

PLANT LIFE

AMARYLLIS
YEAR BOOK

1979



Amaryllis papilio Ravenna
Native to the state of Santa Catarina, Brasil
Discovered in 1967.

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CORRIGENDA

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Page 83 1st paragraph, DESCRIPTION, 5th line, for "Flare of tepals, 1.1 cm to 3.8 cm," read 1.1 cm to 1.3 cm."
2nd paragraph, 3rd line, for "Another closely clustered", read "Anthers closely".

CORRIGENDA—continued on page 85

PLANT LIFE, VOL. 35, No. 1, January, 1979

AMARYLLIS YEAR BOOK 1979

Year Book of
The American Amaryllis Society
46th Issue

GENERAL AMARYLLID EDITION

EDITED BY
HAMILTON P. TRAUB
R. MITCHEL BEAUCHAMP
HAROLD N. MOLDENKE
THOMAS W. WHITAKER

THE AMERICAN PLANT LIFE SOCIETY
Box 150, La Jolla, California 92038

THE AMERICAN PLANT LIFE SOCIETY

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

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The Houston Amaryllis Society, Mrs. A. C. Pickard, Pres., 1702 N. Blvd., Houston 6, Texas. The Hattiesburg (Miss.) Amaryllis Society, Mrs. Sam Forbert, Pres., 117 North 23rd Ave., Hattiesburg, Miss.

Men's Amaryllis Club of New Orleans, Dr. Tim Calamari, 1016 Rosa Ave., Metairie, La. 70005.

The Coastal Bend Amaryllis Society, Mr. Fred B. Jones, Pres., 521 Vaky St., Corpus Christi, Texas.

The Greater Houston Amaryllis Club, Mrs. Sally Fox, Corr. Secy., 1527 Castle Court, Houston, Texas 77006.

The Southern California Hemerocallis & Amaryllis Society, Mrs. Dorothy Rose, Secy., 10300 Rosewood Ave., South Gate, Calif.

The Amaryllis Society of Baton Rouge, Louisiana, Dr. Joseph K. Mertzweiller, 9266 N. Parkway Dr., Baton Rouge, La. 70815.

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South Africa—Mr. Leon Boshoff-Mostert, Balfour

Chile—Sr. Pierfelice Ravenna, Santiago

(AMERICAN AMARYLLIS SOCIETY, continued on page 125.)

PREFACE

The interesting cover by Penrith B. Goff, featuring *Amaryllis papilio* Ravenna, is based on a photo print furnished by Dr. James E. Shields of the Amaryllis Research Institute, Indianapolis, Indiana.

This 46th issue of the Amaryllis Year Book is dedicated to Harry Blossfeld, the renowned South American plant collector, and Amaryllidarian, who contributes a charming Autobiography and an article on an undescribed *Amaryllis* species. For his outstanding contributions to the advancement of the Amaryllids he received the 1979 WILLIAM HERBERT MEDAL.



Fig. 1. Sam Caldwell, Dean of the Lycorisarians, Nashville, Tennessee, contemplating the success in growing frost tender *Lycoris*, mainly *L. elsiae* and other commercial "albiflora" variants. When grown outside in this area, the foliage is so badly winter-damaged that they seldom bloom; with plastic covered sash for winter protection, they flower abundantly. Photo by Sam Caldwell

In this issue we celebrate also Sam Caldwell, the Dean of the Lycorisarians, who has devoted thirty years to *Lycoris* culture and

breeding (see Fig. 1). He reports success in getting seed set on *Lycoris squamigera*, a feat that so many of us have tried without results. He also presents his 1939 report. (See also 1964 PLANT LIFE.)

We are particularly happy to include articles by Dr. James E. Shields, President of the Amaryllis Research Institute. His work will till a field which the American Plant Life Society has not been able to cultivate since its main efforts have been directed toward the diffusion of knowledge about the introduction, breeding and culture of plants and the biographical details about persons connected with plant advancement. The Amaryllis Institute will devote its efforts to preserving viable breeding colonies of the various species of *Amaryllis*, and will also be concerned with the breeding and physiology of the various species. We welcome this new institution for the advancement of *Amaryllis* and congratulate Dr. Shields on a good start.

Mr. Cothran reports on yellow-, and pastel flowered hybrid *Amaryllis*; Dr. Bell writes about *Amaryllis* for breeders; Mr. Deme up-dates his program for breeding double-flowered *Amaryllis*; Kaiker and Singh, in India, report on the role of mutation breeding in *Amaryllis*; Mr. Myake, in Japan, reports on his breeding program for 6-8 flowers per umbel in *Amaryllis*, and Mr. Gerson emphasizes the need for a well-rounded *Amaryllis* breeding program.

Dr. Howard and Sr. Ravenna describe new *Hymenocallis* species from southern Mexico. Dr. Howard reports on the Woelfle and other *Hymenocallis* hybrids, and Dr. Shields contributes notes on *Hymenocallis*. Mr. Tisch writes about dwarfing from chemoalteration. Mr. Bennett contributes notes on *Crinum japonicum*; and the Mueller-Doblies report on the morphology of *Ungernia*.

There are Regional reports from the Zephyrantheae Committee by Mrs. Marcia C. Wilson; the General Amaryllid Report from Mr. Bennett; the Alstroemeria Committee by Mr. Duncan, and the North Midland by Dr. Shields.

Mr. Speed reports on blooming Zephyrantheae; Mr. Manning writes on growing *Amaryllis* and other plants in the North; Mrs. Forberg reports on growing Amaryllids in Virginia; Mr. Craft writes about *Amaryllis evansiae*, and Mrs. Lewis on the growing of the Eucharis Lily in California.

Mr. Roberts writes on the growing of Hemerocallis in southern California; Mrs. Wilson presents a charming report on the Sabal Texana Sanctuary in southern Texas.

There are still other contributions, as shown by the Table of Contents, including the reports on the Amaryllis shows in 1978, and Mrs. Pickard's Course on the judging of Amaryllis exhibits at the Regional Shows.

Contributors to the 1980 issue of the AMARYLLIS YEAR BOOK are requested to send their articles by August 1, 1979, in order to insure earlier publication of this edition. Unless articles are received on time, publication will again be delayed to June or July or even later as with some issues in the past. Your cooperation toward earlier publication

will be greatly appreciated. *Those having color slides or transparencies which they wish to use as the basis of illustrations are requested to have black-white prints made, and to submit these with their articles.*

January 15, 1979,

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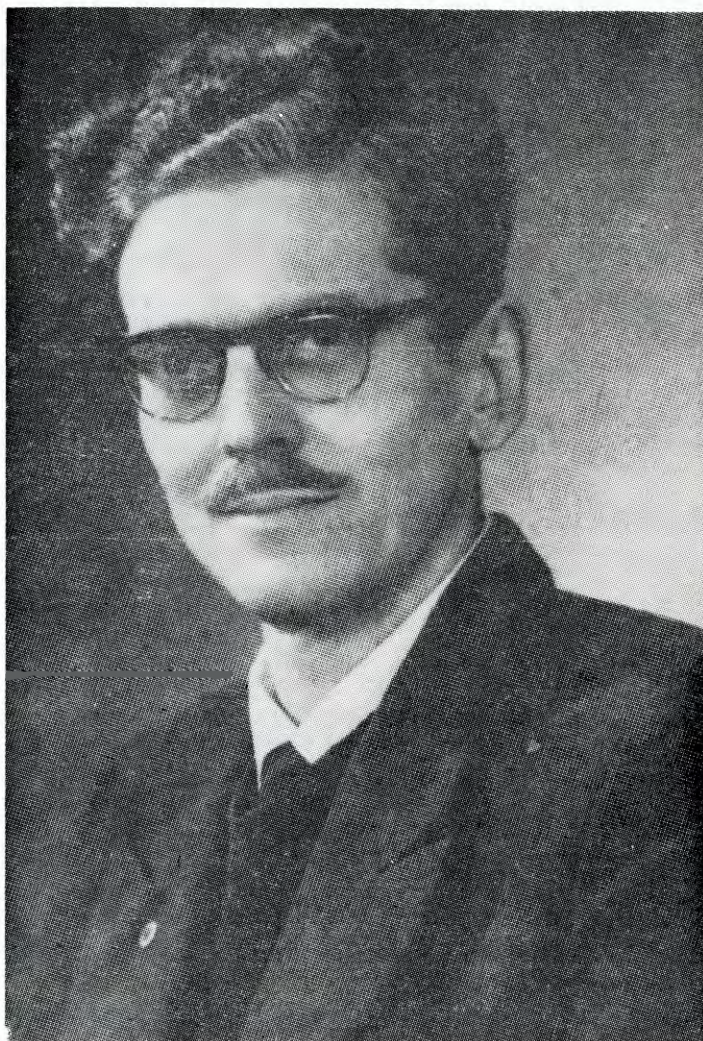
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HARRY BLOSSFELD



HARRY BLOSSFELD - HERBERT MEDALIST

HARRY BLOSSFELD

AN AUTOBIOGRAPHY

The BLOSSFELD family originated in Thüringen, Germany, a renowned center of horticulture. My forefathers were mostly horticulturists and my grandfather Carl Blossfeld, founded a nursery at Cölleda. He had two sons, both professional gardeners, and three daughters, all of them trained as florists. The two sons learned in Erfurt and Hildesheim, practiced in Belgium and became head growers at several famous orchid nurseries in Europe.

My father Robert Blossfeld settled at Potsdam, where he started in 1913 a seed and plant import and export firm. By the outbreak of World War I, he lost all merchandise, capital and trade connections. In 1920 he made a second start and already in the thirties, the firm expanded by world wide trade connections, including the introduction of *Kalanchoe blossfeldiana* to horticulture. In the sixties, the firm was reestablished at Lübeck, West Germany, under management of the writer's sister.

I inherited my scientific inclination certainly from my mother's family; my grandfather was a keen horticultural amateur and a relative of Andreas Voss, who was author of several important botanical encyclopedias and horticultural books in the 19th century. It is little wonder that I followed such massive traces of tradition. I had the benefit of professional advice in horticultural practice from my father and both grandfathers and an excellent scientific education, granted by the generosity of my father.

I was born February 27th, 1913 at Potsdam, Germany, in the very year when my father started his first independent enterprise. After college, I first entered as apprentice in the renowned nursery of the Sanssouci Park at Potsdam, where the director Paul Kache instructed his pupils one day each week in his excellent teachings on the theory of horticulture. I later had a year's practice at Hahn's Cactus Nursery in Berlin-Lichterfelde and attended the Horticultural School at Berlin-Lichterfelde, under teachers Jessen and Breschke. This was a government establishment, and in concluding the course, I obtained the official certificate of horticulturist and was distinguished as the best scholar of the year by the award of the "Beckmann" premium. I then immediately matriculated as a student of botany at the Botanical Garden & Museum of Berlin-Dahlem. There I had famous botanists as teachers: Diehls, Pilger, Werdermann, Kolkwitz, Czaja, Noack and Markgraf.

In those years, the democratic government in Germany was overthrown by Hitler. Since the students made continuous protests, drastic disciplinary measures were imposed on them which converted the German universities into barracks of *preliminary* instruction; students had but little time left for study. In my particular case it was discovered that my father had been elected repeatedly a secretary of a horticultural association and by malevolence, this was classed as "trade-unions leadership" and thus, my father suddenly had become politically

suspect, his liberal ideas aggravating the situation. This reflected unfavourably on my own career as a student. Talking over the matter with my professors, they decided to sponsor for me a special license for making botanical studies in South America.

Botanical exploration in South America had been for a long time discussed in our family; Professor Werdermann, the famous cactus specialist, had been a frequent guest in our house and his stories about his travels in Chile, Bolivia and Argentina had fascinated us all. My father had permanent plant collectors and orchid hunters in South America and there was a big market for novelties in cacti and succulents in the thirties. By curious coincidence, an old cactus collector of my father submitted a plan to collect 5000 cactus plants of the miniature type, including at least 10% of new species, within six months, if he could obtain funds to pay the expenses.

Funds became available through my father's clients in the United States of America, in England, France, Italy and as far away as New Zealand and Australia. When I got exemption from the obligatory student's "Volunteer Work Year" proving that I had worked two years as a horticulturist, I got my passport and permission to leave Germany—not an easy matter in those days. The remainder of 1934 was spent with an exhaustive study in the Museum's library, of the flora of the Andes Mountains in South America.

I sailed early in 1935 to Buenos Aires, Argentina. Already during the ship's voyage I succeeded in improving my very rudimentary knowledge of the Spanish language and on arriving, I was able to make myself understand. An old plant collector of my father, Oreste Marsoner, had agreed to lead me to the best hunting grounds for cacti. We bought a second-hand pick-up Ford T-Model, hired a driver and started the daring venture of collecting and shipping five thousand dollars worth of live plant material, to pay off the assumed contracts. The task challenged the mind and physical and mental capacity of a 21-year old greenhorn.

The guidance of an experienced plant collector was, under these circumstances, an invaluable asset. By strenuous efforts of us all, leading a Spartan life, sleeping in a tent for months, searching the wilderness beyond the roads with native guides on muleback and shipping the collected materials by railroad back to Buenos Aires, we succeeded, after seven months of travels, to gather the larger part of the required wild plant material. Our travel route crisscrossed the following provinces in Argentina: Córdoba - San Luis - San Juan - La Rioja - Catamarca - Tucuman, Salta - Los Andes - Jujuy, ending at the boundaries of Chile and Bolivia.

Among the several hundred different species of cacti, we registered about one hundred supposedly new species which were described as soon as they flowered in Europe, unfortunately not always with the necessary complete range of observations. Of course we also collected other interesting plants: Bromeliads, Orchids, and also several Amaryllids. One of our most exciting discoveries was a big grove of *Amaryllis immaculata* in the Quebrada del Toro, Province of Salta, of which we shipped a lot of bulbs to Messrs. Tubergen in Holland and

a few dozen to Las Positas Nursery in California. We found also several *Zephyranthes*, *Bomarea*, *Cypella*, *Habranthus* and two *Amaryllis* species which were never identified.

My second collecting expedition started January, 1936 and had the purpose of searching for seeds at the most promising areas for cacti, that we had discovered during our first trip. I travelled alone this time, to reduce expenses. The whole output of seeds, was shipped to my father's firm, which distributed these seeds in Europe. Even now, forty years later, from these seeds new cactus species have been raised and described.

When I arrived at the boundary of Bolivia, the Chaco-War between Bolivia and Paraguay had just been ended by an armistice. It was not without difficulties, to obtain a passport visa to travel in Bolivia, but I succeeded visiting the pre-Andean mountains of southern Bolivia, around the beautiful town of Tarija, during six weeks. Most of the plants gathered there were new species.

After crossing the Bolivian Altiplano from south to north by the "Transandino Railway" I paid a short visit to La Paz and visited the famous Inca Ruins of Tihuanaco, crossed Lake Titicaca in an Indian sailing-boat and entered Peru for a period of six months.

This was my first travel in Peru, and I decided to concentrate my collections in three areas, in the south, center and north of that country, where communications are easier. My first headquarters were at Arequipa, where I explored the foothills of Chachani and Misti Volcanoes and the desert Pampa de las Joyas, where I found the *perfect imitation of a lunar landscape* than may be found on earth, the only place that I remember to be *totally bare of any vegetation*. Though still terribly dry, the Pacific Coast of Peru benefits from seasonal drizzling rains and consequently shows a permanent flora of cacti and a short-lived but vigorous cover of herbage in which *Hymenocallis* species with white or yellow flowers are examples of outstanding beauty.

My second headquarters were at Lima, the capital of Peru. Presenting myself to Professor Weberbauer at San Marcos University, I obtained first-hand informations on prospective collecting areas for cacti and I also had the privilege of partaking in a botanical excursion to the Amancay Hills to admire millions of *Hymenocallis* in bloom under the drizzling rain and a confusing mist of that season. Working my way from Lima up the Andes, along the famous Inca-Road to Oroya at 15,000 feet altitude, I penetrated the eastern slope, sources of the Amazon River, with a moist, subtropical climate, where I gathered a fine collection of orchids for the New York Botanical Garden. Going back to Lima, I packed and shipped my plant collections and after a visit to the Agricultural Experiment Station of La Molina, decided to make a little excursion on foot into the desert hills, where almost every valley contains treasures of rare or even new species of cacti. On this excursion, I became so fascinated by the incredibly colorful glow of the approaching sunset, that I entirely lost my way and only realized it, when suddenly and almost abruptly, darkness envolved me. In that pitch-dark night I had to stumble my way out through twelve miles of

steep sandy hills, aiming at the Pan American Highway that runs along the coast. I still think, the inconvenience was worth while to admire the sunset in the desert of Peru.

From Lima I travelled by Pan American Highway to Piura, near the boundary of Ecuador. The district of Ayavaca is rich in orchids, bromeliads and cacti and in former centuries, the woods furnished hundreds of tons of china-bark, a specific remedy against malaria fever. The trees that produce this bark are now practically eradicated. Returning from an excursion, with a bagful of orchids, bromeliads and cacti, I met an automobile without anyone in it, on that desert road, and while still wondering about the empty car parked at the roadside, there emerged from the jungle *first the Peruvian driver and then the passenger: Professor Weberbauer*. Our surprize about this casual meeting was mutual and soon we showed each other our collected plant material and the professor told me he had made this collecting trip to observe and gather material of the various *Cinchona* species which furnish china-bark. In spite of the scarcity of these trees, he had been successful and I received a two-hour lesson on the history, early exploration and almost eradication of these trees, which led English and Dutch explorers to gather seeds and small plants for transfer to India and Indonesia, where plantations were started successfully. I was so impressed by this story, that during the following forty years I gathered informations and literature on the matter and hope to publish a book on the history of the Chinine-Tree.

I returned to Buenos Aires by steamer, via Chile, crossing the Andes Mountains between Santiago and Mendoza. After a month of rest in Buenos Aires, I combined a third collecting expedition with my former guide Marsoner. We searched in Northeastern Argentina, northwestern Uruguay and southern Brazil, during a month, completing our cactus collections. On this travel, we met the remainders of 17th century plantations of the Mate Tree, started by the Jesuit Missionaries and which were presently being restored by encouragement of the Argentine Government. The French botanist Bonpland had pioneered the idea of Mate plantations. Mate is the almost exclusive tea used in Chile, Argentina, Paraguay and southern Brazil.

On my arrival at São Paulo in Brazil, by end of 1936, I had the the satisfaction of fulfilling my contracts to the entire approval of my clients, but had not made a profit, except the thrill and the experience of two years of travels in South America. My original plan had been of course, to return to Germany and settle down to a scientific career. However in those years of pre-war tensions prospects for concluding my studies at the German universities were frankly discouraging. Friends in Brazil warned me that there would be war in Europe. When my father wrote me that he had orders for several consignments of orchid plants, I therefore decided to collect and ship these plants, trying to make a sufficient profit for a prolonged stay in South America, until the situation in Europe had quieted down.

Thus, early in 1937, I definitely embarked on a career as plant collector. I soon became captivated by the prodigious flora of Brazil,

admiring the beautiful landscape scenes, familiarizing myself *with* the Portuguese language and profiting from the then very low cost of living, and, last but not least, getting married. Surplus plants brought back from my numerous collecting trips were at first planted in the gardens of several friends, but soon I bought a suburban tract of land, installed lath houses and shade trees and later converted this into a private botanical garden. By exchange of seeds and plants, I got exotic species too and my garden tends to be perpetually overcrowded.

During excursions into the Organ Mountains, I re-discovered *Worsleya raineri* and shipped a few bulbs and seeds to California and Holland, and wrote a report on that plant for "HERBERTIA, 1938". I also found and started growing bulbs of *Amaryllis aurica* and several other Brazilian *Amaryllis* species. I had a nice collection of Gesneriads and of *Begonia* species and my wife, who is interested in plants as I am, developed a fancy to ferns and *Philodendron*, *Anthurium* and other aroids.

My father, though understanding my decision to stay in South America, never really approved the idea of abandoning a scientific career. With the secret purpose to persuade me to return to Europe and "invest my experience", he sailed July, 1939 to Brazil, not suspecting the imminence of war. By the outbreak of World War II, much against his desire, he could not return and decided to dedicate himself to the care and development of my plant collections.

As a consequence of the war, plant and seed exports to Europe ceased almost immediately and we had to adapt our small nursery to keep going as a local business, supplying the Brazilian orchid amateurs with suitable plants. Our assortment of Brazilian native species had to be enlarged by others from Colombia, Peru, Ecuador, Venezuela and Mexico. To supply this need, I decided to make another collecting expedition.

The first task was to re-discover the habitat of *Cattleya rex*, found 1890 by Bungeoth in eastern Peru and which had since completely disappeared from cultivation. After three months of strenuous travels and search in the valleys of Marañón, Huallaga and Ucayali I succeeded in obtaining the necessary number of plants, most of which were shipped to the United States and a few to São Paulo. During this travel I found a different *Cattleya* with smaller yellow flowers, which has since been described as *C. blossfeldiana* but which I believe to be a supreme geographical form of *C. luteola* of Brazilian origine. On my way to Colombia I crossed Ecuador and had opportunity of collecting *Cattleya maxima*, another rare and beautiful orchid species.

In Colombia I remained six months, mostly engaged in collecting orchid plants for horticultural firms in the United States, and of each good commercial species, I shipped a few cases to Brazil. When the U.S. declared war against Germany, my letters of credit on account of orchid shipments were frozen since I was a German citizen. Almost simultaneously, the Government of Colombia put in force a law, forbidding strictly exports of live plants from wild sources. An absurd consequence of this was, that a splendid lot of eight hundred plants of

Cattleya warscewiczii ready for shipment to New York was confiscated at the pier of Barranquilla and officially incinerated. Besides, there were evident signs that in short, the government of Colombia too would declare war against Germany and in that case, I would have to stay in an internment camp. Therefore I tried to return to Brazil and to join my family as quickly as possible. I had not sufficient money to return the same way I had come, nor could I return by ship. There was no air connection to Brazil at that time.

I decided therefore, to return by Caqueta and Putumayo Rivers, right across the "Green Hell" of upper Amazonas. This travel was neither easy, nor quick, nor safe. The first part, made by dugout-canoe was frankly daring and tiring and reminiscent of the account published by the English botanist Richard Spruce, who made the same trip in the opposite direction, 83 years earlier.

I arrived at Manaus in Brazil, seriously ill, shivering with fever and physically exhausted. My health was restored by competent treatment under Dr. Canuto de Azevedo at Belem of Pará; this gentleman was an enthusiastic orchid amateur and had bought many plants from me in previous years.

After arrival at São Paulo, though still in failing health, I was still dedicated to orchid growing. In 1944 my father died and a year later a pulmonary affection, which made it necessary for me to retire from horticultural activity for many years.

Forced to a stricted activity, I became a member of the Editorial Staff of a Brazilian Agricultural periodical; published several books on horticulture and gardening in Brazil, and studied all botanical and horticultural literature I could obtain. In 1964 my health was restored by thorax surgery, but my physical strength is impaired by bronchial deficiency, which puts an end to further botanical exploration travels.

After 1965, I contracted service with several public and private institutions, as advisor for botanical and horticultural problems, and collaborator with landscape architects and city development projects. During periods of less activity, I divide my time between botanical studies of living plants and writing. Actually I am finishing a manuscript of the Second Edition of my book on Gardening in Brazil, which I expect to finish this year. Future plans include historical studies on several economic crops, among which are: Coffee, Vanilla, China-Bark, Brazilwood, Sugarcane, Cacao and Mate. All of these plants had important roles in the economic and political evolution of Latin America.

As to my engagement with *Amaryllis* cultivation, collection and study, I have a nice collection of species, totalling some 120 to 150 plants in pots. My idea is to transfer this collection to another locality with a milder and more equable climate than we have here at 3000 feet altitude. I expect to plant them out in beds, under the light shade of small-leaved trees. After retirement, I will then have a better chance to observe them under optimum conditions than presently.

I believe, that many more *Amaryllids* exist unknown and that several of the described species are yet imperfectly studied and require amendments to their old "classic" diagnosis. I strive to maintain my

species material pure, avoiding cross-pollination. In the past, I have distributed pure species seed to many individuals and institutions all over the world, but rarely I have received later comments of the resulting plants. People seems to keep their information a secret, or dislike to communicate their observations.

Therefore I am convinced that publications in the style of the Plant Life Magazine are an excellent means to acquaint plant lovers with each other, and document observations, experiments and habitat reports on new or little known species.

NOTES ON AN **AMARYLLIS** SPECIES FROM BRASIL

HARRY BLOSSFELD, *Rua Pedro, 360 - 02371,*
02371 - São Paulo, Brasil

Bulbs were gathered in full bloom, growing in crevices of a steep granite rock known as "Pedra Grande" near the little town of Atibaia, 67 kilometers north of São Paulo, collected February, 1972.

Bulbs measured 42 cm (=16½") in circumference or 14 cm in diameter. Shape globular, with a 10 to 15 cm long neck, clothed by brownish-black tunics. Bulbs are not stoloniferous and mostly grow singly.

Leaves emerge after flowering, from 8 to 11 per bulb. Measure 100 to 120 cm long and up to 5.5 cm broad, being shallowly keeled, pale green with a pruinous greyish tunic and a very narrow greyish rim.

Flower scape 40 to 42 cm long, hollow, slightly oval in cross section, tapering from 1.8 cm diameter at base to 1.5 cm at tip, pale green and covered with a greyish pruinous powdery coating and slightly reddish near the base. Season of blooming: late summer and early fall, that is in southern Brazil, February to April. Sometimes repeating six months later.

Umbel two-flowered, from two green *spathe valves* that wither while flowers open and measure 2.2 cm broad and 8 cm long. Two narrow bracteoles of 5.5 cm length. *Pedicels* at anthesis 3-6 cm long and 0.6 to 0.8 cm in diameter. When *seed pods* are ripe, *pedicels* have elongated to 12 to 15 cm in length.

Ovary 1.6 cm long, almost cylindric, 1 cm diameter and vividly contrasting by the lustrous green colour against the pruinous pedicels.

Tepaltube about 1 cm long, clear green, with a triangular opening, showing a border of tiny denticulations or scales of pale green colour.

Perigone wide spread open, making a stately big flower of up to 18 cm diameter; length, measured (without tepaltube) of 12 cm. Segments are almost equal, between 3.5 and 4.5 cm broad, the lowermost only slightly narrower. Each segment has on its back a prominent green keel. General colour is a bright pastel red.

Inside pattern of perigone is characterized by six pure green central stripes radiating from the center to 2/3 length of each segment; on both sides of this central stripe is a purple area, from which radiate about 10 purple veins to each side, some of these forked and diluting into the reticulate marginal and apical areas, of the same bright *pastel* red colour of the outside of flower.

Style 12 cm long, green at base, then crimson. *Stigma* trifid, with 0.4 cm long branches, crimson at anthesis, showing a white surface after spreading apart.

Filaments 10 cm long, green at base, tips crimson. Anthers on anthesis to 1.2 cm long, grey to pale violet; after splitting, showing yellow pollen and shrivelling considerably in size.

Seed pods (fruit) takes two months to ripen and show remarkably big dimensions: 5 cm in diameter and 4 cm in length. *Ovules* about 180 per pod, but rarely more than 100 to 120 seeds are developed. *Seeds* are of a more rigid texture than most other *Amaryllis* species, measuring 14 by 11 millimeters and are mostly D-shaped and glistening black.

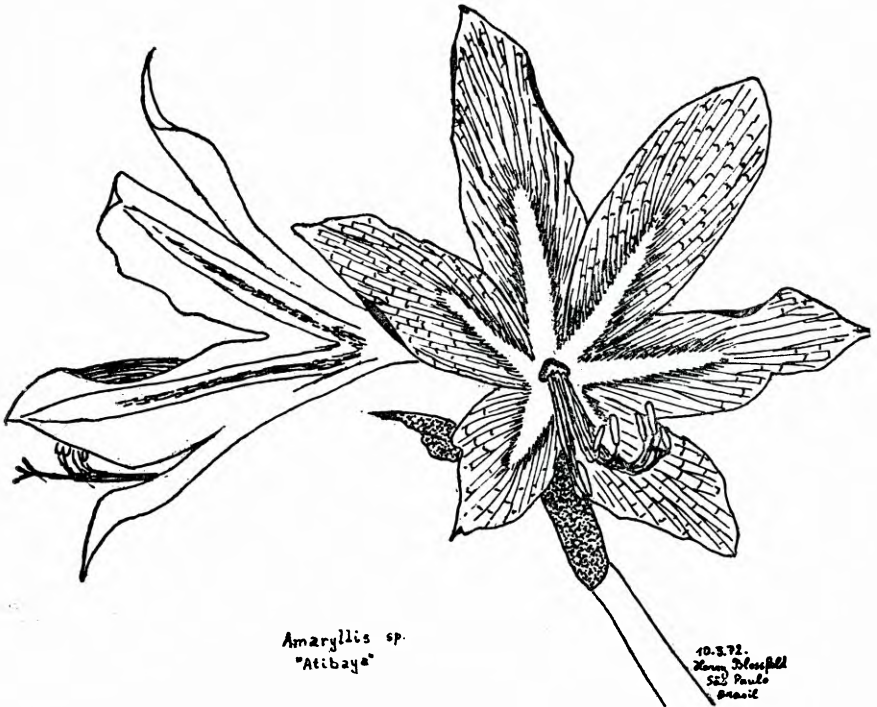


Fig. 3. *Amaryllis* species, from Pedra Grande near Atibaia, Brasil. See text for further comments. From drawing by Harry Blossfeld

Comments: Herbarium material and living plants of this species were gathered by the late botanist F. C. Hoehne before 1946, who registered it in his book "O Jardim Botânico de São Paulo" at page 314, stating the type locality as Pedra Grande near Atibaya, classifying it by the synonym, "*Hippeastrum ambiguum* Herb."

In his "The *Amaryllis* Manual" (1958) Dr. Traub includes *Hippeastrum ambiguum* var. *tweedianum* Herb. as a synonym of *Amaryllis vittata* var. *tweediana* (Herb.) Traub, and indicates its "range Central Brazil, Collected by Tweedie, specimen (type) in the Hooker Herbarium,

according to Herbert (1837)”. Traub believes this plant to be identical with a plant collected by Nelson at Santa Cruz, Bolivia.

A study of the life and travels of Tweedie, apparently the discoverer of the plant, reveals, that this collector emigrated in 1825 to Argentina, where he worked as a landscape architect in the province of Buenos Aires. He started as a plant collector in 1832, when the British minister residing in Rio de Janeiro contracted him as travel companion on his way from Buenos Aires to Rio. Both collected about 1000 herbarium specimens on this route, which started by the river Uruguay and continued on horseback through southern Brazil. On their way they must have touched São Paulo and most probably passed through Atibaya, the traditional first rest-place of travelers to Rio de Janeiro. It is very probable that they gathered this *Amaryllis* species there.

Tweedie returned from Rio de Janeiro to Buenos Aires by ship and 1835, traveled westwards, reaching Tucuman but never beyond to Bolivia. In 1837 he again traveled from Buenos Aires to the south, reaching Mar del Plata. The identity of Herbert's *Hippeastrum ambiguum* var. *tweedieanum* with a species collected in Santa Cruz, Bolivia is, from this evidence, improbable, because the latter is 1000 kilometers distant from Tweedies most western locality (Tucuman) and 1800 kilometers from São Paulo and Atibaia, the latter stated by Hoehne as being “the classic locality of this species”.

A comparison of my descriptive notes on the plants gathered at Atibaia with the original description by Herbert (which I do not have) and investigation as to the herbarium material in the Hooker Herbarium may clear up this matter in the near future. A drawing of my plant is shown in Fig. 3. The plant is really a beautiful species. Its cultivation has offered no difficulty under sub-tropical climatic conditions, since the habitat is precisely on the division line between the tropics and temperate region, and at an altitude of 700 meters (2000 feet) above ocean level.

THE AMARYLLIS RESEARCH INSTITUTE, INC.,

respectfully requests your assistance in realizing our purposes of

1. Perpetuating species of the Genus *Amaryllis* by preserving viable breeding colonies of the various species,
2. Studying the breeding and physiology of these plant species, and
3. Supporting exploration in their native habitats for new species of *Amaryllis* and supplementing the breeding stocks of known species.

The Amaryllis Research Institute, Inc., is a not-for-profit corporation under the laws of the State of Indiana. It was founded to preserve, propagate, and study plants of the amaryllis family. Our chief activity is to establish an Amaryllis Germplasm Reservoir to preserve in North America viable breeding colonies of threatened or potentially threatened species of the South American genus *Amaryllis*, Linnaeus (synonymous with *Hippeastrum*, Herbert). Among these species were the original wild ancestors of the familiar modern commercial hybrid amaryllis. Many were then lost to cultivation for over a hundred years—until recently rediscovered.

Your tax-deductible contribution will help the Institute to gather together living specimens of existing plants in North America and to begin breeding for fertile seed strains of each species that is available.

Scientific studies of the breeding and physiology of *Amaryllis* have been funded by a small starter grant from the Indiana Academy of Science. These funds, of course, can be used only for the limited purposes specified in the grant. It is the goal of the Institute to extend and continue these studies with funds contributed by the plant-loving members of the worlds of gardening and horticulture.

