *H. coronaria,* if any reliance is to be placed on the details of the structure of the corona.

4. *Hymenocallis crassifolia* Herbert, Appendix to Botanical Register, 44. 1821.
SYNONYMY:
Pancratium crassifolium Schultes, Systema Vegetabilium, 7, pt. *2*: 921. 1830.
Hymenocallis crassiflora Herbert; Kunth, Enumeratio, *5*: 677. 1850. (error).
RANGE: The identity of this species appears to be uncertain. The plant was originally collected "Ex portu St. Mary, Floridae Orientalis, lat. circit. 29." The town of St. Mary's is now situated in Camden County, Georgia. It would be most interesting to know if this plant still exists in that vicinity. It should have suberect, fleshy, obtuse leaves almost three feet long and two inches broad.

5. *Hymenocallis floridana* (Rafinesque) Morton, comb. nov.
SYNONYMY:
Pancratium rotatum Le Conte, Annals Lyceum New York, *3*: 144. 1836; not Ker, 1806.
Tomodon floridanum Rafinesque, Flora Telluriana, *4*: 22. 1838.[2]
Hymenocallis rotatum Le Conte; Small, Manual Southeastern Flora, 324. 1933; not Herbert, 1821.
RANGE: Eastern Florida; described from the region of Lake George, on the St. Johns River.
NOTE: It may be presumed that Le Conte believed himself to be redescribing *P. rotatum* Ker, even though no synonym is cited, rather than treating of a new species. Rafinesque realized that two species were involved and gave Le Conte's *P. rotatum* the new name *floridanum* under his artificially segregated genus *Tomodon.* A proper combination under *Hymenocallis* has never been made.

6. *Hymenocallis galvestonensis* (Herbert) Baker, Handbook Amaryllideae, 126. 1888.
SYNONYMY:
Choretis galvestonensis Herbert, Amaryllidaceae, 219, *fig. 35*. 1837.
RANGE: Texas and Mexico.

7. *Hymenocallis keyensis* Small, Manual Southeastern Flora, 322. 1933.
RANGE: Florida.
NOTE: This species may not be distinct from *H. caymanensis* Herbert of the Bahama Islands and Cuba.

8. *Hymenocallis Kimballiae* Small, Manual Southeastern Flora, 323. 1933.
RANGE: Florida.

9. *Hymenocallis laciniata* Small, Manual Southeastern Flora, 323. 1933.
RANGE: Florida.

10. *Hymenocallis mexicana* (Linnaeus) Herbert, Appendix to Botanical Register, 44. 1821.
SYNONYMY:
Pancratium mexicanum Linnaeus, Species Plantarum, 290. 1753.
Pancratium rotatum Ker, Botanical Magazine, *21*: *pl. 827*. 1805.

[2]**Although dated 1836 this part of the Flora Telluriana** was not published until 1838, according to Barnhart (Torreya, **7**: 177. 1907).
Pancratium disciforme De Candolle in Redouté, Les Liliacées, *pl. 155*. 1806.

Hymenocallis lacera Salisbury, Transactions Horticultural Society (London), *1*: 338. 1812.
Hymenocallis paludosa Salisbury, loc. cit.
Hymenocallis rotata Herbert, Appendix to Botanical Register, 44. 1821.
Hymenocallis rotata var. *biflora* Schultes, Systema, 7, pt 2: 921. 1830.
Hymenocallis rotata var. *pluriflora* Schultes, loc. cit.
Hymenocallis rotata var. *disciformis* Herbert, Amaryllidaceae, 217. 1837.
Nemepiodon mexicanum Rafinesque, Flora Telluriana, *4*: 22. 1838.
Tomodon rotatum Rafinesque, loc. cit.

Tomodon riparium Rafinesque, loc. cit.
Hymenocallis Dillenii M. J. Roemer, Synopsis, pt. 4 (Ensatae), 174. 1847.
Hymenocallis disciformis M. J. Roemer, op. cit. 173.
Hymenocallis lacera var. *minor* Chapman, Flora Southern United States, ed. III, 494. 1897.

RANGE: Northern Florida and Alabama to North Carolina.

NOTE: The Linnaean species *Pancratium mexicanum* was founded wholly on the plate and description of *Pancratium mexicanum, flore gemello candido* of Dillenius (Hortus Elthamensis, *2*: 299, *pl.* 222. 1732). According to Druce (The Dillenian Herbarium, 176. 1907) there is no specimen extant. Dillenius described his plant upon material cultivated from bulbs said to have come from Mexico, but no Mexican plants have ever been found bearing any very close resemblance to the figure, which is a fair representation of the plant known as *Hymenocallis disciformis* or *H. lacera* var. *minor*. In Small's new Manual of the Southeastern Flora this species is the one called *H. crassifolia*. *H. bidentata* Small may not differ specifically. The true *H. crassifolia* Herbert is perhaps a different plant. The species called *H. rotatum* Le Conte by Small is *H. floridana*.

11. *Hymenocallis occidentalis* (Le Conte) Kunth, Enumeratio, *5*: 856. 1850.

SYNONYMY:

Pancratium occidentale Le Conte, Annals Lyceum New York, *3*: 146. 1836.
Tomodon pratense Rafinesque, Flora Telluriana, *4*: 22. 1838.

RANGE: Arkansas, Illinois, Indiana, Kentucky, and Tennessee. The range of this species to the southward and eastward is yet to be determined accurately, but it presumably extends to the Gulf States and Florida.

12. *Hymenocallis Palmeri* S. Watson, Proceedings American Academy, *14*: 301. 1879.

SYNONYMY:

Hymenocallis humilis S. Watson, Proceedings American Academy, *14*: 301. 1879.

RANGE: Florida.

13. *Hymenocallis tridentata* Small, Manual Southeastern Flora, 323. 1933.

RANGE: Florida.

DOUBTFUL AND EXCLUDED SPECIES.

HYMENOCALLIS CARIBAEA (Linnaeus) Herbert, Appendix to Botanical Register, 44. 1821.

SYNONYMY:

Pancratium caribaeum Linnaeus, Species Plantarum, 291. 1753.

NOTE: Although long thought to be native to southern Florida, this species is now considered by Urban and others to be endemic in the Lesser Antilles. The plants which formerly would have been referred to this species are now included in *Hymenocallis keyensis, H. Collieri,* and *H. Kimballiae.*

HYMENOCALLIS CAYMANENSIS Herbert, Amaryllidaceae, 614. 1837.

NOTE: Native of the Bahama Islands and Cuba. It has been reported from the Key Region of southern Florida,[3] but is now excluded in Small's new Manual of the Southeastern Flora. *Hymenocallis keyensis* Small is perhaps not different.

[3]Small Flora Southeastern United States 291. 1903; Small, Flora of Miami, 45. 1913; Small, Flora of Florida Keys, 34. 1913.

HYMENOCALLIS VIRIDIFLORA Small, Manual Southeastern Flora, 322. 1933 (name only).
NOTE: This name appears as No. 10 in the key, probably as the result of a clerical error. The name under which species no. 10 is described by Small is *Hymenocallis rotatum* Le Conte.

ISMENE KNIGHTII Knowles & Wescott, Floral Cabinet, *2: pl. 59.* 1838.
NOTE: The original plate and description show a species of *Hymenocallis* bearing 10- to 12-flowered scapes. The corolla tube is greenish and scarcely longer than the pure white segments. The corona is strictly rotate-spreading, orbicular in outline, and dentate-erose between the filaments. This species was founded on material collected by Henry Knight in March, 1836, in a swamp within a mile of the city of Mobile, Alabama, and should be searched for by residents of that district.

PANCRATIUM CAROLINIANUM Linnaeus, Species Plantarum, 291. 1753.
SYNONYMY:
HYMENOCALLIS CAROLINIANA Herbert, Appendix to Botanical Register, 44. 1821.
NOTE: This species was founded on the *Lilio narcissus polyanthos, flore albo,* of Catesby (Natural History of Carolina, *2,* pt. *3: pl. 5.* 1733). This plate obviously represents *Pancratium maritimum* Linnaeus, a native of the Mediterranean region, and must have been drawn from a cultivated plant.

PANCRATIUM LIRIOSME Rafinesque, Florula Ludoviciana, 19. 1817.
NOTE: Although described from Louisiana this species seems to be the same as *Pancratium maritimum* Linnaeus, of Europe, and was probably based on cultivated material.

PANCRATIUM NUTANS Ker, Quarterly Journal Science and Arts, *3:* 324. 1817.
SYNONYMY:
Ismene nutans Herbert, Appendix to Botanical Register, 46. 1821.
NOTE: This tropical species has been erroneously supposed to have come from South Carolina and was so listed by Chapman in the first and second editions of his Flora of the Southern United States.

IV. **ZEPHYRANTHES** Herbert

The generic name *Atamosco* Adanson is applied to this genus by some American authors but is perhaps best disregarded as being inadequately published *(nomen subnudum).*

1. *Zephyranthes atamasca* (Linnaeus) Herbert, Appendix to Botanical Register, 36. 1821.
SYNONYMY:
Amaryllis atamasca Linnaeus, Species Plantarum, 292. 1753.
Atamosco atamasco Greene, Pittonia, *3:* 187. 1897.
RANGE: Virginia to Florida, Alabama, and Mississippi.
NOTE: The specific name is frequently spelled *atamasco,* but the original spelling of Linnaeus is *atamasca.*

2. *Zephyranthes chrysantha* Greenman & Thompson, Annals Missouri Botanical Garden, *1:* 406. 1915.
RANGE: Known only from the type collection, from Rio Hondo, Cameron County, Texas.

3. *Zephyranthes erubescens* S. Watson, Proceedings American Academy, *25:* 162. 1890.
RANGE: Described from cultivated plants perhaps originally from Duval County, Texas.

4. *Zephyranthes longifolia* Hemsley, Diagnoses Plantarum Novarum, 55. 1880.
SYNONYMY:
Zephyranthes aurea S. Watson, Proceedings American Academy, *18:* 161. 1883.
Atamosco longifolia Cockerell, Canadian Entomologist, *33:* 283. 1901.
RANGE: Western Texas, New Mexico, and southern Arizona, southward into Mexico.

5. *Zephyranthes pulchella* J. G. Smith, Annual Report Missouri Botanical Garden, *6:* 114. 1895.
SYNONYMY:
Atamosco pulchella Greene, Pittonia, *3:* 187. 1897.
RANGE: Southern Texas.

6. *Zephyranthes Simpsoni* Chapman, Flora Southern United States, Ed. II. Suppl. 2, 696. 1892.
SYNONYMY:
Atamosco Simpsoni Greene, Pittonia, *3:* 187. 1897.
RANGE: Florida.

7. *Zephyranthes texana* Herbert, Botanical Magazine, *63*: *pl. 3482.* 1836, in note.
SYNONYMY:
Habranthus Andersonii var. *texanus* Herbert, Botanical Magazine, *64: pl. 3596.* 1837.
Habranthus texanus Herbert, ex Steudel, Nomenclator, ed. II, *1:* 717. 1840.
Atamosco texana Greene, Pittonia, *3:* 187. 1897.
RANGE: Central and southern Texas.

8. *Zephyranthes Treatiae* S. Watson, Proceedings American Academy, *14:* 300. 1879.
SYNONYMY:
Atamosco Treatiae Greene, Pittonia, *3:* 187. 1879.
RANGE: Florida.

Catalog of Argentine Amaryllidaceae

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Argentine Ministry of Agriculture, Buenos Aires

AGAVE L.

A. americana L. Distr. geogr: Tucuman, Cordoba, Buenos Aires.

ALSTROEMERIA L.

A. aurantiaca Don. Distr. geogr: Nahuel-Huapi.
A. Bakeri Pax. Catamarca.
A. Diazi Phil. Nahuel-Huapi, Chubut.
A. inodora Herb. Misiones.
A. lightu L. Nahuel-Huapi.
— var. *pulchra* Sims. Patagonia.
A. nana Rendle. Lago Argentino.
A. patagonica Phil. Tierra del Fuego, Santa Cruz, Chubut.
A. pelegrina L. Buenos Aires.
A. rosea Phil. Mendoza.
A. spathulata Presl. Mendoza.

BOMAREA Mirb.

B. edulis (Juss.) Herb. Distr. geogr: Misiones.
B. macrocephala Pax. Tucaman.
B. purpurea (Ruiz et Pav.) Herb. Tucuman.
B. rosea (Ruiz et Pav.) Herb. Tucuman.
B. stricta Pax. Misiones.

CHLIDANTHUS Herb.

C. fragrans Herb. Distr. geogr: Buenos Aires, Mendoza, Tucuman.

CRINUM L.

C. argentinum Pax. Distr. geogr: Tucuman.

EUSTEPHIA Cav.

E. argentina Pax. Distr. geogr: Catamarca.
E. Coccinea Cav. Tucuman.
E. marginata Pax. La Rioja.

EUSTEPHIOPSIS R. E. Fries.

E. latifolia R. E. Fries. Distr. geogr: Jujuy.
E. speciosa R. E. Fries. Jujuy.

HAYLOCKIA Herb.

H. andina R. E. Fries. Distr. geogr: Jujuy.
H. pusilla Herb. Buenos Aires.
— var. *rubella* Herb. Buenos Aires.

HIERONYMIELLA Pax.

H. chlidanthoides Pax. Distr. geogr: Catamarca.

HIPPEASTRUM Herb.

H. ambiguum Herb. Distr. geogr: Buenos Aires, Jujuy. Misiones.
H. ambiguum Herb., var. *Tweedianum* Herb. Misiones, Jujuy.
H. angustifolium Pax. Misiones.
H. Bagnoldi (Herb.) Baker. Patagonia, Chubut.
— var. *minor* Speg. Nahuel-Huapi.
H. bicolor (Ruiz et Pav.) Baker. Mendoza.
H. bifidum (Herb.) Baker. Buenos Aires, Misiones.
H. bonariense OK. Buenos Aires.
H. brachyandrum Baker. Corrientes.
H. breviflorum Herb. Buenos Aires.
H. chilense (L'Herit.) Baker. Patagonia.
H. flammigerum Holmberg. Misiones.
H. gladioloides (Hieron.) Pax. San Juan.
H. Holmbergii Hicken. Misiones.
H. Jamesoni Baker. San Juan.
H. marginatum R. E. Fries. Jujuy.
H. pallidum (Herb.) Pax. Rio Negro a Mendoza y Catamarca.
H. petiolatum Pax. Corrientes, Misiones.
H. pratense (Herb.) Baker. Mendoza.
H. rutilum (Gawl.) Herb. Buenos Aires, Misiones.
H. tubispathum Pax. Misiones.
— var. *grandiflora* Hicken. Misiones.
H. tucumanum Holmberg. Tucuman, Salta.

HYMENOCALLIS Salisb.

H. calathina (Herb.) Nichols. Distr. geogr: Buenos Aires.
H. littoralis (Jacq.) Salisb., var. *ditischa* Herb. Buenos Aires.
H. Niederleinii Pax. Misiones.

HYPOXIS L.

H. decumbens L. Distr. geogr: Buenos Aires, Entre Rios, Santa Fe, Tucuman.
— var. *major* Holmberg. Tucuman.

SCHICKENDANTZIA Pax.

Schickendantzia pygmaea (Herb.) Speg. Distr. geogr: Catamarca, Tucuman, Salta, Jujuy.

ZEPHYRANTHES Herb.

Z. Andersonii (Herb.) Benth. et Hook. Distr. geogr: Patagonia, Prov. de Buenos Aires, Entre Rios.
— var. *rosea* Holmberg. Tandil.
Z. andicola (Herb.) Baker. Mendoza, Cordillera de Villarica.
Z. candida (Lindl.) Herb. Buenos Aires, Entre Rios.
Z. carinata (Spreng.) Herb. Entre Rios.
Z. caerulea (Gris.) Baker. Entre Rios.
Z. Commersoniana Herb. Entre Rios, Misiones.
Z. entrerrian (*O.* Hoffman) Pax. Entre Rios.
Z. filifolia Herb. Patagonia
Z. flammea (Herb.) Baker. Mendoza.
Z. gracilifolia (Herb.) Baker. Buenos Aires, Entre Rios.
— var. *bulula* Holmberg. Tandil.
— var. *bijou* Holmberg. Prov. Buenos Aires.
Z. Hieronymi Pax. Entre Rios.
Z. jujuyensis Holmberg Jujuy.
— var. *volcanica* Holmberg. Jujuy.
Z. longistyla Pax. Cordoba.
Z. mendocensis Baker. Mendoza.
Z. mesocloa Lindl. Del Rio Negro a Tucuman, Jujuy, Misiones.
Z. minima Herb. Buenos Aires, Entre Rios, Cordoba.
Z. porphyrospila Holmberg. San Luis.
Z. robusta (Herb.) Baker. Buenos Aires.
Z. timida Holmberg. Misiones.
Z. versicolor (Herb.) Baker. Buenos Aires.

ADDENDUM

Alstroemeria apertiflora Bak. Formosa.
Altroemeria isabellana Herb. Corrientes.
Alstroemeria insignis Kranzl. Misiones.
Bomarea multiflora Mirb. Jujuy.
Bomarea spectabilis Schenk. Misiones.
Curculigo scorzoneraefolia (Lam.) Bak. Formosa.
Hippeastrum Bagnoldi (Herb.) Bak., var. *Gilliesianus* (Herb.) Mendoza.
Hypoxis catamarcensis Brack. Catamarca.
Hypoxis decumbens L., var. *major* Seub. Misiones.
Hypoxis humilis H. B. K. Cordoba.

NUMERICAL SUMMARY

Totals,—15 genera and 79 species.

INDIGENOUS AMARYLLIDS CULTIVATED IN THE REPUBLIC

Hippeastrum ambiguum Herb. Cultivated in Jujuy.
Hippeastrum rutilum (Garol.) Herb. Cultivated in Buenos y Rosario.
Alstroemeria aurantica Don. Cultivated in gardens.
Zephyranthes candida (Lindl.) Herb. Cultivated in homes and gardens.

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Phylogeny of the Amaryllidaceae

With the appearance of Dr. Hutchinson's phylogenetic arrangement of the *Amaryllidaceae*[1] it is in order to refer briefly to the foremost system which preceded it, the classification of Pax and Hoffman.[2]

Following Lindley (1836),[3] Pax and Hoffman separate the *Amaryllidaceae* from *Liliaceae* on the basis of an inferior ovary in the former as contrasted with a superior ovary in the latter. The only exceptions noted are the *Conostylideae* and *Conontherеae* where some species have superior ovaries.

The family, in which 86 Genera are recognized, is subdivided into four subfamilies, I. *Amaryllidoideae*, II. *Agavoideae*, III. *Hypoxidoideae*, and IV. *Campynematoideae*.

Subfamily I. *Amaryllidoideae*, is again divided into tribes and subtribes, under which 55 genera are arranged. The subtribe, *Amaryllideae*, comprises the *Heamanthinae, Galanthinae, Amaryllidinae, Zephyranthinae, Crinae*, and *Ixoliriinae*, and under the tribe *Narcisseae*, appear the subtribes *Dentiferae, Eucharidinae, Phaedranassinae, Hippeastrinae*, and *Narcissinae*.

Under Subfamily II. *Agavoideae*, are grouped seven genera.

Subfamily III. *Hypoxidoideae*, is divided into the tribes *(Alstroemerieae, Hypoxideae, Conothereae* and *Conostylideae)*, under which 22 genera are grouped.

Subfamily IV. *Campynematoideae* comprises two genera.

Pax and Hoffman point out that in their opinion the *Amaryllidaceae*, according to their arrangement, is not monophyletic. The *Amaryllidoideae* are closely related to the *Liliaceae*, the *Agavoideae* suggest relationship to the *Dracaenoideae* under the *Liliaceae*, and the *Hypoxidoideae* to the *Haemodoraceae*.

Dr. Hutchinson has had the courage to strike out boldly and remove some of the cobwebs that have befuddled this subject for over a century. He notes that the separation of the *Amaryllidaceae* on the basis of the position of the ovary leads to an artificial system. With keen vision he notes that the important characters of the *Amaryllidaceae* are the umbelliferous flowering habit and the presence of an involucre of bracts. On this basis the *Amaryllidaceae* becomes a smaller and more homogeneous group embracing only subfamily I of Pax and Hoffman to which are added three groups characterized by superior ovaries, the *Agapantheae, Allieae* and *Gillieseae*.

According to Dr. Hutchinson the *Amaryllidaceae* have sprung from the *Liliaceae*, and he notes especially close relationship between certain members of the *Eucharideae* and the Genus *Hosta* of the *Hemerocallideae*, some of the former being considered as apparently epigynous types of the latter.

The *Agavoideae, Hypoxidoideae* and *Campynematoideae* of Pax and Hoffman are removed from the *Amaryllidaceae*. It is of interest to note that the *Alstroemerieae*, considered as a part of the *Hypoxidoideae* by Pax and Hoffman, are given the rank of a family closely allied to the *Liliaceae* in Dr. Hutchinson's arrangement.

Mira Flores,
Orlando, Florida.

HAMILTON P. TRAUB.

[1] J. Hutchinson "Amaryllidaceae" in "The Families of Flowering Plants. Vol. II. Monocotyledons", Macmillan. London. 1934.

[2] F. Pax and K. Hoffman. "Amaryllidaceae" in Engler and Prantl, "Die Natuerlichen Pflanzenfamilien" Vol. .. 19.., pp. 391-430.

[3] John Lindley. "Amaryllidaceae" in "A Natural System of Botany, 2nd Ed." 1836.

Holmberg's "Amaryllidaceas Argentinas"

Through the kindness of Sr. José F. Molfino of the Argentine Ministry of Agriculture, we have received a copy of a valuable monograph on the *Amaryllidaceae* of the Argentine [1] by the venerable Dr. Holmberg, the Dean of the Argentine botanical fraternity.

The first part of the work is concerned with brief notes on such subjects as the distinguishing characters of the *Amaryllidaceae*, their habitat, and geographical distribution. Following this he arranges the indigenous and cultivated *Amaryllidaceae* according to the system of Pax and Hoffman. Dr. Holmberg describes quite a number of native Argentine species,—*Zephyranthes*, 18; *Haylockia*, 1; *Hippeastrum*, 21; *Hieronymiella*, 1; *Eustephia*, 3; *Alstroemeria*, 7; *Bomarea*, 5; *Schickendanzia*, 1; and *Hypoxis*, 1.

One of the most outstanding features of the monograph appears at the end giving the geographical distribution of the indigenous Argentine amaryllids. The data is presented in a table and an outline map.

We are indeed grateful to Dr. Holmberg for the excellent presentation of the subject.

HAMILTON P. TRAUB.

Mira Flores,
Orlando, Florida.

Distinguishing Characters of Florida Zephyranthes

H. HAROLD HUME,

University of Florida, Gainesville

According to Chapman (1) and Small (2), the genus Zephyranthes in Florida is represented by three species. Their chronology begins with *Z. Atamasco*, first mentioned in literature by Parkinson in 1629, named *Amaryllis atamusco* by Linneaus in 1753, and transferred to a new genus, Zephyranthes, by Herbert in 1821. The first specimens to find their way to Europe came from Virginia. This species was followed by *Z. Treatiae*, described by Sereno Watson in 1879. It was discovered in the vicinity of Green Cove Springs, Florida, by Mrs. Mary Treat, a naturalist from Vineland, New Jersey, who spent the winters of 1876-77-78 in Florida. *Z. Simpsonii*, the last of the three to be named and described, was found in the vicinity of Bradenton, Florida, by J. H. Simpson, botanist and plant collector, and sent by him to Dr. A. W. Chapman who added it, in 1892, as a new species to the list of known Florida plants.

The three species are closely related and present certain characters in common although differing in other particulars. Because of this the amateur and sometimes the professional botanist finds difficulty in separating them from one another and this is particularly true of herbarium specimens when poorly prepared or lacking certain parts. In the field, however, there is no real difficulty in separating them and determining which species is at hand. There are differences in habitat, growth habit, foliage and flowers that are characteristic.

HABITAT—*Z. Atamasco* is an inhabitant of swamps, river bottoms, subject to overflow, and the slopes of moist woodlands where vegetable matter and humus from tree debris are abundant. In the areas where it grows the tree population consists mainly of black gum, sweet gum, swamp chestnut oak, water oak, ash, cypress, red maple and wax myrtle. Both *Z. Treatiae* and *Z. Simpsonii* are flatwoods plants where they are found with pines, saw palmetto, gallberry and wax myrtle. To this statement two exceptions in the case of *Z. Treatiae* have been noted. In Hernando

[1] Eduardo Ladislao Holmberg. "Amaryllidaceas Argentinas; indigenas y exoticas cultivadas. Anales del Museo Nacional de Buenos Aires. Tomo XII: 75-192. 1905.

County, about Brooksville, this species is found in high hammocks where the growth consists of such trees as live oak, magnolia, iron wood, sweet gum, and red cedar and again near Magnesia Springs, in Alachua County, where it grows along a stream in low hammock. Aside from these exceptions *Z. Treatiae* has been collected by the writer only at stations where pine trees were close at hand.

Growth Habit—*Z. Atamasco* forms offsets abundantly while *Z. Treatiae* and *Z. Simpsonii* do so to a very limited extent only. As a consequence there is a distinct difference in growth habit. The first named commonly is found growing in bunches, and as many as forty-six bulbs have been taken from a single clump. Leaves appear before the flowers and the plants stand out as green masses against the surrounding fallen leaves and dead vegetation. On the other hand, *Z. Treatiae* and *Z. Simpsonii* are found growing singly, scattered here and there over the ground.

Foliage—The color and general appearance of the leaves serve to separate *Z. Atamasco* readily from the other two. Its leaves are bright shining green, thin along the edges and channeled on the upper surface. Those of *Z. Treatiae* and *Z. Simpsonii* are dull gray green, with thickened edges, and commonly much narrower than the leaves of *Z. Atamasco*. Once these differences are learned there is no difficulty in separating *Z. Atamasco* from the others when in growth. It is an interesting observation that the foliage of *Z. Atamasco* is nearly always much more abundant on herbarium specimens than is the case with either of the other two, due in part, at least, to the latter having lost their leaves by fire.

Flowers—A careful examination of the fresh flowers of the three species shows noteworthy differences. The sepals and petals of *Z. Treatiae* are strongly curved outward and downward; those of *Z. Atamasco* are commonly curved outward at an angle of about 45° or occasionally almost horizontal, and those of *Z. Simpsonii* are upright, slightly bent outward at the tips or not at all. The flower presents the appearance of a trumpet. In color there is little difference, but the sepals of *Z. Simpsonii* are washed or marked with pink more strongly than those of the other two. Furthermore, *Z. Simpsonii* is readily separated from the others by the relative position of the stigmas and stamens. The style is of such length as to bring them all together in the same plane. *Z. Simpsonii* is a polymorphic species, but the relative length of the stamens and style is always a very constant feature. In flowers of *Z. Atamasco* and *Z. Treatiae*, the style is of such length as to bring the stigmas well above the anthers, often as much as three-eights or even half an inch.

Season—*Z. Atamasco* has been found in flower in Florida as early as December. Its main season is during February and March. *Z. Simpsonii* blooms during the season January through March, and has been collected as late as April. *Z. Treatiae* is most abundantly in bloom during March, though found as early as December and as late as June. Both *Z. Simpsonii* and *Z. Treatiae* are more commonly affected by variations in moisture than *Z. Atamasco*. Since the latter grows in wet and swampy soil its water supply is usually quite constant and in consequence it is more regular in its time of flowering.