Eventually, it is hoped that the Institute will be able to support occasional collecting expeditions to bring seeds or bulbs back from South America to strengthen and broaden the breeding program.

Annual memberships are offered with contributions of \$5.00. Members will receive the Annual Report of the Institute, as well as any occasional publications issued by the Institute. Members will also be eligible to participate in distributions of surplus seeds as these become available from the Institute's projects.

If support warrants, a list of members with addresses and special interests will be issued to members, and a "Beginner's Handbook of Botanical *Amaryllis* Culture" is under consideration.

Write to: Dr. James E. Shields, President, The *Amaryllis* Research Institute, Inc., P. O. Box 50121, Indianapolis, IN 46250.

THE AMARYLLIS GERMPLASM RESERVOIR

JAMES E. SHIELDS, *President*

The Amaryllis Research Institute, Inc.

P. O. Box 50121, Indianapolis, Indiana 46250

On May 4, 1978, the *Amaryllis* Research Institute was incorporated as a non-profit organization at Indianapolis, Indiana, to provide an administrative structure for the *amaryllis* germplasm preservation project.

It should be no surprise to readers of *PLANT LIFE* to see the need for a program to rescue the botanical species and varieties of the genus *Amaryllis* expressed in print. Many of these species are becoming rare in their native South American habitats due to human activities. Collecting expeditions have ended, at least for the time being; and it is difficult for North American botanists and horticulturists to establish useful contacts with their South American counterparts. Furthermore, many species are represented in North American collections by only a very few clones. It is almost certain that several species are known in cultivation from a single clone and its vegetative offspring.

The primary purpose of the *Amaryllis* Research Institute is to establish and maintain an *Amaryllis* germplasm collection in North America. Additional aims include research into the physiology and taxonomy of the *amaryllids* as well as the dissemination of knowledge of the plants of the *Amaryllidaceae*. The last-named goal might duplicate the efforts of the American Plant Life Society, but it is our firm intention that such duplication shall not occur.

At the moment, the germplasm collection has its physical home in the bench space of the small home greenhouses of three of the members of the board of directors of the ARI, in suburban Indianapolis. Its contents, as of the date of writing, are given in an appended article. One of the greenhouses serves as a quarantine station for holding virally-infected plants and those suspected of harboring viral infections. Each accession is given its own serial number and is tagged to distinguish it from the personally owned plants with which it shares greenhouse space. Each plant's history is recorded under the accession number in the research records of the Amaryllis Research Institute. Indiana and Federal tax laws require strict accountability for the assets of non-profit organizations, and we will be required by these regulations to rigorously maintain the integrity of the live plant materials of the Amaryllis Research Institute, as these will constitute its principle assets.

The concept of preserving Amaryllis species is not original with this writer; Russell H. Manning suggested it several years ago. J. L. Doran implied its necessity in numerous published accounts and private communications, as he described the disappearance of old *Amaryllis* habitats due to the expanding human populations in South America. Dr. Hamilton P. Traub added many of the finishing touches in a single brief letter to this writer. The idea has also occurred to many others interested in these plants.

Encouragement and moral support have come from all corners of the United States: Dr. Gordon H. Svoboda, of Indianapolis, Indiana; Drs. Richard Evans Schultes and Timothy Plowman, of the Botanical Museum of Harvard University; Harold F. Winters and Margot Williams, of the U.S.D.A. in Maryland; Dr. W. D. Bell, of Gainesville, Florida; Sterling S. Harshbarger, of Pasadena, California; Drs. Thomas W. Whitaker and Hamilton P. Traub, of La Jolla, California; J. L. Doran, of Burbank, California; and Russell H. Manning, of Spring Valley, Minnesota.

GERMPLASM RESERVOIR

The germplasm reservoir is so-named to indicate the dynamic nature of the concept on which it is based. Rather than a "static" collection of seeds stored far below freezing in a cryostat, it is intended to become a breeding colony for each of the species it may contain.

Several parental clones of each species selected for the Reservoir are being sought, so that a reasonable degree of genetic diversity within the species can be maintained. For there to be a "breeding colony" means producing fertile seeds, growing seedlings to maturity, and further breeding. However, whereas the hybridizer seeks to attain some ideal of flower or plant perfection, the goal of the Reservoir must be to preserve *all* the genetic forms possible from the wild stock. Someday, it could conceivably become necessary to re-introduce these species back into their original habitats, using our Reservoir as the source of plants. The Genus *Amaryllis* may be suffering extirpation from their native habitats at present, but it is unthinkable that the indifference to the fate of these magnificent South American wildflowers could persist in their homelands.

SCIENTIFIC IMPLICATIONS

Physiology of Self-Sterility. It is highly likely that several species of *Amaryllis* will be available only as a single clone. Most species are also apparently self-incompatible; i.e., they will not produce viable seeds from their own pollen. The possible mechanisms of this are discussed by Heslop-Harrison (1975). It probably involves biochemical interactions between the pollen grains and the surface membranes of the stigma, or between the pollen-tube membranes and the membranes lining the channels of the style. It may be possible to overcome this evolutionary device to allow selfing of single clones in the laboratory. After two or three generations of this biochemical manipulation, it may be possible to find strains of seedling-grown plants which can produce fertile seeds naturally on crossing. This is clearly less desirable than breeding directly from a fairly large pool of diverse parental clones, but it may offer some advantages over straight vegetative propagation. This latter method will, of course, be kept as a last resort to preserve a plant species and propagate it.

The process of overcoming self-incompatibility will almost certainly yield seed-pods with few viable seeds and little likelihood of maturing and ripening normally on the scape. Fortunately, Dr. Bell has developed and published methods of embryo culture *in vitro* which will enable us to overcome this obstacle readily (Bell, 1972).

It is also possible that we may be compelled to resort to meristem propagation *in vitro* in cases of virus-infected clones or of single-clone accessions which cannot be forced to set seed by their own pollen. The methods of tissue culture propagation of *Amaryllis* described by Nowicki and O'Rourke (1974) and by Bell (1973) will give us a sound starting-point for such work, should it become necessary.

Taxonomy and Genetics. The cultivation of numerous independent collections of purportedly conspecific plants in the same greenhouse will offer some unusual opportunities for taxonomic studies based on plant habit and gross morphology. As F1 and F2 generations of seedlings from these parental clones mature, further insights into relationships will become possible. If methods are indeed found for generally overcoming self-sterility barriers, F1 seedling plants from selfed parental clones will reveal the breadth of genetic variability inherent in the individual clones. This will provide yet another system in which to increase our knowledge of the taxonomic interrelations of the various populations of the genus *Amaryllis*.

Mechanisms of Genetic Isolation Among Sympatric Populations. This is an area of botanical research in which the most formidable obstacles stand between the intentions and hopes of the founders of the *Amaryllis* Research Institute and their realizations. For only by supporting trained botanists in the field can it be hoped to succeed in the final resolutions of the perplexities of *amaryllis* speciation. The following list is not intended to be more than a preliminary suggestion of the types of phenomena that the evolutionary biologist must study directly in the habitats of the species in question:

I. *Pollination-vector isolation.* This is a well-known process in the

Orchidaceae, and has been extended to other types of plants and vectors in a recent paper by Sussman and Raven (1978). For instance, moths are nocturnal and prefer white flowers; fragrance also presumably plays a role in the interaction between nocturnal lepidopterid pollination vectors (i.e., moths) and the plants which depend upon them. On the other hand, hummingbirds are diurnal pollinators, and are strongly attracted to the color red; they are also apparently indifferent to fragrance. Bees are diurnal and partial to almost any bright colors. Bats are nocturnal and nearly indifferent to color while reacting strongly to fragrance.

II. *Temporal Isolation.* By having different blooming seasons, two populations can remain totally isolated from one another genetically while growing literally side-by-side. Even so subtle a temporal segregation as having their stigmas receptive to pollination at different times of day or night could provide this isolation between plants blooming together at the same seasons.

It is possible to postulate mechanisms of genetic isolation among sympatric populations that could be investigated in an institution such as the Amaryllis Research Institution aims toward becoming. Two such areas of scientific research might be the following:

A. *Chromosomal isolation.* If two species of amaryllid, each having the same chromosome number (i.e., two diploids with 22 each) proved to be impossible to cross, the reason might well lie in an inability of their chromosomes to pair correctly at meiosis, leading to inviable aneuploid gametic structures (Bell, personal communication).

B. *Physiological Incompatibility.* An apparently undemonstrated hypothesis (Heslop-Harrison, 1975) which could involve a parallel mechanism to the self-incompatibility mentioned above, but involving a marker-receptor system for recognizing and rejecting "foreign" (i.e., non-conspecific) pollen. This system could arise by a suitable gene-doubling and mutation within what was originally a single interbreeding population. I personally find this a tantalizing concept.

A PERSONAL NOTE

An explanation of the necessity for founding an independent corporate entity at this particular time, the Amaryllis Research Institute, requires delving into the founder's (this writer's) personal situation. I am a salaried employee of Eli Lilly and Company, with the position of a senior scientist in the biochemical research department. My salary is comfortable, but my financial resources are limited; in any case, I have a wife and a growing daughter to support. The considerable indulgence of my wife, Irma, has allowed me to crowd our present home with extensive beds of daylilies and a home-made 8 ft X 10 ft greenhouse. Our typical suburban half-acre lot has little room left to turn the lawnmower around in. The greenhouse is the principle abode of the Amaryllis Germplasm Reservoir and my remaining personal collection of *Amaryllis* species and hybrids. We find ourselves forced to acquire more living and gardening space; hence, the recent purchase of 5 acres of beautiful cornfield a few miles farther out of Indianapolis. On this land, we are

going to build a new home and an attached greenhouse of as large a size as our financial resources will allow. By the time you read this in print, the home and greenhouse will be nearing completion if all goes as planned. That greenhouse is the primary hope of a home for the *Amaryllis* Germplasm Reservoir for the foreseeable future. An attempt to affiliate it with an established botanical garden failed, due to their own financial limitations. The tax laws in this country are not overly generous in dealing with hobbies as such. My only recourse—aside from abandoning the idea of rescuing botanical *Amaryllis* species and varieties entirely—lay in creating a tax-sheltered organization and attracting the support of others in the world of plant lovers. A quirk of the tax laws also forces us to seek as large a number as possible of individual, private contributors of modest sums: to qualify as a "Public Charity" (i.e., one eligible to receive grants from Foundations, etc) a minimum of $\frac{1}{3}$ of our organization's income must come from these modest donations from the general public.

You, the members of the American Plant Life Society, are part of that "general public" and the most reasonable prospects for such support. BUT IT WOULD BE THE EXTREME OF FUTILITY WERE ANY OF YOU TO DROP YOUR AFFILIATION WITH AND SUPPORT OF THE AMERICAN PLANT LIFE SOCIETY IN ORDER TO SUPPORT THE AMARYLLIS RESEARCH INSTITUTE! Any weakening of the APLS would only undermine the aims and purposes of the ARI. We sincerely request the aid of those of you sympathetic to our project, but *not* if it means choosing between the APLS and the ARI.

Contributions of live plant materials to the *Amaryllis* Germplasm Reservoir are most welcome, where the species are available as offsets or as seeds. Hybrids should not be donated without prior consultation; and it is especially important that virus-carrying plants be clearly so marked and kept segregated from uninfected plants.

ORGANIZATION OF THE AMARYLLIS RESEARCH INSTITUTE

As a Not-for-Profit corporation under Indiana law, there must be a Board of Directors of at least three members, and at least two officers, both of whom may or may not be members of the board. The Board of Directors of the ARI is made up of the following five individuals: James E. Shields, Ph.D., President and Member of the Board, Research Scientist; Eli Lilly & Co., Indianapolis, Indiana; Bruce H. Frank, Ph.D., Research Associate, Eli Lilly & Co., Indianapolis, Indiana; Charles R. Epperson, D.D.S., 1619 W. 86th St., Indianapolis, Indiana; Calvin E. Higgins, Research Scientist, Eli Lilly & Co., Indianapolis, Indiana; and Klaus K. Schmiegell, Ph.D., Senior Organic Chemist, Eli Lilly and Co., Indianapolis, Indiana.

The Secretary-Treasurer's office is currently held, somewhat reluctantly, by Mrs. Irma Shields, wife of the president. Legal niceties require that the Corporation hold at least one meeting each year of the Board of Directors at which a majority of the members are present. For this reason, and a total lack of travel funds, the Board members

were chosen from the founder's circle of friends in the Indianapolis area. Mr. Higgins and Dr. Schmiegel are experienced home greenhouse operators; Dr. Frank has had wide experience on the boards of community service organizations; Dr. Epperson has the experience of maintaining his own professional corporate organization.

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SPECIES AND HYBRIDS OF AMARYLLIS IN THE GERMLASM RESERVOIR

The following list covers the types of plants represented in the Amaryllis Germplasm Reservoir as of approximately July, 1978. Many are gifts to the Amaryllis Research Institute, while others, in particular some rare and very valuable plants, are on loan to the ARI for use in breeding. Loaned plants and their vegetative propagations must be returned to the lenders on demand.

AMARYLLIS SPECIES	NUMBER OF CLONES	COMMENTS
aglaiae	3 sibs	unbloomed seedlings
anzaldoi	1	virus suspected
argentina	1	
autila	many	
belladonna	many	
belladonna <i>semiplena</i>	1	
belladonna #E16-1	1	
blossfeldiae	many sibs	small seedlings
blumenavia	1	
calyptrata	1	
evansiae	many	
fosteri	4 to 6 sibs	unbloomed seedlings
fusca	1	
fragrantissima	1	
flammigera	2	
"leopoldii" #A17	1	one virused plant and one uninfected offset
mandonii	1	
moreliana	1	
neoleopoldii	3	unbloomed seedlings
papilio	1	
parodii	5 sibs	small seedlings
psittacina	1	
petiolata	2?	one pot is virused
reginae	1	
reticulata	2	
stylosa	1	virus infected
tucumana	1	
PI390623, -629, -630	3?	
Cheese & Watson 5038	1	
Cheese and Watson 5217	1	
Doran #1278	1	
Doran #1323	1	
Doran #1525	1	

The following hybrids are held in the ARI collection only until parental clones of their species parents can be obtained:

aulica x *forgetii*
correiensis x *fosteri*
evansiae x *reticulata* x *braziliana*

lapacensis x *nelsonii*
traubii dorianiana x *aulica stenopetala*
 (E16-1) x *traubii dorianiana*

PRESENTATION OF THE 1978 HERBERT MEDAL TO DR. WALTER S. FLORY, JR.

In behalf of the Board of Directors of the AMERICAN PLANT LIFE SOCIETY. Provost Edwin G. Wilson, WAKE FOREST UNIVERSITY, Winston-Salem, North Carolina, presented the 1978 WILLIAM HERBERT MEDAL, awarded for outstanding contributions in the field of the *Amaryllidaceae*, particularly in the field of caryology (chromosomes), and evolution of species, to Dr. Walter S. Flory, Jr., at the WAKE FOREST UNIVERSITY CONVOCATION, at Winston-Salem, North Carolina, in Wait Chapel, on September 5, 1978.

THE EDITOR'S MAIL BAG

Dr. Robert Smirnow, Route #1, Huntington, N. Y. 11743, of the firm of Louis Smirnow (85 Linden Lane, Glen Head, P. O. Brookville, Long Island, N. Y.) who have done wonders in *Peony breeding* as shown in their booklet, "Tree Peonies", has become interested in *Lycoris* breeding. I do hope that Dr. Robert Smirnow can do for the fine Genus *Lycoris* what the Smirnows have accomplished with the Genus *Paeonia*.

With this issue we welcome Mr. James Elsol of Queensland, Australia, as a member of the Society, who has been asked to furnish an Australian Newsletter for each issue.

Mrs. Nell Keown, of Mobile, Alabama, writes, under date of July 12, 1978, "We had word that Mrs. Boshoff-Mostert of South Africa, will be visiting the United States in September. She leaves South Africa on September 3, going to Rio, Brasil, Miami, Orlando, and will be in Mobile September 26th through 30th. It seems her husband died in 1976, and she had to dispose of everything except her *Hemerocallis*, which are her main interest now. She offered to speak at our *Hemerocallis* Club while here. Arrangements are being made. I sent to Germany for the *Traub-AMARYLLIS MANUAL* as soon as I read about it in *PLANT LIFE*, but they had already sold out."

We are saddened to report the death of Mulford B. Foster, the Dean of the Bromeliadarians, and Amaryllid enthusiast, and 1951 WILLIAM HERBERT MEDALIST, at the age of 89 years, August 28, 1978, after 4½ years of paralysis; organically he was in excellent condition.

The Editor enjoyed a visit from Hubert C. Monmonier, 2305 Bella Vista Drive, Vista, Calif. 92083, on Tuesday, December 12, 1978. He is an outstanding amateur grower of *Cactus* and other succulents, and Amaryllids.

John Bond reports on *Agapanthus* Trials, from Wisley, in The Garden (Jour. Roy. Hort Soc.) Vol. 103(8): 315-318. Aug. 1978, in-

cluding many awards made for outstanding blue-, and white-flowering selections. The clone, 'Loch Hope' (Savill), dark blue flowers, extends the flowering season to late September and even into October. It is 3 feet in height.

The members should note the change in address of Mrs. Emma D. Menninger, from 1030 Old Ranch Road, Arcadia, Calif. 91006 to 546813 Paseo del Lago East, Laguna Hills, Calif. 92653.

1. REGIONAL ACTIVITY AND EXHIBITIONS

1978 AMARYLLIS SHOW SEASON

The 1978 Amaryllis Show season began early on April 1st with the Sixth Intra-Club All Horticulture Amaryllis Show, in New Orleans, and in Texas with the Corpus Christi Amaryllis Show, on the same date. However, The Greater Houston (Texas) Amaryllis Club Show, scheduled for April 2, could not be held due to earlier severe winter weather that delayed blooming of Amaryllis generally. The New Orleans Official All-Horticulture Amaryllis Show was held on April 8, but the Houston (Texas) Amaryllis Society Show, announced for April 9th had to be canceled due to previous inclement winter weather. The Southern California Official Amaryllis Show was held on April 22nd and 23rd; and the Mobile (Alabama) Greater Gulf Coast Amaryllis Society Show took place on May 6th and 7th. The Show season ended with the 1978 Extravaganza which was held at the Los Angeles State and County Arboretum at Arcadia, California, June 10th and 11th.

NOTE TO AMARYLLIS SHOW ORGANIZERS

It is important to designate some one to write a *brief* review of the official show, and to send this promptly to Dr. Hamilton P. Traub, Editor. Amaryllis Year Book, 2678 Prestwick Court, La Jolla, Calif. 92037. *Your plans are not complete until this appointment has been made.* Only in this way is a permanent international record of your show assured.

1978 NEW ORLEANS INTRA-CLUB SHOW

L. W. MAZZENO, JR.

944 Beverly Garden Drive, Metairie, La. 70002

The sixth annual Intra-Club all horticulture Amaryllis Show was staged by the Men's Amaryllis Club of New Orleans on April 1, 1978 in the City Park Backer Room. Awards were won by T. A. Calamari, Jr., for the best 4-floret specimen "Summertime"; Holly H. Bowers, Jr. for the best 3-floret specimen "Candy Floss"; and the author of this article for the best 2-floret specimen "Alvira Aramayo".

The Club's regular annual Show, open to the public, was held April 8, 1978, and is reported separately.

1978 CORPUS CHRISTI AMARYLLIS SHOW

MRS. CARL C. HENNY, *Corresponding Secretary*,
P. O. Box 3054, Corpus Christi, Texas 78404

Texas suffered a very cold winter this year with only a small amount of rain to fall in Corpus Christi during the first part of January. This naturally caused our ground to remain cold and dry—which also caused slow development of all of our horticulture. Therefore, on April 1st, our Amaryllis Society Exhibit consisted of only 10 entries to be judged and 2 entries for display, much to our disappointment. Nine of these entries were potted specimens. Only one cut specimen was available for display. If our Annual Flower Show had been held two weeks later we would have had a much better exhibit. However, none of us can control the weather or the bloom period of our flowers.

Mr. and Mrs. Bill Miller, club members, received the Silver Bowl Award for their entry of 'Beautiful Lady'. Mr. J. M. Mabe, club member, received blue ribbon awards for his entry of 'Beautiful Lady' and 'Summer Time'.

Other registered and named potted amaryllis entered in the Exhibit were: 'Amethyst' (Van Muean), 'Palace Sunset,' 'Ludwig's Goliath,' 'Doris Lillian,' 'Desert Dawn,' 'Cinderella,' and 'Fairylend.'

National Accredited Judges for the Exhibit were Mrs. G. Browning Smith of Harlingen, Texas; Mrs. Tom Burke, Jr. and Mrs. Jesse Jamison, Jr. of Corpus Christi, Texas.

THE GREATER HOUSTON AMARYLLIS CLUB

MRS. SALLY FOX, *Corresponding Secretary*
1527 Castle Court, Houston, Texas 77006

The reserved date of April 2, 1978 for the Greater Houston Amaryllis Club's annual official Amaryllis Show was too early this year due to severe Winter weather. There were no blooms; in fact, most bulbs and plants in this area were just about one month late in blooming. Our final meeting and installation of officers is held the first Monday in May, which was the 1st. As a rule our long banquet table is centered with choice daylily blossoms from each member's garden. This year only three daylily blossoms were brought in on that date, but the table was loaded with Amaryllis blooms—which made us all feel we were having a delayed show. Our only wish was that the public could have been able to view this magnificent display of show quality Amaryllis blooms. Hopefully, next Spring we can carry on our pledge of 'promoting interest in growing amaryllis'.

1978 GREATER NEW ORLEANS OFFICIAL ALL-HORTICULTURE AMARYLLIS SHOW

L. W. MAZZENO, JR.
944 Beverly Garden Drive, Metairie, La. 70002

On April 8, 1978 the Men's Amaryllis Club of New Orleans, Inc.

held its nineteenth annual all-horticulture Amaryllis Show.

For those who thought the 1976-77 winter in New Orleans was severe, they were in for a double shock in 1977-78. The prolonged cold weather took its toll again in the number of entries for the Show. Most affected were, quite naturally, the specimens grown outdoors. Total entries were only 157, the lowest ever for this Show. Despite this, the display was beautiful and the quality of exhibits high.

The number of trophies awarded each year keeps growing. A new one was introduced honoring Milo C. Virgin, for many years the mainstay of the annual Show. Until his illness, it was always expected that come rain or shine, warm or freezing weather, Milo would have about 50 or more entries. To us, in the Club, he will always be "Mr. Amaryllis". So, it was only fitting that an award be introduced in his honor. The trophy was awarded for the best specimen in the Show as judged by the total membership of the Club. It went to Holly H. Bowers, Jr.

In the official judging, by the Show judges, Mr. A. T. Diermayer won the "Best-in-Show" Rosette and the Holly H. Bowers, Jr. Trophy for the best specimen in the Show. To most it was an unexpected but delightful surprise that the judges chose a species *Amaryllis - Evansiae* for this award. It certainly was well deserved because the specimen was spectacular. In addition to his "Best-in-Show Awards," Mr. Diermayer was also awarded the James E. Mahan Award for the best named and registered hybrid, the Ludwig Challenge Cup and the accompanying MACNO Club Trophy, the Edward F. Authement Award for runner-up to the best unnamed, unregistered hybrid, the Amaryllis, Inc. Award for the best Amaryllis species, the Nola Luckett Trophy for the best 2-floret potted specimen and the Sweepstakes Ribbon for most blue ribbons in the unregistered specimens.

Continuing his success of previous years, Holly H. Bowers, Jr. won the most awards of any competitor in the Show. Besides the Milo C. Virgin Award, he also captured the W. J. Perrin Memorial Award for runner-up to the best named and registered hybrid, the Laurence Mazzeno Trophy for the best miniature hybrid, the T. A. C. Construction Co. Award for the best unnamed and unregistered specimen, the Reuter Seed Company, Inc. Award for best cut flower, the George Merz, Jr. Trophy for most blue ribbons won by a Club member, the Sweepstakes Ribbon for most blue ribbons in the registered specimen Sections, and best of all the most sought after Robert Diermayer Memorial Award for best hybrid in the Breeder's Class.

Other trophies were won by: Ed M. Beckham, the Vincent Peuler Award for best registered single floret; L. W. Mazzeno, Jr., the Jerome Peuler Award for best unnamed single floret; L. L. Laine, the Gautier Family Trophy (first year awarded) for best registered 2-floret potted specimen; O. J. Robert, Sr., the Victor Pannell Trophy for runner-up to the best registered 2-floret potted specimen.

Other Club members winning blue ribbons were: T. A. Calamari, Jr., and Vincent J. Peuler.

Vincent J. Peuler served as Show Chairman, ably assisted by Albert Touzet, Jr. Their guidance and hard work assured the success

of the Show. Almost every member served in some capacity prior to and during the Show. Much thanks goes to them. We must single out A. T. Diermayer. Without his tremendous effort in arranging for the location and the widespread publicity, including appearances of some of our members on two television shows, the Show could not have been held. His untiring work year after year are most appreciated by the entire Club.

Next we must thank the merchants of the Lakeside Shopping Center for making their beautiful Mall available to us for the Show.

The judges, what can we add to what's been said before. These ladies give unselfishly of their time every year for the benefit of the Show. Their contribution is really appreciated.

And to the donors of the trophies, again thanks. The new Orleans Show is rather unique, we think, because none of our awards are rotating awards. (The Ludwig Challenge Cup was, but it was retired this year.) The winner of each award keeps it. And every year it means a new trophy from each donor. Our grateful appreciation goes to them.

HOUSTON AMARYLLIS SOCIETY

MRS. A. C. PICKARD, *Official Show Chairman*

1909 Alta Vista, Alvin, Texas 77511

The Houston Amaryllis Society's Show, announced for April 9, 1978, was cancelled due to earlier inclement weather. The prolonged cold winter seemed to delay the blooming period and the result was poorly developed scapes and very poor quality of blooms. The Society depends a great deal on garden grown blooms for its shows.

We are planning the 1979 April Show hoping old man weather will give us an early Spring. Our goal as usual is to keep the unity or continuity of growing, showing and sharing as we have the past twenty years.

1978 SOUTHERN CALIFORNIA OFFICIAL AMARYLLIS SHOW

V. R. FESMIRE AND S. HARSIBARGER, *Co-chairmen*

The 1978 Amaryllis Show was held as usual at the Los Angeles Arboretum in Arcadia on April 22nd and 23rd. Since there had been a very rainy winter with a late Spring, it was decided to set up the tables for a small show, but to everyone's surprise, more and more flowers arrived, and we ended up with a very large flower show. There were a total of 14 exhibitors with 114 entries, plus five special exhibits and much background material.

Unfortunately, there were very few entries of named and registered Amaryllis, and none scored 95 points or higher. The bulk of the flowers entered were in the Hybridizers Section, and here the competition was extremely close. There were entries in Divisions 3, 4, 5, 7, 8, and 9, and

these beautiful flowers were the backbone of the Show, as can be seen in Figure 4. Particular mention should be made of the Belladonna hybrids, both potted plants and cut scapes, entered in Division 3. This group was probably the largest showing we have ever had of Belladonna hybrids, and it was one of these which won the Quinn Buck award as the best seedling in the Show. This was a beautiful plant with four rather large flowers of lavender and white, being a cross between *A. evansiae* and *A. brasiliiana*, and entered by D. C. Cothran. This hybrid, incidentally, was just one of many beautiful hybrids that Mr. Cothran has been producing by his program of species crossing.

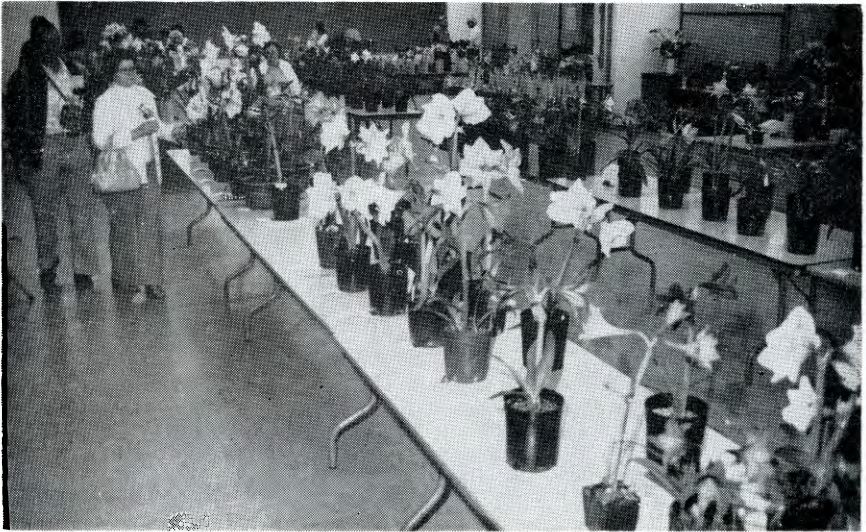


Fig. 4. Partial view of the Amaryllis exhibits at the 1978 Southern California Amaryllis Show, Arcadia, California. Photo by Phil Rosoff

The Sweepstakes Award was won by Ed Pencall, who entered a large number of his beautiful seedlings in Divisions 5, 8, and 9; the runner-up was D. C. Cothran. The Judges' Award, for the best flower in the Show from their viewpoint, was given to Leonard Doran for his entry of 'Elenora', the judges being Gladys Williams, Fred Boutin, Joe Werling, and Roger Fesmire. The President's Award, given to the winner of the Popularity Contest, went to D. C. Cothran for another of his seedlings; the visitors to the Show selected this magnificent apricot hybrid by an overwhelming majority. Special awards were also made to Fred Boutin's educational exhibit, and to Mr. E. Mathis for furnishing the *Amaryllis* flowers used in arrangements and as background color, and to three other special exhibits.

These three special exhibits became major attractions at the Show. The first of these, shown in Figure 5, was an exhibit of *Amaryllis* species by Leonard Doran, featuring seven different species in bloom, one of which is still not named, plus colored photographs of many other species. It is doubtful if such an exhibit, with seven species in bloom at the same time, has ever before been seen in this country, and Society members and visitors alike were much impressed by the sight. The second special exhibit was one of the other members of the *Amaryllis* Family; part of this can be seen on the right side of Figure 5. Sixteen different genera



Fig. 5. Southern California Amaryllis Show, 1978. **Upper**, Partial view of flower arrangements. **Lower**, *Amaryllis* species exhibits by L. Doran. Photos by Phil Rosoff

were represented, plus several doubtful ones. Some were in bloom, but many were not, although the plants were all clearly labeled. The discussion carried on at these two tables showed that the public is very much interested in Amaryllids. The third exhibit consisted of several tables of flower arrangements, each centering around the Amaryllis flower. These were made by the ladies in the Amaryllis Society under the supervision of Alice Hanson, and a small portion of them can be seen in Figure 5. These arrangements displayed much ingenuity and good taste, and were a definite attraction to the ladies visiting the Flower Show.

THE AMARYLLIS SOCIETY OF MOBILE

MRS. NELL KEOWN,

2210 Pratt Drive, Mobile, Al. 36605

The Amaryllis Society Of Mobile held its annual Greater Gulf Coast Amaryllis Show on May 6th and 7th, 1978 at the Bel Air Mall Mobile, Alabama.

The date for the show was originally set for April 22nd and 23rd but due to prolonged cold weather it was rescheduled for the later date.

Two days before show time we had a drenching six inch rain. But with two beautiful days of sunshine we were able to have a show that was smaller than usual, but still a good one.

Our show is open to the public and everyone is encouraged to enter flowers whether a member or not.

Mr. John Fellers, a non-member, won the John A. Lamey Memorial Trophy for the most outstanding horticultural potted specimen in the show with 'Elvira Aramayo.'

Mrs. Nell Keown won a silver trophy for Sweepstakes and one for a beautiful candy stripe type seedling. She also won three trophies for the most blue ribbons in three different categories.

Mrs. C. E. Tagert won the Ludwig Trophy for an outstanding 'Apple Blossom' and two Amaryllis Society Of Mobile Trophies for the most blue ribbons in two different categories.

Mrs. Mammie Wiggins won the Amaryllis Society Of Mobile Trophy for a cut specimen of an American hybrid. She also was awarded the Inez Scheuermann Trophy for the most blue ribbons in the American potted and cut division.

Many blue ribbons were awarded, some receiving them were, 'Golden Triumphantor,' 'Snow Queen,' 'Orange Wonder,' 'Moreno,' 'Prince of Orange' and 'Bordeaux.'

One feature that drew special attention this year was a table of single florets displayed in orchid picks. For this display Mrs. Tagert and Mrs. Keown were awarded special rosettes.

Different types of plants were donated by the members and we had a successful plant sale that helped finance the show.

Despite a few anxious days and nights the show turned out to be a real success, even though it was a full three weeks later than usual.

We're looking forward to a more favorable *Amaryllis* season next year which will be our 25th show.

Mrs. Mammie Wiggins was club president. Mr. Freddie Frambrough, Jr. was show chairman.