Distribution—Plant surveys in Florida are far from complete and therefore it is not possible to state with accuracy the distribution of native Zephyranthes. Many more collections must be made before all stations for these plants are located. *Z. Atamasco* is known to occur in four northeastern counties, Nassau, Duval, St. Johns and Clay, and two western counties, Gadsden and Jackson. The northernmost limit for *Z. Treatiae* is the southern edge of Charleton County, Georgia, and its range extends at least as far south as northwestern Highlands, southern Hillsborough and northwestern Polk Counties. It has not been collected west of the Apalachicola River. *Z. Simpsonii* belongs to peninsular Florida. So far as now known it does not occur north of a line drawn from central Flagler County through Gainesville to Cedar Key. From that line it extends southward to Lee County on the Gulf of Mexico and into Martin on the Atlantic Ocean. Collections of the three species substantiated by herbarium specimens have been made thus far in forty-five counties.

The Occurrence of Alkaloids in the Amaryllidaceae

ROBERT F. RUTHRUFF, *Indiana*

It is difficult to arrive at an entirely satisfactory definition of the term alkaloid, but for present purposes it is sufficient to state that alkaloids are basic nitrogen containing substances of vegetable origin exhibiting marked physiological action. The occurrence of such substances in various species of the Amaryllis Family is naturally of interest to members of this Society but their presence is of even broader significance since alkaloids, as a rule, occur only in dicotyledonous plants. It was known that bulbs of certain Amarylleae were poisonous long before they were subjected to chemical investigation. During the past 55 years considerable attention has been given to the problem and it is now definitely established that alkaloids are present in many species.

In 1878, Ringer and Morshead [1]* examined the alkaloids isolated by Gerrard from *Narcissus pseudonarcissus*. On the basis of experiments with men and frogs as subjects, these investigators concluded that dormant bulbs contained a substance similar to pilocarpine while an atropine like compound was present in flowering bulbs. Chemically the two extracts were identical and Ringer and Morshead applied the name "narcissa" to both materials indiscriminately. Fragner [2] obtained a substance which he christened amarylline from *Sprekelia formosissima* and belamarine from *Amaryllis belladonna*. *Lycoris radiata* was investigated by Morishima,[3] who isolated two alkaloids which he named lycorine and sekesanine. The former was found to have a strong emetic action followed by paralysis.

Ewins [4] repeated the work of Ringer and Morshead and obtained the same alkaloid from both resting and flowering bulbs, although the concentration was only half as great in flowering bulbs. He observed that the alkaloid was not similar to either pilocarpine or atropine but had a marked emetic action instead. Ewins modernized the name suggested by Ringer and Morshead, designating the alkaloid narcissine. Only traces of this substance were found in *Narcissus princeps*.

Tutin [5] investigated bulbs of the extremely interesting *Buphane disticha* of South Africa, the "gift bol" (poison bulb) of the Dutch. Extracts from the bulb are reputedly employed as arrow poison and in medicine.[6] Previous investigators had stated that the bulb contained brucine which others had denied. Oliver [7] stated that the species contained aconitine. Tutin found neither of these alkaloids but isolated a base resembling hyoscine and hyoscyamine, which he called buphanine. Three other alkaloids were found, one being identical with narcissine. In addition to these alkaloids, Tutin also succeeded in identifying a number of other classes of organic compounds in extracts from this species. The bulb of *Buphane disticha* is similar to that of *Amaryllis belladonna* in that the outer layers are fibrous and of a fine silky texture, being used by the natives as surgical dressings. These portions contain no alkaloids, the active principles being concentrated in the inner portions of the bulbs, which also contain considerable copper.

Botanists are ever sailing between the Scylla of minute division of species and the Charybdis of gross grouping. To a lesser extent the chemist is beset by similar evils. Up to 1910-1920 each investigator believed that each Amaryllis alkaloid he isolated was new and distinct and so gave it an individual name. Now we enter an era in which attempts were made to show that the various alkaloids were identical, following which a second period of division begins. Asahina and Sugii [8] repeated the work of Morishima on *Lycoris radiata* and established the identity of lycorine with narcissine. Gorter [9] went even further, not only confirming the identity of lycorine and narcissine, but also stating that buphanine and the alkaloid from *Narcissus tazetta* isolated by Yumanouchi [10] were identical with the first two. Unaware of the early article of Ringer and Morshead and even that of Fragner, he suggested that the name lycorine be applied to all of them. Later Gorter [11] discovered the Fragner reference and believed that the belamarine and amarylline therein described were identical and were also lycorine, as was the alkaloid isolated by Molls [12] from *Clivia miniata*.

* Reference is made by number (italic) to Literature Cited at end of article.

Gorter found lycorine (which on grounds of priority should probably be designated narcissine even though Ringer and Morshead did not accurately characterize the compound) in *Zephyranthes rosea, Crinum asiaticum, C. giganteum, C. pratense, Hymenocallis littoralis, Eucharis grandiflora, Eurycles sylvestris, Amaryllis belladonna, Clivia Miniata, Cooperia drummondii, Cyrtanthus pallidus* and *Sprekelia formosissima. Crinum* species were found to contain the most alkaloid, representing 0.10 to 0.18% of the bulb. Gorter [13] confirmed Ewins' formula, $C_{16}H_{17}O_4N$, for the compound, and in addition suggested a possible structural formula.

Kondo and Tomimura [14] have recently done considerable work on *Lycoris radiata,* claiming to have isolated no less than nine separate and distinct alkaloids, including lycorine. It is evident that we are again entering an era of minute division, especially in view of the fact that Kolle and Gloppe [15] have recently isolated a new alkaloid, narpoetine, from *Narcissus poeticus.*

The study of the toxic compounds in bulbs of the Amaryllis Family is of economic as well as scientific interest as the bulbs are eaten by man in time of famine and by cattle. Narita,[16] in describing human foodstuffs used in time of famine, states that while amaryllis bulbs contain 15 to 20% sugar, the alkaloids present cause nausea. Steyer [17] has found that bulbs of *Haemanthus amarylloides, Narcissus jonquilla* and *Nerine lucida* as well as the seeds of *Amaryllis belladonna* are definitely toxic to cattle.

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New Varieties

On account of lack of space the introducers' numbers and names, only, for the varieties are given in this issue for new varieties registered with the Secretary of the Society. This information is published to avoid duplication in names. Short descriptions will be published later. Names should be as short as possible, one word is sufficient. It is suggested that in no case should more than two words be used.

Hybrid Hippeastrum

Introduced 1934 and 1935 by Mrs. W. G. Tilghman, Palatka, Fla. Seedlings,—No. 1, *Elizabeth Traub;* No. 2, *Helen Tilghman;* No. 3, *Palatka;* No. 4, *Osceola;;* No. 5, *Florida;* No. 6, *Helen Jane.*

Introduced 1934 and 1935 by Heaton Bulb & Palm Co., Mr. I. W. Heaton, Orlando, Florida. Seedlings,—No. 5233, *Orange King;* No. 5242, *Orlando;* No. 1, *War;* No. 29, *Marie;* No. 30, *Dawn;* No. 174, *Eola;* No. 177, *President Roosevelt;* No. 18, *E. P. Hall;* No. 19, *Peace;* No. 5001, *Orchid;* No. 5111, *Dr. Traub;* No. 901, *Red Wing;* No. 1500, *Mrs. Lamberton;* No. 5051, *Virginia;* No. 639, *Serapis II;* No. 971, *Mother;* No. 5033, *Mrs. Donald Dudley;* No. 5381, *Faith;* No. 5387, *Helen;* No. 5036, *Henry Nehrling;* No. 5173, *Sunset;* No. 5058, *Ralph Wheeler;* and No. 1490, *Theodore L. Mead.*

Wyndham Hayward

Hybrid Hippeastrum: Salmon Queen

This is the average Leopoldi Type A under the tentative classification; variety introduced by Wyndham Hayward, 1935.

Introduced 1935 by Lakemont Gardens, Winter Park, Florida, Wyndham Hayward, Prop. Seedlings,—No. 458, *Kirby Pink;* No. 600, *Salmon Queen;* No. 601, *Flame;* No. 602, *Strawberry Glow;* No. 607, *Mars;* No. 634, *Full Moon;* No. 641, *Ruby;* No. 645, *Edith;* No. 650, *Ernestine;* No. 651, *Pardy;* No. 652, *Purity;* No. 660, *Goliath;* and No. 662, *Nevoso.*

Introduced 1934 and 1935 by Hamilton P. Traub, Mira Flores, Orlando, Fla. Seedlings,—No. 31, *Will Rogers;* No. 24, *Wyndham Hayward;* No. 42, *Greta Garbo;* No. 29, *Frank Wootten;* and No. 2, *Bert Merrill.*

Introduced 1934 by Mr. Harry Searles, Orlando, Florida,—No. 1, *Harry Searles.*

Introduced 1934 by Mrs. B. A. Dominick, Orlando, Fla. No. 1, *Anne Lindbergh;* No. 2, *Eleanor Roosevelt.*

Fischer Color Chart

The Fischer Color Chart, published by the New England Gladiolus Society, was adopted as the official standard by the American Amaryllis Society in 1933. The publishers have kindly agreed to offer this Chart mounted on heavy cardboard to members of the American Amaryllis Society at $2.00. Send orders to your Secretary, Mr. Wyndham Hayward, Winter Park, Florida.

3. Breeding

Opportunities for Breeding With Daffodils

DR. DAVID GRIFFITHS, *Senior Horticulturist,*

Bureau of Plant Industry, U. S. Department of Agriculture

A fancier said the other day that we have too many daffodils now. True! But we need better ones and the only way to get them is to make more. There has been great activity in the making of new forms and varieties in the British Isles, less in the Netherlands, and least in the U. S. A. until the last few years. We have lagged behind shamefully with only 3 or 4 in the entire country devoting their attention to the improvement of this queen of spring flowers.

With all the work that has been done in the British Isles and possessions only a part of the field has been covered. The Trumpets and half-Trumpets are well worked by the English breeders, and the Poetaz by the Dutch, but there are tremendous gaps to be filled in. There is no one doing a thing of note with the Polyanthus group outside the Poetaz section. No one seems to have considered it necessary to improve the three great commercial Polyanthus species, *Paperwhite, Soleil d'Or,* or *Chinese Sacred Lily,* as many of which are used as all others put together. There is opportunity here for a lifetime of work in the improvement of these strictly commercial forcing stocks and they are compatible. Combinations of them are possible with segregations of characters in the first generation. This we know because we have *Soleil d'Or* (seed parent) by *Paperwhite* (pollen parent) coming on now. They should blossom profusely in 1936 if nothing happens.

Paperwhite is prized as much for its easy and early forcing as for its beauty. Its dead white could be improved upon, and its flowering habit leaves much to be desired. Its early forcing quality needs to be preserved, but it might benefit from some of the color characteristics of *Soleil d'Or.* The species has a narrow range of marketability. Its bulb performs differently from most daffodils. It would be more valuable if its round merchantable bulb could be traded off advantageously for a double-nosed one which would function satisfactorily. *White Pearl* and *Grand Monarch* possess such bulbs now. It would be an advantage to the grower and consumer if a double-nosed *Paperwhite* could be produced which would throw two spikes instead of one. The bane of the grower's existence is to keep his *Paperwhites* from splitting up too much. The other Polyanthus varieties do not offend in this respect.

It will be realized that such improvements must be made in our Southland where these tender forms are so well adapted. The breeder who will put more character in the flower of *Paperwhite* and increase the range of marketability of its bulbs will be rendering a real service.

The Dutch have done a great deal with the Campernelles, but no more than to add to the foundation on which to build a great group of daffodils adapted to our warm southern regions. The so-called hardy daffodils are illy adapted to warm regions. Who knows what may be evolved from the combination of characters of the Polyanthus varieties with the Campernelles and their derivatives and with such semi-adapted varieties as *King Alfred* and *Minister Talma!* There is a much wider base for development here than lies behind the Trumpets which have been multiplied into the most unexpectedly beautiful series of varieties.

In the North there are opportunities all along the line. It has been shown that there are possibilities yet undreamed of in the groups most worked. Breaks are being segregated in crosses between varieties which have been most worked. The need is for someone to take to the breeding of daffodils on true Mendelian lines with a large enough progeny to cover the possibilities of the combination. Small progenies have been the rule in the past. A few seedlings of a cross show only a very small sector of the combinations possible from it. For this reason new segregations are appearing from crosses which have been made many times.

U. S. Department of Agriculture

Narcissus: Thomas Jefferson

Named in honor of the third President who did so much to bring the far Northwest into the Union; U. S. Bulb Farm, Bellingham, Wash.

As a glaring example of this witness what trumpets the Van Waverens have secured from crosses of mediocre varieties. It seems to me that the time has come to strive for all the possible combinations of a cross between two varieties. Instead of a single pod of seed 50 to 100 should be made. This would not only be likely to exhaust the possible segregations but put the breeder in possession of data that is not available now.

There is a nice job here for the amateur and the garden club enthusiast. It has long seemed to me that garden clubs need above all else to have a little attention given to directing their energies. The majority of the membership is capable of doing real plant improvement. Instead of growing over and over again the items that are and those that make an appeal, would it not be vastly more profitable if some of the members took up a group or two with an eye single to its improvement? There is no better field for plant improvement in my opinion today than in the genus *Narcissus,* and every part of it is vulnerable.

In the undertaking no expensive list of varieties must be had, although pedigreed stocks are to be preferred if their parental qualities are proven. Good improvements are possible in the best of the commercial items, for seldom in the past have the progenies been large enough to give but an indication of the possibilities latent in the cross. The main requisite always is to select good seeders for the mothers.

The first 4 years for an undertaking of this kind would, of course, be tedious, but after that the new progenies which come into blossom each spring will furnish zest and stimulus enough for anyone. My experience has been that large progenies such as described above contain not less than 50 per cent of individuals of comparable quality with those listed in the best commercial lists besides an occasional outstanding one.

An interest in the breeding of daffodils among the amateur class of growers would lead eventually to competitive spring exhibits. Such work it seems to me is certain to lead to some permanent benefit to garden science and garden materials.

There is no reason why the same sort of advancement and similar enthusiasm should not be worked up in seedling daffodils as now obtains in the bearded iris. There should be 50 or more growers in this country who exhibit their own seedlings, all different from each other, and all different from anything anyone else has. It will take twice as long as in iris to realize the first fruition, but that is a small matter. One spring show has already been held wherein one amateur exhibited 75 of his own seedlings.

As certain as one starts in on such a venture just so sure is he eventually to discard much of what is and grow his own. The writer went through that experience quite rapidly after starting in with just this kind of a venture. He would have no regrets today if obliged to dispense with the commercial stocks of trumpets and Incomparabilis. The 60 selected seedlings of a few years ago would make up the loss quite satisfactorily.

The Nerine, Its Species and Hybrids

P. R. Barr, G. R. Barr, G. H. Barr and H. R. Barr,
England

Nerines are handsome bulbous plants, producing umbels of 6 to 24 blooms in Autumn on stiff erect stems, ranging from one to two feet in height. In most cases the flowers have curling reflexed petals and protruding curved stamens. In colour they range from vivid crimson, cerise, and scarlet to salmon, coral-rose, pink, blush and white, the petals having a glistening lustre, which in sunlight gives them the appearance of being dusted with gold or silver. They remain decorative for many weeks and their beauty may be enjoyed in a sitting-room window as well as in the greenhouse.

The nerines are native of South Africa, the different species being distributed through Cape Colony, the Orange Free State, Natal, and East Griqualand, at an altitude of 1000 to 6000 feet. The bulbs are found growing in stony and rocky ground, sometimes being wedged in between rocks. They are subjected to a long

period of drought, during which time they are exposed to a scorching sun. Then come cooler weather and drenching rains, when the bulbs quickly start into bloom and begin making their foliage, going on growing until the hot weather comes round again, when the foliage dies down and the bulbs once more go to rest.

Culture:—In England nerines are of comparatively easy culture when grown in pots in any glass structure from which frost is excluded in winter, the period when the bulbs make their foliage growth which is soft and very sensitive to frost. At all times the bulbs require plenty of light and air, with as much sun as possible. A moist and warm atmosphere is fatal to them.

The bulbs should be potted up in August, one bulb to a 3½ inch pot, or a larger pot in the case of larger-sized bulbs. The best compost to use is good fibrous loam mixed with coarse silver sand and a little very well-decayed manure.

The only artificial food which may at any time be used is bonemeal. It is most important that plenty of crocks be put into the bottom of the pot to insure perfect drainage. Pot firmly with only the neck of the bulb showing above the soil. If the potting soil is moderately moist no watering will be necessary until the flower bud or foliage is seen to be pushing up. Then give a plentiful supply so that the soil is well moistened. After that only occasional waterings are required until the plants are in full growth, when an application of manure water every few weeks will be found beneficial to encourage a vigorous growth.

In May when the foliage is beginning to turn yellow gradually reduce the water supply, and later place the pots on a shelf in the greenhouse where they can get plenty of light, air, and sunshine, and here let them remain (unwatered), so that the bulbs can ripen off well until August when they should be given a good soaking of water to start the bulbs into active growth.

When once planted nerines should be left in their pots undisturbed for three or four years, an annual dressing of bonemeal being given after they have once started to make their autumn growth.

The finest effects are obtained by planting three or four bulbs in a large pot. When once established these make a glorious show.

In the milder climate of Southwest England, *Nerine bowdeni* and the two grand hybrids *Aurora* and *Hera* may be grown outdoors if planted against a south wall and covered during winter with dry heather or bracken.

Species.—J. G. Baker in his *Handbook of the Amarylldieae,* 1888, records 10 species of Nerine with 11 geographical sub-species. He also gives a list of 18 interesting hybrids raised many years ago by Dean Herbert *(Amaryllidaceae, 1837),* and Messrs. O'Brien, Max Leichtlin, Cam, etc. Of these species and hybrids very few are in commerce to-day, but some might possibly be found in botanic gardens. The following, however, are to be had:—*N. sarniensis, N. sarniensis plantii* and other varieties, *N. flexuosa, N. curvifolia, N. fothergilli,* and the hybrids, *Mansellii,* and *Meadowbankii.*

Hybrids:—As stated above several hybrid nerines were raised years ago by Dean Herbert and others, but little was done afterwards with this family until Mr. Elliott of Hassocks, Sussex, devoted himself to raising a group of seedlings, which showed a pleasing variety. These were purchased by that great traveller, and naturalist, Henry John Elwes of Colesborne, Gloucester, who had started cross-breeding nerines.* Many beautiful new forms, and colours resulted from his hybridizing. A few years before his death (1922) Mr. Elwes disposed of the major portion of these to our firm, and since that time we have continued making crosses and adding some new and beautiful varieties to the family. These we exhibit annually at the Royal Horticultural Society's autumn shows in London.

A fine species called *N.bowdeni* introduced from the Cape, and of vigorous habit, has proved to be hardier than other species and hybridists set to work to use it as a parent. It was in the second generation that some good results were obtained. Of these by far the finest were the hybrids raised by Mr. J. Rose of Oxford, called *Aurora* and *Hera.* These were purchased by us from Mr. Rose and their descriptions will be found given further on.

Raising from seed:—Nerine seeds do not keep well and require therefore to be sown as soon as ripe in pans or pots of a light compost of loam and sand, the seeds being only lightly covered with sand. When the young growths appear give them every encouragement to go on growing, not forcing them to go to rest in summer

* The late Dr. Attilio Ragionieri also produced hybrid nerines.—Ed.

unless they show an inclination to do so. When sufficiently large to handle easily, transplant 12 or more and give the same treatment as required for nerines generally. When the seedling bulbs have become overcrowded in the pans, transplant them 3 or 4 or more to a pot and grow on. No flowers may be expected under five years from sowing.

Descriptions of Hybrids and Species.

Aurora, a splendid hybrid Nerine resulting from *N. Bowdeni* crossed with a *N. Fothergilli Hybrid,* producing in October flowers of great size and substance, *satiny rose* with *silvery lavender* stripe down centre of petals, borne in very large bold umbels, rising from a wealth of foliage. The resting period is after flowering, and it should be kept dry and cool from November to January until growth recommences in February; it should then be watered sparingly until April or May, after which a plentiful supply should be given. Like *N. Bowdeni,* it should flourish outdoors in mild districts, F.C.C., R.H.S.

Barcarolle, beautiful *old rose,* with glistening *silver* and deeper stripe up each petal.

Beacon, soft shade of *scarlet,* slightly paler at center.

Bedouin, scarlet-cerise, large open flower with recurved and waved petals, tall grower.

Berenice, bright pink with *rose* stripe half-way up each petal, fine large open flower, good truss.

Betty, coral pink flowers changing to *mauve,* large flower with waved petals.

Bowdeni, a fine species from the Cape, producing large umbels of flowers 3 to 4 in. across, *pink* with a *rose* coloured line down each petal. One of the hardiest and may be grown out of doors in the South and West of England. A.M., R.H.S.

Calpurnia, bright pink, lighter at margin and centre, petals much waved and recurved.

Comus, glistening *pink* with deeper stripe, broad-petalled flower.

Elegantissima, large trusses of charming *pink* flowers with *rose* stripe down centre of each petal, strong free-blooming variety, rather late flowering.

Felicity, soft *salmon-red* slightly shot *mauve* with *scarlet* centre, large open waved flower.

Flexuosa alba, a distinct species bearing an umbel of about twelve *snowy white* flowers with elegantly undulated and recurving petals. A.M., R.H.S.

Fothergilli major, large umbels of handsome brilliant *salmon-red* flowers shaded *scarlet,* a splendid early-flowering variety, very showy, reliable, and free-blooming.

Her Majesty, glowing *rose-cerise,* deeper at centre and *gold* dusted, large flower, *extra fine.*

Hera, a sister seedling to *Aurora* but rather earlier flowering; the flowers are of great size and fine form, brilliant *rose pink,* with a *deeper rose* stripe down centre of petals, F.C.C., R.H.S.; for cultural note see *Aurora.*

Hilda, salmon-red with *gold* dusting, good truss and tall grower.

Ingens, deep salmon-pink flowers with *rose* stripe half-way up petal, large truss, early flowering.

Judith, rose with faint *mauve flush,* large trusses of open flowers, tall grower.

Knight Errant, bright *rose-crimson,* shot *gold* and shading to *scarlet* at centre, petals waved.

Knight Templar, very large open flowers with recurving petals, brilliant *glistening rose* with *crimson* stripe and centre, tall and robust grower.

Lady Clementina Mitford, an exquisite shade of delicate *shell-pink.*

Lady Folkes, rich bright clear rose, excellent spike and truss.

Lady Mary Shelley, large open *soft clear shell-pink* flowers, slightly deeper towards centre, with waved and recurving petals.

Lucifer, growing deep *crimson-scarlet,* flat open flower with slightly recurving petals.

Lydia, rose-pink with deeper central stripe, petals recurved and prettily waved, fine truss.

Mansellii, tall handsome variety, having bold heads of satiny *rose-pink* flowers, late bloomer.

Meadowbankii, fiery orange-scarlet flowers, petals slightly waved and recurved.

Miranda, a *glowing rich cerise self,* with *crimson* centre, large flowers, good truss, strong grower.

Peter Barr, large open trusses of *glistening rose* flowers deepening towards centre and with sparkling *golden* sheen, of tall vigorous habit.

Pink Beauty, pretty flowers of medium size, *bright rose-pink,* with *gold* and *silver* dusting.
Plantii, large well-formed trusses of *bright rose-scarlet* flowers, *gold* dusted, *extra fine.*
Princess Mary, glistening *pink* with *slightly deeper* stripe, petals waved and recurved, tall grower.
Queen Alexandra, bright cherry-rose, large open flower with slightly recurving and waved petals, a glowiing colour, late.
Queen Mary, of tall robust habit with large trusses of handsome *bright pink* flowers with *deeper stripe* half-way up petals which are beautifully recurved, *silver*-dusted.
Queen Nathalie, salmon-pink with glistening *scarlet* stripe, good truss, tall grower.
Red Hussar, large *salmon-scarlet* flowers *gold* dusted, *petals* recurved and waved, a fine large truss and of vigorous growth.
Robert Berkeley, rich salmon-rose shot gold, large flower and very free-blooming.
Ronald, deep *coral-red* with deeper stripe, petals well curled and reflexed.
Rose Barton, rich deep *cerise-rose* flowers, long tapering petals, tall grower.
Rose Beauty, ruby-rose with deeper centre, tall spike.
Rosella, large *bright rose-pink* flowers with reflexing petals, well set on a large handsome truss, sturdy grower.
Salmon Perfection, perfect large truss of *clear light salmon* flowers, tall strong grower.
Sarniensis (Rose Guernsey Lily), deep rose with *deeper* stripe, hardy outdoors in mild localities.
Sarniensis corusca major (Scarlet Guernsey Lily), brilliant fiery *orange-scarlet,* tall grower and free bloomer, may be grown outdoors in mild localities.
Sarniensis insignis, clear glistening *salmon-pink* with faint stripe.
Sarniensis (Rose Queen), large *bright rose* flowers with a *glistening scarlet* bar, petals slightly recurved, tall robust grower and hardy outdoors in the South and West of England.
Scarlet Beauty, brilliant *orange-scarlet* self, an exceptionally vivid colour, fine truss.
Scarletta, rich rose-scarlet self, gold dusted, petals prettily waved and reflexed.
Talisman, bright salmon-scarlet with *gold* dusting, large trusses and flowers.
Vieux Rose, a most distinct and attractive shade difficult to describe, the effect being a *dull salmon* with *old gold* suffusion and *vermilion* centre.

The Species of Daylilies

Dr. A. B. Stout, *Director of the Laboratories,*

The New York Botanical Garden

Thirteen distinct species of *Hemerocallis* are to be recognized among the various types that have been named in botanical literature. But in most cases these have been named and described from a few plants that were brought into cultivation in Europe. Evidently several of these species were described when there was only a single seedling plant of each that was being propagated as a clone. A critical study and survey has never been made of the wild daylilies of Asia.

For several years the New York Botanical Garden has obtained living plants and seeds of wild *Hemerocallis* from various localities in Japan, China, Manchuria and Siberia. It is evident from these plants that the older types which were described are scarcely representative of the wild plants and that in several cases at least the older types were either selected as rather unusual plants of wild stock or were produced as seedlings of possible hybrid origin in garden culture. In only a few cases have wild plants conformed closely to the types of botanical literature and two obviously new species, *Hemerocallis multiflora* Stout and *H. exaltata* Stout, have been described. Either there are many more species of daylilies to be named or the species already known are to be considered as widely variable.

The species now to be recognized are as follows:

Hemerocallis nana W. W. Smith and Forrest, *H. plicata* Stapf, and *H. Forrestii* Diels are dwarf or semi-dwarf types recently discovered in southwestern China by the

botanical explorer Forrest. For some reason plants of these species have not thrived in culture in England or America. Already they have been used as parents in hybridization.

Hemerocallis Dumortierii Morren and *H. Middendorffii* Trautvetter and Meyer have long been known in Europe as semi-dwarf, early-flowering, orange-flowered plants with sessile flowers on unbranched scapes. Certain wild plants received from northern Japan conform closely to the types of *H. Dumortierii,* but considerable variation has been observed in wild plants that are to be classed as *H. Middendorffii.*

Hemerocallis flava Linn. has lemon-colored flowers that are odorous; the stature is about three feet tall; and the flowering is in early spring. This Linnaean type is a clone that was first described in 1570 by Pena and Lobel (Historia) under the name of *Asphodelus luteus liliflorous.* Thus far no plant has been received by the writer from the Orient which resembles this plant.

Hemerocallis minor Miller. This name was bestowed by Miller in 1768 to plants then in cultivation in England which were of smaller stature than the *H. flava.* Miller's description is meagre but the name may be applied to certain plants that are early-flowering and yellow-flowered. The leaves are narrow; the scapes are branched; and the capsules are narrow-elliptic. Plants of this type are grown under the names of *H. graminea, H. gracilis,* and *H. graminifolia;* but certain plants with these names are obviously hybrids.

Hemerocallis Thunbergii Baker. Flowering in mid-summer; scapes stiffly erect to a height of 45 inches; flowers lemon-yellow, and fading or wilting in the afternoon during hot sunny weather. The capsule is broadly blunt at the apex and much smaller than the capsules of *H. flava.* Baker had of this species only a single plant which was growing at the Royal Botanical Garden at Kew, England. Evidently this species is widely distributed in the Orient and is somewhat variable. There are many hybrids of which this species is a parent.

Hemerocallis citrina Baroni. Flowering in mid-summer; flowers fragrant, pale-yellow, nocturnal; perianth tube elongated and the segments narrow. The type clone has an excellent and robust habit of growth and attractive dark green foliage. It has been much hybridized especially with *H. Thunbergii.* Some of the hybrids as the Ophir Daylily and Parthenope surpass the parent species in having large full flowers of good day-blooming habits and richer color. This species is itself comparatively of no value as a garden plant.

The *Hemerocallis multiflora* Stout flowers in late summer and autumn; the scapes are much branched; the flowers are orange-colored and of small size. Already many hybrids with this species as a parent have been produced which exhibit a wide range of coloring in the flowers and which bloom in late summer and throughout the autumn.

The *Hemerocallis exaltata* Stout has orange-colored flowers on tall erect scapes that end in short coarse branches. This very distinct type was obtained from the Tobi Shima Islands off the west coast of Japan. It is not a valuable garden type but some of its hybrids may prove to be of interest and value.

The *Hemerocallis aurantiaca* Baker was described from a single clone which was growing at the Royal Botanical Gardens at Kew, England. It is stated in the Somoku-Dzusetu that this type grows wild in the region of Mount Ibuki, Japan. Baker's plant has evergreen foliage, the flowers have a faint tinge of fulvous coloring over an orange base and the time of flowering is in July. Usually the descriptions of this plant fail to note the faint tinge of fulvous coloring in the face of the flowers.

Hemerocallis fulva Linn. The plant which Linnaeus thus named (Species Plantarum, ed. 2, 1762) has long been widely grown in Europe. It was described by Lobel in 1576 under the name *Liriosphodelus phoeniceus.* It is now known that this plant is a triploid clone that never produces seed to self-pollination. It has become one of the most cosmopolitan of cultivated plants for it is grown in tropical, subtropical, and temperate regions. The writer has applied the name Europa to this horticultural clone to distinguish it from the numerous other clones in cultivation and from the wild types which are to be included in the species *H. fulva.*

The Europa Daylily with its strongly fulvous colored flowers may be considered as the historical type of a variable species that is widely distributed in the Orient.

To be included with this species are certain double-flowered triploid clones known as Kwanso and Flore pleno and also single-flowered types as *H. disticha* Donn,

H. longituba Miquel, *H. fulva longituba* Maximowicz, and *H. esculenta Koidzumi.* There are several other varietal names that have been given to individual plants of the fulvous group. A rather distinct type with rosy pink flowers has recently been described and named *H. fulva* var. *rosea* Stout.

Concluding Remarks

These thirteen species of daylilies, including the variations already obtained from the wild, afford excellent material in a wide diversity of types for use in breeding in the work of developing new hybrid races and clones of distinct merit for horticultural uses.

Already members of all of these species have been used in hybridizations and selective breeding. The writer has made most of the hybridizations possible for these species and also for certain new but unnamed types and has grown a total of over 50,000 seedlings. About 300 of the best of these have been selected for critical study and for use in further selective breeding. Several of the most outstanding have been named as horticultural clones. Breeding of daylilies was begun about 1890 chiefly in England and Italy and the work has progressed until about 200 hybrid seedlings have now been named as horticultural clones.

With few exceptions the species have all been decidedly surpassed as desirable garden plants by certain of their hybrid offspring and hence few of the species will continue to be grown in flower gardens.

Louis Percival Bosanquet and His Crinums

Wyndham Hayward, *Florida*

The unsurpassed delicacy of the rose-purple shading of the hybrid Crinum "Ellen Bosanquet" places it in the fore of this class of sub-tropical garden novelties. It is the masterpiece of the late Mr. Louis Percival Bosanquet, of Fruitland Park, Lake County, Florida, who named his choice creation after his wife.

Mr. Bosanquet was born in Southgate, England, July 20, 1865, and came to the United States in 1888, eventually settling at Fruitland Park, where an older brother, Augustus Bosanquet had set out an orange grove. Louis Bosanquet later took over his brother's interests when Augustus went to live in Lisbon, Portugal.

Louis Bosanquet was an English Gentleman in all that the name implies. Possessed of a private income beyond the returns from his Florida properties, he established a homestead and country place on old Southern lines that is still one of the show places of Central Florida. He devoted himself sincerely to horticulture in many branches, importing bulbs and plants from many parts of the world, and built up one of the finest collections of *Crinum* species of his time.

He died April 19, 1930, and since that time his crinum collection has fallen into confusion; unfortunately the identity of most of the species having been lost. Much of his knowledge of his plants was not written down and with his passing there disappeared a fund of information which should have been made available to later plantsmen.

Mr. Bosanquet added to the collection of rare plants begun at Fruitland Park by his brother. The surroundings of the Bosanquet mansion to this day resemble a miniature botanic garden. Spreading giant live oaks and bamboos, shrubs, vines and various flowering plants are plentiful, but above all there are crinums in pots, tubs and boxes, in rectangular gardens, in rows and semi-circles. During the spring and summer the succession of bloom is almost unbroken.

The species which Mr. Bosanquet hybridized to produce his "Ellen Bosanquet" are not known, but its main difference from other hybrid crinums is the wine color, whereas the hybrids usually run to the pink shades. Another later hybrid crinum, which has been named "Louis Bosanquet" in his honor posthumously, is now in the trade, but is still a rarity.

Mr. Bosanquet was a friend of the late Mr. Henry Nehrling of Gotha, Fla., amaryllis fancier, and they frequently exchanged plants. He was also a cooperator of the U. S. Department of Agriculture. He was a rose enthusiast, and bushes 40

years old are still growing in the Bosanquet gardens where he planted them. He married Miss Ellen Lewis Hall on November 4th, 1891. His son, Alfred P. Bosanquet, lives on the old homestead with his family at the present time, and during the summer of 1934 the son and his charming wife showed Dr. Hamilton P. Traub and the writer around the scenes of the elder Bosanquet's horticultural activities.

The crinum "Ellen Bosanquet" has been introduced into England, and promises to spread to all parts of the world where beautiful flowers and attractive plants are grown. A study of the bloom would lead to the conclusion that it bears the blood of *C. kirkii or Z. zeylanicum,* crossed with one of the "Powelli" or "Longiflorum" types. The blooms are borne in clusters, from a stem of medium height. They are slightly drooping. The bulb is round at maturity, and a fairly rapid propagator naturally. It grows to six or more inches in diameter.

Peter Henry Oberwetter, A Texas Amaryllid Pioneer

Rev. C. W. Hall, *Texas*

If cost of tombstone were indicative of the deceased's earthly contribution one would of necessity relegate Peter Henry Oberwetter to the realm of the unimportant. Only by reference to the records of the cemetery keeper can it be ascertained that in a certain plat, marked merely by a simple curb enclosure, a small clump of shrubs, and a stately cedar, lies the body of this individual. A passerby, if he should give the matter any thought at all, would presume that the body lying here made no worthwhile contribution to the sum total of human happiness.

If, on the other hand, the degree to which the deceased had created and disseminated beauty, thus assisting in the satisfying of one of humanity's inherent hungers, is a measure of his contribution to his generation and to future generations, one must give to him whose body lies in this unmarked grave a place of unusual honor. None of the rare bulbs for which he had such a fascination, and whose beauty and usefulness were enhanced by his botanical skill, adorn his resting place, but their lineal descendants are to be found beautifying the yards of flower lovers in many sections of our nation, and perhaps in the yards of many foreign countries. For Mr. Oberwetter was an importer of rare bulbs, an exporter of native bulbs, and a creator of new varieties of bulbous plants by hybridization.

Information regarding this Texas pioneer in the field of the Amaryllidaceae has been difficult to secure. His six sons are dead. A daughter lives in a distant state. To a daughter-in-law, who perhaps remembers more of him and his work than does any other, the writer is indebted for most of the rather meager information he has been able to secure. He was born in Germany January 8, 1830, and died in Austin, Texas, May 21, 1915. He was related to the royalty of his native country, and because of his marriage to a peasant girl incurred the displeasure of his relatives. He also incurred the ill will of governmental officials by his opposition to service in the army. Because of these situations he left Germany, came to America, and made his home at the little town of Comfort, Texas. This was shortly before our Civil War. Upon the approach of the Civil War he again expressed his dislike of war by temporarily removing himself to Mexico. While in Mexico he manifested his interest in rare plants by making shipments of bulbs from that section to other parts of the world. After the close of the war he returned to Texas and spent the major portion of his later life in Austin. It was while residing here that he made his most worthwhile contributions to the propagation of members of the Amaryllis family.

The daughter-in-law mentioned above says Mr. Oberwetter repeatedly told her he was the first to import *Hippeastrum johnsoni* into the United States. The writer would like to know whether any one can prove or disprove the accuracy of this claim on the part of Mr. Oberwetter. It seems possible that in the intervening years since Mr. Oberwetter's death confusion of the *Hippeastrum johnsoni* with the fall-flowering miniature Hippeastrum may have arisen. The writer feels that it is entirely probable that Mr. Oberwetter was the first to import the latter.

Two or three aged individuals here in Austin recall with interest Mr. Oberwetter's experiments with hybridizing of the Amaryllis (Hippeastrum), and of his producing a new strain, but none know what became of his creation. The statement of these is in harmony with the following translation of a reference found in Henry Nehrling's "Die Amaryllis", published in 1909: "Mr. P. H. Oberwetter in Austin, Texas, another friend of Amaryllis, also used *H. psittacinum*, which he crossed with van Eaden's 'Fidelio' and 'Count Cavour'. He produced a variety of singular hybrids, not especially colorful, but extraordinarily prolific of bloom, that proved exceptionally resistant to the Texas climate." It is indeed unfortunate that all trace of this strain has been lost.

Perhaps Mr. Oberwetter's most valuable importations were the *Lycoris squagmigera* and *Habranthus miniatus*. After Mr. Oberwetter's death in 1915 his stock of bulbs was sold to a local nurseryman. In the collection were something like two hundred Lycoris bulbs. Not knowing the true worth of this bulb, nor the slowness with which it is propagated, the nurseryman sold the major portion of the bulbs. It was not long until he realized that he had let slip from his hands the nucleus of a valuable stock of this rare bulb, and that the few he had left were far too few to replenish his depleted stock by their slow reproduction. Only a few of the Lycoris remain in this section. Because of the ease and rapidity with which they are propagated the Habranthus has not been lost but has increased in numbers until we now have here in Austin what is perhaps the largest supply of this choice bulb to be found in the entire nation. Although a native of Chile it has proven itself to be exceedingly well adapted to our Texas climate and is rapidly proving its adaptability to the soil and climatic conditions of many other states.

These members of the Amaryllis family are the monuments to the memory of Peter Henry Oberwetter. Perhaps in some section of his adoptd state the Amaryllis which he created may be flowering still. Here and there a Lycoris may be found whose progenitors were taken from his garden. In many parts of the world the pure white Texas Rain Lily springs suddenly into flower after the summer showers, due to the fact that he shared it with sections in which it was not native. In numerous Texas gardens and elsewhere the bright red Habranthus each fall testifies to the work of him who may rightly be called the pioneer in the propagating of the Amarylleae in Texas.

A List of Amarylleae Cultivated at Isleworth, Near London, 1896

A. Worsley, *England*

One hundred and eleven species and varieties are included, but all undoubtedly hardy kinds which have become common in gardens are omitted. Stove kinds are marked 'S'; Intermediate kinds 'I'; Greenhouse 'G'; those that will flower out of doors in summer but which are not hardy '½ H'; hardy kinds 'H'.

1. *Hippeastrum aulicum* ..... ½ H. G.
2. *Hippeastrum aulicum*, hybrids of ..... ½ H. G.
3. *Hippeastrum aulicum*, var. Robustum [Fl. des Serres] ..... G.
4. *Hippeastrum equestre* ..... S. to I.
5. *Hippeastrum equestre, major* [*ignesciens* of Gardens] ..... S. to I.
6. *Hippeastrum equestre, pronum* [of Koch] ..... S. to I.
7. *Hippeastrum equestre* from Burmah, very small ..... S. to I.
8. *Hippeastrum equestre alberti* [double flowers] ..... S. to I.
9. *Hippeastrum equestre* from Costa Rica [Wolteri] ..... S. to I.
10. *Hippeastrum reginae* I
11. *Hippeastrum reginae spectabile* [Loddige] I
12. *Hippeastrum rutilum fulgidum var. ornatum* ..... ½ H. G.
13. *Hippeastrum rutilum fulgidum* hybrids of, such as *carnarvonia*, etc. ..... ½ H. G.
14. *Hippeastrum rutilum sub-barbatum* [Herbert] ..... ½ H. G.
15. *Hippeastrum solandriflorum* ..... S

16. *Hippeastrum solandriflorum* hybrids of ..... S.
17. *Hippeastrum stylosum* ..... S.
18. *Hippeastrum rubrum* [New Species]
19. *Hippeastrum vittatum* ..... ½ H.
20. *Hippeastrum vittatum* hybrids of ..... H.
21. *Hippeastrum procerum* ..... G.
22. *Hippeastrum* hybrids of Veitches strain ..... G.
23. *Hippeastrum* hybrids of Continental strains ..... I.
24. *Habranthus advenum* ..... G.
25. *Habranthus brachyandrum* ..... H.
26. *Habranthus brachyandrum* hybrids of ..... H.
27. *Habranthus pratensis* [fulgens of some] ..... H.
28. *Habranthus roseum* ..... ½ H. (?) G.
29. *Phycella* species ..... G.
30. *Zephyranthes brachyandrum* [habranthus] ..... H.
31. *Zephyranthes brachyandrum* hybrids of ..... H.
32. *Zephyranthes carinata* ..... ½ H. G.
33. *Zephyranthes* species Cuba ..... I.
34. *Zephyranthes tubispatha* ..... I.
35. *Zephyranthes verecunda* ..... G.
36. *Sprekelia formosissima* ..... ½ H. G.
37. *Hymenocallis filamentosa* (new species) ..... I.
38. *Hymenocallis littoralis* ..... G. to I.
39. *Hymenocallis moritziana* [Baker] ..... S.
40. *Hymenocallis speciosa* ..... I.
41. *Hymenocallis* species Brazil ..... S.
42. *Hymenocallis* species Ceylon ..... S.
43. *Ismene amancaes* ..... ½ H. G.
44. *Ismene calathina* ..... ½ H. G.
45. *Ismene macleana* ..... ½ H. G.
46. *Ismene pedunculata* [Herbert] ..... G.
47. *Ismene* species [*undulata* of Gardens, non Baker] ..... G.
48. *Pancratium canariense* ..... I.
49. *Pancratium canariense* seedlings ..... I.
50. *Pancratium illyricum* ..... H.
51. *Pancratium maritimum* ..... G.
52. *Pancratium maritimum* hybrids ..... G.
53. *Pancratium zeylanicum* ..... S.
54. *Pancratium* species Japan ..... G.
55. *Eucharis amazonica* var. *fragrans* ..... S.
56. *Eucharis sanderi* ..... S.
57. *Hyline* (new species, larger than gardneriana) ..... I.
58. *Elisena longipetala* ..... G.
59. *Urceolina latifolia* ..... I.
60. *Urceolina miniata* ..... I.
61. *Eurycles cunninghami* ..... I.
62. *Eurycles silvestris* ..... S.
63. *Eurycles*, species ..... S.
64. *Eurycles* very small and distinct ..... S.
65. *Narcissus monophyllus* ..... G.
66. *Stenomesson aurantiacum* ..... G.
67. *Stenomesson incarnatum* ..... G.
68. *Phaedranassa carmioli* [refugium botanicum] ..... S.
69. *Phaedranassa chloracea* ..... G.
70. *Phaedranassa fushioides* (of Gardens) ..... G.
71. *Phaedranassa obtusa* ..... G.
72. *Phaedranassa ventricosa* ..... G.
73. *Griffinia dryades* ..... S.
74. *Griffinia dryades var. petiolata* ..... S.
75. *Crinum amabile* ..... S.
76. *Crinum fimbriatulum* ..... I.
77. *Crinum giganteum* [*nobile* of some] ..... S.
78. *Crinum latifolium* [*campanulatum* of some gardens] ..... G.

79. *Crinum moorei* ..... H. or G.
80. *Crinum moorei* var. *schmidtii* [distinct from *alba*] ... ½ H. or G.
81. *Crinum powellii* (hybrid) ..... H.
82. *Crinum pratense* ..... G.
83. *Crinum scabrum* [from America] ..... I.
84. *Crinum scabrum* hybrids ..... I.
85. *Crinum submersum* (?) ..... I.
86. *Crinum zeylanicum* ..... I.
87. *Crinum* species Brazil ..... S.
88. *Crinum* species Ceylon ..... S.
89. *Crinum* species Surinam [probably *graciliflorum*] ..... S.
90. *Brunsvigia cooperi* ..... ½ H. G.
91. *Brunsvigia josephinae* ..... ½ H. G.
92. *Brunsvigia josephinae* bi-generic hybrids ..... ½ H. G.
93. *Brunsvigia* species ..... G.
94. *Ammocharis falcata* ..... ½ H. G.
95. *Haemanthus multiflorus* var. *kalbreyri* ..... S.
96. *Haemanthus multiflorus* var. *kalbreyri* seedlings ..... S.
97. *Haemanthus* species Cape ..... G.
98. *Haemanthus* species Natal ..... I.
99. *Imbofia crispa* ..... G.
100. *Nerine sarniensis* var. *corusca* ..... ½ H. G.
101. *Nerine pudica* ..... G.
102. *Nerine pudica* hybrids ..... G.
103. *Nerine* species Japan ..... G.
104. *Lycoris aurea* ..... I.
105. *Lycoris radiata* [*Nerine japonica* of Gardens] ..... ½ H. to H.
106. *Lycoris sanguinea* [in two varieties] ..... ½ H. G.
107. *Lycoris squamigera* ..... H.
108. *Lycoris* species (narrow leaves) ..... G.
109. *Lycoris gastronema sanguinea* ..... S. to I.
110. *Vallota purpurea* var. *minor* [brilliant color, very dwarf] ½ H.
111. *Amaryllis belladonna* hybrids ..... H.

My Father's Work With Amaryllis

ARNO H. NEHRLING, *Massachusetts*

It gave me much joy and pleasure when I learned that the first volume of the "Year Book" of the American Amaryllis Society was to be dedicated to my father as a memorial. This is the type of recognition he would have appreciated. Since his work was pretty well covered in the various articles which appeared in this first issue, little remains to be said. Yet I could not refuse the request of the Editor when he asked me to write a brief story on my father's work with amaryllis as I knew it. I will record briefly a few facts as they come to my mind.

In my work in the horticultural field I have come in contact with many nature lovers but none as ardent or with the enthusiasm that my father possessed. He was a true nature lover. His interest in birds and plants was more like that of the poet, artist or musician. When he became interested in a new plant or when a new species or variety appeared in his garden or greenhouse, he often forgot the material things in life. He absolutely detested a business transaction of any kind.

My grandfather when discussing my father's boyhood days, with a twinkle in his eye, made it a point to mention how his son Henry at an early age would wander all over the home farm in Wisconsin studying the habits of the native birds and plants. He would of course try to share some of the discoveries he made with those around him and his enthusiasm was so great that he was considered a little queer even by his parents, to say nothing of his neighbors. My grandfather also told me that as a boy my father's ambition was to have a huge wire cage on the farm where birds could be confined yet where they could fly to their heart's content while being studied by the bird lover. Later these cages really came into existence and when my father

first saw the huge bird cage in Forest Park in St. Louis, he felt that his boyhood ambition had been realized.

After my father graduated from the Teachers Seminary in Addison, Ill., he first taught school in Chicago. From there he received a call to Houston, Texas, to take charge of a Lutheran Parochial School. He arrived in Houston in early April and since he had never been South, he was tremendously impressed with the balmy climate, especially since coming from Illinois where the weather at that time of the year is often very disagreeable. Before reporting to the school authorities, he wandered aimlessly about in this semi-tropical city and he was attracted by the fragrance of the gardenias, the beauty of the tea and climbing roses and the splendor of *Magnolia grandiflora.* He also heard for the first time the song of the mocking bird and the chirp of the cardinal. However, the discovery that gave him the greatest joy was a clump of striped glowing red flowers which he could not identify from a distance. He quickened his steps and was almost overjoyed when he discovered a huge planting of *Hippeastrum Johnsonii.* The group was surrounded by palms, cycads, pampas grass and other subtropical plants which gave them an ideal setting. My father never lost his enthusiasm for this wonderful picture and although he subsequently became interested in orchids and other rare plants he never allowed his love for amaryllis to be crowded into the background. The name amaryllis seemed to have for him a poetic ring which never grew old.

After he became established in Houston, he planted as many *Hippeastrum Johnsonii* as he could obtain. This was the beginning of his collection of amaryllis. New species and varieties were added from time to time and the bulbs were moved from Texas to Missouri as my father at his own request was transferred to another Lutheran School located in the Ozark Mountains region. It should be understood that during all this period a study of the birds of North America was really a paramount issue with my father as he had started work on a book on the North American birds shortly after his graduation from the Teachers Seminary.

From Missouri the Nehrling family moved to Milwaukee, Wisconsin, where, because of my father's interest in natural history, he became director of the Public Museum, an institution which due to his efforts has become one of the leading museums of its kind in the country. In the year 1890 my father was able to build a small greenhouse in the rear of the Nehrling residence and it was at this point that his real work with amaryllis began. To his collection of *Hippeastrum Johnsonii, H. Acramannii pulcherrimum H. reginae, H. equestre, H. solandriflorum conspicum, H. leopoldi,* he added *H. vittatum* and its best hybrids. As funds became available, he acquired a collection of De Graaff's and Veitch's available sorts. Now began the extensive hybridizing work and this is where the writer of this story received his first introduction to the Amaryllis Family. My brothers were away at college so at the age of nine I became, much to my sorrow, at least I felt that way at the time, my father's chief assistant. Some of the work was extremely interesting even for a boy while some of the other tasks were strenuous and most uninteresting, especially when in a vacant lot nearby all the other boys in the neighborhood were engaged in their favorite sports. It was quite a joy, however, when my father allowed me to make some crosses and later gather the seeds and plant them in shallow flats. The majority of these seedlings, of which we sometimes had as high as 30,000, were grown on for a season and then packed and sent to Gotha, Florida, to be grown on into flowering sizes. A few out of each cross were saved and allowed to flower so that notes could be taken on them and the best ones used for further hybridizing work. This was the beginning of the Nehrling Strain which soon became known to amaryllis lovers at home and abroad. The late Jacob Eisele of the Dreer firm in Philadelphia, contracted for all the available bulbs for a period of years. The demand became so great that the stock of flowering-sized bulbs soon became exhausted. Had funds been available, this business could have been extended to immense proportions as there was at that time a tremendous interest in amaryllis culture. It was at this time that my father became interested in fancy-leaved caladiums, first of all because they offered a new field for hybridizing work, but primarily because it was possible to produce a salable crop of tubers in a short period of time. As a result the large-scale amaryllis production suffered, but this may have been an advantage as far as the present strains are concerned because work from that time on had to do with crosses of strains and varieties of unusual merit.

In connection with this work my father's correspondence became tremendous. A good many of the letters he received were most interesting and resulted in many fine friendships which continued during the remainder of his life. These letters came not only from horticulturists but from botanists, plant collectors and plant enthusiasts as well. As stated in the "Year Book" of last year, my father met a number of these men from foreign countries at the International Plant Science Congress held in Ithaca, N. Y., in 1926 and he counted this experience as one of the happiest times of his life.

I have spoken only of the success attained in this early hybridizing work and I should add that there were also many failures and disappointments. This meant that thousands of seedlings were often discarded even after they had reached the flowering stage. When some other hybridizer succeeded in obtaining better results than he, my father would admit it without hesitation and discard thousands of seedlings.

As to the ultimate goal in his breeding work with amaryllis, a few words are in order. Although he was interested in increasing the size of the flowers, he sought primarily the elimination of the stripes in the blood red varieties. This he practically accomplished and in his later work, he was interested in producing pink and flesh colored varieties. To my knowledge he was never particularly interested in producing a white strain simply because he felt that there were good white crinums and equally good trumpet-shaped white flowers in the Lily Family.

Some of the Newer Daffodils

Miss Mary McD. Beirne, *Virginia*

In writing of daffodil introductions for our American gardens it is almost impossible for the experienced grower to think of these new-comers as distinct and apart from many old friends among the genus.

The latter class of flowers having withstood one's trial-garden tests, over a period of long and eventful years, naturally deserves a careful and studied comparison for it is by such effort that we may satisfactorily ascertain what special plants prove of greatest practical value for our gardens. Also those varieties that are best adapted to our various needs.

One encounters many hybrid novelties of today, possessing seemingly the one bare virtue of being *NEW*. It is well therefore to be constantly fortified against possible temptation, and the safest plan to follow possibly is fourfold: Go forth armed with the knowledge and understanding of one's own garden plants: Observe the habits and appearance of these same plants in the gardens of others: Visit Daffodil Shows, preferably staged in different sections, of the country: And lastly endeavor to judge such shows, where possible; if one be prepared through practical experience, careful reading and studied observation. All of these factors contribute their quota toward a gradual and unconscious ideal one eventually forms of the perfect garden daffodil flower: Or what most nearly approximates it.

Grouping our subjects for comment according to the classification of the Royal Horticultural Society: We properly begin with the first of eleven horticultural divisions, which happens to be the class Trumpets, with its sub-divisions. It is impossible for the writer to frankly contemplate this class without scrutinizing each new introduction: almost unconsciously yet vividly, against a background of none other than the little old-fashioned early yellow Trumpet of our Southland: A variety known familiarly as N. spurious or Trumpet Major and which is considered to closely resemble N. Princeps.

But let it be understood: That not by the wildest stretch of imagination could this modest but graceful and charming plant be compared with anything remotely resembling the so-called "Show" flower of today. But so delicately is its small Yellow Trumpet proportioned and so soft is its pale primrose color that either naturalized in small groups or grown in expansive colonies, it proves itself to be of equal grace and beauty.

Thus it may be boldly claimed, that if one has an appreciation of springtime freshness and purity: It must be agreed that N. spurious en masse, is quite incomparable in the complete simplicity of its charming loveliness.

Therefore, it is by a comparison of values only, that one jealously eyes the new hybrid Yellow Trumpet, seeking entrance to our gardens of today. Almost unwittingly the question evolves itself: Will this hybrid novelty make up to us in beauty (which is interpreted to mean form, substance, color etc.): what our old long and well-beloved N. spurious has furnished in delicacy, adaptability and greatest of all; incredible hardihood? For it is a matter of record that hybrid stocks have perished where N. spurious, arriving in Virginia with the early settlers, has thriven on garden neglect and decay.

It is thus, fired by these simple experiences of a pioneer past, that we approach the great class of Yellow Trumpets of today: and dare to set a standard, with an old flower that many would pass unnoticed, in our quite mad but altogether modern quest for size.

The best small uniform Yellow Trumpet for general garden use at RHODEEN, is *Dawson City* (v. Tubergen 1925). The flower is of very perfect form, but sadly, will never win a first award at the show table; unless we learn to regulate our exhibits according to the very admirable English custom. The Royal Horticultural Society qualifies its awards by such additions as: Variety for Show, Garden Decoration, Rock Garden, Forcing, Cutting, etc.