1978 SPRING EXTRAVAGANZA

Chaired by GLADYS WILLIAMS, and reported by DICK SLOAN

Each year the Los Angeles State and County Arboretum, at Arcadia, has a well advertised Extravaganza weekend, when the various local plant societies advertise themselves, answer questions, stage displays, provide demonstrations, and, with the Arboretum, present programs for sessions scheduled throughout the weekend.

The Southern California Hemerocallis and Amaryllis Society participated again in this year's event on June 10th & 11th, held under gauze canopies on the Arboretum lawns. We were fortunate that the schedule was timed perfectly for our local peak daylily bloom. Literally hundreds of individually labeled blooms were displayed, a fantastic mass of color. In addition, blooming potted plants of some of the new superstars such as 'Agape Love' and 'Rosette' were shown by Bob Shufeldt, to indicate to the many interested visitors how a modern daylily looks as a whole plant. The color range of the newer hybrids created a sensation. We were besieged by source inquiries and gained 22 members for our local society.

Many of our own members took the opportunity to note blooms for their own personal want lists. I can scarcely have made more clear my desire to grow a particular seedling of Bill Hawkinson's WHENEVER A SPARE IS AVAILABLE!!!

On the Sunday afternoon Bob Shufeldt, a member, presented a superb history, culture, demonstration, question and answer lecture-discussion on our flower. Many good questions indicated the interest he created.

This event provided our local gardeners with a clear view of modern daylilies by example and by information. We noted a number of those who visited our booth came again to enjoy our successful show staged two weeks later at the Arboretum lecture hall.

THE AMERICAN AMARYLLIS SOCIETY STUDY COURSE FOR THE AMARYLLIS JUDGE'S CERTIFICATE

MRS. A. C. PICKARD, *Official Judging Instructor*,

1909 Alta Vista, Alvin, Texas 77511

Amaryllidaceae (Am-ah-ril-i-day see-ee), the Amaryllis family, contains over seventy genera and hundreds of species of mostly tropical plants. Lily-like florets are different from the Lily family in the technical character of the superior ovary. The Amaryllis family contains many garden favorites of perennial herbs growing from bulbs, rhizomes or fibrous roots.

The genus *Amaryllis* is one of the many genera in the Family Am-

aryllidaceae which contains species that bear several showy florets on a single leafless scape. By extensive hybridizing, bulbs of these hybrids may be considered a cultural group produced in enormous quantities in our states. The blossoms are of various sizes - from miniatures to giant.

The color spectrums range from a choice of pure white, rose pink, salmon, orange, blends and stripes. Red colors range from scarlet, orange red, blood red, dark red and varigations.

Amaryllis is the classical name given the plant by Linnaeus, the master plant recorder and botanist. The word is derived from the Greek word 'Amarysso', meaning "to sparkle" and refers to the surface texture of the blossom.

The name, 'Belladonna', is the Italian for 'beautiful lady'. Linnaeus finally adopted the name *Belladonna* in combination with his new generic name, *Amaryllis*. For more than 250 years various forms of *Amaryllis belladonna* have been in cultivation and crossed with other species and this has opened up a great field for the plantsman. The common form of *Amaryllis belladonna* is grown in Florida, known as "Florida Red," and is botanically referred to as *A. belladonna* var. *major*.

The American Amaryllis Society has classified cultivated *Amaryllis* in nine Divisions on the basis of the chief characteristics of each group. Further sub-division may be made within each of the nine divisions. Each division contains many varieties. This form of classification is necessary as the foundation for exhibition schedules and as the basis for grouping by *Amaryllis* breeders. Familiarity with the flower and its parts is necessary to intelligent evaluation.

In order to simplify the classification, the nine divisions of cultivated *Amaryllis* have been arranged in numerical order with a brief description of the distinguishing characters of each.

Division 1. (D-1), includes all the cultivated wild *Amaryllis* species, sub-species, varieties and forms. The majority of species are native to Boliva, Brazil and Peru. Example: *A. striata* var. *fulgida*.

Division 2. Long-Trumpet (D-2). The whole flower is very long and trumpet shaped, similar to the Easter Lily. The pedicels are relatively long and the flowers are distinctly drooping. The tepaltube is very long, 4½ to 5½ inches. Example: *A. elegans* var. *ambigua*,—color of flowers varies from pure white to white, striped with pink lines.

Division 3. Belladonna type hybrids. (D-3). The flowers are much shorter than in Division 2 and gracefully drooping. The pedicels are long and the tepaltube less than 4 inches in length. They show the influence of species with the informal flower structure of *Amaryllis belladonna*, *Amaryllis vittata* and others. Example: (a) *A. johnsonii*; (b) 'Christmas Joy'.

Division 4. Reginae type hybrids (D-4). The pedicels are shorter than in Division 2 and 3. The tepaltube less than 2 inches in length. The flowers are slightly drooping, horizontal or slightly upright and are moderately open faced. When viewed sideways, the flower length exceeds 4 inches. The tips are rounded or slightly pointed. There are

two sub-divisions in Reginae. D-4A- markedly imbricated type. The tepalsegs overlap $\frac{3}{4}$ or more of their length. Tips of segs are rounded or slightly pointed. Example: 'Helsenki'. (V.M.) and 'Summer Time', Hadeco. D-4B—This is the less imbricated type. The tepalsegs overlap less than $\frac{3}{4}$ of their length. The segs are sometimes reflexed. The tips are rounded or pointed. Example: 'Picotee' (Ludwig).

Division 5. Leopoldii type hybrids (D-5). The flowers are similar to those of Division 4 except the flowers are wide open flat form. When viewed sideways, the length must not exceed 4 inches. There are two sub-divisions in this division. D-5A- The tepalsegs are imbricated almost their entire length. The tips are rounded. Example: 'Boquet' (Ludwig) D-5B- The flowers are similar to D-5A except the segs are less imbricated. The tips are rounded or slightly pointed. Example: 'La Forest Morton' (Ludwig).

Division 6. Orchid flowering type. (D-6). The tepalsegs are not arranged according to the usual flower pattern. They are variously shaped, twisted or extremely reflexed, similar to *Sprekelia* (the Aztec Lily), *Amaryllis cybister*, *Amaryllis calyptrata*, and other irregular-shaped forms.

Division 7. Double hybrids (D-7). This division includes the semi-double and fully double forms of hybrids under culture. The flowers have two, three or more rows of segs, each seg narrowing and shortening toward the center of the flowers. There may be petaloid "ears" in the center. Example: 'Helen Hull'.

Division 8. Miniature type hybrids (D-8). Distinctly dwarf statured types, including various flower forms. The flowers harmonize with the smaller scape diameter and height. Example: Gracillis hybrids.

Division 9. Unclassified hybrids. (D-9). Meritorious hybrids that cannot be placed with certainty into any preceding Division.

The flower form and structure make up the chief difference between Reginae hybrid (D-4) and Leopoldii hybrid (D-5). The Reginae flower moderately open faced but not flat. The Leopoldii flower is a wide open flat form.

Familiarity with the Divisions of cultivated *Amaryllis* is necessary to intelligent evaluation.

A mature plant produces inflorescences and fruit.

A clone is the offspring reproduced by asexual methods (vegetative method of reproduction) of species and hybrids. An unnamed seedling refers to the seedling grown from a particular seed before there is any increase by vegetative means. The clone may be unnamed or named. After the unnamed clone receives a name and is registered, it is referred to as a named clone, such as 'Apple Blossom', 'Bouquet', etc.

Besides the essential reproductive organs, there are several accessory parts:

The inflorescence is the flower bearing transformed branch consisting of the scape, spathe valves, pedicels and the umbel of flowers (flower cluster).

A *scape* is a leafless stem that rises from the bulb (without foliage) which supports the umbel of flowers.

An *umbel* is a flower cluster of two or more flowers that arise from nearly the same point on top of the scape.

A *pedicel* is a stem of the single flower in a cluster. (The support or arm of the flower).

Spathe-valves are leaf like bracts enveloping the immature flower buds and protect them from injury before they open.

The six flower leaves or petals are *united below*, forming a short or longer *tepaltube* below, with free portions above, or *tepalsegs*, segs for short.

Tepalsegs are the six parted portions of the blossom. The three *outer* tepalsegs are setepalsegs (abbreviated to setsegs). These are usually broader than the three *inner* tepalsegs.

The inner three tepalsegs are called petepalsegs or petsegs for short.

Note.—Observe the difference in size of the tepalsegs as they make up the characteristic form of the flower.

Tepaloids are characteristic of some *Amaryllis* hybrids. Sometimes the tepalsegs are variously lobed or twisted near the center. They vary in width, shape and length. They are sometimes referred to as "ears".

Nectaries are glands for the production of nectar and fragrance, attracting insects and birds that transfer the pollen from the anthers to the stigma of the blossom.

The flower organs of reproduction are formed partly inside the *perigone*. The *stamens* are the male reproductive organs. These are composed of very small stems called *filaments*, which are topped by two lobed *anthers*. When mature, the lobes split lengthwise and expose the pollen grains necessary for pollination of the blossom.

The *pistil* is the female reproductive organ. It consists of the *ovary*, *style* and *stigma*. The *stigma* is the capitate or three-lobed structure that receives the pollen.

The ripened *ovary* and adhearing parts is the *Amaryllis fruit*; it is 3-loculed. with flat, black or brown seeds in each locule.

An *Amaryllis hybrid* is a plant resulting from a cross between parents unlike one another in one or more heritable characteristics.

Conformity to *Division standards* is of first importance in the placement of entries in Amaryllis shows. Amaryllis can be judged for flower structure and flowering habit by Division standards only.

Group entries in various colors, shapes and sizes make the show more interesting. There may be a collection, a minimum of 5 scapes all of the same variety; or 5 different types; or mixed colors.

Specialization is excellent for Flower Shows. Some think it is more spectacular and more exotic to feature *Amaryllis only* at an Amaryllis Show, while at other Shows sometimes *Clivia*, *Crinum*, *Eucharis*, *Nerine*, *Narcissus*, etc., are shown. These other Amaryllids may be included to give variety and information about the 85 genera and 1000 species in the large Amaryllidaceae family. To the general public, these just named are other kinds of flowers, because in shape, size, etc. there is only a

family resemblance to *Amaryllis*. With the exception of *Narcissus*, no detailed classification of the flower types of the other Amaryllids is available.

Anthers may be removed without penalty (if permission is granted by the show committee) in order to prevent pollen dusting over the segs, or for other prevailing reasons.

Amaryllis scapes grow tall and it is often necessary to stake them. If the stakes or ties are not conspicuous then no deduction in points is made.

1977 - SUPERCEDING ALL PREVIOUS SCORES

The ten rating characters that make up the scale of points in judging Amaryllis cut specimens and potted plants.

Character scored:	Method of Rating	POTTED PLANTS		
		Specimen Single	Scape Single	Scapes 2 or more
1. Perfection of floret shape - (form)	Rating should be strictly within the division standard on the basis of beauty and form, which is true of a clone in all its customary variations. The normal shape at peak of maturity is judged on the individual floret and division.	20	20	20
2. Conformity to floret color standards.	True color is that which is characteristic for a given variety and judged entirely aside from one's personal preferences. Color qualities may respond favorably to cultural care, skillful handling of sunlight, shade, fertilizer and texture of the floret.	30	30	25
3. Floret size.	Since flower size is dependent on the division, the sizes recognized in the particular division concerned should govern.	15	15	15
4. Pose (symmetry of floret in umbel)	The contour should be generally symmetrical. The lower or bottom petepal (seg) is typically a bit narrow and a bit more elongated but must be in proportion for equal balance of all parts of the floret.	10	10	10
5. Length and character of scape.	The length of the scape should be considered in relation to the size of the umbel. The character of the scape means its weakness or	5	5	5

	strength to hold the umbel of flowers erect.			
6. Number of florets per scape and number of expanded flowers (number of florets per scape includes unexpanded and expanded flowers)	Only 3 or more flowers per scape are eligible. In large flowering hybrids, 2 flowers per scape are too few. Allow 3 points for this condition. Three flowers per scape is quite satisfactory - allow 5 points. For 4 flowers allow 6 points. (no addition points are allowed for more than 4 flowers.) In miniature type hybrids (Div. 8), the scape is usually quite slender and 2 or more flowered scapes are eligible; allow 4 points for 2 expanded florets, 6 points for 3 or more.	6	6	6
7. Number of scapes per plant.	This category applies only to potted plant exhibits. Allow 8 points for only one scape; allow 9 points for 2 scapes; 10 points for 3 or more scapes. Any scapes with faded blooms may have been removed without any deduction of points.			10
8. Fragrance.	If the judge can detect a pleasing fragrance this is a desirable trait and 2 points are added. Some species are recorded as slightly fragrant. If so, it is passed on in future generations. All blooms of plants produce nectar in attracting insects that transfer pollen to the stigma of the bloom, thus carrying out pollination in nature. All perfect hybrid Amaryllis are slightly fragrant. The Belladonna division has distinctive fragrance.	2	2	2
9. Foliage.	This category applies only to potted plant exhibits. Leaf growth that comes along with the flower scapes is very desirable and is often the result of culture and temperature control in a new bulb. The foliage usually appears before the blossom in established yard		2	2

or pot grown Amaryllis. For well established foliage, allow 2 points. If foliage is entirely absent, deduct 2 points.

10. Condition of exhibit.	Specimens in prime condition, properly cultured should receive the full number of points. Spent flowers or scapes should have been removed. The segs should be free of pollen stain or other soil. Evidence of insect injury must be severely penalized. Over-potted bulbs fall in this rating of points. Mechanical injury such as torn leaves or segs is penalized less severely. Staking is permissible if the stake is green, not too high and does not attract attention to itself. If the stake is conspicuous or out of proportion, a deduction must be made.	12	10	10
	Total possible score	100	100	100

OFFICIAL AMERICAN AMARYLLIS SOCIETY SHOW RULES

The official awards of the American Amaryllis Society may be presented at any Amaryllis Show or Amaryllis Division of a general flower show which complies with the rules of the Society.

(1) All flowers exhibited are to be expanded in half or more direct light to show the typical flower color of the florets. Judging in all cases is on the basis of open blossoms and number of blossoms per scape. Never on the basis of the total number of blossoms of the potted plant.

(2) All exhibits must have been grown by the exhibitor. All plants in his possession less than one year should be classified and judged separately. All greenhouse grown plants should be classified and judged separately from yard grown plants.

(3) The Award of Merit is offered for the named and registered exhibit rating 95 or more. Second and third prizes may be offered in each division.

(4) In order to have only flowers in their prime condition, it is permissible to remove any scapes with fading flowers.

(5) It is very important to designate some one to write a *very brief* review of the official show, and to send this promptly to Dr. Hamilton P. Traub, Editor, Amaryllis Year Book, 2678 Prestwick Court, La Jolla, Calif. 92037. Your plans are not complete until this appointment is made. Only in this way is a permanent international record of the show assured.

In listing named clones, it is important to inclose the names in single quotation marks, thus: 'La Forest Morton', 'Maria Goretti', etc. Do not underline or put in all capitals.

The Amaryllis Judges Training Course concerns the Amaryllis plant, the wild and cultivated Amaryllis, the Divisions of cultivated Amaryllis, and the judging of Amaryllis specimens and potted plants at Amaryllis Shows.

The Amaryllis Judges Certificate indicates the applicant is qualified to judge in the Horticulture division of Amaryllis, as of the date issued.

KEEPING UP WITH LATEST DEVELOPMENTS

Current progress in the judging of Amaryllis is recorded in the Amaryllis Year Book. In order to insure that those holding Amaryllis Judge's Certificates keep up with these new developments, all certificates issued are valid only when presented with the current membership card of the American Plant Life Society which includes membership in the affiliated American Amaryllis Society. After several years a refresher course is recommended.

AMARYLLIS JUDGE'S CERTIFICATES

Since the last report in the 1978 Amaryllis Year Book (p. 45) the following numbered Amaryllis Judge's Certificates have been issued.:

No. 201. Troy Wright, 305 Bay Street, Texas City, Tex. 77590. Horticulture only. Mrs. A. C. Pickard, Instructor.

No. 202. Mrs. William Birch, 2607 Woodsdale, Houston, Tex. 77038. Horticulture only. Mrs. A. C. Pickard, Instructor.

No. 203. Mrs. Bertha Cone, 2711 Elysian, Houston, Tex. 77009. Horticulture only. Mrs. A. C. Pickard, Instructor.

PLANT LIFE LIBRARY—continued from page 124.

ages, (3) Artists, writers, musicians; (4) the Making of America; (5) Dinosaurs and Prehistoric Life, and (6) The Twentieth Century. With over 300 colorful illustrations in each booklet. These fascinating informative booklets are a very great bargain at the nominal price of \$2.95 each and are highly recommended.

CACTUS LEXICON, by Curt Backeberg, enlarged by Walther Haage. The present translation was prepared by Lois Glass and based on the 3rd German Edition supervised by Walther Haage, who added nearly 300 additional recent species. Sterling Publishing Co., Two Park Av., New York City 10016. 1977. Pp. 828. Over 536 illus. Trade edition, \$50.00; Library edition, \$39.99.—The Preface to the First Edition by Curt Backeberg, 1965; a Foreword to the 3rd German Edition by Walther Haage, 1974, and Lois Glass' Translator's Introduction to the English Edition, 1977 (pages 6-8), precede short sections on "Principles of Systematic Classification," "Cultivation" (9-19), and "Classification." Key to the Categories of the Family **Cactaceae**, subfamilies, Tribes and 233 genera (pages 21-59). The rest of the text is devoted to a **Descriptive Catalog** of the genera, species and varieties of the **Cactaceae** (pages 61-518); **Distribution Maps** (pages 519-544); 535 **illustrations**, 205 of these in color (pages 545-838); of these Nos. 1-459 are attributed to Backeberg, and Nos. 460-534 to others. Very highly recommended.

GREENHOUSE MANAGEMENT, by Joe J. Hanan, Winfred D. Holley and Kenneth L. Goldsberry. Springer-Verlag New York, 44 Hartz Way, Secaucus, N. J. 07094. 1978. Pp. 530. Illus. \$67.00.—This outstanding new text greenhouse management breaks new ground since it charts the development of the industry and which is undergoing rapid technological change. The following named topics are explored thoroughly: light, greenhouse construction, temperature, water, soils and soil mixtures, nutrition, carbon dioxide and pollution, insect and disease control, chemical growth regulation, business management, and marketing. Appendices and a subject index complete the volume. Very highly recommended.

Volume 30. PROGRESS IN BOTANY, by Heinz Ellenberg, Karl Esser, Hermann Schnepf and Hubert Ziegler. Springer-Verlag New York, 44 Hartz Way, Secaucus, N. J. 07094. 1977. This is a review volume of recent research in the fields of plant morphology, physiology genetics, taxonomy and geobotany since the publication of volume 29. Highly recommended.

NEW NATURAL PRODUCTS AND PLANT DRUGS WITH PHARMACOLOGICAL, BIOLOGICAL OR THERAPEUTICAL ACTIVITY, edited by H. Wagner and P. Wolff. Springer-Verlag New York, 44 Hartz Way, Secaucus, N. J. 07094. 1977. Pp. 286. Illus. \$30.90.—This volume is devoted to the Proceedings of the First International Congress on Medical Plant Research, Section A, held at the University of Munich, Germany, Sept. 6-10, 1976. The subjects covered include: problems and prospects of discovering new drugs from higher plants by pharmacological screening; natural products screening and evaluation; data concerning antitumor and cytotoxic agents from plants; advances in the field of antibiotics; saponins with biological and pharmacological activity; investigations on Indian medicinal plants; dimeric natural compounds; and natural substances with effects on the liver. Highly recommended.

PLANT LIFE LIBRARY—continued on page 86.

2. LINEAGICS

[BIOEVOLUTION, DESCRIPTION, DETERMINING RELATIONSHIPS,
GROUPING INTO LINEAGES]

AT LONG LAST—SEEDS ON **LYCORIS SQUAMIGERA**

SAM CALDWELL

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In the early 1950s when I started hybridizing lycorises I tried crossing everything available, including, of course, *L. squamigera*. Over several years I spread pollen from *L. squamigera* to every other *Lycoris* that was blooming and pollen from other species onto *L. squamigera*, with very discouraging results—not a single seed. Then a botanist friend told me, “*Lycoris squamigera* is an infertile triploid,” and I read in Traub and Moldenke’s *Amaryllidaceae: Tribe Amaryllieae* that “*Lycoris squamigera* appears to be a sterile natural hybrid, not represented in any fertile wild populations. . . .” Having little botanical knowledge myself, I was impressed by these statements and concluded that in my innocence I had been trying to do something impossible. Also at the time I was getting good results and many seedlings by using *L. sprengeri*, *L. sanguinea* and a fertile strain of *L. radiata*, so I just dropped all efforts with *L. squamigera*.

Nevertheless, over years that followed I would occasionally hear or read of someone claiming to have seeds on *L. squamigera*. I carefully investigated every report and rumor that I could and in every case found it to be in error. The reason seemed to be that to average gardeners *L. squamigera* (see Fig. 6) does *appear* to make seeds. After the flowers fade large seed capsules often develop, filled with chaff and bits of aborted seeds which are worthless but to the uninitiated do look like flower seeds.

Speculating that somewhere, someone might really have a fertile strain of *L. squamigera*, I wrote a letter that was published in the September, 1975 issue of *Flower and Garden* magazine, which circulates among more than a half million gardeners. I explained the situation surrounding *L. squamigera*, the Magic Lily, and requested any reader having one making seeds to get in touch with me.

My letter drew some thirty responses—tributes to the warm-heartedness, generosity and spirit of helpfulness that prevails among garden-minded people. Unfortunately, these attributes are not always coupled with much horticultural knowledge, for it soon became clear that more than twenty of the writers didn’t know what a lycoris was. The common name, Magic Lily, covered a lot of ground for them and they sent me seeds of *Hemerocallis*, *Hymenocallis*, *Amaryllis*, *Brunsvigia rosea* and even stem bulbils from stalks of *Lilium tigrinum*. Then eight correspondents sent dried seed capsules of *L. squamigera* containing the

usual worthless chaff that they thought was seed. Exactly one person—a lady in Dublin, Ohio—sent me three real lycoris seeds, which I planted.



Fig. 6. It is just a matter of finding the right mate! *Lycoris squamigera* Maxim., long thought to be sterile, set seeds when crossed with *Lycoris chinensis* Traub. Photo by Sam Caldwell

However, from information supplied in her letter and from the appearance of the one seedling I now have growing, I feel sure that this is *L. sprengeri*.

By coincidence I received from Japan at about this time a letter from my good gardener friend, Dr. Shuichi Hirao, who wrote: "I want



Fig. 7. *Lycoris chinensis* Traub has a big and beautiful flower, orange-yellow in color. Photo by Sam Caldwell

this letter to report you my 'finding' on lycoris. It is to obtain seed from sterile species. The practice is very simple: just cut the bloom-stalk after pollination and hang it downwards in the shade, or just lay on a shady ground. The stalk will shrivel gradually from the cut end, but the umbel will continue to live and the pod will swell gradually. If lucky you will find one or more perfect seed in the pod after four to five weeks after the pollination. I got a perfect seed out of three umbels of *Lycoris squamigera* treated above."

So in the flowering season of 1976 I went back to work on *L. squamigera*, using pollen from *L. sanguinea*, *L. sprengeri*, *L. chinensis*, *L. "Sperryi"* and from a new unidentified yellow lycoris that looks much like *L. squamigera*. Reciprocal crosses were made. I cut about 40 scapes, labeled them and hung them in light shade in my greenhouse. For a time they made progress; seed capsules fattened in an encouraging way. However, in September when they were fully ripened it was a disappointing task to shell out the capsules, umbel after umbel, and find no seed. But one scape looked particularly good and, sure enough, when I peeled away the capsule covering, there they were—three large, shiny, hard black seeds, one of them fully $\frac{3}{8}$ " in diameter. This may sound absurd but plant breeders will understand—it was like finding gold nuggets after a 20-year search!

A label showed that this was the only scape of *L. squamigera* on which I had applied pollen from *L. chinensis*. The secret was out. *Lycoris squamigera* could produce seed in cooperation with the right partner. And as one might guess, *L. chinensis* is something special. It is the big, beautiful hardy yellow "spiderlily" type lycoris received in 1948 at the U.S.D.A. Plant Introduction Garden in Glenn Dale, Maryland from the Nanking, China Botanic Garden. It came under the label, "*L. aurea*," but proved quite distinct from what we regard as true *L. aurea*, that grows in St. Augustine, Florida and other mild-winter areas. Dr. Traub named it *L. chinensis* in 1958. (See Fig. 7).

There are few bulbs of the species in this country. I have had it since 1958 and still have only two flowering size bulbs. Last year I dug my first acquisition, planted as a single bulb in 1958. There was still the original bulb, $1\frac{1}{2}$ " in diameter, one additional bulb slightly smaller, and two offsets about $\frac{3}{4}$ " in diameter—a very miserly natural increase after 19 years of growth, during which time it has borne a single good flower scape in July of nearly every year. It is very fertile and sets good crops of seed to its own and other pollens. Oddly enough, though I have raised hybrids with *L. chinensis* as the seed parent, I have never been able to bring up a mature bulb from self-pollinated seed. They germinate fairly well but under exactly the same conditions that I routinely grow other lycoris seedlings, the little *L. chinensis* bulbs just disappear after two or three years. No doubt it is possible to grow them; I just haven't found the way.

Now back to the story of my 1976 crop of the three hybrid seeds, *L. squamigera* ♀ X *L. chinensis* ♂. These were planted in a 4" pot kept under a bench in my cool greenhouse over winter, as I customarily

handle all lycoris seed. In March I carefully dug into the planting medium and was happy to find two small white bulblets emerged from black seed covers. It was a sad day a few weeks later when I again dug in and discovered both bulblets rotting.

Fortunately the next flowering season, 1977, was a good one. There were two scapes of *L. chinensis*, supplying plenty of pollen for use on dozens of *L. squamigera* flowers. Some of these I cut and hung in the greenhouse, others were placed in the greenhouse in a jar of water which was changed occasionally, and still others were left outside on the bulbs as an experiment. Those in water all decayed after a few weeks, but

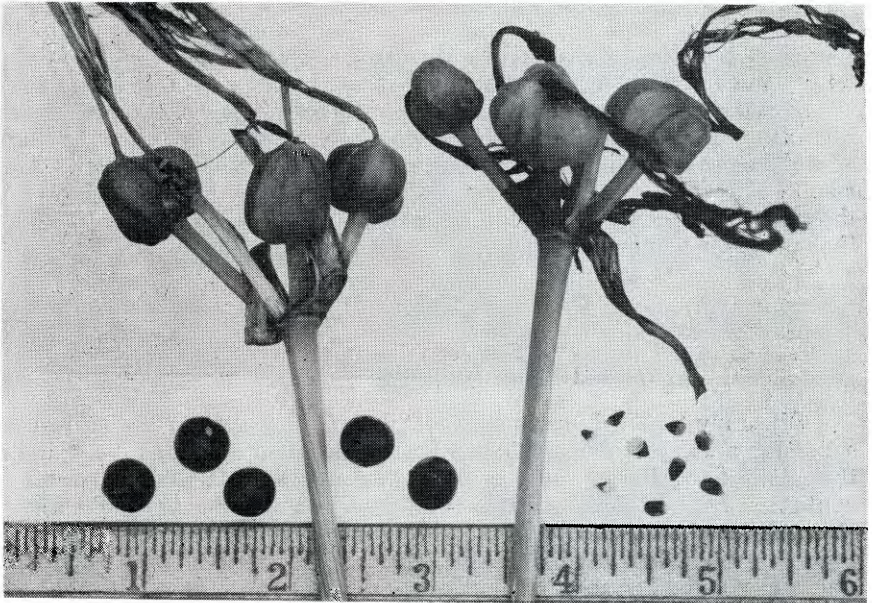


Fig. 8. Fruit (seed pods) and seeds of *Lycoris squamigera* Maxim. when crossed with *L. chinensis* Traub. Capsules contain a few large, round seeds, shown at left, but are filled mostly with worthless aborted seeds shown at right. Ruler scale in inches. Photo by Sam Caldwell

from the greenhouse hung scapes and those gathered outside in mid-September I was delighted to get 36 mature, sound seeds. (See Fig. 8). In fact, those pollinated scapes left outside on their bulbs were quite as productive as those brought into the greenhouse, so it would appear that cutting and hanging is unnecessary.

Actually, the ratio of seeds to pollinated scape was low. Many scapes produced no seeds at all. Six was the most from any one scape, while the over-all average was slightly over one seed per scape, although I had generally pollinated every flower.

This time, hoping to avoid decay of small bulblets, I planted the

seeds in a peatmoss-vermiculite mix with a fungicide added. The same medium was used for all my other lycoris seeds of the 1977 season, and these germinated and grew well. Not so the squamigera seeds. It is sad to report that about half of them apparently rotted without germinating at all. Others did germinate and develop plump little bulblets but these also decayed within a few months.

Discussing the problem with friends who are experienced plant propagators, I was told that these seeds undoubtedly can be started successfully under aseptic culture in a properly equipped laboratory. In fact, one who is connected with a government agency having adequate facilities offered to start seeds that I might supply. I hoped to take advantage of that offer this year but it turned out to be one of those years when I had no bloom on *L. chinensis*, nor were there any flowers on the species at the Plant Introduction Garden in Maryland. Thus there was no pollen for fertilizing *L. squamigera* flowers.

But there'll be another year . . . more lycoris blooms . . . more pollen spreading . . . more of the illusive seeds on *L. squamigera* . . . more years of waiting as seedlings grow to flowering bulbs. What a hybrid might result! How will the traits of orchid-tinted *L. squamigera* combine with those of the golden ruffled Chinese parent? Answering a question like that provides endless fascination for the avid plant breeder.

1978 LYCORIS REPORT

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Since my "1970 Lycoris Report" (*Plant Life* 1972) my interest in collecting and hybridizing this genus has continued unabated. Although their 1978 flowering season was poor—due probably to extremely severe winters of both 1976-'77 and 1977-'78—recent years have brought several developments worth recording. Most important, I believe, is the performance of three new unidentified lycorises, all of which may be named eventually as new species.

I am indebted to Dr. Shuichi Hirao, a biochemist of Kanagawa, Japan for supplying me with these and other rare bulbs. A lifetime hobby gardener, he is deeply involved with varied horticultural interests, including Japanese irises, daylilies, daffodils, nerines, lycorises and other amaryllids.

Lycoris #251 (see Fig. 9). (Since these lycorises are un-named, I shall designate them simply with my acquisition numbers.) In August, 1970 Dr. Hirao sent me two fairly large, long-necked bulbs, about 2" in diameter near the base, with strong live roots, along with a note saying they were an unknown species with flowers "pearly pink, overlaid light blue."

Knowing nothing of their hardiness, I planted them in one of the coldframes where I grow most lycorises that need winter protection. They made no foliage in the fall but in late January leaves began pushing up. These grew on, much in the manner of *L. squamigera*.

foliage except that blades were not as wide as in that species. They died down in late spring.

Newly acquired lycoris bulbs often fail to bloom the first year after planting, so I was pleased to get one sturdy scape with a nice umbel of flowers early the next August. (See Fig. 9.) Bulbs have multiplied reasonably well and have bloomed every year since then. Scapes run mostly from 21 to 24" in height, with umbels about 8¼" across. Flowers



Fig. 9. *Lycoris* species (unidentified), No. 251. Un-named with lilac-colored flowers, somewhat resembling *L. sprengeri* Comes ex Baker. Scape 22", umbel 8¼" across, flowers 2½" across, segs to 7/16" wide. Photo by Sam Caldwell

are 2½" across, segments up to 7/16" wide. Dr. Harao's color description is quite accurate but for brevity's sake I usually just call it lilac.

This lycoris would not be confused with any other species that I know, though it is nearest in general appearance to *L. sprengeri*. Besides the color difference, it usually blooms earlier than that species and has somewhat taller and larger scapes, though they do not approach the size of *L. squamigera*.

Lycoris #251 seems to be only moderately fertile; most years some of the scapes will produce just one or two large, sound seeds from selfed or cross pollinations. These have germinated and I have a few seedlings coming along but none of blooming size yet. Also, I've used the rather scant pollen on *L. radiata* and *L. "sperryi"* with apparent success and have small seedlings of these.

Because the bulbs had foliage habit similar to *L. squamigera*, I hoped that they might be equally hardy. So in November, 1973—three



Fig. 10. *Lycoris* species (unidentified) No. 252, white, faintly flushed lavender-pink. A sturdy, vigorous grower which appears to be developing seeds, which never mature. Photo by Sam Caldwell

years after the original planting—I dug one of the coldframe bulbs and found it had increased to four fairly large bulbs. Two of these were set back in the coldframe and, as a test, the other two were set outside at different locations where I have various hardy species naturalized. One of these bloomed just once, in 1975, but now both have disappeared. While this cannot be considered a conclusive hardiness test, I do fear that this *Lycoris* will not thrive without coldframe protection in winter in my area. Zero temperatures are not unusual for us in early February and killing frosts occur until the end of March. Leaves on *L. squami-*

gera are able to survive without appreciable damage, but I noticed that foliage of #251 was badly hurt by cold spells when there was no snow cover.

Still this is a quite pretty and interesting lycoris, well worth space in my coldframe, and whenever bulbs become available it should prove satisfactory outdoors in slightly milder climates.