If this rule were adopted here, many desirable and useful flowers would not be overlooked, in competition with a plant that is preeminently a Show variety, such as *Crocus* (Will., P. D. 1927). This is one of Mr. Williams very finest productions. The color is an intense gold throughout and deepens to a rich dark orange with age. Mrs. Davis grows this flower to perfection in her daffodil garden of priceless gems, at Nashville, Tennessee.

Kandahar (Brodie, 1927) is another superb garden plant, with an immense vase-shaped Trumpet borne on tall stems well above the broad strap-like foliage. The color is a very telling deep solid self gold throughout. But one must wait a little while for a plant of this price to attain the much coveted increase.

Lord Antrim (Guy Wilson, 1927) makes a stunning garden picture, having unusual height and vigor. It has fine form and good color but at Rhodeen we prefer the soft lovely primrose yellow of *Apotheosis* (v. Tubergen). Despite its rather dwarfish statue, not quite of the proper proportion to carry a trumpet of such size, it is a very beautiful flower and decidedly distinctive in the Yellow Trumpet class. Mr. Hoog to whom we owe a great debt of thanks for this and so many other lovely flowers, writes us, that the plant is never very tall in his nursery at Haarlem, Holland.

Evidently its normal height was exceeded by some strange accident in one of my own garden plots, several years ago. For the three flowers that were exhibited at a state show that spring, created quite a sensation. The stems were very tall and strong, and the blooms unusually uniform, according to experienced judges present.

Among White Trumpets, it is difficult to choose, for all are refined flowers of great beauty. *Corinth* (Brodie, 1928) unlike many fragile companions of its class, is a plant of strong constitution. A child of Nevis by Beersheba, it is considered by many, to be even more lovely than the parent flower. Certainly the vigor and rare beauty, which go hand and hand, with this very charming creation, are to be heartily commended. Its perianth which is broad and flat, is purest white, and of the finest substance. The trumpet opens pale yellow, fading gradually to a very beautiful soft ivory.

Kenbane (Guy Wilson, 1927) gave late bloom this year but appeared in finer form than we have ever seen it. The great bell-shaped creamy white trumpet contrasted finely with the deep blue-green of its heavy foliage. The flowers held their shape and retained their freshness for a seemingly indefinite time, possibly due to the unusually cool weather.

Savonorola, one of Brodie's 1916 introductions, is still treasured, possibly for sentiment's sake together with its very pure whiteness. *White Conqueror,* a Backhouse seedling, is a much better garden plant however and is strongly recommended.

To Brodie we are indebted for two especially charming flowers in *Eskimo,* whose trumpet opens pale primrose but passes to an intensely pure white. And *Nevis* another pale bicolor seemingly, on first opening, but changing to a clear cool milk-white throughout. Both plants have furnished healthy increase as well as prolific bloom during six happy, fruitful years in my possession.

Neither of these fine acquisitions however, can rival or excel two of Mr. Engleheart's superlative hybrids, which are numbered among my most treasured posses-

sions. *White Emperor* in form, purity of color and habit is everything that one might desire in a perfect garden plant: While *Snowscape* is a flower, not so large as some of its neighbors, but of the purest white and most lovely form.

Rob Berkeley, (Mrs. Berkeley, 1922) is another White Trumpet of medium size, which is finely proportioned and of exquisite form and balance. Such sheer loveliness one would not associate with prolific bloom or vigorous increase which are other desirable attributes of this very fine flower.

Bicolor Trumpets, as a class, have consistently proven of such poor constitution in my trials that I am wary of further investment unless reasonably sure of what I am getting. Such old standbys as *Carmel* (Brodie, 1926) and *Tapin* (Richardson, 1926) are still with me. But in future we shall hope to supply ourselves from my own fine seedling daffodils. The plants give every promise of furnishing ample vigor for what they may possibly lack, in perfection of form!

Among Giant Yellow Incomparabilis, *Fortune* (W. T. Ware, 1923) is of course the most conspicuous flower of its class. Its value is said to be extreme earliness, good form, fine size, great height and brilliant color. Little more could possibly be desired for the superlative flower of our dreams. Personally, the writer must acknowledge that she is wholly unorthodox and remains entirely unmoved, after viewing exhibition blooms, grown in many different localities. There is always left an impression of coarseness and none too lovely form, despite higher authorities to the contrary.

At least there is rejoicing at Rhodeen, that £15 paid by a friend for one bulb of this much heralded flower, is not a subject to be lamented here together with £7, regrettably wasted on *Damson* (Will., P. D., 1925). The latter flower suffers from a very serious defect in a streaked yellow color at the base of its creamy-white perianth. The cup is supposedly deep red. But as it bloomed in my own garden, there is every reason to believe that the virtues so vividly described, are seriously exaggerated.

Bodilly (Will., P. D., 1925) on the other hand is everything that is claimed for it and a fine representative of the bicolor class of Incomparabilis. The plant is of immense stature carrying a bloom of grand quality, especially recommended for exhibition. The broad overlapping perianth is of thick waxy substance with a large bright lemon-yellow cup beautifully frilled at the mouth.

Nissa (Brodie, 1925) is another flower of high quality. A seedling from Kingdom, one may trace its good form and the fine substance of an even-rounded overlapping perianth, and a clear lemon crown. At Rhodeen, it is used mainly in the capacity of a seed parent for which purpose, by the way, it is highly recommended.

Festive (Back., Mrs. 1923) and *Kennack* (Will., P. D. 1927) are both outstanding plants for garden decoration and all that are to be desired in vigor, attractive form and fine color. Festive's bowl-shaped crown is tipped with a bright orange band, while Kennack boasts a telling rich solid orange cup.

Folly (Will., P. D. 1926) has been intentionally reserved for the last as it is possibly the best beloved of all Bicolor Incomparabilis flowers. There is great charm about its finely pointed petals with their dainty reflex. The cup is solid orange-red and it developed in all its perfection for me this spring. Perhaps it was grateful for the bit of woodland shade that protected and preserved its color. Under my, sometimes uncertain cultivation, the amount of color in the cup varies with the season. But this flower's entrancing profile is always enjoyed, also the brilliant color of the cup when one is favoured with it.

Among Yellow Barrii, *Tredore* (Will., 1927) is one of the finest of its class, having very great substance and a splendid cup of deep solid red. *Treskerby,* another popular variety of Mr. William's raising, is a great favourite for Show and appears to hold its color well, as does *Tredore* which has figured prominently in this distinguished hybridist's seedling exhibitions abroad.

Galata (Brodie, 1927) promptly suggests itself, as being doubtless the most striking giant flower, to best exemplify the great beauty of the White Barrii section. The ivory white perianth contrasts beautifully with an expanding saucer-shaped crown of clear yellow, edged with a very brilliant broad red rim. *Dick Turpin* (Crosfield) is another flower of keen contrasts in clear red margins on marble-like whiteness.

Kilter (Will., P. D.) completes this splendid trio and deserves everything fine that is said of it except that the flower is a "Glorified Firetail". For neither plant could possibly serve as a substitute for the other and all sensible gardeners will insist upon having both.

The Giant Leedsii section is so generally popular with the gardening public, and offers such a vast collection of different types of flowers, old and new, that a compromise between the two seems the best policy in making selection.

My first and very best choice however is *Nacos* (Engle., 1923). Of exquisitely beautiful form, it might be said to be of Ajax proportions. But in spite of its size, the whole flower is of the most superlative quality. The perianth is composed of overlapping pointed segments and the crown is somewhat trumpet-shaped, neatly reflexed at the brim, and purest white throughout.

Another perfectly beautiful flower of this same class and which we owe to Mr. P. D. Williams, is *Mitylene*. The plant is entirely hardy, prolific of bloom and the whole bloom is of cardboard-like substance. The perianth is pure white, overlapping and of amazing quality; the crown a delicate pale primrose color, fading to cream. It is of one of the best beloved treasures in my garden.

Tunis (Will., P. D. 1927), as we grow it at Rhodeen, is a perfectly stunning garden plant. Some people claim that it is not so vigorous with them but here we find it is most happy, when given light shade. Under the protecting branches of nearby trees, the flower opens creamy-white with a pale lemon crown. But after several days, passes to milk-white with a frill of coppery gold at the edge. If the weather is propitious, it is not uncommon for the blooms to remain in fine form for from ten days to two weeks.

The newest and best acquisitions among short-cupped Leedsii are *Pucelle* (Engle., 1930) and *Nelly* (Will., P. D. 1927). The former is a most distinct and beautiful hybrid with narrow flat pure white perianth and a medium-sized goblet-crown. The flower is tall and striking, a chaste pure white throughout.

Nelly, a plant of very different type, is sometimes called a White St. Egwin. It has immense height with flowers of grand quality which are said to measure 4 inches across. We failed to measure ours but the broad overlapping perianth is purest white with a small lemon tinted crown, showing sometimes a touch of salmony-orange in the rim.

But one might continue indefinitely, telling of experiences with these lovely creations of the modern hybridist. But space is limited and it is possibly well to pause with the Leedsii group. For there are always beautiful additions being made in this class, and we may feel perfectly sure of having even finer things to report at some later time.

Artificial Reversal of Growth Dominance in Amaryllids

HAMILTON P. TRAUB, *Florida*

In connection with the working out of a technic for amaryllid [1] breeding with flowers on excised scapes, an interesting case of the artificial reversal of growth dominance has been observed.

In a large number of trials, self or cross pollinated flowers of excised amaryllid scapes, especially those of *Hippeastrum*, placed in water or a nutrient solution, have in the great majority of cases produced seeds. Within limits, the number of seeds produced per capsule seems to be largely a function of the relative size ("fleshiness") of the peduncle. Species in five Genera have been used in the experiments,—*Hippeastrum, Crinum, Haemanthus, Zephyranthes* and *Narcissus*. In *Zephyranthes* the number of seeds produced has been below expectancy, especially in the case of *Z. Atamasco* and *Z. treatieae*, which may be due in part to the relatively small size of the peduncle. *Z robusta*, with a larger peduncle, produces a relatively larger number of seeds per capsule. Although abundant seeds have been secured from excised scapes of *Crinum asiaticum, C. longifolium album* and *C. longifolium roseum*, only an abundant number of fleshy fruits without seeds were produced in the case of *C. augustum*, a doubtful species which does not set seeds under Florida conditions. A Burbank hybrid *Crinum* produced many small seeds in each pod which were not viable. Approximately 5 percent of flowers on excised scapes of *Haemanthus multiflorus* have produced seeds.

[1] The term "amaryllid" as used here refers to any species under any Genus of the Amaryllidaceae, Order Amaryllidales, according to Hutchinson, "Families of Flowering Plants, Vol. II, Monocotyledons". London. Macmillan. 1934.

The behavior of *Narcissus tazetta*, The Pearl, under Florida conditions, led to the experiments reported below. This variety does not set seeds under Orange County, Florida, conditions, but it was noticed that when excised flower scapes fell to the ground, in the partial shade of the rows of narcissi, in due course, seed capsules were matured containing a few seeds. This suggested the hypothesis that growth dominance for this variety of *Narcissus tazetta* is normally confined to the lateral growth at the base of the flower scape *(2)*[2] after flowering in central Florida and that growth dominance in excised scapes can be reversed in favor of the developing ovary under favorable conditions.

To test this hypothesis further an experiment was carried out with excised scapes of *Hippeastrum equestre major* in water with flowers pollinated. The controls consisted of excised scapes in water with flowers not pollinated and unexcised scapes with flowers pollinated. This variety of *H. equestre* propagates very rapidly by offsets under Florida conditions but normally does not set seeds.*(3)* Six flowers were self pollinated; the same number were crossed with pollen from a named hybrid variety. In the first case 66 2-3 percent and in the second, 100 per cent of the flowers produced seeds. The ovaries on the scapes used as controls dried up soon after the flowers faded. The ovaries on the excised scapes in water where pollen was applied increased to normal size even when no seeds were produced. The number of seeds was low, usually only one or two seeds in the upper end of each of the three locules. The results indicate that part of the failure to produce seeds in this variety under Florida conditions may be due to self-incompatibility but another important factor is apparently to be found in the growth dominance of the rapidly forming offsets, or the new lateral growth at the base of the declining flower scape.*(2)*

Although these results clearly indicate that growth dominance may be artificially reversed in favor of the apical stem (peduncle, and ovaries at its periphery) they do not give direct evidence as to the causal mechanism responsible for the reversal. The variety *H. equestre major* is native to tropical America and its failure to set seeds in Florida may be due to the fact that it flowers from February to April inclusive, during the latter part of the dry season in the State. The *Narcissus* variety, The Pearl, also flowers during the winter. A hormone mechanism *(5,1)* on the basis of growth promoting and growth inhibiting substances *(4)* might be postulated to account for the facts but no experiments with this in mind have been carried out. This plant material may be of value in such studies.

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Experiences in Breeding Crinums

Cecil Houdyshel, *California*

Before arriving in California thirty years ago we had possessed a few *Hippeastrum johnsonii* and *Crinum moorei* bulbs. It was our ambition to grow and breed bulbous plants especially of the Amaryllis Family here. Since it was necessary to earn a living we followed our profession of teaching for the following nineteen years and the bulb interests were perforce reduced to the rank of a hobby. But later they became a "side line." Finally the origination of the gladiolus *Los Angeles* enabled us to devote our entire time to bulb growing and originating.

[2]Reference is made by number (italic) to "Literature Cited" at the end of the article.

By 1913 we had accumulated a small collection of crinums and began breeding them. We found *C. longifolium* so hardy and so profuse in the production of seeds that for one season we fertilized all its flowers with pollen from *C. moorei.* From this cross we raised approximately 600 seedlings. This is the same cross as *C. powellii alba* and *rosea,* though it is probable that the seed parent of *powellii alba* is *C. longifolium album* and of *C. powellii rosea* is *longifolium roseum.* As we had few if any *C. longifolium album* at that time we probably used the variety *"roseum"* as the seed parents. We are not sure as no notation was made. Our results were a series of seedlings of close resemblance but different in flowers from *"Powellii."* Not one had a white flower, nor one that much resembled the pale pink variety *"roseum."*

Several of these new seedlings were a deep pink in color. Most of them were profuse bloomers, more profuse even than its seed parent. The one selected for introducing had the deepest pink flower and is a perpetual bloomer except in very cold (California) weather. This one we named *Cecil Houdyshel.*

The foliage and bulb of this crinum, and of all seedlings in the series, are the same as the *"Powellii"* hybrids. In fact it is safe to predict that this cross will always produce hybrids of nearly identical appearance when not in flower.

Of the original 600 seedlings, besides *Cecil Houdyshel,* we still have four other varieties. They are probably too nearly like the named variety to warrant introduction, though one is still being considered.

The ability of this variety to bloom in cool weather has made it quite popular in Florida as a winter bloomer. For the same reason it should be very useful in the north and for growing in conservatories and in the house. Both parents are relatively hardy. Indeed *C. longifolium* has wintered outdoors with some protection in the North. We are told that *Cecil Houdyshel* is hardy in South Carolina and we believe, if planted deeply and protected by a mound of earth, leaves and brush, it should survive the winters much farther north. We hope this may be tried and results reported.

The fact that crinum hybrids are usually infertile or nearly so is partly the reason that little advancement has been made beyond the species. Even the species, except *C. longifolium* and *C. moorei,* set almost no seed for us. It has been said that *C. moorei* may be a hybrid and the great variability of its seedlings might seem to indicate that, but its great productivity in seed bearing, in our opinion, conclusively proves it a species.

We were surprised and pleased to find that our hybrid bore quite a few seeds by self pollination. Several of these seed were planted. The seedlings so produced have shown little variation from the parent. We were able to obtain a cross with pollen from another hybrid, *J. C. Harvey,* and raised one plant introduced last year under the name, *Virginia Lee.*

The hybrid, *J. C. Harvey,* is the offspring of *C. moorei* pollenized by *C. kirkii.* In our experience, crinum hybrids usually resemble the seed parent more than the pollen parent in foliage and general appearance. *J. C. Harvey* thus has a greater resemblance to *C. moorei* than to *C. kirkii. Virginia Lee* departs from our experience in this as the general appearance of the plant is very much like *J. C. Harvey,* its pollen parent. This is probably due to the influence of *C. moorei* in both sides of its ancestry.

With us, *J. C. Harvey* is a rather shy bloomer. It has a pretty pink flower smaller than *Cecil Houdyshel. Virginia Lee* is free flowering and has an extended season but begins to bloom later than *Cecil Houdyshel.* Last winter, being very mild, we had flowers from it until mid-winter. With less than fifty bulbs in existence and less than ten years old, we do not yet know all about it. It has been moved and divided twice, the last time very recently. It seems to prefer semi-shade, but we are trying out a few in nearly full sun.

The flowers of *Virginia Lee* are bright pink with a light throat. They show the *C. moorei* influence but are larger and wider open.

This variety bears seed quite freely and hybridizes readily. Probably no other hybrid approaches it in this respect. We have already grown a number of seedlings from it but so far none have bloomed. They vary somewhat in form.

We were very much pleased to receive a letter from one of the best judges of amaryllids, (an official of this Society) stating that he considered *Virginia Lee* the most beautiful crinum hybrid so far produced.

Our experiences in plant breeding have included gladioli, iris, hippeastrums, amaryllis and other genera. We have sometimes found it advisable to work up a strain that bears seed profusely as a preliminary to development. We believe the introduction of *Virginia Lee,* having three species in its ancestry and possessing a high degree of fertility, considerably enlarges the opportunity for plant breeders to improve *crinums.*

Although we have introduced but two *crinums,* that is not the sum of our efforts to obtain new and worthy varieties. Many hundreds have been rejected. We are at present trying out more than twenty-five. We have a few *C. pedunculatum* (very similar to *C. asiaticum)* crosses. These are large plants like the seed parent but the flowers have wide petals. Since we can grow as nice and as large a flower on the smaller crinum bulbs, it is likely to be "thumbs down" for them.

We have raised many seedlings of *C. moorei,* self fertilized. The flowers range from almost pure white to deep pink usually with a light throat. One of these seedlings, which we have not been able to locate recently and is now probably lost, had wider petals and was entitled to be called, "variety *platypetala.*" We have another that has two or more times as many flowers in the umbel and seems to be entitled to the varietal name, *"flore pleno."* Albinos with pure white leaves frequently appear among seedlings. A lot of recent seedlings have over 10% albinos. Lacking in chloryphyll they usually die after using the food stored in the seed. This tendency to albinism has sometimes resulted in plants with foliage striped white but they too are weak. We had one for years but it never multiplied or flowered and finally died. *C. moorei* also varies somewhat in the shape of the bulb. This seems to be the only variable crinum species and hence is most useful to the breeder.

Crinum development has scarcely passed the desultory stage except that our own efforts in recent years have been rather systematic we think. So far as we know *Virigina Lee* is the first second-generation hybrid and the first to show more than two species in its ancestry. No one knows the possibilities of future development. So far crinums have developed comparatively little beyond the forms produced by nature. Compare the modern hybrid hippeastrums with the wild species. We have bred them for twenty-five years and have at least a nucleus of bulbs left from the thousands we have grown that have wide rounded petals, pure self colors and variations with color tones never seen in the wild species. We have even raised a few having absolutely no green in the center. The combined work of many breeders has produced a race of hybrid hippeastrums to which the wild species cannot be compared. Compare also the modern pansy, the modern gladiolus and iris with their prototypes and a vision is gained about the possibilities of crinum development.

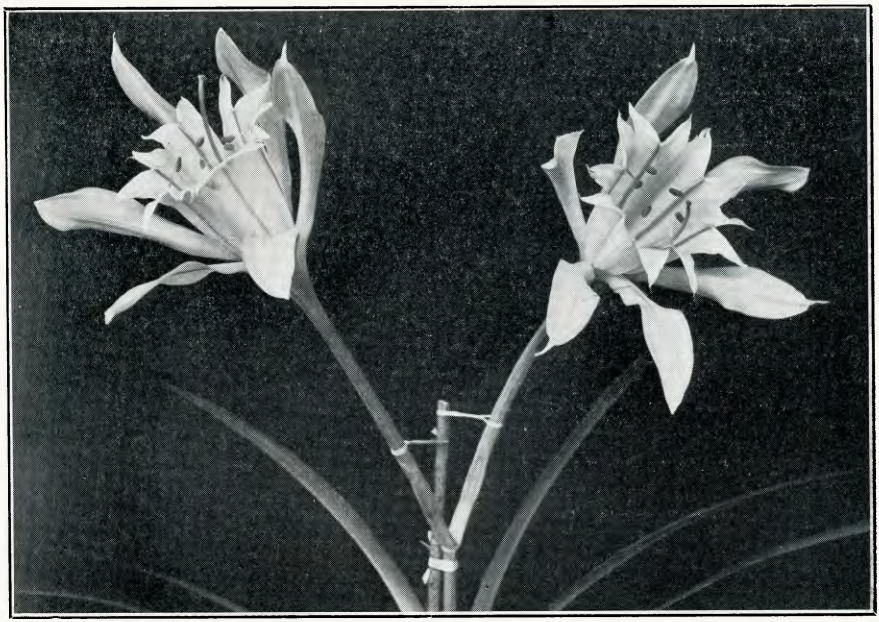
We believe the greater possibilities for producing distinct breaks in the tenacious racial characters of the crinum lies in the use of *Virginia Lee* as a seed parent. To other breeders we do not mind revealing that we shall use pollen from the best hybrids available and favoring perhaps those having *C. moorei* as an ancestor. It is important in order to increase the tendency to "break" or vary considerably from other crinums to bring as many genera as possible into the race of hybrids. If this article, written in the spare moments from arduous labor and in one (nearly) all-night session shall increase the interest of flower lovers in crinums or inspire others to help in their breeding and development we shall be well repaid. Most any amateur breeder might raise the finest new hybrid.

Extensive experiments will bring the greatest results. The plant breeder needs customers. This may likely result from improvement and the dissemination of formation by this Society. We wish to emphasize a fact noted in last year's Amaryllis Year Book. Although crinums are tropical and semi-tropical bulbs, so also are gladiolus, dahlias and some other summer bulbs grown in the North. At present few crinums are found in the gardens of the temperate zone. This is an unnecessary restriction for crinums can be handled much the same as gladiolus or dahlias. When stored the large roots should be preserved and well covered with dry earth or sand. We have often kept crinum bulbs out of the ground for years. A bulb so stored for a couple of years will often bloom at once when planted. Some species (notably *C. longifolium* and *C. moorei*) are far more hardy than is generally supposed. Some have been left out doors all winter as far north as Missouri. They must be protected from freezing by a mound of earth, leaves and brush.

C. G. van Tubergen, Ltd.

Amaryllis belladonna parkeri var. zwanenburg

See page 114 for description.



C. G. van Tubergen, Ltd.
Pamianthe peruviana

Belladonna Lily Hybrids and Pamianthe Peruviana[1]

TH. M. HOOG, *Holland*

"For many years we have tried to improve *Amaryllis belladonna* and what we have obtained is shown by the enclosed photograph. *Amaryllis belladonna* was crossed with *Brunsvigia josephinae* and *B. gigantea* and this produced *Amaryllis belladonna parkeri,* which is a tall *"Belladonna"* with a large number (up to 20) of flowers. Alas, owing to *Brunsvigia,* it will only grow and flower well in a climate which has a very hot summer and autumn, like the south of France, Italy or Spain. As we have in Holland a variety of *A. belladonna (var. purpurea major)* which even in our cold climate always blooms regularly and, if well established, with several spikes, we obtained seeds from this by hybridization with the said *A. belladonna parkeri* and this resulted in a strain of free blooming *"Belladonnas"* with numerous and large flowers of a very beautiful coloring, deep pink and white with yellowish throat, on strong stems. (See illustration on page 113).

There are as you know in September and October very few or no bulbous plants in flower with long stems and large beautifully colored blooms, which are of long endurance. Here is one of great beauty.

We also beg to enclose a photograph of a new amaryllid, *Pamianthe peruviana,* a new genus, midway between the central and southern American genus, *Hymenocallis,* and the old world *Pancratium.* This is flowering here for the first time. It is very beautiful, distinct and easily grown in a temperate house."

[1]Excerpts from a letter by Mr. Th. M. Hoog, C. G. Van Tubergen, Ltd. Haarlem, Holland, Dec. 28, 1934.

4. Propagation

Vegetative Propagation of Hippeastrums

IDA LUYTEN,

Laboratory of Plant Physiological Research, Wageningen, Holland

In 1926 an initial account was given of the propagation of *Hippeastrum* by vegetative means. The experiments published at that time, have been followed up by several series of researches, such as those to determine: the optimum temperature at which the scales must be kept, in order to insure regeneration; the best way to harvest the young bulbs; the width of tissue on the scales, showing power of regeneration; the age of bulbs to use for scooping; the most favorable season for scooping Hippeastrum bulbs; relative advantages of cutting and scooping methods.

It is sincerely hoped, that this short account of these various experiments may be found helpful, when applying this method of propagation. As a result of these experiments it ought now to be possible to obtain with certainty, large quantities of pure stock from *any Hippeastrum* bulb by the scooping method. The importance of this method will not only be found in the fact, that the fixation and preservation of fine hybrid specimen can be insured by the vegetative propagation of the original bulb, but they can now also be produced in *commercial quantities* by the same means and *sold true to name*. Moreover, I have found that the percentage of flowers produced is directly influenced by the temperature. In order to obtain exact data as to this influence of the temperature and the proper treatment of the bulbs, it is necessary to experiment with the bulbs, which are as nearly as possible alike in age and kind, and consequently this means of propagation is also of the greatest importance for the entire culture of *Hippeastrum*.

Before giving the results of my latest experiments, I wish to describe the method of scooping once again, for it has come to my attention that difficulties are often encountered, through not being sufficiently acquainted with the details of this method.

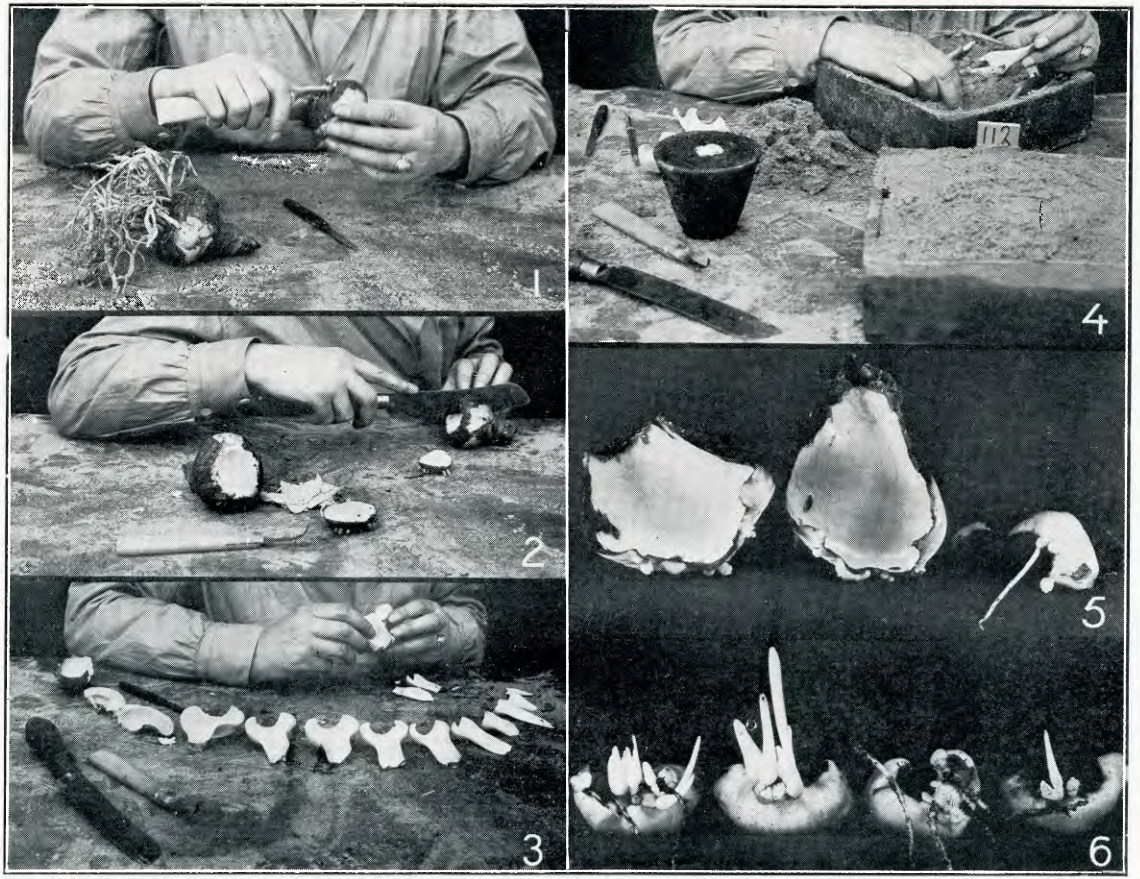
If the bulb has any foliage, this should first be cut off. The next step is to remove the basal plate of the bulb by means of a scooping knife (Fig. 1): the scooping operation. This name is due to the resulting hollow found in the bulb, when the basal plate is removed in this fashion (see Fig. 2). The cutting surface of the scooping knife should be kept parallel and as close as possible to the spherical surface of the bulb-base (basal-plate).