Lycoris #252 (see Fig. 10). It was also in August, 1970, that Dr. Hirao sent me two bulbs described as an unknown species bearing "off-white" flowers. They were tall and slender, about $1\frac{1}{2}$ " in diameter near the base, firm and sound but dry and without roots. These, too, were set in a coldframe. Performance has been about like that of the lilac-flowered #251; they grew off well, first flowered in August, 1972, and since then have multiplied satisfactorily and bloomed well. Foliage resembles that of #251 but doesn't come up until along in February, two or three weeks after #251 has started. As shown in Fig. 10, the flowers have a clean-cut style of their own. Scapes 20" or more tall are thick and sturdy. Umbels run about $8\frac{1}{4}$ " across and flowers 3 to $3\frac{1}{2}$ " across with segments up to $\frac{5}{8}$ " wide. The over-all effect is a sparkling white, but in truth "off-white" is more accurate, since there are lavender-pink flushes, particularly on the back side of segments, and the color shows strongly in style and filaments.

After flowers fade this lycoris proceeds as though it were going to make a bumper seed crop, as capsules grow plump and shiny. But it is a promise never fulfilled, for no viable seeds develop. And the pollen, when applied to other species in my hybridizing efforts, has never produced seed. Dr. Hirao reports similar negative results.

Limited trials of #252 for winter hardiness under outdoor cultivation indicate that it may not be reliable in my area, so I keep it under coldframe culture.

Lycoris #289 (see Fig. 11). This is probably most important of the three new lycorises. My first bulb came in October, 1972 from Dr. Hirao, who wrote "This has no botanical name yet, so far as I know. It is a light yellow *L. squamigera* type flower. . . . I think it was found among the imported bulbs from China about 30 years ago or maybe more." Then in the fall of 1974 a letter arrived from Mr. Satoshi Komoriya, a rare bulb fancier and dealer of Chiba-shi, Japan, in which he stated, "I now have a small quantity of *L. straminea*, which is said here to have been extinct. This is very similar in the habit and shape of flowers to *L. squamigera*. Recently one of the professional journals here reported on my *L. straminea*."

In exchange for some of my hybrid lycorises Mr. Komoriya sent me two bulbs of "*L. straminea*." One of these I planted out of doors and the other in my coldframe near the unnamed bulb received two years earlier from Dr. Hirao, since I suspected from descriptions that they might be the same. This was confirmed later when they bloomed together.

As a matter of fact, for the first year or two I thought both gentlemen had sent me *L. squamigera* bulbs by mistake, the broad-bladed



Fig. 11. *Lycoris* (unidentified) No. 289, with yellow flowers (left) beside a scape of *Lycoris squamigera* Maxim. (right). Note close resemblance except for the yellow color, and the unusually longer tepal tube at the base of the tepalsegs. Photo by Sam Caldwell

foliage starting up in late January and dying down in spring was so much like that of *squamigera*. Dr. Hirao's bulb bloomed in late July, 1976, and dispelled my doubts; it was indeed yellow-flowered. (see Fig. 11.) Both bulbs in the coldframe bloomed together the next year and the Hirao bulb again in 1978. The one bulb planted outside has survived our winters but evidently doesn't like them as it has never flowered.

L. #289 is a big lycoris, with about the same stature as *L. squamigera* and blooming at the same time. (See Fig. 11). Some might regard it as just a color variant of that species.

One important—and fortunate—difference is that it is extremely fertile. It produces copious quantities of pollen which seems to “take” on all the other fertile species, and its own self-pollinated flowers bear full capsules of very large seeds. At this writing none of my seedlings are more than two years old, so I cannot report on ultimate results, but thus far all indications are favorable.

It is a good thing that seed propagation is feasible, because not one of my bulbs shows any sign of increase by offsets, although one has been in the ground six years and the other two, four years. And while seed propagation is slow, it does mean that this lycoris should be available eventually to many gardeners.

Still to be settled is the matter of identity of #289. Some Japanese botanists regard it as the long-sought-for *L. straminea*, but there is substantial evidence against such a conclusion. The name *L. straminea* was published in London in 1848 by Lindley for a plant sent from China to Kew Gardens by Fortune. The type material was still on file at the Cambridge University Botany School Herbarium in 1954, when Dr. Traub managed to get a photograph of it. (*Lycoris straminea* Lindl. emend. Traub, PLANT LIFE 1956, p. 42.) This shows a relatively small lycoris with long exserted stamens and style and segments reflexed and ruffled in general resemblance to the form of *L. radiata*, *L. albiflora* and *L. aurea*. Obviously this is not the plant we have now. So here is more work for taxonomists. Perhaps a newly named species will emerge.

There has been speculation that *L. squamigera* itself may have resulted from a crossing in the wild of this L. #289 and *L. sprengeri*, both natives of China. I have made this cross, along with many others involving #289 during the past two years, and look forward eagerly to observing what the future will bring in my “lycoris nursery.”

NOTES ON **CRINUM JAPONICUM** (Bak.) Hann.

RANDELL K. BENNETT,

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During the past year some information has come my way concerning *Crinum japonicum* (Baker) Hannibal (syn. *Crinum asiaticum* Linn. var. *japonicum* Baker) that should be of interest to amaryllid collectors. I have also acquired some plants of the varieties to be mentioned in this article. At a later date the various forms of *C. japonicum* will be de-

scribed in more depth. Photographs will be published to show the diversity of this amaryllid.

The first accession of *Crinum japonicum* I received was seeds of the typical, green leaved form. These seeds took between six and eight months to germinate, most of that time outside of the greenhouse. It is assumed that germination would have occurred sooner, had the seeds been in the greenhouse from the start. Nevertheless, Les Hannibal has stated that seeds of *Crinum pedunculatum* have taken two or three years to germinate. So, the six to eight month wait for the germination of *C. japonicum* was not excessive.

From a friend in the Philippines I received news about the various variegated forms of *C. japonicum* that were grown principally in Japan. These plants are naturally-occurring mutants. The three cultivars described below are all extremely rare, and are prized in Japan.

“Akebono” has leaf tips which are flushed white. This is an extraordinary type of variegation for an amaryllid, and I have not heard of any other instance in the family of this variegation.

“Han-ire” is the spotted form mentioned by some authors. This highly ornamental plant has light green leaves, spotted with yellow. It is the type of interplay of colors that would be expected of a dweller of the tropical forest floor, not a Japanese sand dune plant.

“Shima-ire” is a rhizomatous, striated form of the species. The leaves of this mutant are the typical green color, frequently striated with white. The presence of the rhizomatous root system seems to distinguish it from the other forms of *C. japonicum*.

At this time, I am still trying to obtain plants of *C. japonicum* “Akebono”, the extremely rare, white-tipped mutant. I have managed to acquire some plants of the other forms, and some plants have been distributed to a botanic garden in Hawaii.

Baker established the Japanese *Crinum* as a variety of *Crinum asiaticum*, its distinguishing features being firmer leaves, and the plant being smaller in all its parts than the typical species. Hannibal later established the Japanese variety as a separate species.

Crinum japonicum occurs in southern Japan, as well as islands off the southern coast of Japan. As mentioned earlier, it is a dune-dweller, apparently living in beach sands, and extending almost to Tokyo in the north.

The plants of *Crinum japonicum*, including the mutants, have been grown in a mix consisting of two parts good quality loam, one part fine sand, and one part redwood shavings. Lime and Superphosphate are added to this mix. Benomyl is applied periodically to combat fungi, and fertilizer is supplied in the form of a water-soluble 15-30-15, every four weeks. *Crinum japonicum* has grown well in part, or full sun. Full sun would be preferred for flowering purposes. It does not seem to require a mix restricted to beach sand, although it will grow in that type of mix. The use of peat, or other organic material that breaks

down quickly in the soil should be avoided. Beach-dwelling *Crinum*s received from the Marshall Islands have also done very well with the culture described above.

The various forms of *Crinum japonicum*, especially the variegated mutants just described should be made more widely available. For amaryllids, their foliage is unsurpassed, and they possess the typical white flowers of asiatic *Crinum*s.

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Hannibal, L. S., 1972, **Garden Crinum**s, Bulletin of the Louisiana Society For Horticultural Research, Volume III, No. 5, 1970-1971.

THE MORPHOLOGY (GROUND-PLAN) OF **UNGERNIA**, THE ONLY ENDEMIC AMARYLLID GENUS OF CENTRAL ASIA

DIETRICH AND UTE MUELLER-DOBLIES, *Free University of Berlin*

SUMMARY

(Editorial note.—The following summary is taken verbatim as appended to the original German article appearing in Bot. Jahrb. Syst. 99 (2/3): 249-263. Stuttgart, May 16, 1978.)

Ungernia tadschicorum and *U. trisphaera* show a characteristic sequence of leaves which is unique among the 32 hitherto studied genera of Amaryllidaceae: the first leaf of the main innovation bud is reduced to two minute adaxial scales, the second one is a half sheathing foliage leaf, and the following ones may be wholly amplexicaul, but the 3rd and 5th may also have an open base, the last but one is an open foliage leaf and the uppermost is a half-embracing scale leaf. When the uppermost leaves of the blooming generation and the lower ones of the following shoot generation are waiting for development in next spring. The flowering scape is thus preceding its own foliage leaves (precursive=praecurrent) and that for one vegetation period, which means proleptic behavior. Among Amaryllids this type of periodicity is only known to us from *Sternbergia macrantha*.

There is only one scape flowering per year (annual innovation) and the induction probably takes place in late summer.

The morphologic results support the recent separation of the tribe *Lycoridae* Traub from the Amaryllideae, as these differ in three of the four main characters of bulb morphology.

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HYMENOCALLIS CHIAPASIANA SP. NOV.*

T. M. HOWARD,

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I was accompanied by Stephen C. Lowe, of San Antonio, on my 1970 annual plant collecting trip into Mexico. At the end of our search in mid-July, in the State of Chiapas, we located a *Hymenocallis* species in leaf, *Howard No. 70-59*, associated with *Calochortus* sp., light yellow flowers with wine throat.

This species apparently flowers a month earlier in its native habitat, due to the 6000 ft. elevation, and high rainfall. The climate is very mild and spring-like. The City of San Cristobal de las Casas lies in an alpine valley surrounded by pine forests and meadows.

The bulbs of *No. 70-59*, have been flowered at my home in San Antonio annually since 1971, and proved to be a new species which I am naming in honor of the State of Chiapas.

HYMENOCALLIS CHIAPASIANA SP. NOV. T. M. HOWARD

Hymenocallis chiapasiana a *H. choreti* differt tubo tepalorum curvato, seapo bimarginato, valvis spathae majoribus, eupola stamininum marginibus plus erectis, floribus multo magis suaveolentibus, et fructus striata.

Specimens grown at Santonio, Texas, from bulbs collected ca. one mile S.E. of San Cristobal de las Casas, State of Chiapas, Mexico, July 12, 1970. TRA No. 1185 (Holonomenifer), May 24, 1978; TRA No. 1186 (Paranomenifer), May 20, 1971.

Description.—*Habitat*: Chiapas, vicinity of San Cristobal de las Casas in rocky outcropping surrounding a valley, flowering with earliest summer rains in May or June and becoming dormant in July. Elevation ca 6000 ft.

Description.—*Bulb*: ovoid, 5 cm wide and 6 cm long, with brown tunics. *Leaves*: 3 to 5 in number, glaucous, oblanceolate to obovate, acute, petiolate to sub petiolate, 20 to 30 cm long and 2.5 to 4.5 cm wide in the middle, tapering to .5 cm wide at the base. *Scape*: 13 to 38 cm tall, compressed with two distinct edges, umbel 2- to 6-flowered. Flowers white, sweetly scented, one or two scapes per largest bulb. *Spathe valves*: 4 or 5, 4 to 6 cm long, lanceolate, .8 to 1 cm wide at the base. *Tepaltube*: slightly curved, (living material), 5.5 to 7.5 cm long, green in lower 2/3rds, white in upper 1/3. *Tepalsegs*: 5.5 to 6.5 cm long, spreading, slightly recurved to strongly recurved in living specimens. .4 mm wide. *Staminal cup*: funnel form to nearly rotate with margins nearly erect or slightly spreading, from short tubulose base, 1.5 cm long and 1.5 cm wide. *Filaments*: 3 cm long, green; anthers versatile, with orange pollen. *Pistil*: 5-8 cm long, longer than fils. *Ovary*: ses-

* Editorial Note.—Received on October 15, 1977 for the 1978 PLANT LIFE, but was held over for the 1979 issue.

side, *one to 2 ovules* per cell; *Fruit*: oval, 1.6 to 1.8 cm long, and 1.3 cm wide, striated, pale green with semi-gloss, smooth, rounded surface.

Notes: One of the earliest Mexican species to flower, flowering in May or early June with the first rains of summer. Distinguished from *H. choretis* (the only species it is apt to be confused with) by its curved tepaltube, compressed two edged scape, larger, better developed spathe valves, smaller staminal cup having more erect margins, much more pleasantly scented flowers, and striated fruits. *H. chiapasiana* grows at higher elevations than *H. choretis*, and flower a full month or more earlier in the season.

CORRIGENDA - PLANT LIFE vol. 34, page 64. 1978

Page 64, first line for **HYMENOCALLIS QUERREROENSIS** read **HYMENOCALLIS GUERREROENSIS**.

HYMENOCALLIS SPECIES FROM SOUTHERN MEXICO *

PIERFELICE RAVENNA,
Universidad de Chile, Santiago, Chile

HYMENOCALLIS BAUMLII Rav., sp. nov. (Fig. 13)

Species a *H. tenuiflora* *H. litoralis* et *H. acutifolia* similis necnon a prima faliis crassioribus angustioribus erectis vel suberectis, ab alteribus tepalis e base poeculae staminiferae liberis recedit.

Flores sessiles. Perigonii tubus pallide viridis ad 10-13 cm longus circ. 3.4 mm latus. Perigonium album 12-15 cm latus. Tepala usque 9 cm longa 3.7 mm lata. Corona infundibulata ad 18 mm longa circ. 18 mm lata basin versus angustiora. Filamenta et stylus sordide virides.

Plant up to 54-66 cm high. *Bulb* widely ovoid, to 47-60 mm long, 40-50 mm wide, prolonged into a pseudoneck. *Leaves* often 7, ensiform, arising simultaneously as the flower-scape, erect, distic, subcarinate, moderately channelled, subacute, to 20-33 cm long, 19-25 mm broad. *Scape* almost cylindrical, not at all edged, to 36-46 cm long, 7-12 mm in cross section. *Spathe* marcescent; *valves* lanceolate, free to the base, to 30-33 mm long. Inflorescence 4-8-flowered. *Ovary* ellipsoid, sessile, to 10-12 mm long, 6-8 mm wide, green. *Flowers* spreading unright or erect, very delicate. *Perigone tube* 10-13 cm long, 3.4 mm across. *Perigone* 12-15 cm in diameter. *Tepals* linear subequal, white, lax, moderately recurved, to 9 cm long, 3.7 mm broad. *Staminal cup* very thin, to 18 mm long, 18 mm wide, much narrower below. *Filaments* dull green, 4-5 cm long. *Anthers* linear-versatile, thin, to 11-13 mm long, scarcely 1 mm broad. *Style* very narrowly filiform, dull green, to 16-20 cm long. *Stigma* capitate, small, viscose.

Habitat.—Low, open places between Cintalapa and Tuxtla-Gutiérrez, in the State of Chiapas, Mexico.

* Received for publication in *Plant Life* October 19, 1978.

Specimens: In graminosis humidis inter Cintalapa et Tuxtla-Gutiérrez civit. Chiapas Mexici; leg. Ravenna 2173, VI-1976 (typus in Herb. Ravennae, isotypus BH).

Hymenocallis baumbii belongs in the Series *Litorales*, its closest allies being, *H. tenuiflora* Herb., *H. litoralis* (Jacq.) Herb., and *H. acuti-*



Fig. 13. *Hymenocallis baumbii* Rav., as photographed in its natural location. Photo by P. Ravenna

folia (Ker-Gawl.) Sw. From the former, it is distinguished by the thicker, erect or suberect leaves; from the other two, by the smaller size, not edged scape, and tepals free from the lower part of the staminal-cup.

The species is properly dedicated to Mr. James Bauml of Brownsville, Texas, who is preparing his Thesis on the Mexican representatives of the genus.

LITERATURE CITED

Flory, W.S., 1978, Known distribution of *Hymenocallis* Salisbury in North and Middle America and the West Indies; Pl. Life 34: 47-59.

HYMENOCALLIS NOTES

JAMES E. SHIELDS,

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It was called to my attention by Mr. James A. Bauml that his plant of *Hymenocallis* "Icon" had abnormal blooms: only 5 stamens and 5 tepals. This prompted me to examine all my yellow-flowered types of *Hymenocallis* carefully, too: only my accession JES#154, purchased in 1974 from a commercial source as *H. amancaes*, showed this trait consistently. Moreover, the staminal cup of this variety is at least 50% larger than that of any other yellow *Hymenocallis* type that I grow. An attempt at propagation of #154 by cuttage has yielded a profusion of bulblets. All this leads me to reaffirm my previous suspicion (Shields, 1977) that this plant is not simply wild-type species *H. amancaes*. Moreover, a blooming-size bulb of *H. amancaes* was supplied by the U.S.D.A., Glenn Dale, Maryland, for comparison with my #154. The U.S.D.A. bulb carried the identification number P.I.390844. This and JES#154 were planted near one another on 22 May 1978 in a freshly-prepared outdoor bed in full sun. The plants of JES#154 grew and flowered as usual, and as vigorously as "Helios", "Pax", and "Icon". In striking contrast, P.I.390844 failed to grow at all until one tiny, weak shoot appeared in late July. Thus, P.I.390844 lived up to the reputation of *amancaes* of being very sensitive to hot weather, while JES#154 behaved as do the other hybrids. I am forced to conclude that the plant referred to as *H. amancaes* in previous articles and private correspondence is not, in fact, the species.

There are also at least two distinct clones in circulation under the name *H. "Helios"*. These are accessions #124 and 168. Clone #124 has a markedly taller scape, deeper yellow color, and slightly smaller florets than does #168. A clone received as "Pax" (JES#103) and a clone received as "Icon" (JES#178) correspond approximately to #168 in scape height, floret size, and color, although there appear to my eyes to be subtle differences separating the three. Bulbs of each of my yellow-flowered *Hymenocallis* varieties are being sent to Mr James A. Bauml

for his evaluation. Well-documented representative bulbs of Woelfle's yellow hybrids would be invaluable in assisting in the clarification of this nomenclatorial mess.

In any case, any commercially-obtained bulbs of so-called *Hymenocallis amancaes* must be considered suspect. Only plants collected in the wild by reputable individuals can be called *H. amancaes* with any degree of confidence. My plants of #154 appear to be a selected form or hybrid of *amancaes* which was chosen for (1) flower size, (2) ease of propagation by cuttage, and (3) ability to survive hot weather. It is a fine horticultural variety, but surely not the botanical wild-type of *H. amancaes*.

REFERENCE

Shields, J. E. 1977. *Hymenocallis* Culture in Indiana. PLANT LIFE 33:79.

REGISTRATION OF NEW AMARYLLID CLONES

MR. JAMES M. WEINSTOCK, *Registrar*
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This department has been included since 1934 to provide a place for the registration of names of cultivated **Amaryllis** and other amaryllids on an international basis. The procedure is in harmony with the International Code of Botanical Nomenclature (edition publ. 1961) and the International Code of Nomenclature for Cultivated Plants (edition publ. 1958). Catalogs of registered names, as well as unregistered validly published names, will be published from time to time as the need arises. The first one, "**Descriptive Catalog of Hemerocallis Clones, 1893-1948**" by Norton, Stuntz and Ballard was published in 1949. Additional catalogs of cultivars have been published since 1949: **Catalog of Brunsvigia Cultivars, 1837-1959**, by Hamilton P. Traub and L. S. Hannibal, PLANT LIFE 16: 36-62. 1960; Addendum, PLANT LIFE 17: 63-64. 1961; **Catalog of Hybrid Nerine Clones, 1882-1958**, by Emma D. Menninger, PLANT LIFE 16: 63-74. 1960; Addendum, PLANT LIFE 17: 61-62. 1961; **The Genus X Crinodonna**, by Hamilton P. Traub, PLANT LIFE 17: 65-74. 1961; **Catalog of Hybrid Amaryllis Cultivars, 1799-1963**, by Hamilton P. Traub, W. R. Ballard, La Forest Morton and E. Authement, PLANT LIFE. **Appendix i-ii + 1-42**. 1964. Other catalogs of cultivated amaryllids are scheduled for publication in future issues. These may be obtained at \$8.00 prepaid from: Dr. Thomas W. Whitaker, Executive Secy., The American Plant Life Society, Box 150, La Jolla, Calif. 92038.

The registration activity of the American Plant Life Society was recognized when at the XVIIth International Horticultural Congress, Brussels, 1962, the Council of the International Society for Horticultural Science designated the American Plant Life Society as the Official International Registration Authority for the cultivars of **Nerine**; and this was extended to include all the **Amaryllidaceae** cultivars, excepting **Narcissus** and **Hemerocallis**, at the XVIIIth International Horticultural Congress, 1966.

Only registered named clones of **Amaryllis** and other amaryllids are eligible for awards and honors of the American Amaryllis Society at Official Amaryllis Shows.

Correspondence regarding registration of all amaryllids such as **Amaryllis**, **Lycoris**, **Brunsvigia**, **Clivia**, **Crinum**, **Hymenocallis**, and so on, should be sent to Mr. Weinstock at the above address. The registration fee is \$2.00 for each clone to be registered. Make checks payable to American Plant Life Society.

3. GENETICS AND BREEDING

YELLOW-FLOWERED AND OTHER **AMARYLLIS** HYBRIDS

C. D. COTHRAN,

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Some twenty five years ago Cecil Houdyshell forced about fifty *Amaryllis* seeds upon me in exchange for some Camellias I had given him. At that time I was very busy with Camellias and did not really want to start a new line, but since I cannot resist seeds, these were planted and flowered in due time. These flowers really jolted me, from dark red to almost pure white, and much larger than any *Amaryllis* I had seen before. They set seeds and I planted some of them, getting several distinct variations from the originals when they bloomed. The next year I hand pollinated some of the better ones, and from these got some good solid colors, and better form, and I was hooked.

My wife and I saw in the newspaper that an *Amaryllis* show was to be held at the Los Angeles State and County Arboretum, and that it was sponsored by the Southern California Hemerocallis and *Amaryllis* Society. We attended the Show and were much impressed by the size and colors of the blooms, especially the Dutch. As a result of the Show we joined the Society, and it has been a very pleasant association.

From the plant table at an *Amaryllis* Society meeting I selected a small plastic bag which had the contents of a potted plant emptied into it, and thoroughly mixed. At home I found a tag had been included which said "Senorita", a cross of *A. evansiae* by *A. striata*. I carefully potted up the half dozen small bulbs, and about a year later two of the bulbs bloomed. I was quite entranced with the bloom, first rather yellow and turning an apricot pink as the flower passed through its cycle. The idea occurred to me, why not get an all yellow flower?

Pollen was taken from the "Senorita" blooms and stored, and the blooms themselves were pollinated with one of the Houdyshell hybrids, and from a Dutch hybrid. None of them set seed. However the reverse crosses did set seed, and the seed from the White Dutch (mistakenly sent to me as 'Maria Goretti') was given the number 225. These pollinations were made in the late Spring of 1970.

Starting in February 1972 the first of these 225 seedlings started blooming. No yellows, but some lovely pastel colored blooms six inches in diameter, often four blooms to a scape, and fairly wide segs and a flat flower. Very charming; very worthwhile as a pot plant. It was found that they produced offsets in great numbers, and some of these grew large enough to bloom the next year, producing 8-10 scapes per pot. Many of the blooms were open at the same time.

Number 225-C did not have much yellow, but it did have four-flowered scapes of nice size and form. This was pollinated with a cross which was blooming for me for the first time, (EA x E) which was quite

yellow. The first scape of 225-C pollinated was numbered 339 and the second scape 340. Seed was produced from both of them and planted in March 1972, resulting in about 20 plants of each to work with.

The first of these bloomed in February 1974 and was *quite yellow* as the flower opened, but the *yellow faded to a cream*, and red veining developed with a few red flushes along the edges of the segs. The flowers were about 5 inches in size. As other 339 plants (Fig. 14) bloomed it became apparent that there was *quite a bit of yellow in these plants*, and size was up to six and one half inches. The 340 group started to bloom also, but it was not until the Spring of 1975 that *the yellowest of the flowers appeared*. Number 340-8 and 339-16 and 17 were quite yellow with yellow veinings. They were 6½ to 7 inches in diameter with an acceptable flower form.

Attempts were made in 1974 to both self and cross pollinate from the best that had bloomed up to then, but no success was had. In 1975 a number of crosses within the group were tried, but only one cross produced a few wrinkled, twisted seed of very doubtful viability. This cross was 339-4 x 340-6, and the seed from it were given the number 591 (Fig. 14). Several of these seed did germinate, and one grew much faster than the others. It was put in a separate pot, and in 20 months from pollination it bloomed from a little bulb about one inch in diameter. There were two flowers about 6 inches in diameter, good yellow (about the same as (EA x E), with a slight veining in deeper yellow than the ground. The flower had a flat face with segs about 2¼ inches wide, and a greenish yellow throat. In 1978 the flower was 7 inches in diameter, and 3 flowers in the scape. A trace of red veining was apparent after several days.

When 591-1 (Fig. 14) first bloomed I had the feeling that it would probably prove difficult to get it to set seed. The contrary was the case; the flower set seed from its own pollen, and that from a good yellow cross (EAE x E), and the seed germinated well in both cases. Several other crosses were made with the 591-1 pollen. At the present time the plants from these crosses are all very small, and we will have to wait more than another year to see what happens.

Number 591-2 bloomed in April of this year (1978) with four flowers, about 7 inches in diameter, Dutch type. The flowers opened quite yellow, but in a days time acquired a pink flush which was quite attractive for beauty, but detracted from the objective of a yellow flower. No crosses were made from it.

To further increase the bank of yellow material available for future work, 339 was crossed with *A. parodii*, a long tubed very yellow flower. The seedlings show *parodii* parentage strongly, however it will be two or three years before any of these bloom. In 1973 Kelly Spearman gave me some pollen from *A. papilio*, and I put it on *A. evansiae* among others, but it was the only one that took. I got three plants from the few seed, and the first bloomed in January of 1977 with two flowers about 5 inches in diameter, strong yellow with a trace of green, and bold red veining curving in the segs as in *A. papilio*. Segs were broad at the

base, narrow at the tip, twisted, and a strong yellow band the last inch of the rib. A narrow red picotee ran around each seg. This flower is interesting because the yellow color is such a deep yellow. Because of this, two flowers were pollinated with 591-1. (Fig. 14) This was not

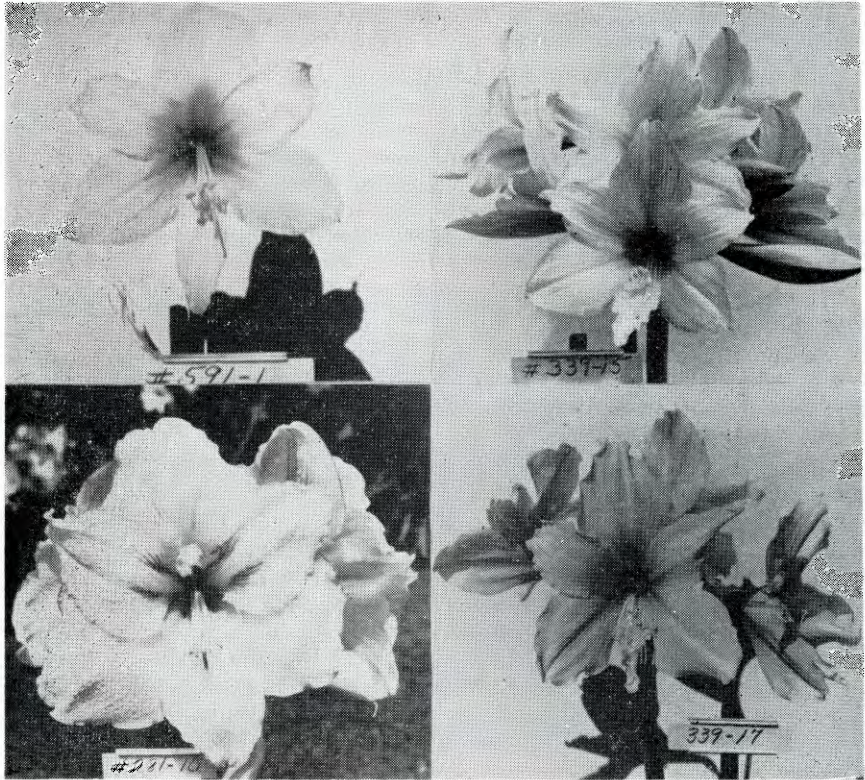


Fig. 14. *Amaryllis* hybrids produced by C. D. Cochran. #591-1, (#339-4 x 340-6), flower 7" diam., good yellow ground color, as strong as in EAX E; slight veining in deeper yellow.

#339-15: (White Dutch x 'Senorita') x (EA x E), 7" diam. flower, ground color creamy yellow with strong yellow ribs to tip of flower.

#281-10. 'Golden Triumphator' x 'White Giant' pastel colored flowers, (8"); picotee edges, soft red frosting on segs; opens flat, lasts long.

#339-17, (White Dutch x 'Senorita') x (EA x E), 7" diam. flower, ground color light yellow with deeper yellow along ribs, very pale orange veining after 1-2 days.

Photos by C. D. Cochran

successful, so the reverse pollination was made, seeds were set, and the plants are growing.

To me it is interesting to note that each step has produced very pretty and interesting flowers. Flowers from each step have won ribbons

at the shows. I say this to prove that it is not all work; that there is a lot of pleasure in it also. Number 339-4, -16, and 340-8 and -17 are worth keeping, for while they are not as yellow as desired, they are a big step in that direction. The *evansiae-papilio* cross is very vigorous and blooms well. One of them had four scapes this year, with three to four flowers on each scape. After one gets used to the yellow and red combination, the flowers become quite attractive.

Fragrance is slight or entirely lacking in most *Amaryllis*. It is really unfortunate that such beautiful flowers do not have a pleasant fragrance to go with their beauty. This is particularly true of the Dutch hybrids. Several species do have a fragrance, among them *A. brasiliana* and *A. fragrantissima*. Leonard Doran gave me some seed of a cross of *A. evansiae* and *A. brasiliana*. The flowers of this cross are very pretty, somewhat tubular, and for a few days have a very pleasant fragrance.

I was given some *A. fragrantissima* pollen, and by being very stingy with it I was able to pollinate several flowers. Seed were obtained, and one of the seedlings bloomed this Spring with long tubular flowers, and a very pleasant fragrance. I will be anxiously awaiting the blooming of some of the other seedlings to see if the fragrance of *A. fragrantissima* is a dominant characteristic.

Doubleness occurs very seldom in *Amaryllis*, but one of the *A. belladonna* variations became completely double, *A. belladonna flore-plena*, or *A. belladonna* forma *albertii*. McCann of Punta Gorda, Florida, a number of years ago, as described in PLANT LIFE, developed double hybrids from this little belladonna double and the ordinary large forms of hybrid *Amaryllis*. His 'Helen Hull' and 'Margaret McCann' are still in the trade. They are frequently quite double but not very large. I obtained 'Helen Hull' and flowered it. It was too double to have a pistil or stigma, but did have some rudimentary stamens and pollen. Crosses on 'Maria Goretti' produced no doubles, only medium size white picotees. Other crosses with 'Helen Hull' on Dutch hybrids have not produced doubles.

I grew 'Double Beauty' from seed given to me by Leonard Doran. I have not seen anything to equal it in size, doubleness, and beauty. However, doubleness has its disadvantages because it seldom sets any pollen. I very much wanted some more doubles, so I started working with the little *belladonna* double. It does not have much pollen, either, it blooms irregularly, and the pollen seldom caused a seed set.

A Doran 2R5 double was obtained, and since it frequently has good quantities of pollen, seedling crosses were soon obtained. Some of these have now bloomed, and three of the plants have come double. One of these doubles is an *A. yungacensis* cross which has the almost maroon coloring of *A. yungacensis*. A cross of 'Double Beauty' pollen on Dutch bloomed this year, and is quite double, and lends encouragement for some 15-20 more plants of the same cross.

This year all of the doubles have had some pollen, so many attempts were made to get seed sets on large red hybrids, such as 'Violetta',

'Nostalgia', 'Beautiful Lady', 'Queen of Night', and some of my own deep red hybrids. Seed yields were good and germination excellent. A lot of little plants are looking forward to the next two years. Some of them by the laws of chance should be double, but those not double, and having good form and color, will be excellent subjects for re-crossing with doubles.

Not all of my time has been spent developing a yellow, fragrant, or double amaryllis. It seemed to me we had a great need for pastel colors. Big reds, stripes, and whites are beautiful, but not as attractive to me as the pastel colors. Goedart in Florida suggested that I use 'Golden Triumphator', and 'Glorious Victory' as my starting point. This I did, and I have obtained some excellent progeny from them. (Fig. 14) 'Glorious Victory' is very vigorous, and seems to thrive in producing seed; very large good seed. 'Maria Goretti' works well with both of the above.

Senorita was finally coaxed into setting seed. With pollen from white Dutch hybrids, Senorita yielded some very fine, large pastels with a certain cockyness that makes them very attractive. Most of the Senorita crosses produce offsets freely, and bloom precociously.

The picotees 'Dutch Doll', 'Red Lining', and 'Picotee Petticoat' were obtained and have been a joy to work with. Besides their own beautiful blooms, crosses with them have produced pure whites, picotees, picotees with red flushes in varying amounts, and small flowers with all of these characteristics. Working with them is a constant pleasure. Not any are bad, few are of show quality, but all are charming, and work with them can be highly recommended.

AMARYLLIS FOR BREEDERS

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Amaryllis are among the easiest of plants to breed for new varieties. And those who have flowered just one seedling have been unanimous in describing the experience as being far more rewarding than growing only commercial bulbs.

Inquiries that I have received indicate that there has been a shortage of material to use for breeding new forms other than standard commercial varieties and a few species. The latter are usually rather high priced and are often the diploid species which do not combine well with the more available tetraploids. However, the diploids bred as a group lead to very interesting new combinations not found in the larger types. The miniature belles suitable for windowsill culture in the north come from the diploids.

Because I have a large germ plasm reservoir of *Amaryllis* for breeding, I have been prompted to increase these plants to make this material available to the growing number of *Amaryllis* breeders. The need that I see is for plants of known genetic composition and for certain types with particular attributes such as disease resistance or cold

hardiness. As stocks of such plants become available, they will be offered on a wholesale basis.

Of particular note at this time are seedlings from crosses of white Dutch pollinated with an induced tetraploid hybrid of *Amaryllis evansiae*, *A. aglaiae* and *A. parodii*. The primary hybrids of this cross all have pigments other than the desired yellow. But in contrast to the earlier hybrids of *A. evansiae* x white Dutch, these have high fertility—allowing self or sub pollinations. The earlier hybrids were triploids which set very few seeds and it is all but impossible to obtain seed set among triploids alone.

All other classes of *Amaryllis* hybrids described in the *Amaryllis Manual* will be represented. But it may be several years before most are available in any quantity.

DOUBLE AMARYLLIS UPDATE

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In the months following the article on my double amaryllis in the 1978 issue of *PLANT LIFE*, I have received many inquiries about my doubles and some excellent breeding advice from Dr. William D. Bell of Gainesville, Florida. I am currently waiting for 350 seedlings to bloom, so I can put some of Dr. Bell's advice to use.

The seedlings are offspring of all the doubles registered in the last *PLANT LIFE* issue. Dr. Bell's advice was to use semi-double plants as the female parents, after first making sure that the plants have a viable stigma. If a semi-double will make seed, chances are greater to get better doubles. I am really looking forward to this batch of seedlings blooming this fall or winter.

ROLE OF MUTATION BREEDING IN AMARYLLIS

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In *Amaryllis* breeding the most prevailing method of inducing variability is by means of conventional breeding at the varietal level. However, limited success has also been achieved by raising interspecific hybrids (Parkash Narain 1974), since sterility of the F_1 hybrids thus raised poses a problem of raising a second generation wherein the segregants are expected to provide new and novel garden cultivars. Polyploidy has also produced flowers of larger size in *Amaryllis* cultivars.

The present study on mutation breeding in this ornamental plant was taken up at the division of Vegetable Crops and Floriculture, I.A.R.I., with a view to determine the efficacy of different doses of irradiation from the standpoint of producing new and better forms for flower size, flower shape, number of florets per spathe and colour of the flowers. The results of this experiment obtained are briefly summarised

here.

MATERIAL AND METHOD

Five bulbs of *Amaryllis gracilis* cv. 'Dutch Red' were irradiated with 0.5 and 1 KR dosage of gamma-irradiation at the J. N. University, New Delhi, during Jan. 1977. Prior to that still higher doses had been tried which were lethal. The bulbs were immediately planted after treatment along with their respective controls. Before irradiation, the



Fig. 15. *Amaryllis gracilis* cv. 'Dutch Red'. **Top** flowers, control; and **bottom** flowers, mutant.

roots and leaves were cut so that the bulbs had a smooth entry into the gamma cell. The dose rate was 3.5 KR of gamma rays per minute.

Portions of 0.5 gm fresh petals of cv. 'Dutch Red' of *Amaryllis gracilis* and its induced mutants were taken for estimation of Flava-chrome-B pigments according to the technique of Kaicker & Pandey, 1973. The fresh petals were then crushed in agate mortar and by adding 15 ml of acetone the pigments were extracted. In order to make the

extract free from colloidal particles it was centrifuged, using the Jantzki K70 centrifuge, for 15 min. at 2000 R.P.M. and the percentage of absorption was observed with Sepectronic-20 (B&L) at 570 μ -wavelength. The differences between the relative amounts of Florachrome-B in control and mutant plant were observed.

RESULTS

Growth data and development of the bulbs under different treatments showed that growth was diminished with increase in the dose rate. In the first year all the treated bulbs were very slow in growth in comparison with the control. All these treated bulbs flowered in the same season but without any change in flower characteristics except that *they were late* in flowering by about one month over its respective control.

In the second year the growth was still much retarded in the 1 KR treatment and sprouting was late by 15 to 30 days. In this treatment bulbs produced hardly one or two leaves which were smaller in size, almost half normal size, thick narrow and twisted. All the bulbs in this higher dose did not flower through out the season. In case of the 0.5 KR treatment, growth of the bulbs was also slow and retarded in comparison to the control. The sprouting of bulbs was about 15 days later than the control. This treatment has given several flower mutants which are described as follows:—

MUTANT NO. 1

In this case plant growth was normal except some changes in leaf size. The leaves were about 20 cm long and 3.5 cm broad while in control it was 30 to 36 cm long and 4 to 4.3 cm broad.

This mutant was 14 days later in flowering than its control. The flower stalk was smaller in size (24 cm long; in the control it was 40 to 45 cm long). The flower stalks were variable. All flowers were bicour i.e., red and redish white striped throughout the perianth as compared to the control which was pure red in colour (See Fig. 15). The other variation was in the number of tepals, stamens and stigma. In four flowers there were 10 tepals, 10 stamens, (eight long, two were very small) with smaller anther lobes; the stigma became broader and flatter. The respective control had six tepals, six long stamens with larger anther lobes and long trilobed stigmas (see Fig. 16).

Second flower had 6 bicour tepals, 4 were bilobed, giving it a double appearance as found in the natural mutant. It had 7 stamens with small anther lobes; one stamen was very small, petaloid and twisted, the stigma rudimentary, and completely hidden near the base of stamens suggesting there by that the ovary was infertile which was also expressed by no seed set at a later date.

The third and fourth flowers were also different in colour. 6 red tepals with redish-white stripes. The petals were lenceolate, with bifurcated apex, similar to the natural double mutant. Of the 6 petals, two were pointed, petaloid, with growth at the center. It had 6, long stamens with long anther lobes as in the control. The stigma was also long

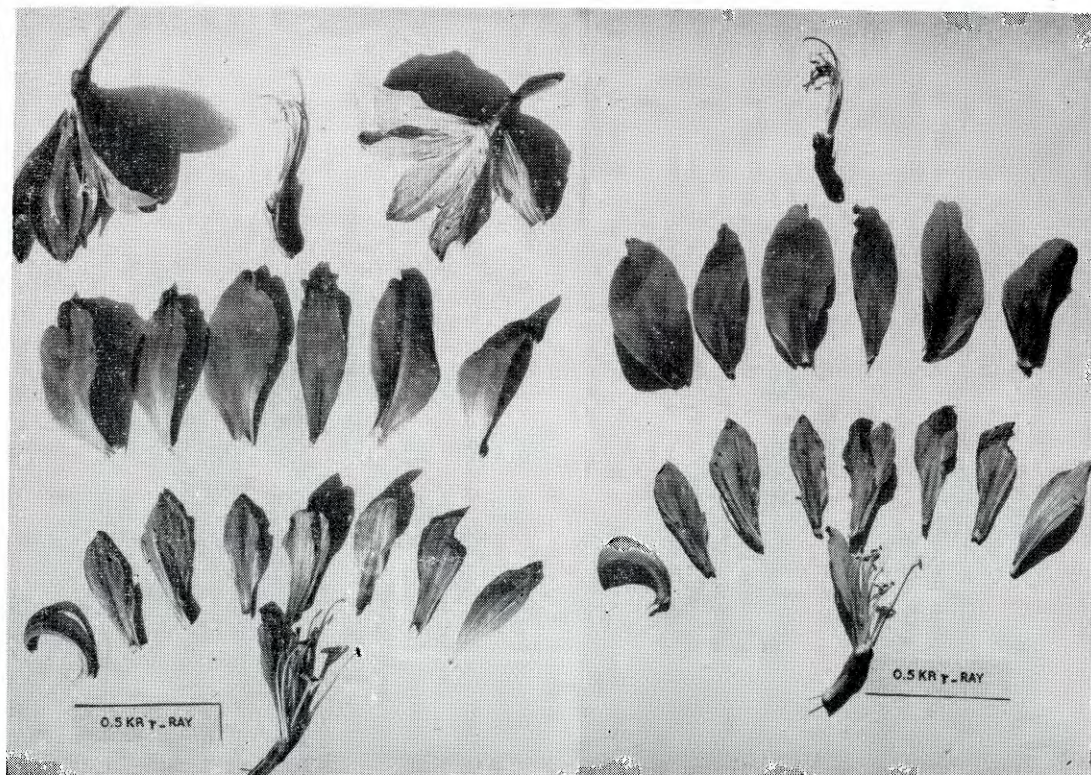


Fig. 16. *Amaryllis gracilis* cv. 'Dutch Red'. Left, control, top two rows; mutant, bottom two rows. Right, control, top two rows; mutant, bottom two rows.

(5.5 cm in length) and flat instead of trilobed as in the control. All flowers were mosaic for colour and shape.

MUTANT NO. 2

In this mutant, vegetative characters were the same as in above mutant No. 1. The only difference in flower was that it was borne on a small stalk (size 16 cm long). It had 3-bicolour flower. The flower color was red with reddish white stripes. Each flower had 6 notched tepals, 6 stamens with small anther lobes, stigma long and flat, while in another flower it became rudimentary and was hidden at the base of flower. All flowers were mosaic in its colour.

MUTANT NO. 3

Vegetative growth of this was slightly vigorous in comparison to the other two above mutants. It was 10 days later in flowering than the control. The change brought about was in flower colour and shape. The flowerstalk was 36 cm long, bearing 6 flowers per scape. All flowers changed in colour and they were different in number of tepals, and stamens.

One flower had 8 bicolour tepals with red and reddish-white stripes; two tepals were fused making the total number of petals 10 (Fig. 16). It had 9 stamens, 3 were very small, having filaments only 1.5 cm long. All these three stamens were twisted, bearing small anther lobes. In this case stigma was also very small and twisted and hidden near the base of stamens suggesting thereby that it was female sterile which became evident when later no seed was set.

Another flower had 6 bicolour petals, 6 stamens, (5 with long filaments and large anther lobes as in control) while one stamen was small with a small anther lobe and twisted filament. The stigma was long and flat.

Still another flower had 6 bifurcated, bicolour petals showing a tendency toward doubleness. It had 10 stamens, 3 were small and twisted; stigmas were rudimentary.

Fourth to sixth florets had only 3 bicolour tepals which were formed by fusion of two tepals, as shown by the bifurcated apex of the tepals. Flowers had 4 stamens with small anther lobes. One stamen in each flower was twisted at the base. In all cases the stigma was long and flat.

Florachrome studies. The acetone extraction of tepals by the methods described earlier gave suitable florachrome extracts which showed absorptions bands in satisfactory strengths in control and mutants. The results are presented in Fig. 17, which indicates that the method employed gave differences by spectrophotometry in the mutants of 73% optical density at 570 μ wave length in comparison to the respective control which was 80%. Both visual, and spectrophotometric optical density results suggest that the light colour of the mutants, was due to the *gamma ray* treatments.

CYTOLOGICAL ANALYSIS

That irradiation also effects the fertility of the flower is well known. In all the mutants obtained, pollen fertility was reduced from 40 to 45% as against the control with 84% fertility.

DISCUSSION

It is evident from the results that mutation breeding of *Amaryllis* can give rise to similar flower mutant to those obtained in other ornamental plants heretofore. Stunted growth, leaf curling, flower colour, (red to reddish-white stripped), different flower forms, increasing number of tepals giving rise to doubleness, induction of female sterility, stamen number, and possible increased number of florets per stalk, can be induced as genetic changes by gamma-irradiation.

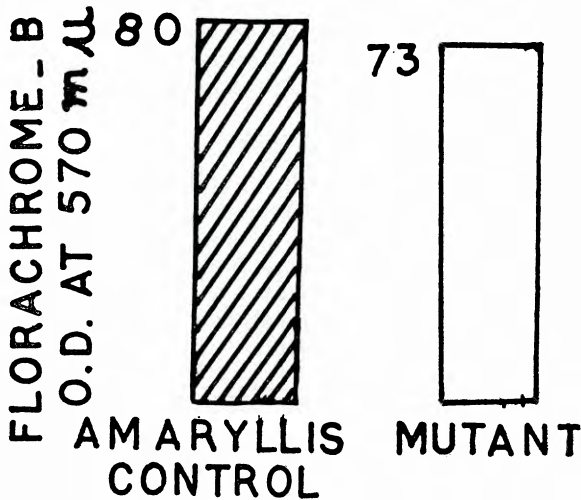


Fig. 17. *Amaryllis gracilis* cv. 'Dutch Red'. Relative amount of florachrome-B in controls and mutants (expressed as percentage O. D. of fresh weight basis.)

With mutants it is necessary to practice selection for several generations to develop a satisfactory mutant line which will be an improvement over the parental types. The qualitative variations in colour, is governed by the genetic mechanism. Pure clonal selections of these mutant would provide new cultivars hitherto unknown in *Amaryllis*, as shown by results obtained in different crops. Flower mutants for doubleness and color etc. have been reported in *Tithonia* by Kaicker, Swarup & Singh (1971). Similar doubleness was induced in Sweet Pea by Kaicker & Swarup (1971). In roses bicolor mutants were obtained by gamma-irradiation and chemical treatments by Kaicker, and Swarup (1972, 1978) and Swarup Et. AL., 1971, 1973. Similar results have also been obtained by Abraham and Desai (1976) in case of Tuberose where-

by they were able to induce chlorophyll changes in the leaf colour by 1.75 KR treatment of gamma rays and 0.5 KR for *Amaryllis*. However chlorophyll changes for leaf colour have not been obtained in the present study. It is thus evident that 0.5 KR of gamma-irradiation is the most promising dose for induction of mutation in bulb crop like *Amaryllis*. The vegetative changes observed as in case of delayed sprouting, stunted growth, curling of leaves etc., is supported by the work of Manning (1969) on irradiation of *Amaryllis* seed with 15 KR dosage. The increase in floret number to six as against 2-4 in the control as found in mutant No. 3 is suggestive of the fact that dominant changes can be brought about by 0.5 KR gamma-irradiation. The inheritance of this characteristic has been worked out by Bell (1977). He has on the basis of species hybridization suggested the floret number to be a dominant factor but which is not inherited as a simple trait. This gives a method for the improvement of this trait through the mutation breeding technique. Likewise similar results on the increase in floret and tepal numbers, fused flower, and increase or decrease of stamens numbers, were noted in irradiated populations by Abraham and Desai (1976).

SUMMARY

Amaryllis gracilis cv. 'Dutch Red' bulbs were exposed to gamma-irradiation dosages. Mutants for flower, leaf shape, colour and floret numbers have been obtained. 0.5 KR is most effective dosage for irradiation of bulbs. Three different mutants have been described, their florachromes studies which have brought out differences in their flower colour as shown by measuring optical density which was less in the mutants than in the respective controls.

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BREEDING HYBRID AMARYLLIS WITH 6-8 FLOWERS PER UMBEL

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In the 1920's new hybrid *Amaryllis* cultivars were imported from Europe and admired by many gardeners in Japan. In the past, the older kinds of *Amaryllis* hybrids had been grown for probably over century.



Fig. 18. *Allium giganteum* grown by Isamu Miyake in Japan for the cut flower trade under glass, in **background**. In **foreground**, Miss Miyake, holding giant many-flowered scape of pure white Miyake strain of Hybrid *Amaryllis*. Reproduced from Kodachrome color print.

A few leading gardeners hybridized the new cultivars to select and give Japanese names to superior clones by about 1940s, but due to the



Fig. 19. The Miyake strain of many-flowered Hybrid Amaryllis Hybrids. **Top**, pure white hybrids, which reproduced well, and **bottom**, beautiful medium red hybrid, which did not reproduce satisfactorily, from Kodachrome color prints.

difficulties during the war nearly all of them have been lost.

In 1950s the amazing Ludwig's *Amaryllis* hybrids were imported from Holland and an agricultural station and some leading nurserymen started to grow them as a commercial item. Their activity however was not enough to maintain the people's fascination in *Amaryllis* and the collection of Dutch hybrids gradually disappeared from the nurserymen's catalogues. The cause of failure of the Dutch *Amaryllis* was that Japanese nurserymen tried to produce the bulbs in the open while they were plants developed under controlled greenhouse conditions rather than in outdoor fields. Infection of virus by careless handling also discouraged the industry.

At present those found in the market are old, pointed tepal strain hybrids and the Ludwig's strain. In far smaller quantity *Amaryllis gracilis* and *A. reticulata* are grown.

I have been growing *Allium giganteum* and others for cut flowers for many years and the *Amaryllis* has been one of the main items that grow. Several years ago it was my good fortune as I found a few clones among seedlings of Ludwigs strain which bear six to eight florets on a single scape, while, as everyone knows, almost all the *Amaryllis* cultivars bear up to four buds on a scape. The many flowering habit of my clones is quite stable, and it is truly a most luxuriant display when five to six, perfectly round florets, over 20 cm wide, of heavy substance open simultaneously. The scape usually exceeds 1 meter in height, upright with usually two scapes per bulb that is prolific and vigorous. I have not named any of them yet, but the colors are pure white, brilliant red, salmon shade, striped and others. Being encouraged by the success I will devote more of my time to *Amaryllis* breeding. I shall appreciate warm cooperation of our Society members through exchange of breeding materials as I wish to extend my activity to such other categories of *Amaryllis* as small flowering hybrids differently colored hybrids and others that we *Amaryllis* hybridiers dream of.

A WELL-ROUNDED AMARYLLIS BREEDING PROGRAM NEEDED

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When one considers the range of types within the genus *Amaryllis* it becomes clear that breeders have taken a conservative approach to development. The trend in breeding over the last several decades has not brought a diversified product to the market. In fact the market has become so pointed that even the older American varieties are hard to come by. Today's commercially available Dutch material, while impressive in its own right, testifies to the fact that many delicacies of form in the wild species have been ignored. It is unfortunate for the consumer that such a state of affairs exists. On the other hand it leaves the door wide open for breeders with an eye for new forms.

Such an attitude on my part resulted from an increased awareness

of the genus. It has been some four years since I first became intrigued with the form and beauty of *Amaryllis*. My first exposure came while I was doing vegetable breeding research at Michigan State University. One of the people working on the project had set aside a portion of greenhouse bench to grow a few plants. During the month of March, Ludwig's Goliath and Peppermint Candy opened their buds. I was impressed to say the least. I obtained some offsets and followed the progression of these plants. As a result and quite by accident, I became totally absorbed in a new pursuit.

During the first two years I made a number of random crosses and grew a population of seedlings from a self pollination. As one who from the beginning has been fascinated with genetic variability I was curious to see what segregating populations and crossed types might look like. In the past year that same interest and more knowledge of the genus has guided my efforts in a different direction. Currently I am making attempts to obtain as many of the species as possible so as to examine the range of types. So far I have obtained specimens of *Amaryllis aulica* from Thomas W. Whitaker and an interspecific cross from William D. Bell.

The potentials for breeding programs in the future are many and one must narrow individual goals so as to engage in a manageable program. The first task might well be a familiarization with different germ plasm. The way to achieve this is to take up a collection of diversified forms. Aside from the physical restraints one can not over collect. Once a representative collection has been obtained it should be evaluated for potentially useable traits. Eventually a sound program with definite goals should be developed. Of course the breeder may take advantage of any unexpected results but sound strategy will increase the likelihood of success.

It would be premature for me to finalize my directions for the future. There are however a few projects which I intend to undertake. One is the development of new forms using *Amaryllis cybister*. *A. cybister* represents an extreme flower form with appearance similar to *Sprekelia*. At present I have only seen pictures of *A. cybister* but hope to locate a source soon. Wide crosses might yield many different flower forms in the F₂ populations. Selection for promising types and continued development could yield new and exciting lines of *Amaryllis*.

I have always been a little disappointed at the lack of fragrance in commercial *Amaryllis*. Part of the beauty of flowers for most people is the fragrance. Undoubtedly this lack is due to the fact that fragrance within the genus is not widespread and would have to be selected for. When the breeder is concentrating on blooms per scape, color and size, the additional selection pressure for fragrance would limit the selection process. At some point I intend to locate fragrant tetraploids to introduce this character into the large tetraploids.

Other areas of interest and possible work are the development of large vigorous yellow types, development of superior doubles, types that

flower at different times of the year, disease resistance, and cold hardiness.

It is my contention that while breeders have been at work for the last century, this field is still in its infancy. The key to the future certainly lies in the continued search for new germ plasm, the maintenance of already collected material, and the subsequent application of new ideas.

DWARFING FROM CHEMOALTERATION

RICHARD E. TISCH

Dwarfing of plants occurs sometimes from chemoalteration treatments. In several cases it was apparently only temporary, but in some cases it seems to have been permanent. In the temporary cases there were signs of dwarfing for two or three years, followed by a sudden change to vigorous leaf and flower scape growth that resulted in normal sized plants. In those cases which seem to be permanent, some plants exhibit very slow growth, and some grow vigorously. In the last instance, it seems to me more likely that true dwarfing has occurred.

My first examples of dwarfing were temporary. Some seeds of *Tulbaghia violaceae* were soaked in a colchicine solution for 48 hours, then planted normally. They were smaller than normal for two years and flowered on shorter than normal scapes. The third year of their growth they reverted to normal size in all respects.

The next experiments in chemoalteration were performed on seeds which had been given only a six-hour soak in the colchicine solution. In two years they began flowering, some with shorter than normal leaves and scapes. For clumps which had the shortest growth were alternately root-soaked in tap water and in colchicine solution six times, for approximately 24 hours in water and 12 hours in the colchicine solution. None of these showed any changes worth noting.

The final experiments included two batches of seeds, the first soaked in a colchicine solution for 48 hours, the second for nine days. That length of time was due to my absence from home while the seeds continued to soak. Of the first batch, none showed signs of dwarfing and were rogued out. Of the second batch, four showed distinct signs of dwarfing and were grown on for observation to their sixth year from sowing. Their status is as follows:

#1—24JUL78—Leaves 10 to 18 centimeters long; only nine individual plants (divisions); no flower scapes yet.

#2—24JUL78—Leaves 25 to 32 centimeters long; several large clumps from divisions; 35 scapes 50 to 65 centimeters long with 9 to 11 flowers per umbel; all flowers normal shape and size.

#3—24JUL78—Leaves 10 to 18 centimeters long; several medium sized clumps from divisions; nine scapes 39 to 42 centimeters long with 9 to 11 flowers per umbel; all flowers normal shape but slightly smaller

than normal size.

#4—06MAY78—Leaves 20 to 25 centimeters long; four scapes 39 to 42 centimeters long with 9 to 11 flowers per umbel; all flowers normal shape but slightly smaller than normal size.

Another experiment in chemoalteration was performed on Tangerine seeds from a commercial fruit. Of 20 seeds soaked in a colchicine solution for 11 days, the four *largest* and fastest growing were set out in an outdoors bed. To my amazement, two of these then settled down to very slow growth; the other two were removed, and the two smaller ones were retained because of their obvious dwarfing. Today, seven years later, they are both smaller than would be expected. Neither has blossomed yet. One is only 1.2 meters tall and 1 meter in diameter through the leaves. The other is only 1 meter tall and 55 centimeters in diameter. The question in my mind is: what might have resulted if I had selected the smallest, slowest-growing seedlings?

The Tangerine trees have remained undisturbed, but the *Tulbaghia* have been reset twice, thus giving me a chance to examine their root growth. So far there is no evidence of "club-rooting" or other abnormal root growth, which has been seen in some other plants treated with colchicine. As noted above, leaf and flower growth is normal except for reduced size. In the smallest, the growth of flower scapes has not occurred over this long growing period.

These results suggest to me that we may have been making a mistake in roguing out the slower-growing plants from chemoalteration experiments. In many types of plants, smaller variations would suit better the small backyard garden, such as mine. Perhaps even purposeful treatment toward achieving dwarfing would result in many plants more suitable for limited growing areas.

DELIGHTFUL HYMENOCALLIS HYBRIDS

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I. INTRODUCTION

When one considers the large number of species to be found in the genus HYMENOCALLIS, it is surprising that there are so few hybrids. There are several reasons for this. Except for a tiny handful of green or yellow flowered species, the overwhelming majority are white in color. Then there is the matter of form—a varied membranous staminal cup surrounded by six very narrow floral segments. Few breeders ever got beyond the stage of hybridizing a very few species, mostly of the South American group, in the subgenera *Ismene* and *Elisena*. To be sure, the effects produced are quite beautifully enchanting, but the surface has barely been scratched by the breeder.

Most of the early attempts were made in Europe (England and Holland). Dean Herbert likely was the first breeder for the group with his *H. spofforthiae*, a cross involving *H. narcissiflora* (white) with the yellow *H. amancaes*. The Dutch repeated this cross and the best of

these, 'Sulphur Queen.' is still cultivated. Another popular creation was 'Festalis', first conceived by A. Worsley, An Englishman, by crossing *H. longipetala* (*Elisena*) with *H. narcissiflora*. 'Festalis' is wonderfully orchid-like in its graceful beauty.

European breeders also spawned a couple of hybrids involving *H. narcissiflora* with *H. speciosa*. These were likely the first recorded crosses involving the *Ismene* section with the subgenus *Hymenocallis*. Two known hybrids resulted: 'Daphne' and 'Macrostephana'. Of these two, only 'Daphne' is known to still exist in cultivation. This is mostly due to the fact that 'Daphne' requires the same culture as *H. speciosa*, a greenhouse plant. Foliage of this hybrid is broad and nearly petiolate, and the flower only barely hints at the *Ismene* parent, though the cup is larger than that of *H. speciosa*, and there is good substance.

The late Cecil Houdyshel may have been our first modern American breeder for the genus. He duplicated 'Festalis' (which was later to be duplicated by others as well), and later developed 'Olympia' by backcrossing 'Sulfur Queen' onto *H. narcissiflora*. 'Olympia' indeed had a large flower, but had the drawback of being a poor propagator. The flowers were cream which quickly turned white. It is unlikely that the clone is still in the trade, since the passing of Mr. Houdyshel, but it is still in cultivation. The writer's initial single bulb has increased to four or five with the help of injuring the bulb basal plate . . . over the span of some 25 years.

II. LEN WOELFLE HYBRIDS

In the nineteen fifties, the late Len Woelfle acquired an interest in this group and began his own breeding program, continuing this until his death in 1964. Len lived in Cincinnati, Ohio, a climate too cold for year-round outdoor culture of this fairly tender group, and thus had to grow his bulbs by the dig-and-store method. This laborious task was truly a labor of love. Len began by making crosses with *H. narcissiflora*, *H. amancaes*, and *H. longipetala*. He reproduced his own FESTALIS, and also made an interesting series of *H. x spofforthiae* crosses giving him near-duplicates of 'Sulphur Queen' . . . 'Pax', 'Helios', and 'Icon'. Of these three, 'Pax' was his best. 'Pax', the reciprocal cross, was lighter in color, but had an interesting, slightly different form. These plants have received very limited distribution, but still exist in a few private collections. In 1955, Len crossed 'Festalis' with *H. amancaes* and got a single seedling, 5504. This clone still exists and is unnamed due to being a bit disappointing. The color is sulphur-yellow as one might expect, but the form of the flower lacks the character of either parent. Far better was his 'Green Gold', a backcross of 'Pax' onto *H. amancaes*. This clone had the deep yellow color of the species, with much lime-green in the throat, giving it a most lively character. Unfortunately this lovely hybrid was lost in a digging accident one autumn. Perhaps someone will eventually attempt to reproduce a clone like it.

Len broke new ground when he attempted a series of crosses involving one of Mexican species of the Mexicana alliance obtained from Van Tubergen under the name of *H. harrisiana*. This species received wide distribution under that name, but there is some doubt if the identity is correct. *H. harrisiana* was crossed with *H. narcissiflora* and reciprocal crosses were likewise made. These were dubbed the "snowflake" series, and consisted of 'Diadem', 'Jack Frost', 'Snowflake', and 'Iceberg'. Of these, 'Diadem' was the most distinct of the group with dark green foliage. Alas it behaved badly and was eventually lost. The other three were rather similar, differing only in very minor details, all with the very sweet fragrance of four-o'clocks, a rotate cup of medium size, sterile yellow pollen, and foliage appearing much like the Mexican species, though more robust. They propagate well and are very easy

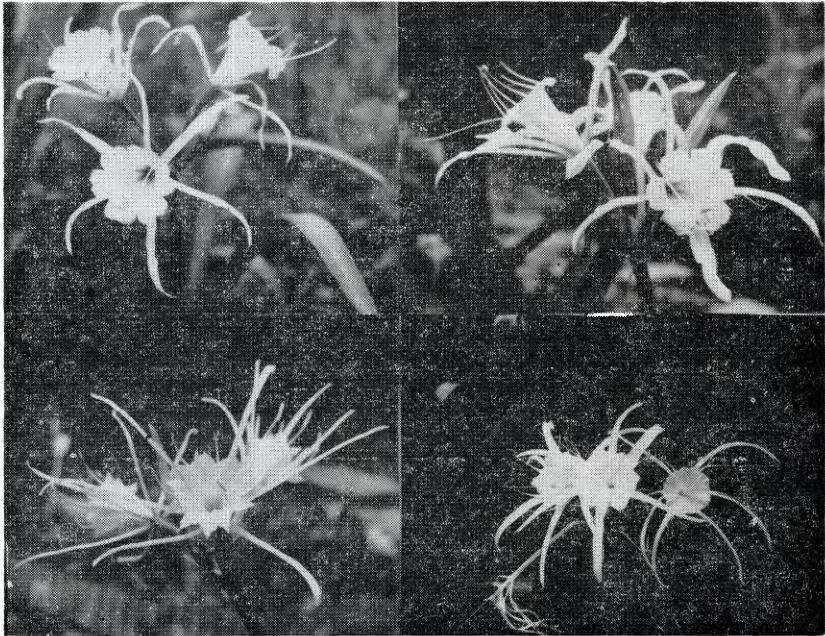


Fig. 20. Woelfle hybrid *Hymenocallis*. **Upper left and right**, Dancing Doll Series; **Lower left**, 'Buckeye'; and **Lower right**, 'Snow Flake'.

to grow. More unusual perhaps was his PIXIE CUPS, a cross of *H. harrisiana* x *H. longipetala*. These greatly resembled the "snowflake" series, save that the cup was a bit longer and more trumpet-like. Another dead-ringer for the snowflake series was oddly a disappointment owing to greater expectations from one of the parents. . . . *Eucharis amazonica*. Len swore that there was no mix-up in his pollinations or recording of this hybrid, but the result was exactly like the "snowflakes". No evidence of *Eucharis* in the progeny. The bigneric effect was lost by dominance of the *H. harrisiana* seed parent.

Len's last decade was spent in giving us his finest hybrids of which we still have two series in cultivation . . . the 'Dancing Doll' hybrids and his 'Buckeye' clone. The writer still has several of his "Dancing Dolls" in cultivation but most of them are too slow to propagate to receive distribution. Two clones, 'Ballerina' and 'Dancing Doll' have the extra vigor to propagate vegetatively. This series was Len's effort to obtain yellow flowered forms resembling 'Festalis', and in this he succeeded. Each clone was in itself very distinctive and uncommonly beautiful in the orchid-like form, the gracefully curving segments and the daffodil-like cup with delicately fringed edges. They varied in coloring from light yellow to cream. All of this came from the uniting of two species: *H. amancaes* x *H. longipetala*. Len correctly assessed that in order to obtain yellow flowered hybrids, one must rely on *H. amancaes*, and in order to obtain the orchid-like gracefully curled segments, one absolutely had to depend on *H. longipetala*. Likewise, the delicate fringing of the cup is derived from *H. amancaes*, while the daffodil like trumpet effect stems from *H. longipetala*. Originally there were six clones, all differing in some minor details, each flowering at different times within the growing season, and with varying robustness. Choosing a favorite clone from this group perpetually stymied both Len and the writer. Each was smashingly lovely and distinctive in its own right. Eventually it remained for their propagating ability to decide. A couple of clones were lost during this time and it is a pity.