The correct scooping stroke can be quickly acquired through practise. It should be executed with a single quick cut of the scooping knife, which has a thin, bent blade, which should always be kept well sharpened. The model of knife used can be seen in Figs. 2, 3 & 4, where it can be seen lying on the table. This scooping knife can be purchased from Heenk, Groote Houtstraat 99, Haarlem, Model Van der Laan, left- and right-handed models are obtainable; Fl. 0.70. The use of an ordinary pocket knife must be strongly disadvised.

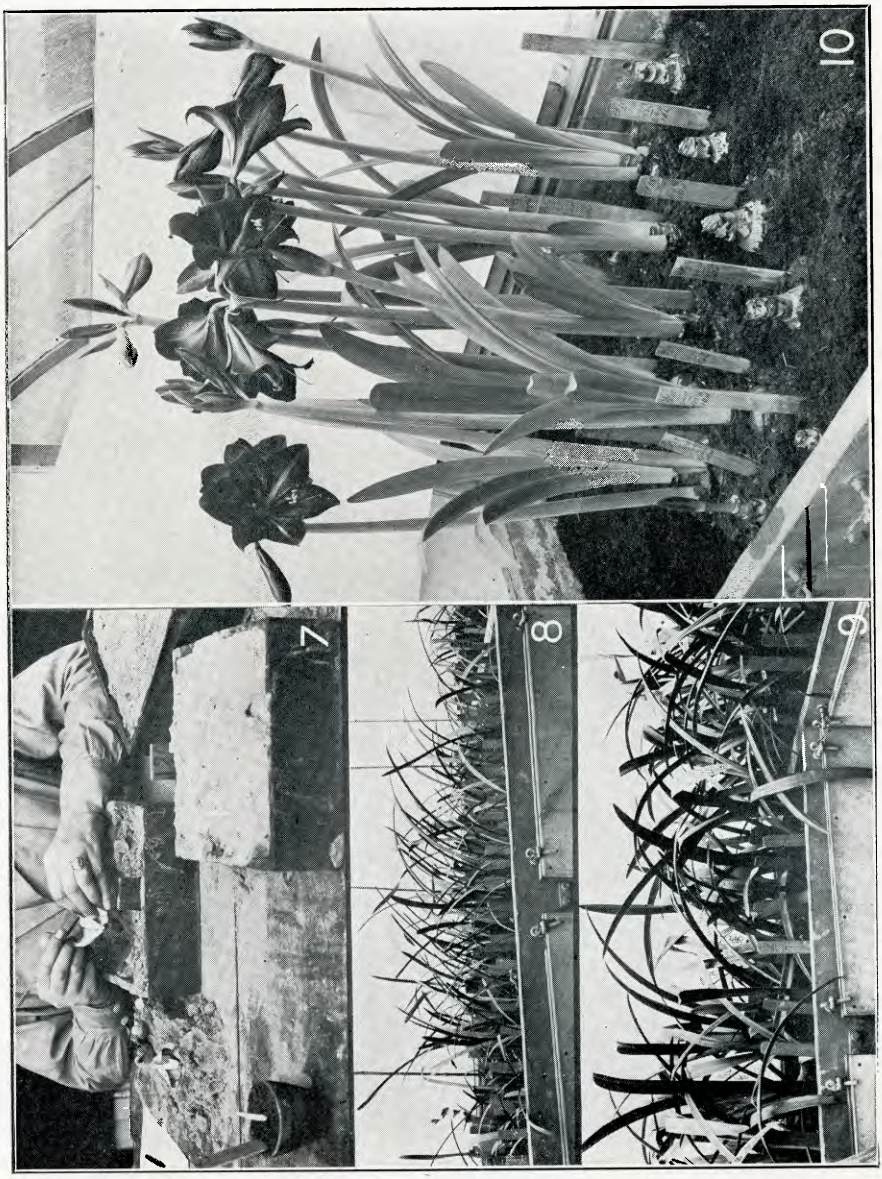
The next step is to cut the bulb lengthwise in half, parallel to the surface of the foliage leaves (Fig. 2). It is advisable to use a fairly large knife to do this, in order to insure making a clean cut.

Starting from the centre of the bulb the scales are then removed (Fig. 3). If any scale should not separate or come loose easily, a little more of the base of the bulb, to which they were attached, may be cut with the scooping knife. Small parts of the base which have in this way been removed, can be seen lying on the table, next to the scooped bulb in Fig. 2.

The separate scales are then placed in a *slightly slanting position with their hollow side down* in a flat or earthenware seed pan, about ¾-filled with moist fine sand. When the flat is filled, they are then covered to the brim of the container with more moist fine sand (Fig. 4). The slightly slanting position gives the advantage that the



Figs 1 to 6, incl., showing method of procedure.



Figs 7 to 10, incl., showing method of procedure and results.

scales can be completely covered. Only the upper ends of exceptionally long scales protrude out of the surface of the sand.

Several experiments were made with scales placed in horizontal position, with their hollow side up and with their hollow side down, all in moist sand. Both methods disclosed certain disadvantages, as compared with the slightly slanting position finally adopted. When placed with the hollow side up, moisture gathered in the hollow cup of the scale, causing decay. When on the other hand, the hollow side was faced downward, the development of the young bulblets was seriously impaired, reducing their growth or producing deformation.

The narrow foliage leaves found in the centre of the mother bulb and the flower buds, can be discarded since they produce no new bulblets. The base of the bulb should however be potted up in fertile soil immediately (Fig. 4) and the pot buried in the ground of a greenhouse at 25-28°C. On this base 1 to 3 bulblets will usually develop. In Fig. 1 we see that the roots of the bulb which is in the process of being scooped, have been cut off. Later experiments have shown that this is not desirable. The scooped base should be planted *with* its roots.

The flats and pans should now be placed at a constant temperature of 30°C. in the light or in the dark. They can be kept in a room, thermostat, propagating case or brooders and electric hotbeds (Wyman and Nixon, 1934) at the prescribed constant temperature. If kept out of doors, care should be taken so as not to place them in direct sunlight. In my own case, I have preferred to place them in a room which was kept at a constant temperature of 30°C. I placed the flats and pans in a kind of open frame covered with a pane of glass, so that they were kept in a moist, well ventilated atmosphere. The glass pane had the advantage of enabling me to inspect the condition of the flats at a glance.

The sand must be kept constantly moist. Every other day the flats were sprayed with a fine nozzle. The sand in the flats may not become too wet and on the other hand when too dry, the scales are apt to dry out and thus lose their regenerating powers. The flats should therefore be kept moist and yet not too wet.

Every 3 to 4½ weeks the flats should be thoroughly inspected. The first inspection after scooping has no other purpose than that of enabling one to remove small parts of the scales which may show a beginning of decay, and also to investigate the conditions of moisture in each of the flats. At that time of course, there can be no question of harvesting any new crop, since no signs of regeneration can as yet be detected.

After the first 2 months, we can see the first tiny bulblets formed on the scales (Fig. 4). Exceptionally, one or two of these bulblets can already be detached from their scale, but it will usually be found necessary to wait 3 months before the first bulblets can be harvested (Fig. 6).

With a small sharp blade the bulblets are then cut loose from the mother scale, being careful to see that the smallest possible part of the old scale remains attached to the young bulblet (Fig. 7).

Weak bulblets remain attached to their mother scale and are returned to their respective flats of moist sand. Bulblets showing leaflets should always be harvested, although in the case of strong and healthy bulblets, it is not necessary to wait for the development of a foliage leaf before detaching them from their scale. Some bulblets will be found to have developed a root. If the instructions are correctly followed, the old scales will present a healthy aspect throughout many long months. Some indeed, will last a whole year ere they begin to show signs of decay.

The new bulbs should now be planted in fertile soil (Fig. 7) and until they have become sufficiently strong, they should be kept in a hothouse under glass at a ground temperature of 25°-28°C and an air temperature of 25°-26°C.

One year after scooping they will present an appearance as shown in Fig. 8 and again one year later as in Fig. 9, whereas Fig. 10 shows the flowering of a pure strain, regenerated from one single bulb.

The Temperature Required for Regeneration

That a fairly *high* temperature—next to sufficient moisture—is to be considered as a first requirement for regeneration, was already discovered when scooping *Hippeastrum* bulbs in 1922 (published 1926). It will be remembered, that in those experiments 27°C gave better results than 20° and 23°C. In 1924 bulbs which had been

scooped on December 4th, 1923 *produced more good bulblets at 30°C, than at 24° and 27°C.* In those experiments 3 series of scales, of 8 bulbs each, were kept at those 3 different temperatures, in a mixture of moist peat-moss and sand, until Oct. 21st. Those having been subjected to 30°C produced far more, i. e. 168 bulblets (averaging 22 to a bulb), whereas those at 27°C. produced 61 bulblets (averaging 8 to a bulb) and those at 24°C. 108 bulblets (averaging 13 to a bulb). The fact that fewer bulblets were produced at 27°C. than at 24°C., is due to the inactivity of four bulbs in the former lot. The percentage of bulblets produced in this experiment, would probably have been higher had pure fine sand been used instead of the mixture of sand and peat-moss, because such a mixture is liable to become mouldy very soon. Investigation will now be made to find out if perhaps temperatures higher than 30°C. will produce even better results.

Best Method of Harvesting the Young Bulblets

From Nov. 26th, 1924 until Oct. 1925 an experiment was made to determine whether, instead of lifting the scales every 3 to 4 weeks and repotting them, as was done in 1923, it might be better to leave them as they were, harvesting and potting up the young crop formed, only in June and at the end of the period, in October.

The substratum used in this case was fine moist sand, kept at a temperature of 30°C. and covered with a pane of glass in such a way, that the flats had ample ventilation and so that a sufficient amount of air could reach the sand and the scales. Since these flats were kept in a greenhouse, the young shoots formed could assimilate as soon as they appeared above the surface of the sand. A total of 18 bulbs were scooped, but on the whole the result was very much less satisfactory than by the old method used in 1924. In that year an average of 22 bulblets was obtained at the same temperature of 30°C. (This average was 16 in 1926 and 38 in 1927), but in this year (1925) the average number of bulblets obtained was only 10, and even so these bulblets were exceedingly poor in quality and for the greatest part, they showed red spots of decay on their surface. Many perished after harvesting, thus reducing the average obtained to about five. Many bulblets could not even be potted, since at the time of harvesting, their centre was found to be completely decayed, the outer scale only remaining. Such bulblets it was found, had grown in unfavorable surroundings, such as the neighbourhood of old scales in the process of decomposition, which infected the young bulbs and hampered their growth. (If inspected every 3-4 weeks, this could never have happened, since the decaying tissues of the old scales are then systematically removed). Moreover, if the bulblets are potted up as soon as they are large enough to be cut loose from the mother scale, (as is the practice at the 3-4 weekly inspections), they reach a fertile soil while still in a perfectly healthy condition which causes them to grow much faster. And finally,—regardless of the fact that decay reduces the crop—fewer bulblets are formed on each scale when they are allowed to remain too long on the mother-scale, for they then draw most of their nourishment from this scale and cause the latter to age more quickly and dry out, whereas on the other hand, as soon as a bulblet is cut loose from the mother scale, the latter will continue to form new bulblets to a much greater extent.

To summarise the results of this experiment, it may be said that the method of "leaving the bulblets on the scales" cannot be recommended.

Size and Age of the Bulbs

The size of the bulb which is to be scooped for regeneration purposes, is dependent on its age and is also a factor of importance governing the production. Next to the number of bulblets produced from each bulb, the age and the weight of the scooped bulb can be found in Table 1. By means of this table the relative production of different groups may be compared at a glance. Thus from bulbs aged 1 yr, 5 mths, an average of 1.8 bulblets may be expected; from those aged 2 yrs, 5 mths, an average of 7 and from those aged 3 yrs, 5 mths, an average of 15.1 bulblets can be looked for, provided other conditions of growth are equal. Thus it is evident, that older bulbs are better stock for reproduction by means of scooping than the younger ones. If the largest number of bulbs attainable from a certain specimen is desired in the shortest possible period, the first lot of bulblets obtained, may themselves be scooped as soon as they weigh 75-100 Grms. In order to figure out the number of

regenerated bulbs in such a case, the number of bulbs scooped may be multiplied by 7. If it were possible to wait another year however, this harvest of young stock could be doubled.

TABLE I.

Age of bulb scooped	Weight in Grms	Harvest	Age of bulb scooped	Weight in Grms	Harvest	Age of bulb scooped	Weight in Grms	Harvest
Yrs.Mos.			Yrs.Mos.			Yrs.Mos.		
1 5	24	2	2 5	106	8	3 5	221	16
1 5	23	2	2 5	75	5	3 5	223	25
1 5	15	2	2 5	62	8	3 5	177	9
1 5	10	—	2 5	76	8	3 5	176	23
1 5	12	3	2 5	67	10	3 5	169	9
1 5	19	3	2 5	69	9	3 5	168	2
1 5	13	1	2 5	81	1	3 5	326	22
Average: 1.8 bulblets per bulb.			7 bulblets per bulb			15.1 bulblets per bulb		

The Method of Cutting

Apart from scooping, the bulbs may also be cut in other ways. In the year 1927 I took six bulbs, which had been obtained from seed sown in 1923 and weighing 230, 150, 150, 178, 175 & 150 Grms, respectively. I gave each of these bulbs three perpendicular and transversal cuts, reaching from the top to the base of the bulb. Three of these bulbs were placed in moist sand at 30°C. and the three others in fertilized soil in the greenhouse at a temperature of 24°C. In both experiments the three bulbs produced an equal number of 7 bulblets. Although these bulbs were much larger than the bulblets obtainable through scooping (in the same period), I would rather prefer the scooping method, because of the greater number of bulbs obtained. *Traub* (1933, 1934) obtained 43 bulblets from 10 bulbs by this method of transversal cutting into quarters, which is also a relatively small number. The results he will secure when bulbs are cut into 96 pieces as reported are awaited with interest. *Heaton* (1934) used another method of cutting. His method was to cut up a large bulb (including the base), into as many as 48 little pieces. He claims that, given proper treatment, each little piece will produce a bulblet. He also cites a case where a bulb cut into 36 pieces, produced 18 bulblets. *Heaton* selects bulbs which easily form offsets, in order to obtain quick propagation. However, although the results obtained by this method would seem favorable to a quick propagation, I would rather advise using the scooping method as described above, especially in those cases when one has to work with material, of which the powers of vegetative regeneration are as yet unknown. My reason for this advise is that by applying the scooping method, the base of the bulb is removed in such a way, that the base of each scale is cut, that is to say the very region in each scale, where young bulblets are easily and rapidly formed. Experience has shown that such a procedure encourages the formation of bulblets to a higher degree than when the scales remain attached to the base.

In relation to this I may also mention, that I have made experiments to determine the height of the meristematic zone. For this purpose I took 4 bulbs and divided each of these into four equal parts by means of perpendicular cuts through the axes of the bulbs. One quarter of each bulb was then scooped in the normal fashion (i.e. close to the base), ¼ was scooped 0.5 cm from the base, another ¼ at 1½ cm and the last ¼ at 2½ cm from the base. The result was, that only the four quarters which had been scooped in the normal fashion produced any bulblets. This proves, that above 0.5 cm from the base no regeneration may be expected.

In a previous experiment (1926) I had found, that when cutting 0.3 cm from the base young bulblets could still be formed on the scales. The extreme limit of the meristematic tissue must therefore lie somewhere between 0.5 cm and 0.3 cm from the base.

TABLE 2

Total Number of Bulblets Harvested Until this Date from Bulbs Scooped in Various Months.

Bulb	Weight in Grms.	Circumference	Date of Scooping	5–20 1930	6–20	7–17	8–20	9–22	10–20	11–23	12–29	1–15 1931	2–20	3–23	4–29	5–22	6–25	7–17	8–24	9–22	10–26	Number of bulblets harvested to each bulb.	Number of months elapsing between scooping and harvesting of the first bulblet.
1	151	22.8	(Dec. 19th)		1	5	5	5	6	7												7	6
2	199.5	25.5	(1929)		2	5	7	8														8	6
3	125	22.0	(Jan. 20th)	1		5	6	8														8	4
4	243	27.6	(1930)	1	2	4	5	6	8													8	4
5	172	25.4	(Febr. 20th)					3	4													4	7
6	113.5	21.8	(1930)			1	2	9	9	10												10	5
7	163.5	24.0	(March 21st)			1	2	6	7	9	13											13	4
8	101.5	21.6	(1930)					2	2	3												3	6
9	107	19.7	(April 22nd)						1	3	7											7	6
10	201	25.8	(1930)			1	2	4	12	16	20	21	23	24	24	25						25	3
11	117	23.1	(May 20th)				1	3	9	14	18	20	23	26								**26**	3
12	222	26.9	(1930)				3	4	8	15	18	22	27	29	30							**30**	3
13	163	23.5	(June 20th)						1	3	9	10	14									**14**	4
14	233	25.1	(1930)						2	5	10	13	17	19	21							**21**	4
15	163	22.5	(July 18th)							2	5	14	22	27	28	31	32					**32**	4
16	225	25.7	(1930)						1	2	9	15	22	27	28	29	30					**30**	3
17	126.5	19.5	(Aug. 20th)									3	4	11	15	16						**16**	5
18	222	24.3	(1930)								2	3	9	13	24	27	28					**28**	4
19	340	30.0	(Sept. 22nd)								1	1	5	11	17	18	26	27	33			**33**	3
20	397	31.3	(1930)								1	2	12	17	29	32	37	38	41	42		**42**	3
20	257	26.3	(Oct. 21st)								1	1	4	6	8	10	14	15				15	2
22	196	24.5	(1930)												3	8	8	8	9			9	6
23	240	26.6	(Nov. 25th)												1	3	3	7	11	14	15	15	5
24	145	21.5	(1930)												2	3	7	14	17	18		18	5

In order to fix the boundary of the meristematic zone more exactly, it will be necessary to determine anatomically—by counting the rows of cells—how many of such rows can take an active part in the regenerative process. For the present it will be sufficient to note, that the more carefully the base of the bulb is cut away (by scooping), i. e. the closer one cuts to the actual surface of the base, or in other words the more tissue which is left on the scales after scooping, the better chance one will have to obtain good results from this method.

The Season of the Year in which the scooping operation is performed, is also of great importance. Until the year 1929 I have always scooped at the end of November or beginning of December, but experiments undertaken in 1929/30 showed clearly that the season in which this scooping was done, also had great influence on the number of bulblets formed on the scales.

At the end of 1929, 24 bulbs of equal weight and all belonging to the same pure strain (i. e. propagated of one single scooped bulb—15/X11/25) were selected. The idea was, that every month during a whole year, 2 of these bulbs should be treated by scooping. A start was made on Dec. 19th, '29. In order that they should have their usual resting period, the remainder of these 24 bulbs were kept (from Oct. 18th. on) at a temperature of 23°C. Later on and as soon as flower buds showed up, they were moved successively to our greenhouse. Until March 22nd however, the bulbs to be scooped (according to our schedule of 2 a month) were taken from the batch that were still kept at 23°C., i.e. which had no foliage leaves. At the end of March all the remainder had been moved out to the greenhouse and been planted. After Sept. 1st. no more water was given. On Oct. 1st, the foliage was removed and at the end of Oct. they were again brought at a temperature of 23°C.

In table No. 2 the dates of scooping and the harvest obtained in each case may be studied in detail. From the total number of bulblets formed (recorded in the next to last column) it is evident that the bulbs numbered 11 to 20 gave the highest production. *These bulbs were those scooped in the months of May, June, July, Aug. & Sept.* We conclude from this, that bulbs which have had a period of active growth and which have had the benefit of assimilating freely, produce conditions more favorable to regeneration. This favorable condition even continues for a certain time *after* the bulbs have been set dry, for after Sept. 1st no more water was applied to them. The next month (Oct. 21st) the number of bulblets formed, again decreases. Note also, that the period of time elapsing between scooping and that of potting up the first bulblet is *shortest* in the period from May until September.

Summary

Good results will be assured if scooping is performed as described above, i. e. starting with good-size bulbs and scooping in the months of May to September. The scales should then be kept at a constant temperature of 30°C. and in moist sand, being careful to protect the flats against loss of moisture by covering them with a pane of glass, or by placing them in a shady place out-of-doors.

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Propagation of Amaryllids by Stem Cuttage

HAMILTON P. TRAUB, *Florida*

Preliminary reports by the writer on the propagation of amaryllids by stem cuttage appeared in 1933 and 1934 (*4, 5,*)[1]. The present report is the final one in this series concerning hybrid *Hippeastrum* mainly and to a lesser extent the Genera *Haemanthus, Crinum, Hymenocallis, Narcissus* and *Crinodonna.* The results are so conclusive that future work need be concerned mainly with minor details of procedure.

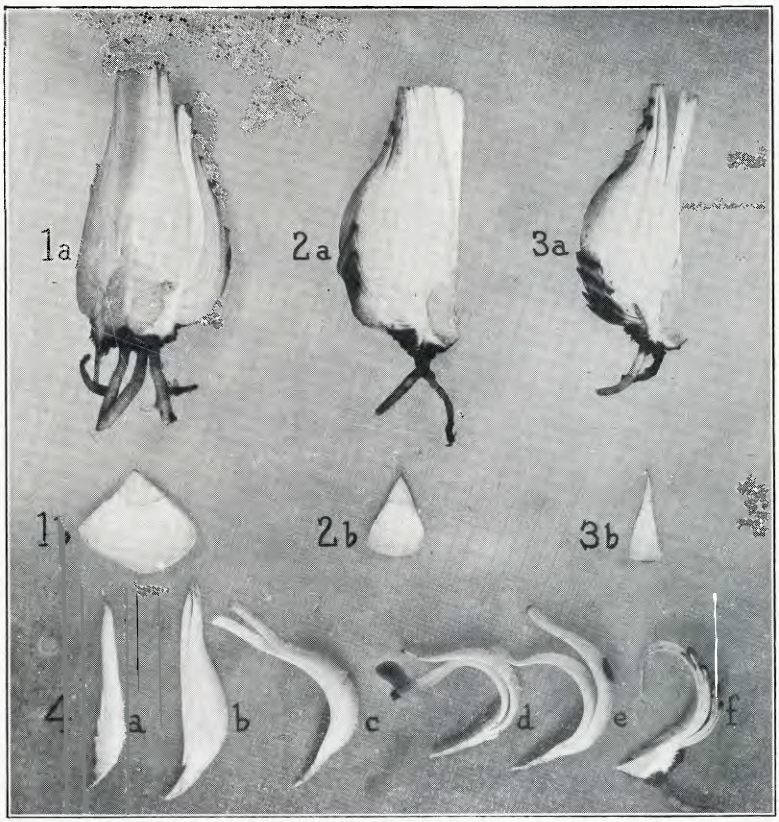

Fig. 1. Showing procedure for stem cuttage method,—1a, 2a, and 3a show ¼, ⅛ and 1/16 bulb fractions (vertical cuttage); 1b, 2b, and 3b represent cross sections of the above to show anatomical structure; 4a,-b,-c,-d,-e, and -f show the six fractions cut from a 1/16 fraction, similar to 3a, by horizontal cuttage.

The method of stem cuttage differs markedly from the method of leaf scale incubation reported by Miss Ida Luyten in 1926 *(3).* In stem cuttage the bulb is cut into sections vertically which in turn are further sectioned horizontally. The final fractions are planted in a propagation medium and placed in half shade. In

[1] Reference is made by number (italic) to Literature Cited at the end of the article.

TABLE 1. Propagation of Hybrid Hippeastrum by stem cuttage; experiment started Nov. 1933. (For data from Nov. 12 to Dec. 15, 1933 see pages 72-74 Year Book American Amaryllis Society, 1934).

			Stem Divisions			Stem Divisions. Number Sprouted 7-29-34						
			No. sprouted with leaves above ground, 5-1-34.			From Lower stem part		From upper stem part				
Bulb No.	No. of Divs.	3-20-34 Number sprouted leaves above ground	From lower stem part	From upper stem part	Total	Leaves above ground	Leaves not above ground	Leaves above ground	Leaves not above ground	Total	Av. per bulb	Percent Sprouted 7-29-34
1	4	1	—	—	4	—	—	—	—	4(1)	—	100
2	4	4	—	—	4	—	—	—	—	4(2)	—	100
1-2 incl.	8	5	—	—	8	8	0	0	0	8	4	100
3-E(3)	32(4)	0	5	8	13	5	0	8	0	13	—	40.1
4-D	32	0	4	7	11	6	0	7	1	14	—	43.8
6-C	32	7	13	5	18	13	0	6	0	19	—	59.3
5-B	32	3	14	8	22	15(5)	0	10	0	25	—	78.1
7-A	32(4)	2	15	0	15	16	0	13	0	29	—	90.6
3-7 (incl.)	160	12	51	28	79	55	0	44	1	100	20	62.5
8-E	96	3	25	0	25	25	4	0	1	30	—	31.3
11-D	96(4)	0	13	0	13	17	22	0	0	39	—	40.6
10-C	96	0	24	0	24	24	20	0	0	44	—	45.8
9-B	96	0	29	0	29	29	21	0	3	53	—	55.2
12-A	96	21	57	10	67	59	2	10	0	71	—	74.0
8-12 (incl.)	480	24	148	10	158	154	69	10	4	237	47	49.4

(1) 5 bulblets counted as 4 stem divisions sprouted.
(2) 6 bulblets counted as 4 stem divisions sprouted.
(3) Arabic numerals refer to the order of arrangement in Table 2 on page 73, Vol. 1, Year Book American Amaryllis Society, 1933; letters following numerals refer to arrangement according to decreasing number of stem divisions sprouted per bulb. A-E.
(4) Stem of bulb was relatively small in diameter.
(5) One division produced 3 bulblets which are here considered as one single stem division sprouted.

Miss Luyten's method, the bulb scales with the small adhering portions of stem tissue after removal of the major portion of the stem, are placed in a propagation medium, and incubated at approximately 80°F. Since the last report a statement of Mr. Byrnes' method has appeared *(1)*. It is described as a slow method "analogous to scooping of the hyacinth. In the process, however, he reams out the base inside the root ring and then pots the bulb and keeps it growing without cessation for two years, when the bulblets are potted off separately". Heaton reported results with a stem cuttage method in 1934 *(2)*. The Luyten method and the stem cuttage method are superior to the "reaming" of Byrnes since results are secured in less than one year.