'Buckeye' was another winner, both beautiful and curious. It was Len's first attempt to cross the fantastically lovely *H. longipetala* with a native N. American species *H. lirisome* (Raff.) Shinsers. The latter is a Texas species with swamp-growing habits and which is best grown in cultivation under aquatic conditions. *H. lirisome* has several good characters that endear it to a hybridist not the least of which is winter hardiness into more northern climates. It flowers earlier than most species, has a nice rotate cup accentuated by a greenish-yellow center. The hybrid 'Buckeye' was the single survivor of a sibling trio, all varying a bit in size, vigor, and minor details. It seems to unite the characters of both parents better than anything developed to date, but this is apt to soon change. 'Buckeye' has a daffodil-like look to the trumpet, with a greenish yellow center. The segments have a bit of graceful curving and curling to them. Alas the aquatic habits of *H. lirisome* are reflected in its hybrids, making them difficult to flower unless kept unusually wet during the growing season. Len experimentally proved that 'Buckeye' was hardy over winter at least to Southern Ohio.

III. HYMENOCALLIS TRAUBII HYBRIDS

For years after the death of Len Woelfle, the hybridizing of *Hymenocallis* nearly came to a stand still. The writer vainly attempted a few crosses in half hearted fashion, but was stymied by the inability to secure mature flowering size bulbs of the various South American species that might set fertile seed . . . *Amancaes*, *longipetala* and *narcis-*

siflora. Only the latter was in my collection and it rarely flowered for me and even more rarely produced any seed. Without the necessary species to work with there was no sense of direction. Then one day I flowered a bulb of *H. traubii* which Dr. Traub had generously given me, and I pollinated it with pollen from an unidentified species I had obtained from a Jacala garden in Mexico. The species was one of the tropical evergreen kinds with wide, dull green leaves . . . a squatty plant with a squatty bulb . . . rather large in every way. The habits of this species were interesting though, as it could produce 2-3 scapes in succession from largest bulbs, and the individual flowers were unusually large with tepalsegs half again wider than those of most species. This species still only bears the number 57-3 "Jacala Garden" for its identification. It is not known if it is even a native of Mexico as it has characters normally associated with members of the genus found around the Caribbean region. When compared to this "fatty" *H. Traubii* is an exquisite miniature compact little plant with small narrow leaves and tidy habits. The flowers of *H. traubii* are stunningly large and showy, spanning about ten inches across, with a very large rotate cup. Its only fault is that the umbel is only two flowered. Apparently it tries to make up in size of flower what it lacks in the number of flowers in the umbel and size of plant. The cross between the "fatty" 57-3 and *H. traubii* was successful and seed was obtained. Two of these survived, and one clone has flowered several times. One clone has erect tapered foliage and the other has more spreading, bluntly tipped leaves. The first hybrid to flower of this series has in a short time proved to be outstanding. It propagates well, maintains an appealing tidy compactness, and reliably has two flowering seasons each year . . . late spring and again in late summer or early fall. This trait is most unusual for hybrids in this genus, but a welcome one. The flowers are large and well formed, with an attractively eye-catching rotate cup and well recurved tepalsegs. The bud count so far seems to be seven per umbel and the flowers seem to last longer than normal. So far the plant seems to be sterile. I have withheld introduction of this cross until I can flower its sibling and compare them. Certainly it now appears that *H. traubii* may possibly open doors to new kinds of hybrids having compact habits suitable for pot culture.

IV. ANOTHER CROSS

The writer has also successfully crossed *H. lirisome* x *H. narcissiflora*. There are two clones, neither of which has flowered although they are nearing maturity. Habits are intermediate, and this seems most promising, but they require more moisture to grow at their best and I have had to resort to nearly aquatic conditions to push them along faster. At this writing, it now appears that *H. lirisome* is compatible with the South American group, and a host of interesting hybrids should eventually emerge from this venture.

V. LUTHER BUNDRANT CROSSES

A new breeder from Texas has suddenly come forth with a host of new *Hymenocallis* hybrids that may make their mark on the Amaryllis World. Luther Bundrant has recently produced several series of hybrids involving a more complex approach. His first effort involved using the pollen of one of the "Dancing Doll" clones . . . PICTURE on *H. galvestonensis*. You will recall that the "Dancing Dolls" sprang from *H. amancaes* x *H. longipetala*, so potentially a variety of new characters were merged. *H. galvestonensis* is one of the hardiest species, but with deciduous glaucous foliage, and a sweetly scented flower having a rotate cup. All three clones flowered in 1978 and all differed in minor details in the flower but were otherwise similar. Poliar habits and differences were more marked. In spite of expectations, the Ismene-Elisena traits were dominated in the flower by *H. galvestonensis*. The white segs had a bit more curving to them, and the white cup seemed less rotate and a bit more "toothed", but this could not be confirmed at the time without seeing the flowers of both parents. Fragrance was sweetly lemony. One clone had dark green, narrow foliage with a basal "neck" like the South American parents, while the other two were sessile in leaf. The most robust of the trio was judged the best, but it will take several successive years of flowering to finally decide.

Luther flowered another very different seedling hybrid in 1978, a cross involving *H. eucharidifolia* with 57-3 "Jacala Garden". This had flowers like *H. eucharidifolia* on a larger umbel. The bulb produced two scapes, like the "fatty" parent, but foliage was dark green and narrow. Although *H. eucharidifolia* is an interesting plant because of its relatively small cup, it really has little to commend it as a hybrid producer. The fact that the hybrid produced two scapes is due entirely to the Jacala 57-3 parent.

Mr. Bundrant has a duo of interesting siblings that should flower in 1979 or 1980 involving *H. tenuiflora* x *H. narcissiflora*. The writer collected the true *H. tenuiflora* in Guatemala in 1974, and it has strongly reflexing segments that dangle like ribbons. The cup is funnel form. It is obvious that the seedlings are hybrid as they resemble neither parent. One can only speculate at this writing what they will look like when they flower.

More exciting perhaps are Luther's crosses involving *H. traubii* x *H. narcissiflora*. There are perhaps four of these and they all show intermediate foliar characters. That is, the leaf base forms a "neck" like the Ismene parent, but are deep green and miniaturized like the other parent. It is too early to speculate, but potentially these could be very good indeed. Luther has some young hybrids involving *H. liriosme* x FESTALIS. Oddly, these seem to lack vigor and may take a long time to mature.

VI. ADDITIONAL HYBRIDS

Two seedlings of hybrid origin have proved an enigma, though they are still a couple of years from flowering. A few years ago I

pollinated *H. galvestonensis* with pollens from two Mexican species . . . *H. glauca* (*H. choretis*) and *H. azteciana*. Seed was secured from both crosses, but many seedlings died and labels got lost. Two seedlings survive and they are fall growing. This is strange indeed, as none of the parents have this strange habit. Both seedlings remain dormant throughout the summer, refusing to grow in spite of coaxing until September. They then go into dormancy before winter. Foliage is petiolate on one and subpetiolate on the other. In typical Mexicana-alliance-fashion only a few leaves are produced. They will only likely be of value to a few, owing to their weird habits. This may be explainable to the mis-matching of the unique growing habits of their parents.

Jim Bauml made a cross that at first promised a good deal when he pollinated *H. fragrans* x *H. nayaritiana*. *H. fragrans* has many similarities to *H. speciosa*, so the potential was inviting. Alas. The seed failed to germinate and eventually shriveled after a year of trying to tempt it to put forth a radicle. It was a failure but one is tempted to see if it might not work again.

Dr. Traub created his own hybrid 'La Jolla' by crossing *H. narcissiflora* x *H. vargasii*. The latter belongs to the subgenus *Psuedostenomesson* and is unusual in this group because of its pendulous green flowers. 'La Jolla', however, has upfacing flowers in white, with only a hint of green. One can only speculate as to what other combinations of *H. vargasii* with things like *H. amancaes* or *H. longipetala* might spawn.

The writer would be negligent if he failed to mention the many hybrids made by Glen Moore at the U of Chicago in the early fifties. At that time Mr. Moore was studying seed respiration of *Hymenocallis* and had acquired a sizeable collection of species from many sources. When he completed his graduate work, he left and took his plants with him to Utah. I have not heard from him since and can only guess that they no longer exist. He never published his crosses and it is possible that he failed to flower them all. I recall that he had several pots of hybrid seedlings involving *H. speciosa*. But there were many hybrids involving tropical species mostly.

I nearly forgot to mention a couple of additional *Ismene*-type hybrids of European (Van Tubergen) origin. Van Tubergen is currently listing a variety of 'Festalis' called "Zwanenberg" which they consider an "improvement". I have not yet seen it. It may be either a backcross onto *H. longipetala* or more likely a sibling selection. ADVANCE is certainly a backcross of 'Festalis' onto *H. narcissiflora*. It too was dubbed an "improvement", but I find it difficult to flower here, although it has vigor and grows well. This is an "Improvement" of doubtful value.

As we have seen, because of the very large number of species, the combinations are nearly endless. They can be wretchedly restrictive as to color choices, and to some degree to size and shape of tepal-segs. They will always have long narrow segs, unless by some miracle someone discovers an exception to this rule. Until that day it is foolish to

speculate about broad petals. The best the breeder can alter is their position with relation to the dup. They can recurve, incurve, spread, or curve alternately.

The cup is quite another matter. Changes in the cup can be more spectacular and rewarding. Some are funnels while others are saucer-like (rotate). Some are quite tiny and others are relatively large. The breeder will favor those with the showiest most prominent cups. The tepaltubes might be of consideration, but to a much lesser extent. Some species have short tubes and others long tubes, and to a degree this will affect the appearance of the umbel display. Most tubes are straight, though a few species have curved tubes. I seriously doubt a breeder would select a given plant for breeding based solely on the tube however. The staminal cups may be toothed or fringed to a greater or lesser degree, depending on the species. This "toothing" occurs between the filaments along the cups edges. *H. amancaes* is beautifully fringed and this is reflected in hybrids like 'Sulphur Queen' and the various 'Dancing Doll' series. Substance in hot weather is a good factor among the species. Some hold up better than others do in heat. A high bud count in the umbel is preferable to a low bud count. Plants such as *H. floridana* and *H. traubii* are hampered by low (two) bud counts. Hybridizing improves this if wisely done. Some species are rigid as to special cultural requirements, and this can be improved through hybridization. Then there is always the matter of the foliage. Some species have foliage that is very ornamental, and this can be a by-product in a good hybrid. Hardiness to cold in the native N. American species is appealing for hybrids. Miniature species are desirable for hybrids intended for pot culture or where space is limited. As for color, we only have yellow in the form of *H. amancaes* available to do much with. Basically, you may only have white species to work with, so make the best of it. The serious breeder will want to have not only the yellow *H. amancaes*, but also *H. narcissiflora* and *H. longipetala* in the South American species. There are other species, but these are not available commercially. After that, one must choose with whatever species are available. Breeding Hymenocallis can be a challenge but often the effort and time invested can be worthwhile.

CORRIGENDA—continued from page 4

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- Page 128, under **POLIANTHES X BUNDRANTH I. M. HOWARD. SP. NOV. FIG. 23**, for "SP. NOV.", read "HYBR. NOV."
- Page 129, for "**Pedicels**" read "**Pedicels**", and under line 6, for "4-5 cm wide" read "4-5 mm wide." In next paragraph, lines 4-7, "They began germinating etc." read "Germinating in nine days; by the 13th day half had germinated. Nov. 30, 1975. Seedlings were planted in a medium of sand, peat moss, and oak leaf mold on April 24, 1976."
- Page 64, first line, for "**HYMENOCALLIS QUERREROENSIS**" read "**HYMENOCALLIS GUERREROENSIS**".

PLANT LIFE LIBRARY—continued from page 42.

PHYTOSOCIOLOGY, edited by Robert P. McIntosh. Academic Press, 111 Fifth Av., New York City 10003. 1978. Pp. 388. Illus. \$24.50.—This volume is concerned with phytosociology, the interrelationships of species of plants in space. After considering the history, concepts, terminology, research papers by outstanding authorities are presented in the fields of selected vegetation studies; ordination and numerical classification; and recent perspectives. Highly recommended.

MAKING THE MOST OF YOUR GREENHOUSE, by Ian Walls. Barron's Educational Series, 113 Crossways Park Drive, Woodbury, New York. 11797. 1978. Pp. 95. Illus. American Edition, paper \$3.36. Author Walls characterizes the greenhouse as a device for overcoming the vagaries and limitations of an uncertain climate and enabling the avid gardener to "raise and grow plants which would fail altogether out of doors, or else be very slow to develop." This concise manual details the lighting, heating and cooling of the greenhouse; watering, feeding and staging plants; choosing soil mixes and propagation of plants. Highly recommended to all beginning greenhouse owners.

THE CARPET GARDEN by Renee and Stave Rockmore. Thos. Y. Crowell, 10 E. 53rd St., New York City 10022. 1978. Pp. 123. Illus. Cloth, \$10.95; paper, \$4.95. Subtitled, "No-work Vegetable Gardening for less than \$5.00," the authors describe their use of durable indoor-outdoor carpeting as a mulch, depending on the carpet's insulative quality to retain moisture, and to protect ground surface, and the elimination of weeding. Complete planting instructions are given for planning, preparing, planting and harvesting.

GARDEN PLANNING AND PLANTING by Eigel Kiaer with Hans Peterson. Sterling Publ. Co., 2 Park Av., New York City 10016. English Edition. 1976. Pp. 222. Illus. This is an adaptation of an outstanding Danish text to British conditions, dealing with the choice of garden style, and the selection of plants for the garden. The text is outstanding for the profuse illustrations in color. Highly recommended.

FOREST MICROCLIMATOLOGY, by Richard Lee. Columbia University Press, 562 W. 113th St., New York City 10025. 1978. Pp. 276. Illus. \$17.50. This outstanding book is concerned with the microclimatology created by forests, with reference to the atmosphere, biosphere, radiant energy, sensible heat, latent heat, metabolic energy, energy budget, microclimate, and problem types. Highly recommended.

SUNSET BOOKS PUBLISHED IN 1978. All edited by Editors of Sunset Magazine and Sunset Books. These may be obtained from Lane Publishing Co., Menlo Park, Calif. 94025. All are soft cover, and profusely illustrated. Highly recommended.

LANDSCAPING AND GARDEN REMODELING. Pp. 80. \$2.95. Gives directions for planning the garden you want; combining plants with structures; when your yard needs remodeling; and selecting your basic plants.

PLANT LIFE LIBRARY—continued on page 116.

4. AMARYLLID CULTURE

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

GENERAL AMARYLLID REPORT - 1979

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During the past year I have obtained more amaryllids than in any previous year. These came from such diverse sources as local nurseries, government agencies, botanic gardens, amaryllid collectors throughout the world, and wild collections. In this report, I will discuss some of the species acquired this year, and will touch on their descriptions, and cultural requirements.

Crinum pedunculatum R. Brown. This species was obtained from two sources. The first plants came from an Australian amaryllid nursery. Plants received from this nursery were presumably originally collected in their native Queensland habitat. A remarkable feature of this first accession is the ratio of leaf length to leaf width. The amazingly long (proportionately) leaves remain erect, however. The second group of plants of this species were collected in their natural habitat on islands of the Torres Strait, off the northern coast of Queensland. Of this second group, one of the plants had the much-reduced bulb typical of the *Crinum* species allied to *C. asiaticum*, while another smaller specimen exhibited a definite, globose bulb. Time will tell whether these both are correctly-identified.

Crinum pedunculatum has been reported from such areas as Eastern Australia, Timor, Fiji, New Guinea, Tahiti, and Lord Howe Island. It is very closely related to *Crinum asiaticum*, and possibly should not be given separate specific rank from that species.

This species responds well to a sandy soil mix, with organic matter added. It is suitable to the large, warm greenhouse, and outdoors in tropical, and subtropical regions. In Queensland, it is noted for its hardiness but it should be considered that Queensland extends far into the tropical zone.

Cyrtanthus herrei Leighton. This succulent species was formerly classified as a *Cryptostephanus*, a much confused genus, which could use some work. It is closely allied to such species as *Cyrtanthus carneus*, *C. falcatus*, and *C. obliquus*. This is probably the largest species in the genus, the heavy leaves eventually topping two feet. Leaves are gray-green in color, typical of many plants from arid, or semi-arid regions. The plant is native to Namaqualand, in South Africa.

This species should be grown as a succulent, with special attention paid to providing a loose, sandy, fast-draining mix. Roots may quickly rot in water-logged soil, especially if the soil has not been sterilized. It will tolerate full sun in most areas. This species has not yet flowered for me, probably because I have had to transplant it several times due

to root rot. It has now settled down to my present mix, and hopefully flowers will be produced next year. The inflorescence is said to resemble *Cyrtanthus obliquus*, only much larger. The leaves of *C. herrei* have the habit of gradually dying back from the tips. After much experimentation, I have decided that this is a natural phenomenon, characteristic of the succulent *Cyrtanthus* species, as well as several other genera of South African amaryllids; *Crinum*, *Ammocharis*, *Nerine*, etc. Some leaves may be expected to exhibit this burning at any given time, although the plant will remain evergreen. This species, like most amaryllids should probably be given reduced watering during part of the year, in this case winter. The four species of *Cyrtanthus* mentioned in this section are the best in the genus, in my opinion, with *C. herrei* standing above the rest, literally.

Hymenocallis macrostephana Baker. A large bulb of this species was obtained from cultivation in Hawaii. While in Hawaii I spotted a large clump of an *Hymenocallis* species growing in a shaded corner of a botanic garden. Closer examination revealed that these plants were labeled as *H. macrostephana*. Many had thought this species to be extinct but it had always been a plant that I had wanted to obtain.

It was suggested by J. G. Baker that this plant could be the hybrid between *H. narcissiflora* and *H. speciosa* mentioned by Herbert. This remains to be seen. The Hawaiian plants originally came from a European botanic garden but little information is available about them other than this.

My plants fit Baker's description of this species well, at least as far as the foliage. I am still waiting for the flowers, which might appear this winter. Leaves are petiolate, with broad blades. They are very similar to those of *H. speciosa* but they are much shinier. As in *H. speciosa*, the leaves are produced at one time (usually in late summer), instead of throughout the year. This characteristic distinguishes *H. speciosa*, *H. macrostephana*, and perhaps *H. fragrans* from most other *Hymenocallis*. *Hymenocallis macrostephana* produces a large, white, scaly bulb, with a pronounced neck. The plant is evergreen in habit. In general, it would appear to fit the *Speciosa* Alliance much more closely than it would subgenus *Ismene*.

Hymenocallis macrostephana is of easy culture. A loose, sandy, but rich mix suits it well. It seems to require less water than *H. speciosa*, and may tolerate more light, and lower temperatures. It should be regarded as a tropical, humidity-loving species, however.

Efforts will be made to self-seed this species in an attempt to determine any hybrid background. In the meantime, it will be propagated by offset.

Sprekelia formossissima forma williamsii Traub. A plant of this form was obtained, and flowered. It produces a huge, crimson flower, among the most singularly spectacular of the family. The form is larger in all its parts than the typical *S. formossissima*. Leaves are about 1½ ft. tall, and are bright green. This semi-evergreen plant produces leaves throughout the year. It spreads quickly by offset.

Any good amaryllid mix can be used. The plant probably would do best in full sunlight in most areas, although it will also flower if given afternoon shade. Two scapes were produced, each about 22 inches tall. The second flower was self-pollinated. The resulting capsule produced around 120 seeds. A very high percentage of these were fertile, and they germinated in a matter of days. After about four months, the seedlings are around eight inches in height.

Sprekelia formosissima f. *williamsii* is the best *Sprekelia* I have seen. There are many forms of *Sprekelia* I have yet to see but I don't believe any of them could surpass this form as flowering plants. The *williamsii* form has been considered quite cold tolerant for a *Sprekelia*. In this region there is no way to test its limits but those growers in northern states may wish to try. Better yet, in northern states, treat it with "gladiolus culture".

Hymenocallis littoralis "Variegata" (syn. *H. pedalis* var. *variegata*). This tropical plant is the most beautiful *Hymenocallis* in foliage, and that statement may apply to the whole family. The leaves are strongly striated with creamy yellow on the edges, while the dark green dominates the center of the leaves, the center also being pinstriped with yellow. The variegation tends to be much more uniform than that of other variegated amaryllids, *Amaryllis reticulata* var. *striatifolia* excepted. I am still waiting for its flowers but they are equally beautiful, with very long tepal tubes.

This is another amaryllid that is best suited to the warm greenhouse, or outdoors in tropical areas. It is not fussy as to soil, and can tolerate considerable light. Being evergreen, moisture should be provided at all times. The plant does not seem to go through any dormant period.

The nomenclature of this species is confused. This plant is widely grown in the tropics, throughout the world but I have not determined whether it has been collected in the wild. Efforts will be made to compare this species with wild collections of *Hymenocallis littoralis* and *H. pedalis*. The latter species is particularly nebulous, while many plants masquerade as the former species. These two species, as well as many other *Hymenocallis* species need to be straightened-out taxonomically.

Eurycles amboinensis Loud. (syn. *E. sylvestris* Salisb.). The outstanding feature of this species is its very broad, cordate leaf blades, and long petioles. The plant has a decidedly aroid appearance, rivaled only by subgenus *Eucharis* of *Urceolina*. It is interesting to place this species next to a linear leaved amaryllid, such as *Zephyranthes*, to see the variation which can occur within a family of plants. *Eurycles amboinensis* produces attractive, white flowers, which may be considered bonuses. It is outstanding alone, as a foliage plant.

For some people this species has behaved as an evergreen in some years, and as a deciduous plant in other years. I don't believe water should ever be withheld for any extended period. Care should be taken if the plant does lose all its leaves, since the last leaf will drop off, leaving a cavity on the top of the bulb. At this time, overhead watering should be avoided, or else the grower risks rotting the bulb.

This species has been troubled by burning of the lip tips and margins. This condition may be due to the high Ph level of the local water supply. I have recently discontinued the use of garden loam, slow-release fertilizer, and local water on this species, and several other plants which have developed the leaf burn.

Eurycles amboinensis is native to the Philippines, the Malay Peninsula, the East Indies, and Queensland. Differences in leaf shape may occur from these areas.

Crinum asiaticum L.—striated form. A plant of this form was obtained from the U.S.D.A. It has been collected in the wild in New Guinea. Striated *Crinums*, usually described as *C. asiaticum*, are grown ornamentally in other areas in the tropics, including the Philippines, Hawaii, and Singapore. Some variation exists in the striation of these plants, and they have not been identified thoroughly, although they tend to be typical asiatic species.

My specimen will have wide, white striations on some leaves, while other leaves will be almost all green, with the margins striped white. Some leaves will be both pin-stripped, and have wide striations. Unlike the typical *Crinum asiaticum* this plant produces many offsets, the offsets being just as variegated as the mother bulb.

In New Guinea, only two or so *Crinum* species have been described. A recent letter from a contact in Papua New Guinea revealed that efforts were now under way to train plant collectors in that country. Hopefully, collections of previously described *Crinum* species, as well as discoveries of new *Crinum* species will be made.

The variegated *Crinum asiaticum* responds to typical *Crinum* culture. I require a moderately-heavy, moist soil. I have not had a chance to test its humidity requirements, since it has only been grown in the greenhouse. It may be assumed that it requires warmth at all times, high humidity, and moisture. In the tropics it makes an excellent specimen plant, eventually forming large clumps.

Clivia gardenii Hook. (syn. *C. gardneri* Hook.). Plants of this uncommon species were obtained from South Africa. It has been described from Natal, the Transvaal, and Swaziland but I believe its native habitat may only be in the latter country. It is listed in R. H. Compton's *Flora of Swaziland* as a saxicolous forest-dweller, growing in shade. *Clivia gardenii* may be added to the small list of epiphytic amaryllids. All *Clivias* could possibly grow under epiphytic conditions. *Clivia caulescens* has been regarded as an epiphyte since its discovery. Yet, the root systems of *Clivia caulescens*, and *C. gardenii* do not differ to any extent from the root systems of other *Clivia* species. The thick, finger-like roots of *Clivias* are reminiscent of orchidaceous epiphytes.

Clivia gardenii appears to be intermediate between *C. miniata* and *C. caulescens* in general habit. It has a short pseudostem, formed by leaf bases, not unlike that I have seen in some plants of *C. miniata*. The short stem is by no means as pronounced as that found on mature plants of *Clivia caulescens*. The leaves of *C. gardenii* are about 1½ ft. long,

dark green, lorate, and acutely-tipped. The inflorescence is pendulous, as in *C. nobilis*, and *C. caulescens*.

This species is a prize for collectors of rare amaryllids. It is of more value from a botanical standpoint than from a horticultural standpoint, however. A mix of two parts good quality loam, one part organic matter (I use redwood shavings), and one part fine sand suits this species, and other *Clivias* well. I have also had good results with lighter mixes for *Clivias*, such as the loose mixes used for *Amaryllis*. Shade is essential, and the soil should be kept moist. This evergreen plant is a strong grower, eventually forming large clumps.

Clivia sp. "Striata". The last species to be described in this article is certainly not the least. In fact, all of the plants mentioned so far, are among the best amaryllids from an ornamental standpoint. Plants of *Clivia* sp. "Striata" were obtained from a local nursery. It is quite rare. The horticultural/botanic history of this plant is confused. Whether it is of hybrid origin or not, remains to be seen, although the suspicion is that it is a hybrid. In the past, it has been regarded by some as a variety of *C. miniata*. This form is cultivated widely but not in quantity. It is grown in such diverse areas as Japan, Rep. of South Africa, and Europe, as well as a few places in this country.

The leaves of *Clivia* sp. "Striata" are dark green, striped with yellow. Leaves vary considerably as to amount of striation, and the variegation is not uniform as in *Hymenocallis littoralis* "Variegata". One wonders if the variegation of this *Clivia* is virus-induced. Otherwise, the plant is not unlike *Clivia miniata* in habit.

This evergreen plant will grow under conditions mentioned earlier for *Clivias*. Care should be taken to prevent the burning of the leaves by bright sunlight. The only pests present in the nursery soil were millipedes. These may be eliminated by drenching the soil with Diazinon. Millipedes generally feed on organic matter in the soil but may attack roots. As in other *Clivias* mealybugs may be expected to be a problem in the future. Malathion controls them.

LITERATURE CITED

- Baker, J. G., 1888, *Handbook of the Amaryllideae*, 216 pp., London.
 Compton, R. H., 1976, *The Flora of Swaziland*, Journal of South African Botany, Supplementary Volume No. 11, 684 pp., Kirstenbosch, Rep. of So. Africa.

ADDENDUM - SOURCES OF REPRINTS AND COLOR PRINTS

1. Lubrecht & Cramer, Booksellers and Publishers, 152 Mountain-side Dr.—This is the warehouse address Randolph, N.J. 07801 or RFD 1—Box 227. —This is apparently the headquarters address Monticello, N.Y. 12701.

Offer the following reprints:

- a. Baker, J. G., *Handbook of the Amaryllideae*—\$16.00
 b. Herbert, W., *Amaryllidaceae . . . and a Treatise—on Crossbred Vegetables*, with an Introduction by Hamilton P. Traub.—\$64.00

On both of these books, a 15% discount is available if the purchaser has spotted one of the publisher's ads. This company offers many other rare books. They also have Baker's *Handbook of the Irideae*, and his *Flora of Mauritius and Seychelles*, among others.

2. Pomona Book Exchange, Rockton, Ontario, CANADA LORIXO.

This rare book company offers Redoute prints from *Les Liliaceae* at \$4.20 each. The prints are 21½ X 14¼ inches. Amaryllid prints include:

(a) "Amaryllis curvifolia" (*Nerine sarniensis* var. *curvifolia* per your former article in *Plant Life*) (b) "Pancratium speciosum" (*Hymenocallis caribaea*) (c) *Hemerocallis caerulea* (I haven't checked this one as to the correctness of the nomenclature). (d) *Narcissus tazetta*.

I imagine that they might offer other amaryllid prints from time to time. I know *Crinum erubescens* was printed in this series. This company also offers prints from this series of species in such genera as *Iris*, *Lilium*, *Polianthes*, and *Tulipa*.

3. I have recently found one other source of Redoute prints. I have written them for their list, and will publish full information when available.

1978 ZEPHYRANTHEAE REPORT

MARCIA C. WILSON, *Chairperson, Zephyrantheae Committee,*
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SPREKELIA

General interest in this monotypic genus seems to be at a low point. A representative of a large distributor of bulbs said that his company used to sell several thousand bulbs of *Sprekelia formosissima* each year, but could probably use no more than several hundred now. As bulbs go today, *Sprekelia* are not very expensive and they are available both wholesale and retail from several well known commercial sources. If it isn't availability and price, part of the reason could be quality of product. This spring I ordered well over a dozen bulbs from each of two different sources. Having seen only bulbs grown by my mother and other members of APLS, I was rather appalled at the commercial product. The first group to arrive were extremely dehydrated, split into many groups of small bulblets and full of mealy bug. Despite their appearance, 20% managed to bloom once. The second shipment, also with mealy bug, looked a little better but refused to bloom at all. No wonder interest is low. This represents quite an investment.

Using stored pollen of 'Harrison's Orientred', some seeds were obtained from the few blooms. If bulbs will cooperate, my mother and I plan a campaign to improve some of the commercial product. We have 'Peru', 'Orientred' and hybrids of these two strains. Seedlings will include back crosses for flower quality and gradual introduction of other strains such as *williamsii*, commercial 'Superba' and hopefully

some various wildings in the future. Pollen seems to store as easily as *Amaryllis* in the refrigerator. Few *Sprekelia* will set self seed, but most any other *Sprekelia* pollen will do the job. In Brownsville, pollen normally matures by noon of the first day and the stigma is receptive in late afternoon. We missed pollinating one evening on a stray bloom and we were lucky to get seed from pollination early the next morning. Flower life is short with this genus. Collect pollen as soon as it matures and plan to watch the stigma carefully.



Fig. 21. X *Sprekanthus cagei* as flowered by Marcia C. Wilson at Brownsville, Texas.

X SPREKANTHUS

X *Sprekanthus cagei* bloomed for the first time in Brownsville this year. I had forgotten how gorgeous this diminutive *Sprekelia*-like

flower is, with its very broad petals, good substance and unusual claret color. (See photo) This slight tinge of purple is the major clue of hybridity with *Habranthus robustus*.

In a letter to Dr. John M. Cage, hybridizer of X *Sprekanthus cagei*, I asked for an update on culture of this bulb. He replied that optimum handling is not known. It will bloom in a pot if kept cool in the summer and almost dry in the winter. Large mature bulbs, stored dry in winter, have bloomed for him when planted in April.

I have always grown X *Sprekanthus* in the ground, undisturbed throughout the year, except the year I moved from Galveston. As a pot plant it was neglected and did not prosper. Since a mature bulb has bloomed twice in Galveston and once in Brownsville, perhaps I can guess at some optimum growing conditions, knowing when I failed to provide some. If your climate allows, grow the bulb in the ground all year: sandy, well drained soil with humus added, morning sun or filtered light. Feed and water *regularly* and try to maintain a pH close to 7 during the warm growing season. In cold climates, dig and replant in a fairly deep pot. Do this well in advance of first frost, to allow disturbed roots to reestablish. Do not fertilize and reduce water for 3 or 4 months, but do not allow roots to go completely dormant. In April, place the pot in a warm sunny location where it may receive some rain. As soon as the soil has warmed sufficiently, replant in the ground.

The best growing weather for spring flowering amaryllids in extreme southern climates is frequently from mid-August to December. *H. robustus* is one of these. It is also one of the rain lilies that grows and blooms best in the ground. It will bloom in a pot, but rather poorly. (My mother would disagree with this for uninvited seedlings thrive anywhere in her yard.) Without a hard frost or freeze, it does not lose leaves until late winter or very early spring. Roots are maintained throughout the year. First spring bloom is usually without leaves, which normally begin to appear in late May. X *Sprekanthus cagei* follows the growing pattern of its pollen parent *robustus* very closely. If the bulb is large and content, it will bloom several times each season and gradually offset. With no garden space available, let these bulbs share a large container with a foliage plant that likes good drainage and morning sun.

HABRANTHUS ROBUSTUS 'RUSSELL MANNING'

In *Plant Life* 1973 (page 50), the late Alek Korsakoff wrote of a seedling clone, X *Sydneya easterlyi* 'Russell Manning'. These notes had been written in 1972, before cytological results had been received. I had sent several offsets of this seedling group to Dr. Walter S. Flory at Wake Forest University. (The 'Russell Manning' clone was sent later and was not studied at this time.) Mr. Korsakoff had become extremely ill and had asked his wife, Meta, to send me all the seedlings grown from this capsule, a hybrid attempt of *H. robustus* x *Z. grandiflora* made by Russell H. Manning of Spring Valley, Minnesota. What a disappointment it was when Dr. Flory wrote that their study showed the somatic chromosome number to be 12, the usual number of *H. ro-*

bustus and too low to possibly be a hybrid with a *Zephyranthes*. To soften the blow of the chromosome results, Dr. Flory had written: "This is a very superior strain of *H. robustus*."

All of these seedlings, planted in the ground in Galveston, formed large clumps and bloomed profusely. Flowers were all larger than regular *H. robustus* I had bloomed from various sources, with deeper color and a slightly different form. I had sent the mother bulb of 'Russell Manning' back to its hybridizer and the offset I kept was one

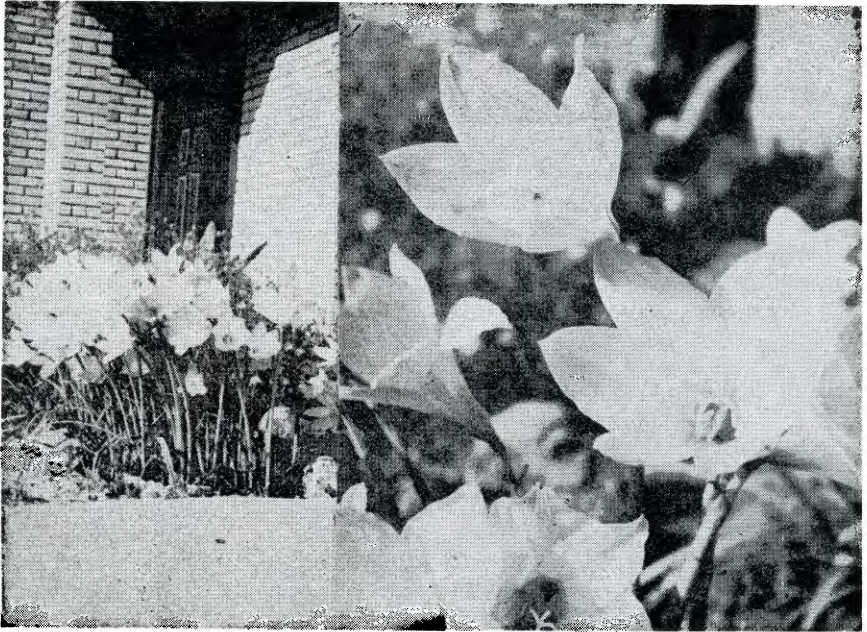


Fig. 22. *Habranthus robustus* clone 'Russell Manning' as grown at Brownsville, Texas by Marcia C. Wilson.

season behind the other group. By the time it formed a clump and caught up with the others, there was no doubt that this clone was an extra special one from a new and different strain. Mr. Korsakoff did not exaggerate one bit.

H. robustus can be extremely variable in size and color shade or marking. Even flowers from one bulb can vary during the seasons. Superior qualities of this seedling group and *H. robustus* 'Russell Manning' do not deviate. Flowers appear to be twice the size of other strains. If a large number of regular flowers were available to compare, it would beat the largest by at least $\frac{1}{3}$. This is not a fish story! This special clone sets seeds as readily as any other *robustus*, but I have not raised seedlings. It originated from bulbs collected in the wild by Dr.

Carlos Gomez Ruppel in South America.

Dr. Flory continues to enjoy the special 'Russell Manning' clone. In a letter of July 18, 1978, he wrote: "We went over these fairly carefully this spring and the somatic number is 12 - just as in the regular species. It has such gorgeous large flowers that we suspected it of being tetraploid, but apparently not."

1979 ALSTROEMERIA COMMITTEE REPORT

DONALD D. DUNCAN, *Chairman, Alstroemeria Committee,*

P. O. Box 238, Sumner, Washington 98380

I was fortunate this past summer in being able to visit two greenhouse ranges where Alstroemerias are grown commercially. Both are located in California, south of San Francisco.

It was a bright, sunny afternoon when I drove into the parking lot of Westland Nursery outside of Pescadero. Mr. Henry Mulder, whom I had contacted earlier when planning this trip, was on hand to greet me and take me on a personal tour of the facilities. We first entered the greenhouse range which covers 140,000 square feet with approximately 20,000 square feet devoted to Alstroemerias and the rest divided among well grown freesias, fuchsias and carnations. Although the *Alstroemeria* hybrids reach their production peak in May, there were still many flowering stems showing on this Friday, the 2nd of June. The stems of some varieties reach a height of seven feet! This makes them rather difficult to harvest Mr. Mulder stated. Most of the varieties, however, grow no more than five feet tall, a much more manageable stem length.

Our last stop was the large grading room where women were busy bunching alstroemerias. Westland Nursery puts ten stems to a bunch and runs three different grades. After the flowers have been graded and bunched, they are placed in water and taken into the large coolers where they are held prior to shipping. Mr. Mulder stated that they sell all of their flowers to brokers who then dispatch them throughout the country.

After thanking Mr. Mulder for taking time from his busy schedule to show me around, I continued down the beautiful Californian coast to Watsonville. Here I would visit the Florival Greenhouses Saturday morning.

I was delighted to have a little time to spend Friday afternoon looking around this charming city. I shall long remember a large "crisp" planting of white and blue *Agapanthus* swaying on their long stems in the warm afternoon breeze. What a sight for those of us who live in areas too cold to grow these beautiful flowers out-of-doors.

Saturday morning turned out to be cool and overcast as I headed out of town toward the Florival Greenhouses. Both Mr. and Mrs. Ben Graust and their daughter were on hand to greet me. To my surprise,

the Graust's had met each other and married while they were both employed by a greenhouse firm in the Seattle area of Washington. Later they moved to Watsonville and started their own business.

The total greenhouse range is smaller than that of Westland Nursery and the area devoted to *Alstroemeria* is roughly 7,500 square feet. Mr. Graust has been growing *Alstroemeria* for approximately seven years and finds them to be a very satisfactory and profitable crop.

After cutting, the flower stems are separated into two different grades, bunched, and placed in a walk in cooler. Mr. Graust also sells his flowers through a broker.



Fig. 23. Wholesale growers of *Alstroemerias* in California. Left, Mr. Ben Graust, Florival Greenhouses, Watsonville, Calif.; and right, Mr. Henry Mulder, Westland Nursery, near Pescadero, Calif.

Other crops of interest were *Gerbera*, *Stephanotis*, *Asparagus retrofractus*, *Asparagus medoeloides*, and *Eucharis grandiflora*, with snapdragons grown as a quick fill-in crop.

Both men grow *Alstroemeria* hybrids which has been developed by the Van Staaveren firm of Holland. Under an agreement with Van Staaveren, the grower can not increase the total number of plants he grows beyond that of the original purchase. Nor can he sell or give

plants away. Through this agreement the supplier prevents the market from becoming flooded with their hybrids.

Both men have used additional lighting to try to bring the plants to flower earlier in the spring. Mr. Mulder stated that he found that there was a definite response to additional light, while Mr. Graust said that he felt it had had no effect at all on his crop.

They did, however, agree that the first crop peaks in May and that a second but lighter crop can be harvested about September.

Mr. Graust stated that transplanting of the *Alstroemerias* must be completed no later than October or many of the plants will die.

Other than the usual greenhouse pests, aphid, white fly, and red spider, *Alstroemerias* seems to have no unusual pests or diseases. Mr. Graust did point out that an oil base spray should be avoided as it stains the flowers.

I again wish to thank both Mr. Henry Mulder and Mr. Ben Graust for taking time to show me through their fine greenhouses and for patiently answering all of my questions.

NORTH MIDLAND REGIONAL REPORT - 1978

JAMES E. SHIELDS, *Regional Vice-President*

A good response came back from my request to members of the A.P.L.S. from the Northern Midwest Region for reports on their observations in growing amaryllis in our region. Several respondents were overly modest about sharing their experiences with "the experts". I fear they have *under-estimated* their own expertise and *over-estimated* that of the rest of us in the A.P.L.S. I hope we can have a much wider participation in the next Regional Report to come out of the Northern Midwest. I note that many members are eager for communication with fellow growers of amaryllids. You need only write to one or two authors of articles in PLANT LIFE to soon find yourself in touch with many, many others of similar interests.

Mr. Donald F. Tunison, 9910 McCauly Rd., Cincinnati, OH 45241, is growing hybrid Amaryllis from seeds, and is tackling *Worsleya rayneri* from seed, too. He starts his seeds in small plastic pots under lights in his basement, graduating them to larger pots out in his garden as they mature. Growing amaryllids under lights may well be the central theme for most residents of this Region. The following contribution from Mr. Walrafen makes this point most tellingly.

GROWING AMARYLLIS UNDER LIGHTS

G. W. Walrafen
1215 Romayne Drive, Akron, OH 44313

I am an amateur Amaryllidarian. All of my experience is limited to growing Ludwig bulbs under fluorescent lights. I bought Ludwig's "Ace" about 6 years ago and had my first efforts at hybridization come

to fruition in July, 1977. A cross of "Ace" with "Dazzler" produced what seemed to be a more vibrant orange blossom. Currently I have many and varied crosses in various stages between seed and flower under the fluorescent lights in my basement.

My first departure from Ludwig breeding stock was use of a plant bearing the tag *Hippeastrum puniceum*. A cross of this flower with Ludwig's "Fire Dance" did produce seed. I recently obtained three species hybrids, all diploids, in the hope of producing forms of amaryllis that will be more suitable for light gardening.

At this point, let me explain some goals and thoughts that I would like to work toward. Maybe there are others who have similar goals, and some who have attained some of these goals. I would appreciate hearing of their accomplishments. The goals: (1) A shorter, sturdier growth without a loss in bloom size—features very desirable for light gardening. (2) A longer bloom period. (3) Increase in bloom periods. (4) Reduction in light requirements. (5) Discovering mutants. (6) Learning methods of inducing mutations.

There are some advantages to growing under lights. This statement may cause some raised eyebrows among our fortunate friends in the South who have outdoor growing conditions year round that bring beautiful blossoms every year at the same time. The advantages are: (1) Flowering can be more or less controlled at any time of the year. (2) The angle of light incidence can be controlled directionally. (3) The intensity and quality (i.e., wavelengths) of light can be varied within certain limits.

The advantages in point 1. are obvious, while that of point 2. is in the possibility of obtaining shorter, sturdier growth. My efforts have not yet proven this, but I propose that use of light directed from the sides of the bulb, leaving a black area directly above the plant, will induce the plant to adopt a lower growth habit. Some plants would be more adaptable to this effect than others, and would be selected for further hybridizing. One observation that I have made is that light directed specifically to the side of the bulb and falling on the neck of the bulb has caused a far greater growth in this area of the plant. The result has been wider leaf growth and an expanded diameter of the scape in comparison to plants receiving light constantly from above only. The subsequent bloom was also larger. As to point 3, it offers routes to varying the length and frequency of flowering periods.

There is much food for thought and experimentation in Mr. Walrafen's report. Interested persons should contact him directly to exchange ideas and observations.

Another northern grower of *Amaryllis* is Melissa Romberger, 1440 S. 80th St., West Allis, WI 53214. She has experienced the unique joy of bringing a touchy, uncompromising species *Amaryllis* to flowering. Growing her plants under available-light conditions indoors and in unavoidable shade outdoors, she has managed to find an assortment of

species and hybrids which will still produce blossoms under these conditions reliably year after year. This sounds to me like the epitome of a successful horticulturist, since none of us is able to be all things to all types of plants at one time and place.

Mr. Isaac R. Hunter, Rt. 3, Box 33, Dowagiac, MI 49047, tells of growing numerous species and even more hybrids, many of his own breeding, in a well-lighted enclosed front porch. He had a nice bloom from his *Amaryllis papilio* in April, and *A. elegans* was in bud in late June. Mr. Hunter is interested in trying to keep a few species from the danger of extinction, but needs sources of pollen, if he is to obtain seed from his own plants. He finds that he gets better results growing species *Amaryllis* under his conditions if he uses a richer potting mixture than the one normally recommended for southern and greenhouse growers. Whatever he is doing sounds like it is the right thing at his location, and I am sure he would be happy to share details with others in similar circumstances.

In my own backyard, I finally saw the blossoms of *Hymenocallis azteciana*. After years of struggling with this touchy mexican spider lily, I was finally rewarded with the early August blooming of one plant in a large community pot. A late-summer sickness had thwarted this in years past, often leading to dead foliage and rotted bulbs. At the first sign of this in 1978, the pot was moved from full sun to partial shade, and watering was stopped. The signs of "summer sickness" quickly halted, and the bloom followed. A bulb of *Hymenocallis eucharidifolia* which had been nursed to large size decided to split into many smaller bulbs rather than bloom this year; apparently, there are limits to how far we can push these plants!

Crinum moorei flowered for me for the first time since I obtained it, as did a plant of *C. "Thaddeus Howard"*. The blooming order for the season was *x-kirkii* and "Cecil Houdyshel" in June, then "Thaddeus Howard" in July, followed by "Ellen Bosanquet" in early August and *mcerei* and "Burgundy" in mid August. All in all, a delightful *Crinum* year.

Habranthus concolor bloomed again, and set a good pod when self-pollinated by hand in the greenhouse. Numerous tiny *concolor* seedlings are now thriving in 6-in. community pots. A large group of a pink commercial *Zephyranthes* clone was grown within a few yards of a long row of *Habranthus robustus* in the 1978 outdoor bed of tender bulbs. In the past, neither variety had ever been induced to set a pod but in 1978, both types yielded 2 plump pods each. I suspect the seeds are all insect-pollinated *Zephyranthes-Habranthus* hybrids. I intend to try growing a few of each.

The Northern Midwest Regional Report concludes with the following contribution from Jane Cullen. My sincere thanks to all the regional A.P.L.S. members who contributed to this report.

GROWING CRINUM IN NORTHERN ILLINOIS

Mrs. Edward V. Cullen
437 Phillippa St., Hinsdale, IL 60521

Perhaps the only way to grow Crinums in northern Illinois, with its extremely variable climate, is through pot and tub culture. The Crinums I am writing about have been growing in this way for the past ten, most rewarding, years. The only drawback has been the necessity for large containers—twelve to eighteen inch diameters and even larger—are useful. Winter storage can become a problem.

At present, in growth is an assortment of twelve bulbs which include *Crinum moorei*, *C. x-powellii*, *C. bulbispermum*, *C. "Cecil Houdyshel"*, *C. "Louis Bosanquet"*, *C. "Ellen Bosanquet"*, and *C. asiaticum*. The *C. asiaticum* is the only one that has not yet flowered. These have different blooming periods from May through September. All receive the same care simultaneously, and usually respond profusely.

In past years these bulbs were stored in their tubs, large pots, etc., under a greenhouse bench for the winter, where the temperature rarely falls below 50°F. It was inconvenient to reach the tubs for inspection, and at times the area seemed somewhat soggy for bulb storage. Last year, in an effort to overcome this, the tubs were stored in an adjacent, drier area with a temperature range of 55-65°F. Survival rate was 100% and bulb condition was very good. The higher storage temperature did not seem to be harmful.

Each year in April, as new growth is apparent, the containers are brought into stronger light and subsequently, to their outdoor positions. As they show activity, new top soil mixed with bone meal and dried cattle manure is applied as top soil. The bulbs are watered lightly at first, and then heavily as is acceptable. The bulbs are fed again in June, July, and finally in August, with a 3-16-6 formula or variations thereof.

Three times each summer and before storage, the entire plant is sprayed with a 57% Malathion preparation, at a rate of 1 tablespoon Malathion per half-gallon of water, as a preventative against mealy bugs. If other forms of life are visible, such as earthworms, sow bugs, or others, a soil drench would be indicated. To help eliminate these nuisances, it is advisable to prevent earth contact by placing the tubs and pots on two horizontal bricks, when they are placed out of doors for the summer, leaving drainage open at the bottom.

However much one dislikes disturbing the roots of the crinums, there are times when it is necessary to repot. At such times, consideration should be given to offshoots. If the offshoots are large and fast growing like those of *C. moorei*, it is feasible to remove them and plant them separately. When the large offshoot becomes independent and movable from side to side, it is likely to have a well developed root growth of its own. It can be extracted completely intact, as a separate bulb entity, with gentle back and forth movement. If the offshoots are copious in number but lacking in circumference, there is little to be gained from their removal. When many offshoots accumulate and appear to be competing for space, both above and below the surface, it is a personal belief that removal of a few or many is of benefit to the

source; and a happier picture is put forth.

Although pot culture of so many bulbs may seem an awkward way in which to grow crinum, there are few times as pleasant and rewarding as finding the first emergent bud of the season and watching its development into an umbel of flowers of the most exquisite shades of pink, rose, wine, and others. Every bud thereafter is as much admired. Just now in full bloom are "Ellen Bosanquet", *moorei*, and *x-powellii*.

Each year, the question of whether or not to continue growing crinum in this manner is seriously pondered. As fall approaches, the tubs seem to find their way to their winter resting place; and each spring the cycle repeats itself. It has become a clean, quite predictable procedure, and a habit not easily discarded.

BLOOMING ZEPHYRANTHEAE SEEDLING WITHIN A YEAR OR LESS

DENNIS M. SPEED,

Route 5, Box 129-B, Sulphur Springs, Texas 75482

My seed crop consisted of progeny of species, hybrids, and some of my own crosses among such Zephyrantheae as *Z. smalli*, *H. brachyanthus*, *Z. simpsonii*, *Z. x 'Ruth Page'*, *Z. x 'Betty Alvey'*, *Z. x 'Mockingbird'*, *H. andersonii*, some un-named Mexican species, and others. These were planted about ten days after ripening as recommended by Dr. Walter S. Flory, of Wake Forest University. It has been Dr. Flory's observation that ripe *Zephyrantheae* seeds held in an envelope for about ten days after gathering take on some additional maturity. He has also observed that holding seeds more than ten days after gathering causes the seed to become less viable - especially after long periods of time.

Five gallon cans, and big three and four gallon capacity crock pots, were chosen to be seedbeds and the future "home" for the development of my seedlings. These were intended to "carry" the young plants into their first bloom and on into two or more years afterward.

"Home" locations were to be mobile and flexible for both Summer and Winter. Large soil mixture volume was chosen for several reasons. A constant supply of plant nutrients was wanted. The moisture supply was intended to be constantly available and with the least effort. Hand watering from the tap would be minimized as long as the plants remained in their imposed habitats. Rainwater as nature provided it would not remain in excessive amounts because good drainage was to be supplied and gravity would also be in action to take water downward in the pots and cans.

Root climate was intended to be so stable it would fluctuate only slightly between daytime and nighttime as well as from day to day. Large space was provided for root development. Larger containers than these would have been selected if they could have served without over-taxing human brawn and back limitations.

Large containers would encourage root and feeder-root development that would approximate that of outdoor in-the-ground culture where moisture, temperature, and plant nutrients are virtually unrestricted constants of a plant's universe.

Drainage was to be so efficient neither human error or Mother Nature's over indulgence would harm the plants at any growth stage. Big cans and pots promised near fulfillment of these requirements.

To support these grand ideals, the soil formula was to be as complete and efficient for young *Zephyrantheae* seedlings being cultivated into adulthood as that of a modern day formula for growing human babies into adulthood.

Present or prepared drain holes in the pots and cans received the usual pieces of broken crockery or stone over them. About two inches of river gravel and sand occupied the bottom of the cans and pots. The rest of the pot or can was filled to within two inches of the top rim of it with a mixture of native sands, humus, rich sandy graden loam and sphagnum peat moss. By volume peat moss made up close to 50% of the total soil mix.

Mixing was done in a metal wheelbarrow with a hoe. Tapwater was added to make a soupy mass similar to that of mortar for a stone-mason. The peat moss was dry and needed much water to soak it to near its' capacity for water storage.

Within about twelve hours after mixing and filling the containers, planting conditions were almost perfect for *Zephyrantheae* seed. Excess water had drained out and/or had been absorbed by the mixture of soils and peat moss. This excellent soil condition gave me a test for possible future behavior of my soil when it would become oversaturated with water. My soil prescription was very satisfactory.

Fingers and thumbs became tools for forming depressions in the medium. Individual seed were placed in the holes spaced about two inches apart. Seed were covered with about one-fourth inch of coarse native "blow sand" or coarse sand from a sandbar in a local stream.

Both sands are almost void of elements of cohesion. They were used simply to cover and to hold the light seed down until germination was completed and their roots had anchored the plants in the soil. Any other coarse sand or fine gravel could have served the purpose. If tap watering is done on new planted *Zephyrantheae* seed, they may float to the top of the water and lose their decided cover and positions. The sand covering helped prevent that occurring. It also provided easy upward penetration of the "pegs" of the monocotyledon's seed.

When planting was finished, a piece of transparent plastic sheeting was placed over each container following a dampening sprinkle of water on top of the sand. Plastic covers were secured with a piece of "hay wire" tied around the plastic at the top of each pot or can. This gave quick easy opening of the units to check germination and moisture content of the soil.

A near perfect germination climate was then present. High moisture and high humidity coupled with warmth of the sun-to-earth-to-pot-

to-air teamed with light to bring forth quick germination.

After planting was finished, the containers were placed where shade from a tree would be on them during mid-day hours. When germination was completed, the plastic covers were removed. As soon as soil in the pots dried some, a solution of water and Ra-Pid-Gro was used at the rate of one teaspoonful of Ra-Pid-Gro to a quart of water. A regular feeding and watering schedule was set up. Every other week the fertilizer-water solution was used. If more water was needed it was applied as necessary.

The two inches above the soil in the containers gave room for large quantities of water at a time. That eliminated frequent watering periods.

Containers were moved according to sunlight needs as the season progressed to cooler temperatures and lengthening shadows. Before frost time the containers were moved into my greenhouse made of corrugated clear fiberglass. Solar heat gave good growing temperatures part of the time during Winter. When cold spells came an LP gas stove kept temperatures just above the freezing point.

My fertilizing program continued throughout the Winter with additional fertilizer sprinkled on top of the soil in the containers. That fertilizer was the same as a farmer would use on his field crops (pelleted for slow release of plant nutrients). Analysis was 14% Nitrogen, 28% Phosphate, and 14% Potash. Growing never stopped until Spring when they were moved outside into near full sunlight all day. From that time, bulb growth and development was very rapid.

First bloom occurred at about 10 months after seed planting. Other blossoming followed until all but one pot of seedling had bloomed within one year from seed planting time. Some clones gave encore performances of bloom, others gave only one round of bloom. At the time of this writing, all clones have bloomed a number of times and many of them are crowding the pots with prolifera.

This is not the first time Zephyrantheae have flaunted their colors and perfumes to pollinating insects, the breezes, and man within such a short time from their genesis from seed. Dr. Thad Howard once bloomed hybrid Zephyrantheae in nine months by wintering seedlings in a greenhouse (PLANT LIFE 29, 1973, page 90).

In notes received from Mrs. Katheryn L. Clint, she mentioned quick bloom on Zephyrantheae. "We frequently had seedlings bloom in the ground the following season. The seeds were germinated in flats and transferred to the ground as soon as the tiny bulbs had formed (8 to 10 weeks). The trick is to keep the seedlings growing at all times with food, water, and cold protection." She said, "Even species that normally need a rest period as mature bulbs should be kept in active growth the first year. "Your author agrees with Mrs. Clint's summation of the circumstances outlined for early Zephyrantheae bloom.

Previous experience with planting and blooming *Amaryllis* from seed gave the pattern to apply to Zephyrantheae early bloom. I would not hesitate to attempt this method for obtaining early bloom for many

other Amaryllids.

It isn't for me to say that my method is practical or even profitable. However, I believe many of you can create your own "Sesame Street" lined with quick Zephyrantheae bloom from seed if you use your native resources, imagination, and keep friendly relations with the "Good Gardening Genies" if you please!

GROWING AMARYLLIS AND OTHER PLANTS IN THE NORTH

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Dr. James E. Shields wrote that he thought that others might be interested in the growing of *Amaryllis* up north in a house without any special equipment such as a greenhouse. Although I belong in this class, I do use some lights.

For one thing, I do grow more plants than just *Amaryllis* or even Amaryllids as I've found that *interest flags when concentration is solely on a single genus* and all does not go as to plan or well. Therefore, there are AFRICAN VIOLETS which glow with color when many *Amaryllis* sulk. FERNS to give form and color, SEEMANNIAS crowd many pots, ZEPHYRANTHES beat the *Crocus* to bloom to announce Springtime, BEGONIAS bloom in the dulllest of Wintertime's shortday times, and so-on. If the *Amaryllis* fail to do well, there's next year which sometimes may run into as many as 7 or 8 years before certain seedling pots spring into bloom. For there are many failures *up North* here because of our kind of weather, and that so much of the time, they must be grown indoors where the temperature and light conditions are not up to their inborn needs. For instance, I found that anything with *Amaryllis evansiae* most likely will not grow to "bloomsize" in the house; although, when the inside temperatures were much higher (now set at 62-65° F. while I'm away at work) *Amaryllis evansiae* grew well and bloomed for me, but now they slowly decline more and more until they just fade away. Anything with *Amaryllis aglaiae* in its make-up is even worse *except* for the cross of *Amaryllis papilio* x *Amaryllis aglaiae* of which enough seedlings partake of the *A. papilio* vigor and grow like weeds; even blooming precociously at times. Which brings to the fore, one of my favorite species, *Amaryllis papilio*. My three clones (and each is different) are directly from Dr. Carlos Gomez Ruppel and took a span of some years before his production by offsets could provide a bulb for me. It is my favorite *papilio*. Although it has never set selfed seeds for me, yet; it is a good brood-mother for crosses and is the clone which he calls "Brown" (mostly) evergreen as it does not lose its entire crop of leaves when it goes into partial dormancy during late Spring. The other two clones do lose all their leaves for several months but I'm surprised this year with a bud showing (now) while *papilio* "Big Seed"

is in its Sumertime (July) dormancy. This is a first! "Big Seed" when selfed produces huge seeds for a *papilio* when first shelled-out.

On the 27 February 1974, I received several seeds of an "*Amaryllis* cross" by Mr. Sterling S. Harshbarger of *Amaryllis papilio* x *Amaryllis reticulata* (which I've shortened to "Papillata"). This flower closely resembles that one illustrated in Dr. Traub's *AMARYLLIS MANUAL*, page 87, which he entitles *Orchard-flowering Amaryllis Hybrids (D-6)*. It's flower color is pure white with (frankly) magenta, but I find it highly pleasing. It will bloom at times with up to four bloom-spikes within several months and again several months later, then starts to bloom again. Five are the most blooms per spike but considering that *A. papilio* has but two, it does well. This cross carries the disease resistance of *Amaryllis papilio*, its vigor, its highly ornamental leafage with bold stripes down through the midleaf; and the genetic make-up for new color patterns with "blotch" inheritance, and greater breadth to leaf width. Its offspring are out of this world. It imparts a pleasing deep green color in its leaves, and vigor to its seedlings. I hope to run-through a number of species and choice hybrids with "Papillata" for I believe that many interesting quirks may lie within "Papillata's" genetic makeup. These "quirks" may be able to contribute further valuable traits to good, beautiful, and healthy *Amaryllis*.

I do not have blooms on *Amaryllis* in *every week* of the year but I do succeed rather well in having bloom *amongst the months* of the year. Sometimes, one just waits for a certain clone to bloom as in *Cothran's #339-yellow* for it has such a *lovely form* and a *unique color*, one wishes that it would just bloom and bloom again and again. One of my errors in judgment, in hybridizing this year, was in not using it's pollen on *Amaryllis traubii* (a good podparent for me) when it was in bloom this year. For I've seen pictures of Dr. Boutin's clone: *evansae* x *traubii*, simply gorgeous, gorgeous (and some think better than *Amaryllis x henryae*) and what would not *Cothran's #339-yellow* have done?!

Further, there is always the collecting of the species that one has longed-for and awaited with such patience, and awaiting its surfacing, such as *Amaryllis belladonna haywardii*. However, *my faith* is so little that it's never allowed itself to hunger for *Amaryllis fragrantissima*, but it is a stimulant to *Amaryllis* growing that adds spice to it. Furthermore, there is the receiving of hybrid clones which others have worked on for years such as *Cothran's #339-yellow* which came my way out of a clear blue sky and I didn't even know what a jewel it was until after further correspondance. One should be willing also *to share with others*, one is sometimes surprised what is lacking in their collections.

As to culture, I differ from many warm-area growers in that I try to give the bulb as large a pot as is healthy for it with more than half of the pot filled with broken claypot sherds which are placed to allow a large root area which stimulates vigor. I give a normal amount of fertilizer in water, monthly with other additives which maybe needed for the soilmix. I do try to incorporate crushed eggshells into my potting mix consisting of commercial black potting soil, and peatmoss (the dry, dusty kind with roots, etc. in it).

GROWING AMARYLLIDS IN VIRGINIA

MRS. HART FORBERG,

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Bulbs have been my special interest since the spring of 1928, when they wintered over here without any extra care. In Minnesota where I grew up it took good mulching held safe, from the winter winds to keep bulbs. Following the usual spring burst of color in small bulbs, great joy can be had through the many types of hardy & tender Amaryllids, making a year round sequence of color, size & beauty.

The Crinums are well suited for the Virginia climate. They grow & multiply fast. A well grown bulb is often several pounds in weight and will do well where other bulbs fail. They are a blessing, with the lily-like blooms in pink, white and lavender, some plain and some striped. It is necessary to use crow-bars to dig them, using two persons, each lifting from the side opposite the other. Clumps have reached 125 lbs. For this reason mine are not divided like they should be. The lavender ones are from China and have a drooping position on the plant, (orientalis var.), rest are white *C. bulbispermum*, the milk & wine lily with the white petals striped with (red or maroon color). I did have the *C. americanum*, however it froze in the severe winter of 1977, the coldest ever here. I saw them growing wild in Texas near Houston and in the Florida Keys. They make wonderful flower designs with their graceful little wisps of white flowers.

The Alstroemerias, or Peruvian Lilies, are among my favorites. Since the rootstock is not a leaf encased bulb, but rhizomatous, one must give them winter storage care. The stalk is so heavy as well as the leaves with food & water, that I leave them in the ground until *eight* days after the first hard frost. This permits the food to travel back to the rhizomes before the tops are dried off. They are packed in sand and peat moss to preserve the roots which remain fleshy and are a permanent part of the plant itself. Storage as with the *Amaryllis* should be in the 50°F., bracket. Planting in spring when the rhizomes are separated, should be on the 1st. day of June, (in Va.)

When the *Alstromeria*, *Amaryllis* (syn.-*Hippeastrum*) or any others are stored at less than 50 degrees the flower bud often disintegrates and as a consequence, *no bloom*. This is the most common error, storing it either too hot or too cold. By the 1st of June the ground is warm and you can expect blooms in 14 days if there is the usual moisture. Are quick growers and they fill a gap in color when it is needed. They are a good investment as they multiply fast, however when the bulbs are old, 20 years or so, they bloom but cease to have offsets. If you wish to produce bulbs faster you may cut up a large bulb into pie shaped sections before planting. Retain a part of the plate with each cutting. Have the place to plant prepared ahead and cover the sections with a layer of mud, then plant immediately. I have tried this and it works. (See Traub, Propagation of Amaryllids by stem cuttage. *Herbertia* 2:

123-126. 1935.) The first time cutting 19 sections from 1 bulb and planting: 18 bulbs in top shape were produced, only one failure. Takes 2 years for these to bloom.

Zephyrathes, are good garden standbys here as shown after a freshet of rain. They seem to be disease free and multiply well.

Sternbergia lutea is a fall blooming species and has often graced our table for Thanksgiving Day.

At this writing Oct. 31, the *Amaryllis* are all stored inside the house in pots, on the side, that the air may penetrate the soil. I move them one fourth of their circumference each time I water which is seldom. Rarely ever one fails to bloom. They are never repotted unless they break their enclosure, it is their signal they need more space. Of course the roots remain in the same position of growth for their life cycle. Most people either over crowd the pot or use one too large. Only one inch should be allowed around a bulb, between it and the pot and nearly one half of the bulb above ground. The rain water is used generally to moisten them.

Miniature Amaryllids. Two years ago a society member sent me an envelope of *small* miniature bulbs. Some have bloomed while others just multiplied. These are a joy & a delight to all. They are so small you can put several in one pot and still get blooms. The foliage is 6 to 7 inches so they take less room. The bloom is large on a 7" or so. stem. I am so happy with them and am wondering if anyone can help me locate a source of them. They are not listed in any catalogue here. If anyone knows where they may be secured please advise. The following are what I tried & some bloomed. *A. equestrex-evansia*, a "reblooming" pink. *A. striata*, *A. starkii*, *A. flamigera*, *A. 'Zenith'*, a large red-orange *striata-argilagea*— Not all have bloomed yet but all did produce offsets.

Here are two incidents involving Amaryllids: My son an officer in the Navy when in Leyte received orders to return to the States. He had to walk on foot several miles to where a plane would pick him up, gear and all! It was hot & humid and he felt he wouldn't make it on time when all of a sudden in his view were many Crinum. They were exactly like the ones in the back yard here at home and gave him a stimulus to carry on, & *on time!*

During the war years when Asst. Dir. of the Virginia Nature Camp of the Va. Fed. of Garden Clubs, I made field trips into the George Washington Forest from Lake Sherando, where the camp was then situated. On two trips I found great mounds of *Hypoxis-Hysurta*, an Amaryllid, called yellow star grass. This was a sight, with the tiny star shaped *blue* flowers and the *sword like* grassy leaves. I had read they grow wild from Maine to Fla. but have only seen them there and on Mad Mountain in Richmond where they were grown on a creek-side and by Nature. It is wonderful to recognize even one of God's creations not trifled by man.