Materials and Methods. Bulbs of the Nehrling-Mead strain of hybrid *Hippeastrum* were used in these experiments. The bulbs were ordinary field run stock, 2½ inch grade, and were purchased from commercial growers. Bulbs of various species in the Genera *Haemanthus, Crinum, Hymenocallis, Narcissus* and *Crinodonna,* were from the writer's collection of amaryllids.

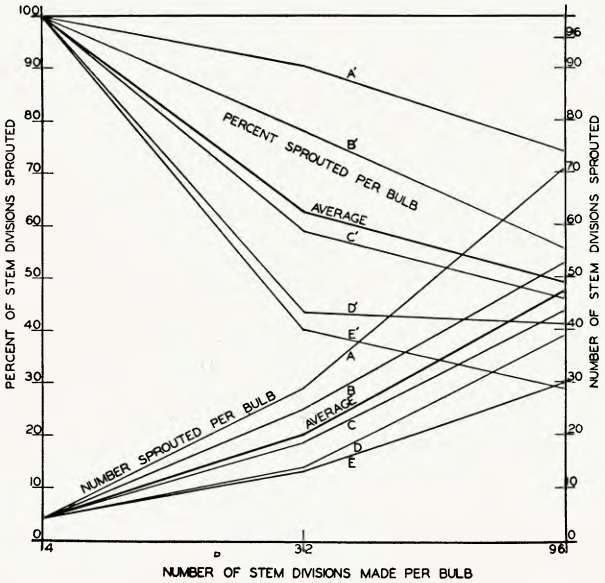

Fig. 2. Graph showing that the per cent of stem fractions sprouted per bulb decreases from 100 per cent to 49 per cent (average of A^1, B^1, C^1, D^1 and E^1); and that the total number sprouted per bulb increases from 4 to 47 bulblets (average of A, B, C, D and E) as the number of stem fractions cut per bulb is increased from 4 to 96.

The method of procedure with hybrid *Hippeastrum* consisted in cutting the bulb vertically into sections which were further sectioned horizontally. The final fractions consisted of a part of the stem and leaf scales. Three treatments were included,—(a) bulbs cut vertically into four fractions, (b) bulbs cut into 32 fractions, and (c) bulbs cut into 96 fractions. The method is very simple involving cuttage vertically and horizontally,—(a) vertically the bulb is cut first into halves each of which is again cut into equal portions making 4 fractions; each quarter is then cut into halves making 8 fractions which are again halved giving 16 fractions as shown in Fig. 1. (b) Each of the 16 fractions is then cut horizontally into 6 fractions making a total of 96, as shown in Fig. 1. This is the procedure with 2½ inch diameter bulbs. Larger bulbs may be cut into a greater number of fractions.

The fractions were planted in flats in a propagation medium of equal parts of granulated peat and coarse sand. From November to February, the flats were set in the open, and were then moved into the lath-greenhouse with half shade. Water was sparingly applied, but the propagation medium was not allowed to dry out.

The stem cuttage experiments with Nehrling-Mead strain hybrid *Hippeastrums* were begun in November 1933 and the final data were recorded in July 1934. The results are presented in Table 1, and Fig. 2.

Results. The Nehrling-Mead strain is a hybrid mixture resulting from the intercrossing of various species and hybrids and it would be expected that variability in sprouting response would be shown. A study of the data shows that the percent sprouted per bulb decreases as the number of divisions is increased, but the total number sprouted per bulb increases with an increase in the number of divisions. The average number per bulb is 4 bulblets or 100 per cent with four fractions; 20 bulblets or 62 percent with 32 fractions, and 47 bulblets or 49 percent with 96 fractions. It should be noted that the number sprouted in the case of 96 divisions, for instance, varies from 30 bulblets or 31 percent to 71 bulblets or 74 percent for individual bulbs, indicating that clonal varieties may be selected which will give results above the average presented in this paper.

It is interesting to note that fractions from the lower part of the stem are more apt to sprout than those from the upper part.

The best time to carry on the operation is after the bulbs have made their full growth following flower production. The bulbs are then provided with the maximum food reserves. With the Nehrling-Mead strain, the late winter and spring flowering strain in Florida, the full growth is made by late July and August, and the operation may be carried on through November. Cuttage of bulbs in the spring immediately after flowering has given poor results. The leaf scales are apt to die back to the stem and although a certain percentage of the fractions will sprout the total results are disappointing. The effect of the temperature, moisture, light and sprouting medium factors on the results should be studied in detail in future work.

The results secured with the stem cuttage method with species in genera other than *Hippeastrum* are very encouraging. No tabular data will be presented here since a detailed report on this work will be published later.

One bulb of *Crinum fimbriatulum* cut into 4 fractions vertically in 1933 gave rise to 8 thriving bulbs; one bulb of *Hymenocallis carabea* cut into 4 fractions in 1933 gave 4 bulbs; bulbs of *Narcissus tazetta,* Grand Soleil d'Or, cut into 4, and 8 fractions, gave 6 and 7 bulbs respectively.

The results with *Haemanthus multiflorus* are very encouraging—one bulb cut into 16's gave 8 plants for the lower part of the bulb, and five for the upper part, a total of 13 bulbs or 81 percent. The response is rapid. Bulbs should be cut when dormant, just before flowering. Plants from the lower divisions are stronger than those from the upper.

A modification of the cuttage method has been developed for use in the case of rare bulbs when increase is desired without interfering too much with the blooming of the mother bulb. A slice is cut from the stem at right angles to the leaf blades in case of flat bladed types. The portion removed must not be too near the center. The slice of stem, with attached portions of leaf scales, is then cut into as many divisions as is desirable. To date the method has been applied only to the variety of hybrid *Hippeastrum, Wyndham Hayward,* (Traub, 1934) *which has made no offsets* and *Crinodonna howardii.* The writer was able to retain his original bulb of the *Hippeastrum* variety and present three bulblets to Mr. Hayward for whom the variety was named. In the case of *Crinodonna* the response was slow but certain. The original bulb has been retained and quite a number of bulblets are sprouting from the divisions.

Conclusions. The popularization of amaryllids has been unduly retarded in the past by slow natural increase in some of the most important species and hybrid varieties. The vegetative propagation of amaryllids is now, however, beyond the academic stage and there is no excuse for the hoarding of superior varieties on the basis that increase must be from offsets alone. It has been shown that the method is a biological success, and only minor details need to be worked out in order to improve it still further.

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5. Culture

Lycoris Squamigera in Woodland

CARL H. KRIPPENDORF, *Ohio*

Lycoris Squamigera is perhaps the most exotic looking flower hardy in regions having zero temperatures in Winter. In color the flower is an inimitable rose-lilac. It seems perfectly fool-proof, as it is with us absolutely free from disease or insect enemies and altho liable to sulk the first year after transplanting it is of fairly rapid increase and will thrive for many years without transplanting. There is, however, one drawback that lessens its value as a plant in the garden proper and that is the heavy narcissus-like foliage that comes up in this latitude in mid-March and grows all thru the month of April, then about mid-May the foliage begins to turn yellow and it takes about a month for it to ripen. All of this time it is a most untidy looking plant and an eyesore if used in quantity in a garden. However, naturalized in woodland this is no serious handicap as the yellowing foliage is covered by the natural growth and is not unpleasantly noticeable. We have these naturalized in many thousands in woodland consisting largely of matured maples and beeches and in this situation they thrive to perfection on the hillside or flat, in sunshine or shade, with no care except mowing the weeds the last of July.

Usually about the first of August the bloom stalks begin to break through the ground and in less than a week they are twenty-odd inches high and the first flowers are open. Grown in this way in large masses they make a stunning garden picture which is not possible, as far as I know, with any other garden material in deep shade in midsummer.

We find that we are most successful with fairly shallow planting, with the tip of the bulb scarcely one inch below the surface.

We have no regular program for dividing the clumps of bulbs but usually let them stand until there is no longer any increase in the number of bloom stalks to the clump. Generally the maximum is from seven to ten stalks, which will take from six to ten years after division. When this condition is reached we lift immediately after blooming, taking care to dig with as many roots as possible. We divide to single bulbs and try to replant the same day, as these bulbs seem to have no real period of rest and make very poor growth the next year if the roots are allowed to dry out. Planted carefully at once a fair proportion will bloom the first year, most of them the second and the third season quite a few will have two to four flower stalks.

This flower seems to have a universal appeal as without exception every one who has seen them in bloom has been desirous of obtaining a stock; it is particularly beloved by the owners of small gardens and I hope that after they learn how easy they are to grow more and more will be encouraged to have them in their gardens, as I know no garden material that is more permanent and requires less attention. (See illustration on page 128).

Amaryllis as House Plants

HENRY H. BUXTON, *Massachusetts*

The Northerner who loves a garden, refuses to face five long months without one. Comparatively few of us have conservatories; our only outlet is the window sill, and we count ourselves blessed if those windows face the south. Of course, we may grow ivies and many other foliage plants in the north and west windows, but for blooms we must have the sun.

No more gorgeous flower for the window garden exists than the amaryllis, and it is one which the amateur need not fear to grow. Let us suppose that you decide, in the fall, to buy some bulbs. First, buy good bulbs—do not buy them in the ten

Carl H. Krippendorf

Lycoris squamigera naturalized in Ohio Woodland; Krippendorf Country Estate

cent store, nor in a department store, for these bulbs are apt to be the odds and ends left after the first quality bulbs have been sold. So buy the best bulbs you can afford from a reputable florist or seedsman. The bulb will probably have very short roots, quite possibly no roots at all. Before it can grow leaves or flowers, it must grow roots, and you must wait patiently while it does this. Some set the bulbs in moist peat moss until the roots start, but they may be started at once in soil if you choose. If the bulb is blooming size, select a six inch pot, wash it, inside and out, and put an inch of broken crocks in the bottom. Over this a little peat moss, to prevent the soil from sifting through the crocks. The soil should be a mixture of two parts garden loam, one part well rotted cow manure and one part sand. The bulb should be set so that it is nearly three quarters above the soil, and there should be about two inches between the sides of the bulb, and the side of the pot. Do not fill the pot to the brim with soil—leave it half an inch below the top for watering space.

After planting the bulb, water thoroughly and set in the cellar, where the temperature is about 50. Water sparingly until the buds begin to appear. Usually the buds come before the leaves and not in the center of the bulb, as one might expect, but a little on one side. At first, it is difficult to tell whether it is a leaf or a bud that is coming,—both are creamy white, but the edge of the bud is thicker than a leaf edge would be. They may appear from four to six weeks after planting, and the flowers will open in another four to six weeks, no two bulbs developing at quite the same speed. After the flowers pass, and the leaves come, redouble your kindly efforts, for on the healthy leaf growth depends next year's flowers. While the thick glossy leaves are growing in your sunniest window, the tiny flower buds are forming in the heart of the bulb. Spray your plant often enough to keep the foliage clean and shining, and when spring comes, set the pots outdoors. They may be sunk in the earth near a shrub, where they will get partial shade. Ours were set in a large cold frame on the south side of the barn, where they got full morning sun and partial shade in the afternoon. Spray frequently on sunny mornings, using a fine spray, and reaching both sides of the leaves. Top dress with well rotted manure, and water once a month with liquid manure, which should be about the color of weak tea.

During the summer, we tried to rid our plants of a diseased condition. The under side of the leaves showed streaks and spots of red; pulling off the dried brown outer husk of the bulb, we found red patches on the bulb. We first noticed it on the bud stalks, at blooming time, little red spots on one side, which increased in size as the stalk developed. Frequently it bent over on the infected side, the red spots became holes, growth was stunted and some times the stalk rotted off. We used powdered sulphur, at this time, but without marked results. In the summer, we waged more vigorous warfare, removing as much of the infected part as possible and dusting bulb and leaves with "Semesan" twice during the summer, alternating with a spray of "Fungine." We kept this up all summer, and while the cure is not 100 percent, conditions are much better than last year.

When September came, the big sturdy leaves began to turn yellow at the tips, and we gave less water. The last of the month, we removed the pots from the frame and laid them on the side in an open shed. The leaves ripened quickly and fell off, and the pots were then taken to the cellar, where they rested, cool and dry, until early in December, when tiny buds were found on two bulbs. These early comers grew very slowly. No more were found until Christmas eve, when one more appeared, but from January on they came fast, and it was great sport, hunting them with a flash light in the dim cellar. If the soil in the pots seemed very dry, and the bulb a bit soft, that plant was watered so that the bulb might harden. When buds were found, the plant was well watered and brought up to the warm kitchen, where for a week or more it set on the floor, with only a subdued light, until the bud was safely through the narrow neck of the bulb. Then the pot was placed in a sunny south window until the gorgeous flowers opened and was then transferred to the front windows, with a northeast exposure, the morning sun giving just enough warmth to keep the color, but not enough to fade it, thus prolonging the life of the flowers to ten days. The pink and white flowers were placed in the parlor window, at one side of the front door, the scarlet and maroon ones in the library windows on the other side, and foliage plants banked around them to conceal somewhat the bare stems. And how the neighbors and the passersby enjoyed them! It is surprising how few people know what they are, and how many

Henry H. Buxton

Hybrid Amaryllis (Hippeastrum) as main feature in window garden

want to know. The telephone jingled often with eager questions, which usually ended with "Where can I get them?" A small boy, gazing at them said, "Say, mister, are them big flowers made of paper?" His judgment was shared by a woman in a passing trolley who said "I shouldn't think they would put paper flowers in among their plants!"

One year, I bought a monstrous sized bulb, nearly as large as a baby's head. The first bud appeared March 6th, seven weeks after planting and on April 11th, there were five flowers and a bud on one scape and two flowers and four buds on the second scape. The flowers were a very dark cardinal red, almost maroon, with a white stripe on each of the three upper petals, and were about five inches in diameter. Later, another bud appeared, between these two, and this also produced six flowers. No leaves appeared until the flowers were nearly gone. As the flowers developed, the huge bulb grew smaller and smaller, shrinking until it was no larger than a base ball,—a very soft, spongy ball. During the summer, we fed it well, and it gradually hardened, growing a good crop of leaves, but it never attained its original size, and so far—March—has not budded this year. This experience is just a little more proof that the biggest is not necessarily the best, but that the medium size bulb gives the best results.

It would be a great advantage to window gardeners if amaryllis bulbs could be bought in colors, or named varieties. Buying as we must do now is "buying a pig in a poke". All colors may be beautiful, but all are not desirable for the window garden, especially if your house is set back from the street, and you enjoy sharing your beauties with the public. Dark reds, while lovely at close range, do not carry well. Twenty feet away, they merge into the background and are lost. But all the light colors show up beautifully, giving much joy to the beholders.

During the winter a new pest appeared,—some sort of a mealy bug, but quite different from the round, fat little villain we find on our coleus. This bug was about one eighth of an inch long, and the microscope showed him equipped with a pair of horns, six legs and three tails,—a fearsome beastie! We sprayed the plant well with lemon oil, which the other mealy bug dislikes so much, and are hoping for good results. The leaves begin to show dark spots on the under side, probably where the bug has sucked the juice, and perhaps these spots may later turn red and solve another problem.

Some Notes on Outdoor Amaryllid Culture in South Carolina

RUSSELL S. WOLFE, *South Carolina*

Although the outdoor culture of narcissi has been successfully carried on in South Carolina on a large scale for a number of years, the outdoor culture of the amaryllis (Hippeastrum) hybrids has been undertaken only recently.

I have not made an exhaustive study of *Hippeastrum* culture nor have I visited all the plantings in South Carolina; therefore, my notes only concern those which have come under my observation.

Most of the *Hippeastrum* hybrids in South Carolina are grown from seeds bought from a traveling representative of a Florida firm. Quite a number of individuals bought these seeds and planted them; but, comparatively few have been successful in growing them: the main cause of failure is apparently due to improper treatment.

Of the plantings that have come under my observation, only one was in a ground bed of a greenhouse, the remainder were planted outdoors, all in June 1931. Although the bulbs made good growth from seed, there was a comparatively small percentage of blooms until last season (1934), and this year (1935) they are blooming profusely on nice long stalks and with many blooms per stalk. The greenhouse planted seed gained some time on the outdoor planted seed, perhaps six months, reckoned by the comparative number of earlier blooming bulbs.

Slight protection from winter cold seems necessary, otherwise, some bloom injury may be experienced from late cold spells. Some unprotected bulbs were

killed during the unusually severe winter of 1933-34. Perhaps nearly every type of fertilizing material has been tried; but better response was secured from the use of organic fertilizing materials in a balanced mixture.

The *Hippeastrum* hybrids are blooming profusely at this time (April) at Magnolia Gardens near Charleston, and the larger planting of Mr. Easterling at Denmark is in excellent condition as to foliage and bloom, and certainly attracts many visitors and receives well merited favorable comment.

About 1928 I became interested in the *Hippeastrum* hybrids, having noticed various articles stating that the new hybrids were so much an improvement over the old types, etc. but, upon seeking information about the culture and source of good bulbs, I was very much discouraged by authorities, one of whom stated ". . . if they can be grown in South Carolina at all, which I doubt, the bulbs would have to be planted so deep they could never bloom". However, I had seen "Johnsonii" blooming here regularly every season as long as I can remember (there are some Johnsonii bulbs in my front yard among the shrubbery that have been there blooming every season for more than thirty years) and this challenge induced me to try my luck.

After considerable correspondence, finally a few small bulbs of good stock were obtained and planted in pots. The advised treatment and planting directions were so carefully carried out, that it took two seasons for the bulbs to bloom. These potted bulbs were inadvertently exposed to our winter weather one season without injury, which convinced me of their hardiness. By this time I had acquired quite a number of bulbs since I had secured both bulbs in small lots, and seeds from recommended sources from different sections of the United States. Several crosses were made with the best blooms and this season (1935) quite a number of my own seedlings are blooming, which in my opinion compare favorably with any I have seen anywhere. One of my sets of crosses was made with the idea of obtaining a pure white bloom, and among the blooms are some whiter than any I have seen elsewhere.

Our spring season varies considerably from year to year as to lateness of cold weather, and the blooming dates vary somewhat accordingly; but, they are usually in bloom during April and May. Some of the bulbs bloom more than once during the year. Last year (1934) some were flowering when frost killed the bloom stalk and foliage. Quite a number are very fragrant.

The normal increase of offsets in the field is satisfactory for some individual bulbs, fair for some and poor for others. So far as I have information, no propagation by cuttage has been attempted in South Carolina. Most of the bulbs are planted in three foot rows, in the open. The soil is usually sandy loam and is worked by horse or mule. One planting which we visited was located in a field protected by woods, (on new ground) which offered some natural shade. The plants were apparently benefitted thereby. Some bulbs, especially small bulbs (1st year seedlings) are planted in beds and seem to do equally as well.

A number of other amaryllids are cultivated in South Carolina but this is possibly only a fraction of those that could be grown here. The *Hemerocallis* grow nicely and bloom profusely with little or no cultural care. *Nerine sarniensis* grows to perfection here. Some naturalized planting that I know have been here for more than twenty-five years. They bloom and bloom season after season. Several types of Hymenocallis are growing here and seem to do nicely. Two types noted are especially desirable and deserve more extensive use. There is only one clump of *Lycoris aurea* in this section to my knowledge which came from an original bulb planted forty years ago. *Zephyranthes atamasco* grows wild in our lowland woods, and does equally as well in our flower gardens. *Z. carinata* does exceedingly well, blooms profusely and is naturally a rapid propagator. *Z. texana* seems weak and small under our conditions.

Several old types of crinums are often seen and they grow, bloom and multiply almost like weeds.

The History and Culture of the Miniature Hippeastrum in Texas

Rev. C. W. Hall, *Texas*

If having thrived for more than a quarter of a century under diverse circumstances is proof of the adaptibility of a plant to a particular section of the country at least one species of miniature *Hippeastrum* may be said to have proven its adaptability to the State of Texas. And since a number of the southern states have characteristics similar to these under which the miniature *Hippeastrum* has succeeded in Texas one may confidently claim for it the ability to adapt itself to a large portion of the South. As a matter of fact, reports from other sections of the country point in the direction of its ability to succeed in the less mild portions of the United States.

While considered a state with a mild climate sub-zero weather at times occurs in Texas even as far south as Austin. These severe cold snaps the miniature *Hippeastrum* has successfully withstood. Occasionally its foliage, which appears in the early fall and continues in growth throughout the winter, is frozen to the ground, but soon afterwards new foliage is sent up by the deeply buried bulb. The long neck of the bulb, often ranging in length from four to six inches, is a valuable asset on such occasions.

Another evidence of the suitability of the miniature *Hippeastrum* for general cultivation in this section is the fact that it does not seem to be particular about its soil, its location, or its care. About Austin may be found a variety of soils ranging in heaviness from the black soil characteristic of much of Texas to the sandy soil found in many other sections of the state. The miniature *Hippeastrum* seems to thrive in them all, and this it does without much attention being given to it. In one particular yard it has flowered in the sod for more than fifteen years without being disturbed. It is needless to say that under such conditions it is not at its best. It is usually described as carrying umbels of four to six flowers on stems eight or ten inches in length. Last fall in a well favored spot in partial shade stems were found twenty or more inches in length and carrying umbels of unusually attractive blossoms. It readily shows its appreciation of the proper care.

Because of the hot and dry summers many flowers are grown with difficulty in Texas. The miniature *Hippeastrum* has the advantage of making its growth and of doing its flowering during the cooler and more moist months of the year. On the eve of autumn the bright flowers suddenly appear, and soon afterwards the bright green foliage makes its appearance. This foliage continues its growing and storing of blossoming energy until the late spring. After it dies down the bulb rests during the summer months under its covering of soil.

As stated elsewhere in the Year Book the species of miniature *Hippeastrum* referred to in this article was imported by the late Mr. P. H. Oberwetter from Chile. Last fall a specimen of flowers and foliage of the species he imported was sent for identification to the National Herbarium, Smithsonian Institution. It was examined by Mr. E. C. Leonard who stated that it appeared to be *Hippeastrum miniatum*, which the late J. G. Baker regarded as a mutant of *H. advenum*. It is found here in Austin in two colors, blood red and pink. The red for some unknown reason is far more plentiful; in fact, the supply of pink is exceedingly limited. The indications are that the largest single stock of the red is to be found in this section, due no doubt to the fact that at an early date Mr. Oberwetter recognized the adaptibility of the miniature *Hippeastrum* to the peculiar climatic conditions of the South.

Blaauw's Morphology of Organs and Periodicity in Hippeastrum

We are fortunate, indeed, to have received a copy of a brilliant research by the celebrated Dutch scientist, Dr. A. H. Blaauw, on the morphology of the organs and periodicity in hybrid *Hippeastrum*[1]. The work is presented in two parts (a) the

[1] A. H. Blaauw. "Organvorming en Periodiciteit van Hippeastrum Hybridum" Proc. K. Akad. Wetensch. Amsterdam. 1931 pp. 1-90.

R. E. Morrison

Haemanthus multiflorus

formation of the flower and leaf, and (b) periodicity in *Hippeastrum*. The subject is covered in detail with many excellent illustrations. Those especially interested in this subject will want to read the English summary which is appended to the article. Only the briefest summary of the most outstanding contributions to the subject are presented here.

Dr. Blaauw shows that the inflorescence is the termination of an axis with four foliage leaves, the flower buds being terminal and not lateral as commonly supposed. Each vegetation point which is to form the following four foliage leaves and flower terminal is seen to arise as a small spot from the base of the existing vegetation point. "About every three months a new growing point is formed, which after leaf development and flower formation is again replaced by the next one." The bulb at any one time contains several stages of flower development.

Mira Flores,
Orlando, Florida

HAMILTON P. TRAUB.

Haemanthus in Florida

WYNDHAM HAYWARD, *Florida*

The *Haemanthus*, regarded as one of the most striking and spectacular blooming bulbs in all horticulture, bears its blooms in a close cluster of many small flowers at the top of a sturdy spike one to two feet in height.

At least one species of *Haemanthus* is perfectly at home in the well-drained sandy soils of central Florida. It has been tentatively identified as *Haemanthus multiflorus*, one of the finest and showiest of the genus. It has umbels of bloom nearly a foot in diameter, perfectly globular in shape, and of the warmest scarlet color.

The bulbs grow to three inches in diameter, with large bases on old specimens. They produce offsets liberally.

Bulbs of this species have been noted in cultivation at Artesia, Florida, next to the Atlantic Ocean, at Orlando, in the central part of Orange County and a large colony of them has been located in the city of Eustis, in Lake County. This last colony was reported to the writer by Mr. R. E. Morrison, a retired florist and Amaryllis enthusiast of Tavares, Florida. Mr. Morrison kindly supplied the photograph from which the accompanying picture was reproduced. It shows one of his *Haemanthus* bulbs in full bloom. Only a color photograph could do justice to the flame shade of the flower.

The bulbs go dormant in November or December, and remain so until about the first of May. At that time they begin growth, first sending up the bloom spike before the leaves appear. In Florida, *Haemanthus* rarely sets seeds even by hand pollination. After blooming, the leaves, usually one or two in number, grow up gradually becoming two feet or more tall in good specimens. The leaves are oval and a rich green in partial shade. They narrow to a petiole an inch or so wide at the base.

At Eustis the bulbs have been perfectly naturalized in sandy loam, growing up year after year and multiplying in the open ground with no care besides occasional weeding and fertilizing. They are apparently not at all exacting in care after becoming established. When better known, and when commercial stocks are available, it should certainly become a popular conservatory and greenhouse plant in this country, besides being a gem for gardens in Florida and the Lower South, Texas and California.

Mr. E. O. Orpet, of Santa Barbara, Calif., has reported a colony of *Haemanthus coccineus* naturalized at an old ranch in that state, and at least one other *Haemanthus* species is known to be in the trade in this country, besides the hybrid variety "King Albert of Saxony". This species is *H. altilineata*.

Naturalizing of Eucharis and Clivia

WYNDHAM HAYWARD, *Florida*

The year since the publication of the 1934 Year Book has given time for more study of the possibility of naturalizing *Eucharis grandiflora* and *Clivia miniata* and its hybrids.

Previous authorities have repeatedly stressed the supposed necessity of having these bulbous specialties well established and "pot-bound" to assure satisfactory blooming. This led to a popular misconception, also repeated by other writers, that the two could only be handled in cultivation in pots, or at least be handled best in that manner.

Inquiry in the last year has disclosed that it is possible to naturalize the *Eucharis* and *Clivia* under proper conditions, which are primarily those of a rich, moist, well-drained soil, partial shade.

At Arcadia, Florida, in the Peace River valley, there is a notable group of *Eucharis* naturalized on the East side of the Arcadia Hotel. The bulbs are perfectly at home, in rich soil, and when observed in February, 1935, were blooming freely with long vigorous spikes and large flowers. Gardeners and nurserymen in Polk county, Florida, have also demonstrated that *Clivia* plants, set out under similar conditions, with added protection from the direct sun rays, also grow thriftily and bloom well under Florida conditions. They need good drainage, adequate moisture and established root systems, to produce good spikes of their orange-yellow blooms in the spring.

A warning should be given to *Clivia* growers in sub-tropical climes, where occasional winter frosts are possible. *Eucharis* bulbs, being entirely underground, are not injured by frosts, only losing their foliage. The new leaves soon appear, and blooming is merely delayed a while. *Clivia*, however has no true bulb, only a semi-bulbous stem, and is very susceptible to frost injury, and a damaged plant may rot away to the heart or base and die. Even if the outer leaves are "touched," the plant becomes unsightly, and blooming may be interrupted. Another year of thrifty growth will be necessary to bring it back to normal condition.

Frequently a *Clivia* may lose nearly all its leaves due to frost or other injury, but nevertheless will sprout out two or more stoloniferous suckers at the base. For this reason, some time should be allowed to elapse before throwing away a plant with good root system, which is apparently damaged beyond recovery so far as the foliage is concerned, to allow such offsets to develop.

Growing Amaryllis in a Small Greenhouse

D. C. ROYER, *Colorado*

I am eligible to discuss this subject so far as the small greenhouse is concerned, as mine is 8x18 by 5 feet on lower side. It is built on the south side of the garage and heated from a gas water heater placed in the garage and the heat piped into the greenhouse. I have the thermostat set for 50 degrees minimum and have had very satisfactory heating.

I am an insurance man and a backyard flower enthusiast, but have no scientific knowledge whatever about plants—just an amateur and collector of new and rare plants. For years I have been growing Glads as my hobby, but they are so easy to grow and so plentiful that they cease to be a hobby. So I have taken to the Amaryllis for hobby No. 1, but from my present experience I may be compelled to drop it as a hobby.

I have said and continue to say, "They are a queer animal." I suppose that is what makes them so interesting and gives one a thrill when he achieves success. I have over seventy-five plants about equally divided between old ones—two year seedlings and one year seedlings. About four of my old ones bloomed last year, and so far this year, not a bloom appeared. They have nice large leaves and look healthy.

I had the good fortune to visit in Orlando, Florida, last October and met both Mr. Hayward and Mr. Heaton. It was a pleasure to visit these men and get first hand information from men of experience.

I became interested in getting some business for these growers. I sold around fifty bulbs to florists and also bought a few for myself. All that I sold did splendidly and came into bloom in a short time. I gave two of mine to a neighbor, and he kept them in the house and in forty-eight days he had wonderful blooms.

I potted mine and put them in the greenhouse and waited and waited for results. They were very slow in starting and a few bloomed but very poor blooms and not satisfactory. As I am writing this article, June 1, I have four that were potted in early February that are showing wonderful blooms, but I brought them into the house over two weeks ago. My old ones were rested during the months of November and December as per information gathered from different sources, but now comes Mr. Diener and says "do not rest them." I would like to read a discussion pro and con on this subject.

I also find in Mr. Diener's book that the temperature should be kept around 70 degrees for best results, and I now believe that temperature has been my difficulty. I inquired of our local florists who bought the bulbs and their temperature has been around 60 to 65 degrees. My temperature went down to 50 degrees every night all winter. If I must keep my house at 70 degrees just for my Amaryllis, I must give them up as a hobby. I am hoping to be able to hold blooming backward till in May in the future, if possible. I am wondering just how long it is practical to hold them dormant.

Mr. Heaton cut one of his bulbs in pieces and showed me the small resting flower bud, also the little leaf stalks. Now, I would like to know if any treatment they may receive will kill this germ and if not, why do they not send up a flower stem even though it may not be a perfect one. In other words, how does the treatment they receive affect this undeveloped flower and its blooming, even though it may not be perfect?

I fear this article is of no value to anyone in the way of information. If these problems can be solved for me, I am sure I will be the one to get the benefit derived from writing this article. Any information that will help me solve my difficulties will be thankfully received.

June 1, 1935,
Greeley, Colorado.

Restoring the Vigor of Devitalized Amaryllis Bulbs

JOHN R. SPRINGER, *Florida*

In the 1934 Year Book of the American Amaryllis Society, it was reported that Mr. Theodore L. Mead's personal collection of Mead Strain Hybrid Amaryllis were deteriorating due to unfavorable growing conditions and lack of time and opportunity on his part to maintain them in the best and most ideal growing conditions. Many of the bulbs had "sloughed" their roots and tops and were so devitalized and shrunken they could actually be rattled around in a sort of pocket in the sour, hard, unfriendly soil.

Mr. Mead realized that this collection, valuable from sentimental and historic reasons, would soon be only a memory if some steps were not taken to rejuvenate the bulbs. In the late summer of 1934 he therefore asked the writer if he would take these bulbs and see what could be done to restore them to health and vigor. Many of the bulbs were located only by the assistance of "Clayton" the faithful colored gardener who had tended them so many years that he knew just where they "ought to be".

Each bulb was carefully rubbed free of dead skin and rotted parts, the root ring was trimmed flush with the base of the bulb and all soaked in a solution of Mercury bi-chloride at a strength of 1-1000 for one hour. Without being rinsed in clear water they were quickly dried in the sun and planted in beds under one-half slat shade

in rows 18 inches apart and spaced 4 inches apart in the rows. The soil in the beds had been prepared several weeks previously by turning under large quantities of local air dried peat and the soil sweetened by the addition of hard wood ashes at the rate of one and one-half tons to the acre. All fertilizer has been applied to the soil by broadcasting and washing it in with irrigation water and has consisted of nothing but equal parts by weight of 10% animal tankage and ground tobacco stems. In the first six months since planting, four applications of this mixture have been made, equivalent to a total amount of one ton to the acre. Irrigation has been frequent and adequate and the beds kept free of weeds by hand.

Results have surpassed the most sanguine hopes. Growth response has been prompt, vigorous and healthy and coupled with a large and active root system the bulbs are rapidly regaining their size. Best of all; this spring about 75 per cent bloomed. The scapes had only two and three flowers of small to average size, but the fact that they bloomed at all indicates a return toward normalcy and their one time splendor.

Palladin's The Formation of Red Pigments in Wounds on Amaryllis Vittata

(Reprinted from *Berichte der deutschen botanischen Gesellschaft*, 29, 132, 1911.)

Abstract *

Pieces of *Amaryllis vittata* bulbs, when placed in an ordinary room slowly dessicate. If however the pieces are soaked in water for a few hours and then kept in a moist atmosphere, the formation of the familiar red pigment begins. Oxygen is necessary for the production of this coloring material; exclusion of oxygen or treatment of the wounds with a reducing agent prevents pigment formation. Bacteria are not concerned in the production of this substance. It is formed through the oxidation of a colorless antecedent of the pigment after cell death, although the increased activity of the surrounding cells in a living condition, brought about by the wounds, is responsible for the development of the color. Bulb pieces in which all cells are dead do not develop color. The coloring material is not a respiratory pigment.

The pigment was isolated as a non-crystalline solid and its ability to dye silk was tested.

Polyanthus Narcissus in Florida

WYNDHAM HAYWARD, *Florida*

The Narcissus varieties of the Polyanthus group are all regarded as types of the general species, *N. tazetta*, the native habitat of which ranges from Southern France to South China, in a large number of variations. They are always found in a warm climate.

This group is among the most important of the genus *Narcissus* both horticulturally and commercially, as there are probably more bulbs of the "Paper White" variety alone sold in the markets of the world each year than of any other narcissus variety. Thousands of city dwellers with no room for outdoor gardens, know the blooms of this fragrant "bunch-flowered" type. Its sales in department and chain stores, run to large sums annually.

The principal bulb farms for the raising of Polyanthus *Narcissus* are in Florida, Texas and California, in the United States, as well as in favorable locations in the south of Europe. Commercial "Paper White" plantings exist in America as far north as Oregon and the Carolinas.

* Abstract by R. F. Ruthruff, Indiana.

The "Tazetta" group has received less attention in the hands of the hybridizer than any other group of the narcissi. The familiar "Paper White" is an old variety, grown for possibly 200 years with little variation or improvement, except a selection of larger-flowered types. The "Grand Soleil d'Or", with a golden yellow perianth and an orange-red cup, and undoubtedly the finest of the polyanthus varieties, is reputed to have originated between 1780 and 1790. I have no record of the age of such varieties as "Grand Monarque," "Chinese Sacred Lily," "The Pearl," "Double Roman," "Gloriosa," and others, but they were all known many years ago.

Dr. David Griffiths, the late bulb specialist of the United States Department of Agriculture, has pointed out what a fruitful field for the hybridizer exists in the "Tazetta" group, even in Florida. It is somewhat difficult to set seed on Polyanthus *Narcissus* varieties, at least in Florida. The writer has never seen seed set on any but the "Paper White" and "The Pearl" in Florida, and then only two or three times out of millions of blooms in the fields. But with the vigor and floriferousness of the "Paper White" for the seed parent, and the beautiful coloring of the "Grand Soleil d'Or," or some of the introduced varieties as other pollen parents, some wonderful results might well be obtained.

The blooming season of these *Narcissus* varieties varies. This is fortunate for the commercial grower of cut flowers, under open field conditions, as he is able to obtain a succession of bloom from bulbs planted at the same time. The first to bloom in Florida are the "Paper Whites," starting well before Christmas, and continuing for more than a month. Before they are through, the "Chinese Sacred Lilies" and "The Pearl" enter their season of flowering. These are followed closely by the noble "Grand Soleil d'Or," which continues blooming through January and into February. A field of these golden blooms in January under a warm winter sun is an inspiring sight.

The "Grand Monarques," the most vigorous of all the types, come last into bloom, late in January, and put forth bloom scape after bloom scape, sometimes lasting well into March. A large bulb will produce a number of scapes of fine blooms. The "Paper White" will sometimes do this under optimum conditions. The "Grand Monarque" makes the largest bulbs of all the varieties, at times more than 22 cm. in circumference.

Bulb sizes are by centimeters, and a 12 cm. bulb is regarded as the smallest blooming size. Anything under that is classed as planting stock. The normal bulb size depends on variety, 17 and 18 cm. for "Paper Whites" and "Grand Soleil d'Ors," and occasionally up to 22 cm. for "Chinese Sacred Lilies."

The "Paper White" is the commonest variety, and as the result of overplanting in the last 15 years, has come to be more of a grower's liability than an asset. Tons of the flowers are shipped out of Florida in the winter to the Northern flower markets, where they compete with greenhouse grown stock, and bring ridiculously low prices. The prices obtained for the bulbs are generally very low in comparison with actual costs of production. A few locations are regarded as more favorable to the production of high quality bulbs, and stock from those areas sometimes brings a considerable premium.

There are growers of long experience who will go so far as to say that the Polyanthus *Narcissus* has never been entirely at home in Florida. The problems of soil conditions, fertilizing, bulb diseases, insect pests, nematodes, and poor markets have made the path of the grower difficult in the last few years. At the present time he is still further threatened by the announced termination of the *Narcissus* quarantine by the United States Department of Agriculture late in 1936. Imposition of this quarantine gave *Narcissus* culture in Florida a strong initial impetus, and brought about the planting of large acreages of the bulbs in the warm-climate state.

The "Chinese Sacred Lily" is of medium popularity as a forcing bulb, and commands a medium price. The "Grand Soleil d'Or" is king in the price field, and good stocks of the bulbs are scarce. It is a slow propagator, and subject to heavy losses from decay following improper growing conditions and unfavorable weather. The bulbs of this variety may sell for six times as much as "Paper Whites."

"The Pearl" and "Grand Monarque" bulbs are rarely seen on the market, although they are excellent cut flower varieties, and satisfactory for garden use. They are said to be "poor shippers" for florists' use. By planting different varieties at the same time, or by a succession of batches of "Paper Whites," a continuous season of winter bloom may be had by either the Southern planter or the northern florist. Except for the "Paper White," which may be forced in bowls of pebbles and

water, the other types are best grown in soil. The forcing in water, of course, ruins the vitality of the bulb.

The "Chinese Sacred Lily" has a white perianth and a brilliant orange cup. "The Pearl" is white with a pale yellow cup. "Grand Monarque" is similar to "The Pearl" except that it has larger heads of flowers and the individual flowers are also larger in size. "Double Roman" is reputed to be a double form of the "Chinese Sacred Lily," but is not in much demand. The bloom is so heavy that the flower sometimes hangs rather low. A few fanciers consider this attractive.

Polyanthus *Narcissus* require approximately the same culture for all varieties. This is a rich, moist soil, with good drainage, and abundant commercial fertilizer if good blooms and the best quality bulbs are to be raised. A soil slightly heavier than what is usually considered "good Irish potato land" in Florida suits them well. They have a fair tolerance for soil acidity. There must be a heavy share of humus in the soil to produce large, sound bulbs, with satisfactory increase.

The bulbs should be kept weeded at all times while growing, and frequent cultivation is regarded as necessary on heavy types of land.

The bulbs are propagated by removing offsets or slabs after digging in the months of May and June. They are planted back in September and October, in furrows, three to six inches deep. A few growers are of the opinion that deep planting makes for larger bulbs. After planting, the bulbs quickly come into leaf growth, and after blooming gradually ripen their foliage. When this yellows and dies down, they are ready to dig.

After digging, the bulbs are dried a few weeks, then the slabs are separated from the mother bulbs and the "round" bulbs or good commercial stock is packed for market. Most of the shipments are made in August.

The offsets or slabs are grown on another year to produce the "round" or commercial bulbs of the next season's crops. A certain supply of the round bulb is usually planted back in the fields, to maintain the good character of the stock. All crops are carefully rogued at blooming time to remove undesirable types and sports and to keep the strain clean. The "round" bulbs are "round" only one year, becoming "mother bulbs" and producing slabs in their turn ever afterwards. While their blooming capacity is unchanged, they are not wanted in the trade after passing the "round" stage except as planting stock.

Polyanthus *Narcissus* are not hardy to any extent. A slight frost will not injure foliage, or even blooms, but a hard freeze will ruin the bulbs.

Hybrid Amaryllis Culture

I. W. Heaton, *Florida*

The economical production of hybrid amaryllis bulbs depends upon many conditions. The selection of seed stock is foremost and should receive very careful consideration and study as this bears directly on production costs and may mean a difference of a year or more in producing a crop.

Only the very finest bulbs should be used for breeding stock and their history several generations back should be carefully studied, as one characteristic may mean the difference between a profit or a loss on the crop. We use for seeding only bulbs which have made at least a three inch bulb in two years from seed, crossing such individuals with the original male parent. This male parent has bloomed in two years and has produced offspring in the same time. It has therefore proved itself and insures a rapidly growing crop of seedlings. Since the present trend of popular opinion seems to be toward the Leopoldi type, only this type males should be used. Our entire stock of reds came from one male parent No. 554, a U. S. Department of Agriculture seedling Leopoldi type, flowers 8½ inches in diameter, crossed with Mead strain Reginae type. Seedlings selected from this cross bred back to No. 554 produced the reds which won most of the awards at the first National Amaryllis Show in 1934.

The use of flats will materially reduce the cost of seedling production. Steam sterilization of the soil pays large dividends in increased stands, quicker growth and reduces weeding to a minimum. Soil made from cow manure, muck, decayed oak leaves and coarse sand in equal parts does best for us producing an average of 950

seedlings ¼ inch to ¾ inch in diameter in seven months from a 20 x 30 inch flat. The pH of the soil mixture should be between 6.80 and 7.00 and hardwood ashes should be added from time to time to maintain the pH at this point. All indications point to the desirability of early transplanting to the field as the bulbs seem to take hold and grow quicker if set early. In resetting offshoots from old bulbs we have found that it does not pay to reset mixed stock which will not make commercial bulbs in one year. The market price does not justify the expense of caring for mixed stock two years.

The use of chemicals as a source of ammonia (nitrogen), during the winter has been justified as organic materials break down too slowly during periods of cold weather. We have tried this spring a new mixture,—300 lbs. fresh cow manure, 50 lbs. Calurea, 200 lbs. Acid Phosphate, and 50 lbs. Sulphate of Potash. This mixture analyzes about 5-7-5 and costs less than $20.00 per ton for the materials. Another years experience has verified our opinion on the necessity for cover croping land used continually for hybrid amaryllis as continued clean cultivation soon wears out the soil and the bulbs make better growth in partial shade.

Our opinion is that amaryllis will assimilate nitrogen, phosphorus and potassium derived from most of the usual sources of these elements and do well if fed in sufficient quantities. However they seem to object to any materials which leave a chlorine residue in the soil.

Alstroemerias in Florida

WYNDHAM HAYWARD, *Florida*

These distinguished plants have not received the attention they deserve in the United States, except possibly on the Pacific coast, where they are grown in California, Oregon and Washington on a commercial scale, in many instances for cut flowers. They are also a striking note in many private gardens.

They are an unusual plant for the beginner to handle, and for this reason there is much uncertainty regarding their culture and propagation. There had been doubts expressed as to their adaptability to the Florida climate when the writer took up the inquiry into the group more than two years ago. However, a chance discovery of a plant growing thriftily in the garden of Mr. Theodore L. Mead of Oviedo, Florida, proved that they can make themselves perfectly at home in the state.

This was also shown at the Jacksonville Flower Show on May 2, 1935, when there were a number of fine spikes of *Alstroemeria* blooms on display in the numerous arrangements and exhibits. Mr. Mead reported that the plant had been growing in his bulb garden for over 10 years without other attention than an occasional weeding. He said it bloomed well and multiplied in spite of the little care he gave it. In Jacksonville, Mrs. John H. Churchwell supplied the information that the plants were fairly common in gardens and that they prefer good soil, and partial shade. Those seen in the Jacksonville Show had deep red blooms.

The flowers are usually small, an inch to an inch and a half across, and vary in color with the variety. The roots of different species or varieties are of varying shapes, some slender and tuberous, while others have roundish oval clusters of tubers. The eyes are produced from the tubers in much the same way as sprouts rise from dahlia roots. The tubers may be raised from seed, or obtained by dividing up an old plant. They are fairly hardy, being able to survive outdoors with a little protection as far north as Vancouver, B. C., and Washington, D. C.

It is apparently well in the sub-tropics to plant the roots in the Fall in rich, well-prepared soil, in a semi-shady place, the medium being a sandy loam, with good drainage, and also a constant supply of moisture. In the greenhouse they are grown in pots. They usually have to be established a year or more to bloom well. In England the catalogues recommend planting them in "a sunny situation, such as under a South wall," with a light covering in winter.

Growing from seed is quite unsatisfactory, as the plants may take a year or more to come up, and then sprout as thickly as can be. It is said that fresh seed gives more prompt germination. The writer obtained some three-year-old seed in spring, 1934. It was planted in a flat and nothing happened for eight months, when

in disgust the earth in the flats was tipped out and used again for sowing seeds of hybrid amaryllis and tritomas. The latter gave a poor stand, but lo and behold, late in the winter of 1934-35 the *Alstroemeria* seedlings began to come up in profusion among the amaryllis and tritomas. Some other *Alstroemeria* seed, planted in August, 1934, has not yet come up, in June, 1935. Such species and varieties as *Alstroemeria aurea robusta, A. aurantiaca, A. aurantiaca splendens, A. chilensis, A. chilensis hybrids, A. lutea, A. pelegrina alba, A. pelegrina rosea, A. Braziliensis, A. psittacina* and *A. tricolor* are listed in the English and Dutch bulb catalogues. Some of these have been imported into the United States and a few are available in the trade here. The usual colors run from yellow to orange and rose. The plants make an abundance of bloom for cutting with very good keeping qualities, when properly grown.

Alstroemerias are native to South America, many of them from Peru. It is interesting to note that this group holds the record, so far as known, for "farthest south" of any amaryllid, Holmberg reporting one species from Patagonia (Tierra del Fuego) in the neighborhood of Cape Horn. (*Alstroemeria patagonica,* Philippi)

Culture of Hybrid Clivias

E. P. Zimmerman, *California*

The name *Clivia* for this important Genus was given because a specimen first bloomed in cultivation in the conservatory of Lady Clive, Duchess of Northumberland. The plant was also called *Imantophyllum* by William Hooker, but *Himantophyllum* would be more correct, as it means "strap-leaf".

The first plant recorded was *Clivia nobilis,* from the shady shores of the Fish River in South Africa. Other species and varieties which are mingled in the hybrids of today, are: *Clivia miniata; Clivia miniata, var. lindeni; Clivia cyrtanthiflora, Clivia gardneri.*

Clivia miniata—the name *miniata* is derived from the Latin word *minium,* (red oxide of lead) and describes the color of the flower. The first blooming plant ever exhibited was shown at the London Flower Show in 1854, and won the Banks Medal at that time. *Clivia lindeni,* a variety of the *miniata* species, is a mutant and is a broad-leaved stately plant, with light cream to orange flowers. It is sturdy, very hardy and free-flowering. The umbels of flowers are more compact and the flower stems shorter in this variety. This plant, crossed with *Clivia nobilis* brought some of the more than 60 variations into the modern hybrid *Clivias.*

Clivia cyrtanthiflora has flowers like a *Cyranthus,* another South African amaryllid, and was first grown by Van Houtte at Ghent, Belgium, from a cross between *Clivia miniata x nobilis.* It was first shown in bloom at the Berlin flower show in 1859.

Clivia gardneri, Hook, is a species imported from Port Natal and Transvaal, South Africa. It grows five to six feet tall. It is not as floriferous as *Clivia miniata,* but the flowers are twice as large. A well grown plant of this species is a beautiful sight.

The modern clivias are derived from the five types and species mentioned above. Increased sturdiness and floriferousness are characters which the hybridizers have tried to impart to the newer generations. This plant is easily grown as a house plant, and will be found as decorative as a palm, even when not in bloom, if a few simple cultural rules are followed,—keep the plant in full shade, and water when necessary. Under good treatment they will sometimes bloom two or three times a year.

There are today some 60 types of hybrid clivias in cultivation, varying in the shape and form of the flowers and the colors. They make their growth of leaves immediately after the flowering season, (February-April) in California. When the leaves are well matured, that is, by June or July, is the time to transplant them. They should be kept in as small pots as possible, until they lift themselves out of the pot with their root growth. If the grower will observe these simple instructions, he will have the pleasure of obtaining from two to 25 flower spikes per plant in a year, depending on the age and size.

Clivias resent being moved around to any extent. They want to be left alone, and should have good drainage at all times. An inch of sand at the bottom of the pot is essential.

A clay soil, or friable loam, mixed with sand and leaf mould, or ground peat is best for a potting medium. Occasional watering with liquid manure will repay the effort. A healthy plant should have dark, shiny leaves, and if the leaves turn yellow, it is a sign that the plant has not received the proper attention and the blooms will be unsatisfactory. During the warm summer months, clivias can be brought outside into the open air if kept in the full shade, and the pots plunged in the ground. They should be protected from winds, kept cool and moist, with an occasional thorough soaking of the nearby soil which will be found beneficial to the health of the plant.

The clivia dislikes continuous sprinkling and watering of the leaves. Once a month for this is sufficient. The soil around the plants should be maintained in a moist and cool condition and the plant should have an abundance of fresh air, with the reservation that the ventilation should be 3 to 8 feet above the plants. Moving air too close to the plant is detrimental.

E. P. Zimmerman

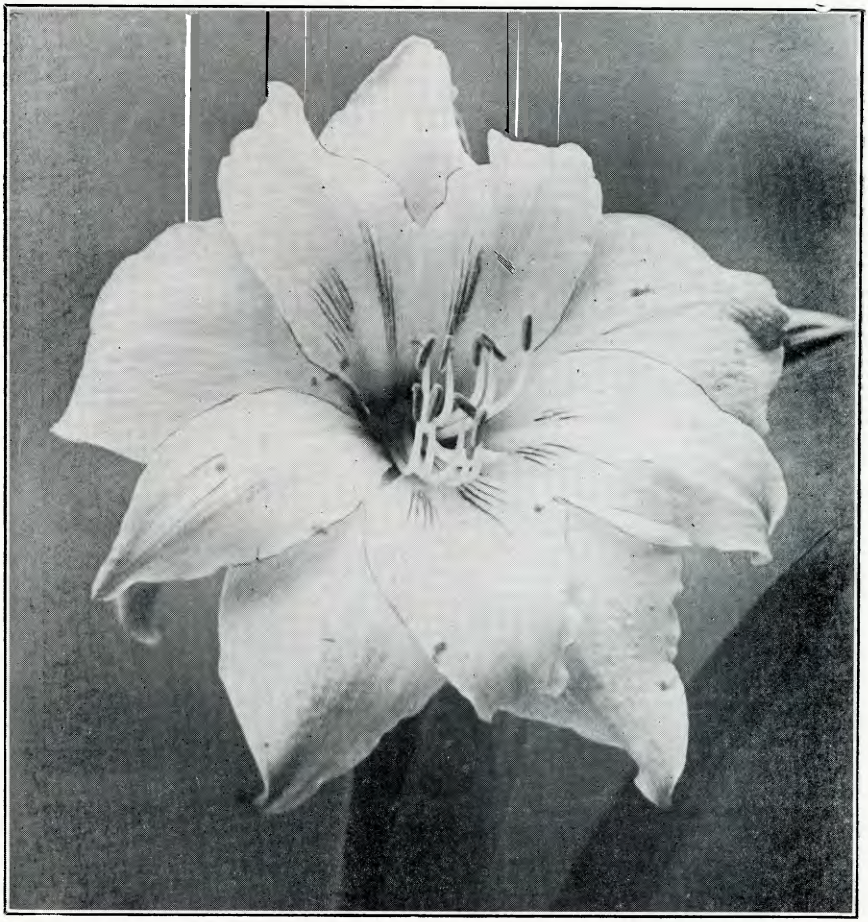
Hybrid Clivias

In the greenhouse or conservatory the clivias should be kept away from the glass, and out of the direct rays of the sun, and all moving air should be well above the plant.

If all these points are carefully observed, the culturist will have wonderful results with his plants, blooms that cannot be duplicated with any other. I have at my nursery in Carlsbad, several thousand of the plants in bloom every spring, the largest collection of blooming size plants of clivias in the world.

To summarize, in growing clivias, do not bother the plant any more than is absolutely necessary in the way of moving it; leave it alone; provide dark shade, the darker the shade, the healthier the plant; grow them in small pots; provide soil as described above; have adequate drainage; water when needed by the plant; transplant in July after the growing period, and water occasionally after that with liquid manure.

The plants are little affected by insects with the exception of mealy bug. If the plants are grown as indicated above, little trouble will be experienced from this source, as the conditions are not favorable to its spread and increased development.



Basil N. Ikeda

Semi-double Hybrid Amaryllis (Hippeastrum)

Mr. Ikeda of Yokohama, Japan, reports that in one season several bulbs produced semi-double flowers but in the following season single flowers were again produced.

6. Curing, Storage, Forcing and Cut Flowers

Forcing Hybrid Amaryllis in Pots

WYNDHAM HAYWARD, *Florida*

The proper time for the potting of hybrid amaryllis bulbs is a matter of considerable difference of opinion among commercial growers. Certain quarters favor potting or re-potting immediately after blooming. This is a frequent time for the transplanting of amaryllis selected in the field at flowering time. Blooming bulbs are often lifted from the field and potted up temporarily for exhibition at spring flower shows without serious results.

When the bulbs are already established in pots, the writer has found a successful and convenient time to re-pot them is just at the end of the drying off or dormant period in early winter, when the bulbs are beginning to show the first signs of spring growth. This has to be done with great care. The great majority of amaryllis bulbs are sold in the fall and winter months, from November to March, and are potted up immediately by those obtaining them.

Two outstanding matters are apparent in the case of potting up cured or dried bulbs in the fall and winter:—First, the bulbs must become well established by spring to produce satisfactory blooming results. Early potting, in November or December, is apparently best. Second, warmth and moisture are necessary to promote a thrifty root and leaf growth on the newly potted bulbs and in order to have them well established in the pots by spring.

In an experiment during the winter of 1934-35, the writer potted 25 dried and cured bulbs in prepared soil, in six-inch pots, December 1, 1934, and placed them outdoors, in a shady location, beside a shed. Despite regular watering and the usual moderate winter weather of Central Florida during most of this time, only two of these bulbs showed root growth when turned out of their pots six weeks later. In the six weeks, there was perhaps a fortnight of cool weather, climaxed by a "freeze" with temperatures as low as 27 degrees Farenheit, on the nights of December 11-12. At a few other times the night temperatures were as low as 35° to 40°, and day time temperatures averaged 50°-60° on a few cold days. The bulbs remained dormant, and were apparently unhurt by the cold weather.

On February 1, 1935, eight weeks after potting, not one of the 25 bulbs yet showed leaf growth, although several were beginning to produce bloom scapes. No decay was apparent in any of the bulbs. However, out of 75 other bulbs of the same lot, planted in rich, moist soil on the same day the 25 bulbs were potted up, but in the open air on a lakeside, more than half a dozen bulbs had bloom scapes a foot and more in height at this time. All of the bulbs planted in the open ground had good root growth established by February 1st. Several had vigorous leaf growth. On many nights of December and January the temperature under the surface of the ground must have been somewhat warmer than the air temperature above.

The following cultural directions for forcing hybrid amaryllis bulbs are quoted, because of their general interest, from the 1935 catalogue of "Barr & Sons, 11-13 King street, Covent Garden, London, England," noted bulb specialists:

"CULTURE—Pot the bulbs from December to March and plunge the pots to the rim in gentle, steady, moist bottom heat, giving very little water until the flower buds are formed. As soon as these begin to show, remove pots from plunging-bed. Thus treated, a vigorous leaf growth is produced, and a strong stem with a fine umbel of large flowers secured. In the absence of bottom heat, the bulbs may be grown in an ordinary greenhouse or sunny sitting room window, if potted up in February or March. After the bulbs have flowered, the pots should be plunged in

ashes until growth is completed, about the end of summer, when water must be withheld and the pots stored on their sides until the bulbs are repotted in December or later."

The Growing of Hybrid Amaryllis for Exhibition Purposes

WILLIAM T. WALKE, *Massachusetts*

In writing this article it is from my experience as a grower in our Northern States, being unacquainted with Southern growing conditions.

First make yourself acquainted with the schedule requirements and the date of the exhibition at which you expect to enter. You will find growing for an exhibition to be very interesting, very fascinating and educational. I think the amaryllis one of the easiest to grow and the most beautiful of the bulbous plants.

While the now common varieties are very beautiful, they have been improved so much of late years that for an exhibition one naturally wants the best types as to size, color and form in order to meet the competition one will naturally expect. In gathering your collection together, if you are situated where you can see the flowers, so much the better. If not it will become necessary to make your requirements known to the amaryllis specialist, who is in a position to give you a collection in selected varieties.

A very fine collection can be got together from hybridized seedlings but this takes time. In my experience three years or more. A very fine collection can be obtained from a good strain of the so called "field grown" bulbs, but it will be necessary to pot grow them for one year in order to produce the flower at its best.

Good culture will greatly add to the quality of the blooms which are formed the previous year. If you start with field grown bulbs, two to three inches in diameter, pot them in a good fibrous loam, about one-third sand. Also add a four inch pot of bone meal to the bushel. Place the bulbs one-half their height above the level of pot and keep evenly moist. Place in a warm and light position. When the warm weather comes in June, plunge your plants outdoors, up to the rim of pot, in the full sunlight. Keep well watered all summer. Feed with a fertilizer every two weeks when leaves commence to develop. By the middle of September it will be necessary to bring your plants under cover as then we expect and do get a frost. In growing a collection of plants at this time you will find that the leaves of some will have a tendency to turn to a yellow color, a good sign that the plant has developed its full growth. Then withhold water and lay away in a dry, frostless place until ready to start. Those that are not properly developed should be kept growing in the warmest and lightest place available until they have attained their full growth as described above.

Timing for the Exhibition is of course of very great importance, and this will depend largely on your temperature conditions. A plant properly matured, of a flowering size, should flower in a temperature of fifty-eight to sixty degrees Fahrenheit at night, in six to eight weeks.

Take your plants from their winter quarters and soak them well. Do not disturb the roots. Make sure the drainage is all right. Bring to the light. In a week or two you will see the flower scape appearing and then the leaves. Give a tablespoon of some plant food and keep watered well. You may find a difference of a few days in the development of the flower and the date of the exhibition, but that can very readily be timed by shading and placing where it is cooler if a little too far advanced. Place where it is warmer if backward. They will stand eighty degrees Fahrenheit if it is necessary.

Next in importance and by no means the least, it is necessary to transfer them to the exhibition hall without bruising, to which they are unfortunately very susceptible. I have seen very fine flowers ruined in transit and again I have shipped one hundred pots without a bruise.

My plan has been to place a three foot bamboo cane as upright as possible in the center of each pot, and fastening the flower spike to it loosely. That will keep the flower upright. Cut the stake six or eight inches above the flower when finished.

Then take twenty-four inch sheets of soft tissue paper and fold in strips of three inches. Wrap these around the stake and in and around beneath the flower heads until you have sufficient volume to hold the flowers rigid and make it impossible for the flowers to move regardless of any shaking they may be subjected to in transit. Use extreme care that the leaves do not break. At the hall place your plants in saucers, water and arrange properly and await the judges' decision. Then it is we learn by our experience how we can improve in the future.

Any plants you may have that are very much pot bound, should be repotted after flowering and given the best care possible for your next exhibition because age will greatly improve your collection.

Storage and Forcing of Amaryllis

WYNDHAM HAYWARD, *Florida*

Preliminary attempts in forcing of hybrid amaryllis outdoors in a sub-tropical climate during the winter months, primarily with the aim of hastening the blooming period of the bulbs, to have them in flower for Christmas, were conducted by the writer during the fall and winter of 1934-35. The results were largely negative, but in some ways rather interesting.

Two lots of blooming size bulbs were dug in the fields in September, 1934. One of 15 hybrid amaryllis, and the other of 50 hybrid amaryllis, 20 *Hippeastrum equestre major,* and 3 bulbs of common *H. johnsonii.* This may not have been the true strain of "Johnsonii", but was the one met in the trade under this name.

All these bulbs were shade dried and placed in cold storage before October 1, 1934. The cold storage plant is set to operate at a temperature of 35 to 45 degrees Fahrenheit continuously. The air inside the storage room was rather moist.

On November 30, the bulbs were removed from cold storage. They appeared in good condition, with the exception of the *H. equestre major* bulbs, more than half of which had started to decay and were thrown out. The other bulbs were then potted up, singly in 6-inch pots, with a prepared potting mixture. They were placed in the open air, in a sheltered location, beside a shed. In eight to ten days time, it was noticed that some of the bulbs had started to rot. No signs of the expected growth, either leaves or bloom spikes, appeared.

On December 11 and 12, there was a "freeze", with temperatures down to 27 degrees farenheit, which apparently had little observable effect on the bulbs.

By December 25, three of the bulbs had started leaf growth. No bloom stalks had appeared, nor did any appear at any time of the experiment, although all of the bulbs were of blooming size when dug. A large proportion showed definite signs of decay at Christmas time, and the tops of these bulbs were sliced off with a sharp knife, disclosing rotting tissues in the heart of the bulbs. In a number of the bulbs the center was entirely gone. More than 40 of the bulbs showed some signs of decay. The remaining *Hippeastrum equestre major* bulbs were found to have decayed completely through to the base.

The hybrid amaryllis bulbs were removed from their pots and the roots examined. Not one bulb was found to have started fresh root growth. The bases of 90 per cent of the bulbs were almost completely rotted away. The "Johnsonii" bulbs showed no decay, but did not start leaf growth until late in January. With the coming of warm weather in the spring, 1935, a few dozen of the bulbs revived and started to grow again in their pots, although mostly in very bad condition. Two or three seasons would be required to grow them on to commercial bulbs again. Only four bulbs remained quite sound.

As far as advancing the blooming date of hybrid amaryllis, the cold storage treatment, as outlined above, proved a complete failure. In fact it so severely affected the bulbs that they did not bloom at all. Whether the cold temperature to which they were subjected was too low, whether they should have been cured longer, whether the bulbs were even slightly frozen in the cold storage plant, or whether a shorter period of the cold application is necessary, remains to be determined.

It is still doubtful whether hybrid amaryllis will respond to cold treatment as do bulbous iris, daffodils, etc., in the effort to produce an earlier bloom.

Cold storage, however, in another minor experiment, proved an excellent means for retarding the blooming period of hybrid amaryllis, as shown by a study made in the spring and summer of 1934.

The normal blooming period of 90 per cent of the hybrid amaryllis under field conditions in Florida is February to April. Three bulbs were used in this experiment. They were dug along with others in January, 1934, and presumably had the current season's bloom bud already formed. They were air dried in shade for three months, and then, the three bulbs were selected for good dormancy, and were immediately placed in cellophane bags in the bottom of an electric refrigerator, where the temperature ranged from 40 to 45 degrees F., until July 1st, 1934. This was at least two months past the normal blooming time of these particular bulbs, and they should in all probability have flowered in late March or April outdoors.

On July 1 the bulbs were removed from the refrigerator, and were still in good condition, although slightly desiccated. They were potted up in prepared soil, and bloomed soon after planting, in ten days to three weeks after the time of their removal from cold storage. They bloomed, however, without leaves or root growth, and the blooms were inferior in size and length of stem. After setting seed, the bulbs began normal leaf and root growth and by the end of summer were apparently in good condition again.

Therefore the possibility remains of keeping bulbs capable of blooming in cold storage at a moderate temperature until the following Christmas, or a period two or three weeks before the holiday. Blooms might be obtained for Christmas by this method, but it is to be doubted if they would be worth a great deal. Whether the long storage would devitalize the bulbs remains to be seen. Possibly if the bulbs were established in pots, dried off before blooming time in the spring, and then placed in cold storage, pots, earth and all, they could be brought into bloom for Christmas with the added vigor of established plants, which is an important factor in all blooming amaryllis. The time involved and expense of this procedure would probably exclude it except as a novelty.

Forcing experiments should also be conducted with the fall and winter blooming species of *Hippeastrum* in this country. Bulbs have been obtained from European nurseries. Both *Hippeastrum aulicum* and *H. reticulatum* are reported to be fall and winter blooming types. They are apparently not available in the trade in the United States at this time.

Robusta Variety of Zephyranthes

H. B. DeBoer, *Florida*

Zephyranthes robusta is native to South America and is beginning to show promise as a cut flower. Those who have used "Robusta" in the preparation of sprays, and flower blankets are quick to give it their approval. Its color is reminiscent of the orchid. The flower is trumpet-shaped as illustrated, 1½ to 2 inches in length and about 1½ inches in diameter. The stems range in length from 4 to 12 inches depending on the richness of the soil in which they are grown.

"Robusta" seems to thrive best in moderately rich soil composed of ¾ sand and ¼ leaf mold. It blooms in Florida from May through June and in northern climes in June and July. As a border plant in masses it is unexcelled, making a beautiful display since it is a steady bloomer and produces flowers after each shower of rain. In planting for border effect the bulbs should be planted close together as they thrive better that way and give mass display.

After the blooming period is over allow the bulbs to remain in the ground 30 days or until the seed pods have formed and the leaves start to die. Then dig them and allow to dry on trays. These are made of "chicken wire" on a wooden frame placed on legs about six inches high. After the foliage has dried and the root system has become dormant clip off the tops and roots and store as you would the average bulb, in a cool dry place until the next planting season.

"Robusta" produces both from seeds and bulblets, the seeds however soon lose their viability and should be planted as soon as they reach maturity. They multiply from bulblets very rapidly and much better results will be obtained from this form

of propagation. The bulblets require about one year before they will produce flowers.

Zephyranthes robusta can be grown in the North out of doors after the danger of frost is past. The bulbs should be planted about 2 inches apart in an upright

H. B. DeBoer

Zephyranthes robusta

position in trenches about 2 inches deep and should be covered with top soil. If planted out of doors the average rainfall in eastern United States will keep the plants in good condition.

Crinums for Florists' Use

CECIL HOUDYSHEL, *California*

Crinums deserve more attention from commercial florists. We remove the single open flowers and attach toothpick and use in sprays quite effectively. So used the flowers rival the true lilies. They keep sufficiently long for funeral work. We also use the long stems in basket work. The cut stems open out their flowers and last a long time.

Country florists who must raise their own flowers will find them very useful indeed.

7. Marketing

The American Amaryllis Society was organized for the advancement of the Hemerocallideae, the Alstroemeriales and the Amaryllidales. Its object is to encourage the appreciation of these groups of plants by holding exhibitions, publishing the Year Book, and establishing trial collections, and to consider basic problems,—the working out of the phylogeny of these groups, the introduction of new varieties and species, breeding methods, vegetative propagation, etc. These activities are of importance to all who are interested in these groups of plants. The details of marketing, for instance, may be based in part on ideas developed as a result of the activities of the members, but the Society is not a marketing organization. The Board of Directors has, however, considered it advisable to offer this section, for an indefinite period, as a forum to those interested in the marketing of amaryllid bulbs. The opinions of the writers are printed as information only.

Vegetatively Propagated Named Amaryllis Varieties for the Trade

I. W. Heaton, *Florida*

Last fall while in New York I inquired of the bulb dealers the prospects and marketing possibilities of named Amaryllis varieties propagated vegetatively. Every dealer I talked to was interested and wanted to know when and where he could purchase bulbs produced in this way. Vegetatively propagated bulbs will place amaryllis in the hands of the florist in sufficient quantities for forcing; it will be the salvation of the industry, and should increase the market hundreds of times. One Chicago grower wants 20,000 for forcing this year but will have to wait several years before such an order can be filled.

Last summer we cut every good seedling we had and recut the bulbs produced in 1933, about 1,800 in all, and wish we had more stock. To date we have set in the field some 70,000 and have the last lot yet to plant. Our stand was much better this year, than the last three years. Bulbs thrive best when cut in August through September. Later cuttings have not produced as well. From the first 200 separate bulbs propagated in August we have set an average of 43 each, with a high of 132 and a low of 6. These bulbs were cut into 54 and 68 pieces depending on the size of the bulbs. We found one small piece had made four bulbs and others had produced two and three each. We have heard of several cases of failure; the causes appear to be either too much moisture or drying out. The propagation medium in the flats must be kept moist but not wet and it should be of such composition as to drain off the surplus water quickly. Sand and German peat appears to be the best, mixed half and half by volume.

Marketing of Hybrid Amaryllis

John Masek, *Florida*

Pleased though I am to have been asked to write on this subject, I must frankly indicate at the outset, that I have nothing to offer in the way of any new or special marketing plan.

I think it might be well to list the most general outlets that a grower has for his bulbs. This list would run something like this,—

1. Local buyers,—
   (a) Amaryllis growers who grow and ship.
   (b) Local marketing agencies.
2. The wholesale trade.
3. The flower forcer.
4. Merchandise Chain stores.
5. General merchandise stores.

As with all bulb growing industries, the first principal buyers are the pioneer growers, who need additional bulbs to fill orders over and above their own output. These same growers continue to emphasize the marketing phase of their business more and more as it goes on, principally because they have developed marketing connections simultaneously with the development of their stock. Evidence shows that at this point in the development of any bulb or plant industry, the problem is more one of getting a supply sufficient to meet the demand. Prices at this stage are usually so attractive that the business attracts other growers, with the resulting general tendency that soon a point is reached where there are more bulbs than can be easily disposed of. Then someone shades the price, and the old story is repeated. Mind you, I am not trying to be pessimistic about the future of the growing of amaryllis, except to indicate the alarming parallel with other horticultural products with which I have had some experience.

I am also aware of the fact that with amaryllis, as with other bulbs and horticultural products, there may be a surplus of bulbs at any given time, insofar as total quantity is concerned, but there might be a shortage of specific sizes, varieties and colors. I believe the amaryllis industry had already reached this point some two or three years ago, and real sales effort had to be made to move the crop. It of course follows that at one time or another some grower or shipper has more orders than he can take care of, but this might not be true of the average grower. As a result, the other marketing outlets that I have mentioned receive some attention. Or to put it another way, someone makes it a special business to call the product to the attention of sales outlets that up to this point have not been approached.

Such a procedure is carried on by some Northern wholesalers working in close cooperation with Florida growers. Or sales effort has been made by local packing and shipping organizations who specialize in horticultural products raised in the state, and whose marketing connections furnish good prospects. Here I mean to point out that the grower may either deal with a grower-shipper, a local horticultural marketing agency, or by working in combination with a Northern wholesaler. Sales of course can also be made direct to flower forcers, though as a general rule the individual grower is not prepared to make the investment in time and money that is required to cultivate this field.

With notable exceptions, if a plant or bulb has the essential requisites to make it popular—can be transported without great risk, planted and bloomed by the amateur, and offered at a price which will appeal to the masses—then it may find its way into the hands of the so-called merchandise chain stores. The buyers are men of experience—their aim is to give the buying public the best "buy" possible. They are in the advantageous position of being able to purchase in considerable volume. Sales to the merchandise chain stores are made only after years of effort. They try an item, let us say amaryllis bulbs. If it sells one year, next year they buy more, all the while looking for a dependable source of supply where it can be had at the right price.

One of the difficulties encountered by the merchandise chain store buyer is with respect to size, and in this he is helpless. The trouble starts because the American public, in a great many cases, assumes that value is in proportion to size. And so if the store manager sees that his customer buys size, then the buyer wants larger sizes. It has been my unhappy experience, for example, to be told that my 3 inch pot size ferns were not as big as someone else's 3 inch pot size ferns. The point is that the competition in supplying the chain stores comes two ways, first, price, and then size. That is to say, some growers (in a falling market) quote the old price but increase the size.

This in a general way covers the more generally known outlets for amaryllis bulbs. In closing might I repeat some of the observations made by men and women with whom I have talked; First,—There is evidence to indicate that 90% of the crop will continue to be bought by the amateur gardener; Second,—That with the grading and classifying now going on, the forcer will use more and more bulbs, provided, of course, that he can get not only the specific colors, but the specific shades, and also bulbs that will bloom more or less together; Third,—Amaryllis bulbs should continue to sell in greater volume in the next few years because they are gaining in popularity.

Marketing Hybrid Amaryllis Bulbs

I. W. HEATON, *Florida*

The present condition of the Amaryllis market is due to the cumulative effect of several underlying conditions some of which are directly within the hands of the growers to remedy.

Unfortunately the results of the "plant amaryllis campaign" conducted several years ago by high pressure promotion methods is becoming more and more apparent. Amaryllis seeds were sold on the promise of marketing the bulbs produced. Seeds were purchased by many growers scattered from South Florida to South Georgia, most of whom knew nothing of amaryllis culture, and many did not have land suited to the requirements of economical bulb production. The failure of the seed merchants to market the bulbs produced has forced the individual grower to find his own outlet. This has resulted in every northern bulb house being deluged with offers of bulbs. In the office of a large New York bulb firm last fall, I looked over quotations from 65 growers. The price range was $105 between the highest and lowest on bulbs of one size.

This practice has enabled the buyers to purchase bulbs on the basis of the lowest quotation regardless of the fact that most of the quotations were from growers who could not have filled an order for 250 bulbs of one size. Another contributing factor to price reduction is the job lot jobber, who having no planting of his own sustains no loss by price cutting, and who can under quote the larger growers and pass the loss to the small grower who has no other market. It is impossible for this type of dealer to supply bulbs of uniform quality when purchased from small plantings which receive materially different culture and are grown on different soil types.

The third and most important factor limiting the increase in the sale of amaryllis bulbs is poor quality, and this is directly within the hands of the growers to remedy. Considering that the bulk of amaryllis bulbs are produced by growers as a side line, and without any experience in hybridization and in many cases with little horticultural training, rapid deterioration in quality is not surprising.

During the early years seed was produced without regard to quality, and even yet little culling is done. Not 10 per cent of the bulbs produced in Florida at the present time are suitable for the florist trade which demands reasonable uniformity of types and clear, clean colors. On account of the higher production cost many growers have discontinued seed production and are relying entirely on offsets to maintain their plantings.

The trend in the sales of amaryllis bulbs is early fall and spring. The grower must be able to supply mature well ripened and cured bulbs from October 1 to April 1. With cool storage delivery may extend to June 1. This will result in increased sales by enabling the bulb houses to take full advantage of the spring and fall gardening seasons. In central Florida amaryllis bulbs mature in August and are more nearly dormant at that time than at any other period for a new flush growth begins with the September rains. Bulbs dug at this period cure better and show less shrinkage than stock dug later. All stock should be harvested by January 1 as the flower scapes begin to expand in the neck early in February. Early digging also enables the grower to replant and take advantage of the entire winter's growth.

Some criticism from a few bulb dealers has been directed against the industry for selling to the chain stores. It is claimed that this practice has injured and curtailed the sales through the retail channels. The writer does not hold this view. The chain stores have furnished a market for large quantities of small No. 3 grade bulbs which could not have been sold in any other manner, and which have introduced hybrid amaryllis bulbs to thousands of people who could not have been reached through any other channel. These bulbs were not suitable for the florist trade and had these bulbs been culled out and destroyed it would have increased the cost of the better grades and placed them out of reach of all but the fancier. While chain sales show little or no profits, they enable the grower to produce selected stock at a reasonable price.

Many growers persist in offering 2-2½ inch bulbs for flowering stock. Not over 25 per cent of the bulbs of this size will flower and nothing injures the industry as much as blind bulbs. Some growers in their eagerness for a few dollars have supplied late orders with bulbs dug while in bloom.

Amaryllis for Pleasure and Profit

S. R. NICHOLSON, *Florida*

My first experience in growing amaryllis was shortly after my arrival in Florida before "the boom". A friend, who had grown the bulbs profitably, told me that all I needed to do to make the start of a fortune was to set out a hundred bulbs and before many years I "should have thousands to sell". I bought one hundred one inch bulbs for $5.00 and set them in a prepared bed. Some of them bloomed now and then, a beautiful orange scarlet shade, but apparently a few bulbs of some species of *Hymenocallis* was included among them and gradually took possession of the bed crowding out the amaryllis.

I gave the bulbs no care for ten years, and still, when I dug them up finally, I found thirty-six left around the edge. I know now that these bulbs were *Hippeastrum equestre major*. This is a very beautiful variety but if I had then seen the many shades and colors of the hybrid forms I might have become even more interested.

A few years ago I secured several Mead strain hybrid bulbs. I set them in sandy soil near some casuarina trees where nothing else seemed to thrive. They grew vigorously, and one sent up the most beautiful flower I had ever noticed among amaryllis. It was a beautiful pink; the blooms, four in number, each eight inches across, opened one after another and lasted more than a week. That bloom "sold" me on hybrid amaryllis. I bought more bulbs. Next year that same bulb grew two spikes and attracted much attention. A flower lover patron has tried repeatedly to induce me to sell this plant, but I am too much attracted to it to part with it. I cross pollenized the bloom and saved the seed. Then I began to make a study of amaryllis culture. So far, I have been unable to put into practice all that I have learned, but I hope to do so in time. I learned more from reading the first Year Book of the Amaryllis Society than from any other source.

I have not given the bulbs any special care; I water regularly, but my plants are often neglected. They seem to grow on this thin, sandy soil better than any other plant that I have grown. I use only raw bone meal, and occasionally add sulfate of potash to the water with which I water them. They grow readily from fresh seed and equally as well from offsets.

I think that the value of amaryllis as a shipping flower remains to be fully investigated. We accidentally broke a spike from a bulb which had previously given beautiful blooms. However we placed the broken end in a cup of water. That flower kept right on growing. The water was changed daily. Four florets eventually grew and blossomed. They were pale and washed out, but I believe if fertilizer had been added to the water the colors might have been normal. There is no reason, that I can see, if they will grow in this manner, why they would not make as fine a shipping flower as the gladiolus.

Many are not acquainted with the great variety of hybrid forms. The society is doing a splendid work in attempting to popularize the amaryllis: the members of the society should help the work along to the limit of their ability. One or two cannot accomplish as much as a group of people, working together harmoniously.

My planting is small and the profit comes mostly from selling potted blooming plants. Mead strain amaryllis usually bloom in the spring and the lighter shades sell well at Easter. A pure, or nearly pure, yellow would bring a good price. Let us hope some of the hybridizers may develop such a shade.

We displayed a blooming plant at our county fair. It had two florets open on Monday when we placed it on exhibition. Saturday evening, when we went to get it, the fourth floret was still standing open although the whole plant was sadly in need of water. Apparently it had not been watered all week. The good qualities of hybrid amaryllis are not appreciated sufficiently.

If potted plants are not sold one year they will bloom again the following year, if fertilized and cared for. I grow some in pots and some in the ground, but our soil is so poor that mine do better if potted. I have not been troubled with diseases as yet, but I suppose some may show up sooner or later.

A plant that will grow, bloom, and multiply under such adverse conditions of soil, heat, etc., as encountered in south Florida on the location where mine grow, certainly seems destined to rank among the great of the horticultural world.

Suggested Commercial Grades for Hybrid Amaryllis Bulbs

I. W. Heaton and Wyndham Hayward, *Florida*

For the benefit of the commercial amaryllis trade and the protection of both the growers and the florists' industry the general adoption of improved standards of grading for hybrid amaryllis bulbs as outlined below, is suggested for consideration by the growers and the trade. These proposed new standards would remain operative until commercial stocks of good named varieties, produced by the new method of vegetative propagation by stem cuttage, have been made available for the trade.

The standards have been devised with the aim of being as nearly adequate as possible to cover all of the various types, colors and forms of hybrid amaryllis, without being too technical for practical use. The main purpose of the standards is to bring to the attention of the trade the fact that the value of an amaryllis bulb rests in its ability to produce normal, well-shaped, clean colored flowers of good size.

1. Flower Size Standard.

Grade No. 1. Exhibition Stock. Bulbs in this grade must be capable of producing well shaped, clean colored flowers 8 inches or more in diameter across the face of the flowers.

Grade No. 2. Selected Stock. Bulbs in this grade must be capable of producing well shaped, clean colored flowers 6 to 8 inches in diameter across the face of the flowers.

Grade No. 3. Field Run Mixed Stock. There is no standard for flowers in this grade. It may contain all types of hybrid amaryllis.

2. Bulb Standard.

Bulbs in Grades Nos. 1 and 2 may be of any size above two inches in diameter when cured. They must be sound, free from disease or mechanical injury, well cured, with roots trimmed to 2 inches or less of the root base and with the leaves trimmed to the neck of the bulb. Since these bulbs are guaranteed as to grade and size of the flower by the grower, the size of the bulbs is not important, if above two inches in diameter.

Bulbs in Grade No. 3, field run stock, must be sound, free from disease, insect or mechanical injury, well cured, with roots trimmed to 2 inches of the base of bulb and with the leaves trimmed to the neck. The root base may be trimmed. Bulbs in this grade are to be graded after curing, into three sizes,—2½-3 inches; 3-3½ inches and above 3½ inches.

3. Curing Standard.

All bulbs to be cured on trays or racks for at least thirty days before sizing and packing.

4. Packing Standard.

Bulbs in all grades are to be packed in paper cartons 12x10x15 inches, 100 2½ inch, 50 3 inch and 25 3½ inch bulbs in each, with adequate protection by paper to assure the bulbs reaching the purchaser in good condition during cold weather.

5. Standard Color Nomenclature and Description.

Although not perfect, the Fischer Color Chart, is easily available and is generally satisfactory for use with hybrid amaryllis. The use of this chart will enable the trade to describe fairly accurately any color likely to be found in hybrid amaryllis. Colors are divided into three classes,—(a) solid colors otherwise known as selfs, (b) whites with light markings and (c) striped or particolored.

6. Shape and Form Standard.

Botanically several types of amaryllis flowers are recognized but for commercial purposes two main types are sufficient, the others are rare in trade stocks.

(a) *Leopoldi.* These are the full open faced type flowers with the perianth limb measuring less than four inches from the center of the face of the flower to the base of the seed pod.

(b) *Reginae.* These are flower types similar to the above but measuring four inches or more from the center of the face of the flower to the base of the seed pod.

Modifications of Leopoldi and Reginae Types,—Rounded; This term following the types listed above, would denote a full faced flower with little space showing between the outer line of the petal tips and the intersection of the petals; *Pointed;* This term in relation to type would denote a flower with pointed petals in which the line of the petal tips would be more than 1½ inches from the intersection of the petals. *Examples of flower description,*—"8 inch Leopoldi, rounded, solid color, red to orange red; 7½ inch Reginae pointed, light red with darker veins and keel."

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