AMARYLLIS EVANSIAE

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(Mr. Craft served as Artist for the Society from 1959 to 1962, inclusive. The reader is directed to the PLANT LIFE issues of that period for samples of cover designs contributed by him.—*Editor*)

In the spring of 1977, the author ordered a bulb of *Amaryllis evansiae* from Geo. W. Park Seed Company. The bulb came already growing in the company's soil mixture in a 2" fibreglass pot. From what could be observed the bulb appeared to be about the size of a large acorn. It shortly put forth a bud and one tiny offset. It eventually bloomed having two separate scapes with two flowers, slightly upturned, per scape . . . it wasn't "creamy white" as the catalogue described but more an ivory white with a light chartreuse-greenish throat . . . lovely all the same. When scapes died back, it was repotted to a 7" pot, using a mixture of soil formulaes recommended by L. Doran and others, fed alternate weeks over the summer with Atlas fish emulsion and Hyponex and monthly drenches of Benomyl 50% W.P. (Benlate) at the rate of 2 teaspoons per gallon (see Doran, PLANT LIFE 1976, p. 39). The writer was rewarded with five offsets to date. It is hoped to fill the pot with this species and bulbs should be available to Society members, interested, when they crowd the pot or seem to need repotting.

The parent bulb seems to have increased to double its original size at this writing . . . the end of January 1978. It has been resting completely dry since the beginning of November. According to Doran, this species seems to need about a three month rest of complete dormancy . . . the leaves drying back. It is this writer's observation that this species seems to bloom without leaves as in contrast to *A. striata* which seems to be completely evergreen the year around, although the latter is not watered as much during the winter months. This author's small collection of species either grows or goes into dormancy in a small plant room (similar to a cool sunroom) with good south exposure for the winter sun. Temperatures range from 45° to 50°, nights to around 80° daytime . . . less of course on cloudy days. Most plants are moved outside to the porch with southern exposure, partially shaded by a peach tree, for the summer months and where the summer rains can both nourish the soil as well as wash out any extra salts from fertilizers, etc. Feeding is completely withheld for the winter months. Sometime in February, the author will begin to water *A. evansiae* very judiciously and sparingly until bloom begins and then more and more frequently as growth progresses until almost continuous daily watering is given over the summer.

This writer's potting soil mixture for this species is: 2 parts leaf mold, dirt from a woods nearby; 2 parts Vermiculite; 2 parts coarse and fine sand; 1 part 2 or 3 year old cow manure from a farm; 1/3 part

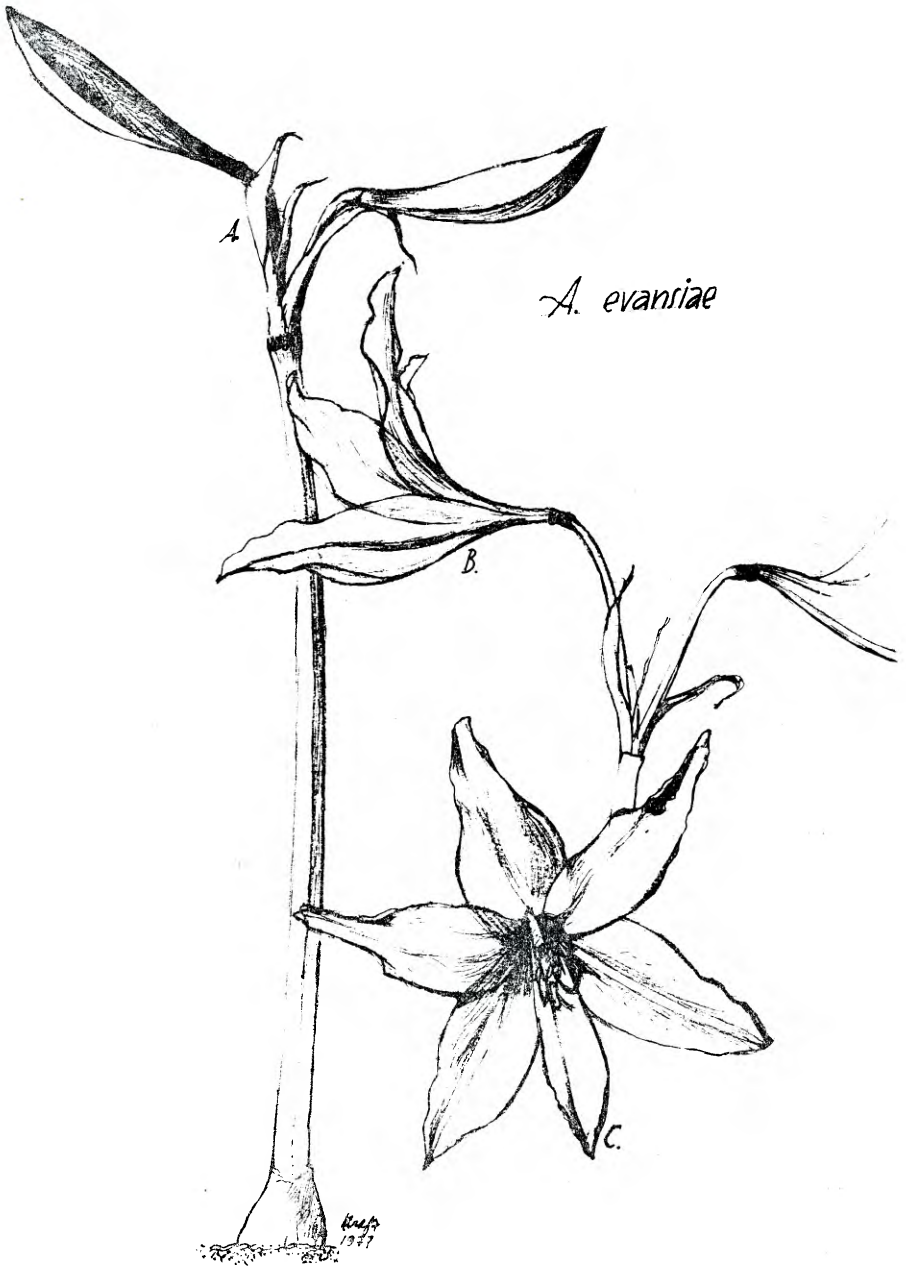


Fig. 24. *Amaryllis evansiae*. Drawing by Douglas D. Craft.

steamed bone meal; 1 part charcoal.

To this is added $\frac{1}{2}$ teaspoon superphosphate and $\frac{1}{2}$ teaspoon lime per 6" pot. The 7" pot was filled to half full with coarse sand before above soil mixture was added. All soil is sterilized also by baking in oven at 180 to 195 F. for no longer than an hour and a half.

The author wishes to state his gratitude to L. Doran for his gracious and generous suggestions on growing the species . . . by correspondence as well as earlier articles in PLANT LIFE.

At some future date providing the writer is still successful, a report can be made on the growing of some small species crosses from seed supplied so generously by Dr. W. D. Bell; as well as seed of *A. aglaiae* and *A. starkii* kindly sent to the author by L. Doran.

EUCHARIS LILY - COLOMBIAN COUSIN GROWN IN CALIFORNIA

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This genus of the Amaryllidaceae from northwestern South America and adjacent Central America seems to be a neglected group. The Eucharis Lily or Amazon Lily, *Urceolina grandiflora* (Planch et Linden) Traub (See reference, Traub, 1971 at end of this article) is offered commercially and is sometimes included in books on house plants; but the emphasis is often on its being a greenhouse plant and the descriptions, cultural advice and estimates of tolerances are at variance. It has been under cultivation for a century and a quarter, the most widely grown species and once a very popular florists' plant.

All of the twenty-one species are evergreen, all are fragrant, most are smaller than *U. grandiflora* and at least two have partly yellow-petalled flowers. Most are native to mid-Andean altitudes in deciduous forest. One much larger species was found at a lower altitude in the far south of the range (1,000 feet, northern Peru). In general, the habitat provides generous air and ground moisture, wind protection, shade, good drainage, frost-free moderate temperatures.

For greenhouse growing, it might be better to go to a British source, but the *U. grandiflora* bulbs being discussed here were imported from a commercial nursery in India (at a guess, a West Bengal hill station). From long-cultivated and presumably selected stock, they are considered suitable for growing and flowering outdoors in the warmest parts of the United States. The family has more spectacular flowers, but how many are broad-leaved evergreen shade plants of good size and proportions that require no major work for three years at a time? Then too, it has possibilities—there have been hybrids produced between two species and between *Urceolina* species. The following combines a description in lay terms and a record of twenty months' growth outdoors in Zone 10 of six *U. grandiflora* plants that so far have merited

their name (pleasant, agreeable) in more ways than the scent of the flowers to which it refers, while the first flowers have been larger than promised by the seller.

The plant grows an arcing fountain of broadly elliptical leaves, deep rich green and glossy. A solid stalk, somewhat triangular in cross-section, continues as midrib of the leaf, depressed on top and protruding underneath, decreasing in girth as it approaches the modified drip-tip. Acutely angled channels pattern the leaf, in close-set, curving, parallel lines. Mature leaves are about 10 inches long by 5

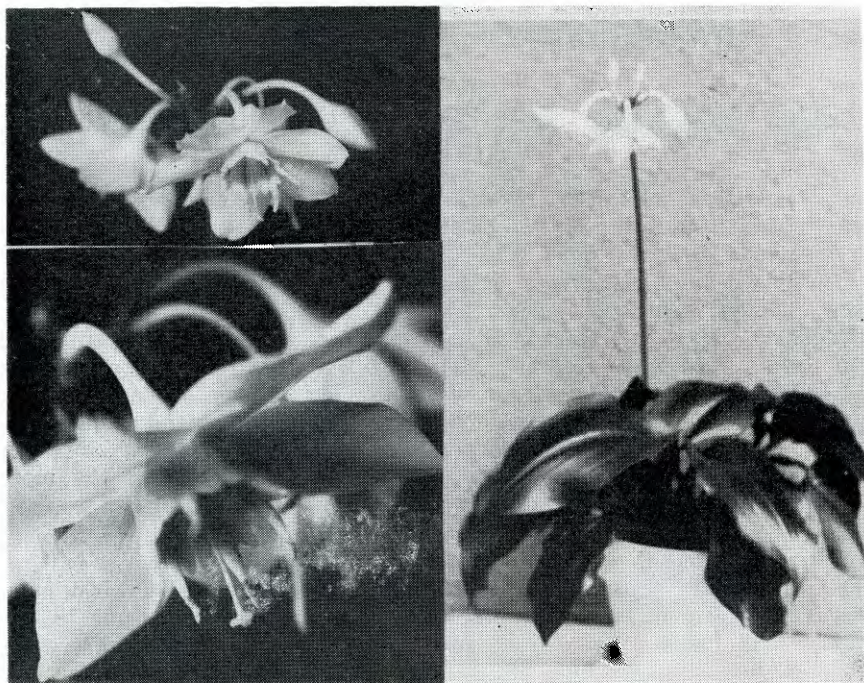


Fig. 25. The Eucharis Lily, *Urceolina grandiflora* (Planch. et Linden) Traub as grown by Jane E. Lewis, San Diego, California.

inches wide on 4 to 5 inch stalks (a few exceptions noted in the record). The new leaf is a curious sight, appearing as a tightly furled upside-down scroll. When about 3 inches long, it begins to unroll from each side as its stalk clears the surface; when fully open it continues to grow, darken and develop markings while the stalk lengthens. The leaves are quite substantial, show a faint translucence when backlighted and are attractive in motion as they tilt from side to side and ripple slightly. The "fountain" is held high or low, changing with varying moisture and temperature.

Under optimum conditions, *U. grandiflora* can be brought into bloom three times a year. Twice might be more realistic estimate for outdoor growing, but even once a year would be acceptable for such a handsome flower. The solid, oval scape rises to a maximum 24 inches and terminates in an umbel of gracefully pendant flowers said to increase in size and number with plant maturity. Information varies: 2 to 8 or 10 flowers; 2, 3 or 4 inches in diameter. Here, first blooms were 5 to an umbel, 3½ inches across. The individual blossom has been described widely as resembling a narcissus, an over-simplified understatement. There are six substantial waxy-white petals, broad, pointed and alternately overlapping, on a slim tube. They open flat-out, show a ridged pattern down the centers. A scalloped bowl-shaped cup is tinged pale green inside and out; six darker straitions end in a surrealist touch - dangling elongations that quickly develop into visible stamens and anthers. The green tinge turns to a cool yellow as the flower ages. The style protrudes slightly beyond the anthers, ends in a 3-lobed stigma. According to the literature, the flowers are highly, delightfully, deliciously fragrant, but almost no one has attempted to describe the scent. One British source says it is classified as a lily scent, leaving plenty of room for individual opinions. A great many in bloom at one time in an enclosed place may impart much fragrance, and even smell different. Otherwise, one needs to be close to catch it and it seems like a light, fruity fragrance. A first impression was of freshly cut grapefruit with a dash of tangerine and minus the tang of bitter rind. It was strongest on the evening of the first day of each flower's opening. In their native habitat, they are pollinated by night-flying moths. These six produced no seed. There were many ovules in the 3-part chambers at the base of the tube. The flowers are urn shaped and dry to a beige papery state, rustling in a breeze without losing their grip, while the stalk stands sturdily even after it is flat and dry.

MARCH 1977—Bulbs ordered in January received March 1. Globular, 1¼ to 1½ inches in diameter, dark brown, dry, almost weightless, no roots, many loose papery scales. Left overnight in deep pan of damp milled sphagnum, bulbs took in some moisture, looked plumper, felt more substantial. Removed loose scales. Three bulbs already sprouted when received, looked damaged. Planted with tops just below surface in Supersoil® (said to include Canadian sphagnum, firbark, redwood, vermiculite, sand and "selected nutrients" in unspecified quantities). Used styrofoam pots - light-weight, moisture-holding; "breathe" but do not collect salts and algae; have three extra drainage holes with channels to pot edges. The sprouted bulbs, which on leafing out again became Nos. 1, 2 and 3, were put individually into 5-inch standard pots; the other three, Nos. 4, 5, 6 in order of sprouting, were planted in a triangle equidistant from each other and the rim, in an 8-inch short pot (6 inches deep). About an inch of clay shards in each pot. Bulbs potted firm, watered from bottom, kept indoors in shade.

APRIL—Watered cautiously around the bulbs and alternately from the bottom, keeping evenly moist. Water needed about every ten days.

After the first four weeks, Nos. 1, 2, 3 and 4 were growing new leaves. No. 1 lost the unopened damaged leaf, but Nos. 2 and 3 continued to grow their first sprouts, though twisted and scarred.

MAY—Soil settled a little, but bulbs did not protrude. Leveled surfaces, topped all with a little of same mix plus minimal amount of fish fertilizer (10-5-5, crushed tablets) with first watering in May. Switched to liquid 10-15-10 at half strength with third watering. Small pots began to need water sooner than large pot. Measured at end of month: Nos. 1, 2 and 3 - new leaves 6, 4 and 3 inches; Nos. 4, 5, 6 - new leaves 8, 6 and 5 inches. Only this once did the latter three grow faster than the former. Leaves long and narrow, stalks equally long, color a medium olive, linear ridges instead of angled channels. Measured light, found it to be less than 100 foot-candles at best on bright day. Put all outside in open shade on slatted redwood benches.

JUNE—Nos. 1, 2 and 3 had rusty streaks after two weeks outdoors. This started at mid-rib, spread lengthwise, then broadened an inch. Sunburn? These leaves faced west and direct sun from about 4 P.M. Placed large tubbed camellia west of *Urceolina* group. Each grew a second new leaf in June, in numerical order. These and subsequent leaves were broad with shorter stalk, channeled, darker without olive cast, of heavier substance, held at higher angle. Misted plants daily as days and nights grew warmer and humidity lower. Fed 10-15-10 every other watering, increased to full strength.

JULY—All grew and matured third leaves in same sequence and a few days apart. Rusty patches did not spread any farther and no more appeared. Fish fertilizer at full strength (10-5-5) as alternate, for trace elements. Misted daily and raised humidity by wetting down floor, redwood planters. Aided by well-watered and misted shade plants in immediate vicinity.

AUGUST—At beginning of month, Nos. 1, 2 and 3 started their fourth leaves while the others completed growth of third leaves, and at mid-month followed along with the fourth set. Same summer care.

SEPTEMBER—Nos. 1, 2 and 3 matured fourth leaves and No. 1 started a fifth. At mid-month Nos. 4, 5, 6 grew fourth leaves to full size. Summer routine as before.

OCTOBER—With No. 1 well in the lead, all put out their fifth leaves at a slower rate and lengthening intervals. Cautiously reduced water and fertilizer. Removed original a typical leaves as all were pale, dry, drooping.

NOV 1977 - JAN 1978—The last leaves all matured by mid-month and no new ones sprouted. Watering cut down, feeding stopped. Unusually rainy winter, more humidity, higher minimum night temperatures. Plants taken indoors briefly during a hailstorm and on a few nights when air dry, wind blowing and/or temperature in low 40's.

FEBRUARY—Second brief hailstorm damaged a few leaves, punching small holes or freeze-marking. Discovered there has been growth going on out of sight: soil level rose in small pots, reducing

headway from an inch to $\frac{1}{3}$ inch. Leaf growth started at end of month, so began feeding - fish first, as before. Planting mix in good condition, not packed down and draining well.

MARCH—Soil level now noticeably higher in 8-inch pot, leaving about $\frac{3}{4}$ -inch headway. Each had a new leaf in numerical order, a few days apart and growing fast. Resumed step-up watering and feeding same as last year. Old leaves in excellent condition except for the few marks of hail damage.

APRIL—Another round of leaves cleared surface and grew to full size. Remarkably, no insect damage, although nearby plants periodically catch something from patio miscellany in background. Besides regular misting, plants have been sponged off now and then, using tepid faucet water with a few drops of Basic-H to the gallon. Plain tap water has been used all along for watering; this, of course, has been more rain and less Colorado River after last winter.

MAY—Another new leaf each at about same speed. Watered, fertilized and misted as usual. 10-15-10 up to full strength, now and throughout growing season, with alternate waterings. No direct sun allowed.

JUNE—Leaf growth still programmed. Summer routine same as last year. Mid-summer fish fertilizer, crushed 10-5-5 tablet per plant with last watering in June.

JULY—Nos. 1, 2 and 3 went to a new home in a shady, bricked-in bottomless planter, so no longer pot-bound; otherwise, environment and care much the same. As it turned out, the transplanted three and the 8-inch pot trio continued to grow the same.

AUGUST—Growth slowed, several mature leaves drooped and paled and the newest leaves remained half size and nearly stemless. Nervous speculation was followed by enlightenment (perhaps): news came that No. 1, still leading the pack, was pushing up a flower stalk; then they broke ranks and No. 4 followed. No. 1 scape was 5 inches tall when first seen on August 12 (in was hidden behind a leaf). No. 4 appeared on August 25; on the following day the inch-long flower head had cleared the surface. It was enclosed by 3 pale green bracts that were slightly open at the tips. The scape then grew an inch a day for six days. Being portable, No. 4 was easier to inspect closely and constantly, so is followed here; but No. 1 was almost identical in all respects.

SEPTEMBER—At 6 inches on the first of the month, No. 4 scape cleared its leaf umbrella. In four days, the bracts opened enough to show green buds. One at a time, each grew longer, whitened, turned out and downward on a long, slim tube. At sixteen days, the scape reached its final height of 18 inches. Two days later, the largest bud bulged in the morning, began to open in late afternoon and was fully open in 24 hours. The remaining buds ballooned and opened in about 6 hours, every second day. During the last week of the month, very hot, dry weather probably affected the lasting quality: the first flower began to shrink at 8 days; the fifth lasted only 5 days. During the blooming period, leaves growing closest to the scape began to stand

almost vertical and their stems grew longer. The most recently grown dwarf leaves remained small.

OCTOBER—New leaves on all, growing slowly. On the 14th, No. 5 showed a flower scape. At the end of the month, it had reached 18 inches, but buds not as advanced as were those of No. 4 after 17 days during warmer weather. No. 2 flowered this month also. Size, height, number of flowers same as first two plants. Into the middle of November, with much lower temperatures, the flowers lasted longer, and faced outward rather than facing down. If they survive our ministrations and a second winter outdoors, these Bengali-Colombianos may yet become Californios.

LITERATURE CITED

Traub, Hamilton. *Urceolina grandiflora* (Planch et Linden) Traub; syn. *Eucharis grandiflora* Planch. et Linden, Flore des Terres I. ix. 255. pl. 957. 1853-54; PLANT LIFE 1971, p. 58.

AMARYLLID MARKETING NEWS

(Under this heading, the names and addresses of those who have Amaryllids for sale, retail or wholesale, and brief notes on items for sale, will be listed *when information is sent to the Editor.*)

Marcia's Amaryllidaceae, Proprietor, Mrs. Marcia C. Wilson, 255 Galveston Road, Brownsville, Texas 78521. Phone 512—541-2142. September 1978 catalog. Cultural notes, *Amaryllis* species and hybrids. Mini-tensiometer.

Sudbury Laboratory, Sudbury, Mass. 01776. Royal Dutch Hybrid *Amaryllis*, and soil testing equipment.

William D. Bell, (wholesale trade dealer), P.O. Box 12575, Gainesville, Fla. 32604, offers tetraploid *Amaryllis* stock for *Amaryllis* breeders, including all classes described in Traub's *Amaryllis Manual*, but it may be several years before most are available in any quantity. (See article in this issue of PLANT LIFE.)

Randell K. Bennett, P.O. Box 304, Sierra Madre, Calif. 91024: has a limited quantity of *Clivia gardenii* for sale, and will have *Clivia caulescens*, *C. nobliis*, *C. miniata* and *C. cyrtanthiflora* for sale, and possibly other amaryllids, in the future.

PLANT LIFE LIBRARY—continued from page 86.

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EDITED BY

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THE AMERICAN PLANT LIFE SOCIETY

Box 150, La Jolla, California 92038

SOUTHERN CALIFORNIANS ENJOY BRIGHT FUTURE IN HEMEROCALLIS

SANFORD ROBERTS, 15011 Oak Creek Road, El Cajon, CA 92021

Hemerocallis fanciers in California enjoyed increased activities in daylilies in 1977 and 1978. The Southwest Hemerocallis Society staged its first accredited show in July 1977 in San Diego's Balboa Park. This show was well received by the public and, in addition to providing a perfect staging of 218 horticultural exhibits of cut scapes and individual blooms, provided arrangers an opportunity to create 38 artistic displays using the modern daylily in arrangements. Much publicity for daylilies was achieved by educational displays of hybridizing from the dried seed to a mature, blooming plant. A two-hour lecture, with 100 excellent how-to-do-it slides, was presented in another room of the park's Casa del Prado on growing hemerocallis in home gardens and their near-perfect use in landscaping. This was well attended by nurseymen, flower judges (garden and horticultural) and fanciers. Club members chose "A New Dawn," as the theme of this first accredited show. It is interesting to note that of the 218 horticultural exhibits, more than 95% were tetraploids. 'Chicago Star' (Marsh), a golden yellow, was selected as Best Introduced Cultivar by the three officiating American Hemerocallis Society judges. 'Jock Randall' (Peck), a warm red, won the Regional Popularity Poll Section. 'Mary Todd' (Fay), a universally acclaimed bright yellow, was tied as the regional favorite for 1977, as voted by Region 7 (Arizona, California and Nevada) daylily growers and AHS members. It was a particularly good year for the modern daylily.

In June 1978, the Southern California Hemerocallis and Amaryllis Society staged its first accredited show Hemerocallis at the Los Angeles City and County Arboretum in Arcadia. This was a two-day event, again with artistic arrangements, and it was well attended. Walter Gorrell, a member of both societies, was awarded a special rosette for his crowd-pleasing educational exhibit.

A week later, some members of both societies made the trek to Stockton and the regional meeting at Melrose Gardens.

In July, Southwest Hemerocallis Society members staged their second accredited show in San Diego. The show's theme, "A Day in the Tropics," had been selected in conjunction with the International Palm Society, whose members were concluding their biannual meeting with a farewell brunch in Balboa Park as the hemerocallis show was opened to the public nearby.

A theme staging of specimen *Cycas revoluta* (Sago Palm) from Mexico; *banksias* from Australia; the exotic proteas from Africa and *Haemanthus katherinae*, again from Africa—all of which were grown and owned by club members—set the mood for the show's theme. Additionally, members wore aloha shirts or colorful muus muus to complete the tropical theme for the daylilies. More than a thousand visitors

viewed and enjoyed the five-hour show. 'Watatic' (Himottu), a well-branched, many-budded, black-red cultivar, hybridized in Massachusetts, was adjudged as Best Horticultural Scape in the show.

A week later, several Californians attended the National Hemerocallis Convention in Pittsburgh. All reports from those attending reflected perfect weather, good bloom, and many well designed and landscaped gardens filled with most of the latest diploid and tetraploid creations from hybridizers.

The modern daylily is enjoying steady acceptance by California gardeners. The state's many micro-climates permit a long growing season and recurrent blooming tendencies in a cultivar is perhaps the most desired trait in a new introduction. Landscape architects continue to use the ubiquitous orange-yellow cultivar profusely in landscaping freeways, public buildings, banks and restaurants. The modern daylily, both diploid and tetraploid, is probably a long way off in being used as mass landscape material in the western states, probably due to lack of wholesale outlets for the modern daylilies.

The fancier and home gardener can, on the otherhand, select a wide color range of excellent cultivars in diploid and tetraploid plants to grow and enjoy through most of the year. Some recent introductions flower from February through November and offer much enjoyment in the garden. Among recently introduced cultivars, these have been observed for two years, and are considered some of the best obtainable: 'Apple Tart' (Hughes), ruffled, dark red with green throat; 'Barbarossa' (Peck), a wide, overlapping cherry red self with green throat; 'Botticelli' (Munson), large, deep pink self; 'By Myself' (Peck), light gold self; 'Chicago Firecracker' (Marsh), full Chinese red self with charreuse throat, recurring bloom sometimes double; 'Chicago Star' (Marsh), golden yellow self; 'Chinese Autumn' (Munson), brilliant blend of coral, orange, rose, gold and apricot, all pleated and ruffled; 'Christmas Wreath' (Drake), round, flat, deep red self; 'Coral Gem' (Roberts), coral self with orange throat; 'Dawn Ballet' (Reckamp), perfection in a peach-pink blend; 'Evening Bell' (Peck), large, pure golden yellow; 'Gaugin' (Munson), sunset blend of coral, tangerine and rose; 'Gentle Dragon' (Peck), pure red, often double in recurring bloom; 'Ginger Creek' (Blocher), a ginger blend with extra petaloids for breeding doubles (This cultivar and Reckamp's 'Dawn Ballet,' similar in size, excel in near perfection.); 'Inca Torch' (Reckamp), golden orange of heavy texture; 'Iron Gate Geisha' (Sellers), rose pink, recurved self; 'Lusty Leland' (Peck), fiery red self of excellent fertility; 'Mary Moldovan' (Moldovan), superb quality in peach-pink blend; 'Mary Todd' (Fay), medium yellow self and a top performer; 'Meadow Mystic' (Wiese), excellent lavender with green throat; 'Olive Bailey Langdon' (Munson), deep violet purple self of frequent rebloom quality; 'Quinn Buck' (Peck), ruffled, bluish lavender, still scarce and named for a fine amaryllis and hemerocallis hybridizer from Southern California; 'Round Table' (Peck), a strawberry veined pink with much ruffling; 'Ruffled Apricot' (Baker), a large and showy apricot self;

'Sacred Shield' (Reekamp), a fine, heavy textured apricot-melon; 'Scarlock' (Peck), a recurved bright red; 'Sombrero Way' (Reekamp), a flat-formed, deep orange-pink; 'Tammis' (Peck), a fine raspberry purple with green throat, probably best in partial shade; 'Viracocha' (Roberts), a mammoth, deep orange of great carrying power for the show bench and garden; and, 'Watatic' (Himottu), a well-branched red.

One of the most popular tetraploids seen in many gardens is 'California Butterfly' (Traub), a big, bold and brassy yellow offering much enjoyment in a golden shade of yellow.

The foregoing are some of the best of hybridizing efforts to-date, in tetraploids. The future is indeed bright for hemerocallis in Southern California. The hues and colors are becoming highly refined in breeders' work and soon the good white and possibly a blue may also be available to further enhance the color spectrum.

SABAL TEXANA: A SANCTUARY WITH A HISTORY

MRS. MARCIA C. WILSON,

255 Galveston Road, Brownsville, Texas 78521

There is much interest today in preserving antiquities of nature and man, whether it is a relic from the sea, a delightful example of architectural style, or an endangered plant species on a remote desert plateau. About seven miles east of Brownsville, Texas, we have our own antiquity which probably has not made the news in your area. It is the *Texas Sabal Palm Sanctuary of the National Audubon Society*, ceded to them by oilman *Ben F. Vaughn* with financial assistance of the *Exxon Company* in 1971.

In 1519, Spanish explorer *Alonzo Alvarez de Pineda* was sent by *Francisco Garay*, governor of Jamaica, to find a water passage to the Orient. Rebuffed at Veracruz by Cortez, Pineda sailed north with his four ships and landed at the mouth of the *Rio Grande River*. Here they camped for a month to repair their vessels and trade with the Indians. Exploring twenty miles up the river in a small boat, Pineda described a vast palm forest in his report and named the river *Rio de las Palmas*. In 1974, a group of Naval Reservists, camped near the mouth of the *Rio Grande*, uncovered the decayed remains of an ancient wooden boat with wooden pegs and a broken slab about 12' x 2½'. Translated, the abbreviated inscription reads: *Here Alonzo Alvarez de Pineda, Captain 1519, with 270 men and four ships, of Garey. Colony of Garay*. Attempts have been made to authenticate the relic. (Ferguson, Henry N. 1976. *The Port of Brownsville*. Springman-King Press, Brownsville, Texas. pp. 11-14.)

The *Texas Sabal Palm Sanctuary* is a small remnant of the large forest reported by Pineda and represents the only truly indigenous species of palm in Texas. In 1890, about 20 years before my paternal grandfather moved his family to Brownsville, Frank Rabb bought about 3000 acres along the river and built a grand two story home. Locally,

the property is still known by either Palm Grove or the Rabb Ranch and has been visited through the years by four generations of my family.

Our Editor, Dr. Traub, is quite interested in history, and asked that I revisit the Sanctuary. I invited my brother, Morris Clint, Jr. and his family. Morris is quick at recognizing native plants in our area and his son Chip (Morris W. Clint III, aged 13) is good with a camera.

The Rabb home is still privately owned by Mr. Vaughn, who is about the fourth owner. It is well maintained and impressive in this remote setting. To the left of the home is the cottage of Audubon Warden *Ernie Ortiz*, a friendly warm natured young man with experience

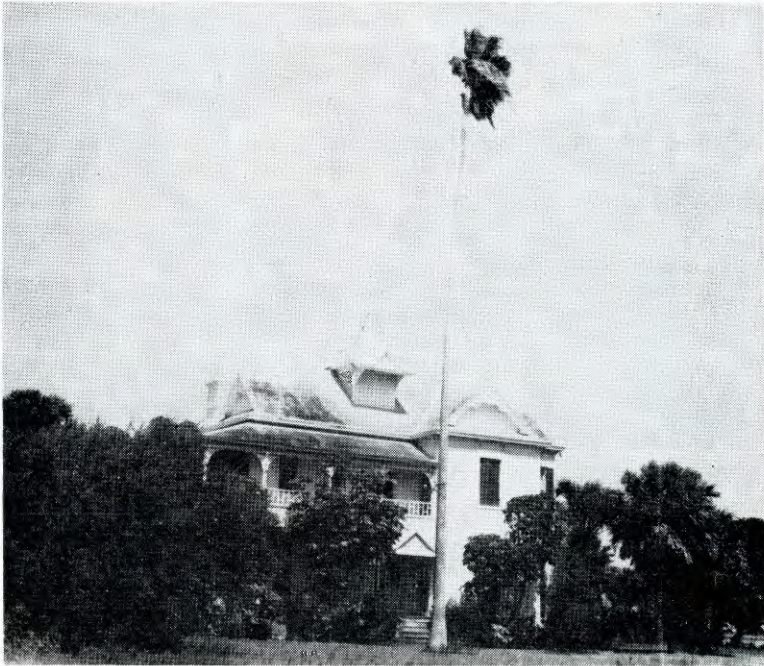


Fig. 26. The Texas Sabal Palm Sanctuary, Rabb Ranch House. Photo by Morris W. Clint III, aged 13.

as a plantsman. In bloom in his garden was a row of *Crinum* 'Ellen Bosanquet', a lovely old and popular dark pink hybrid. Warden Ortiz told us that *the Audubon Society had fenced about 40 acres of palms for the plant and wildlife Sanctuary*. He had worked for a wholesale nursery on the property at the time of *Hurricane Beulah*. This hurricane hit Brownsville September 19, 1967 with winds up to 140 miles an hour and destroyed the nursery. Remnants of other palms and some propagating stock can be seen naturalized along the well cleared walking trails. We were also told that the palms had not set seed in the ten

years or so since *Beulah*. On the day of our visit, June 18, many of the palms were loaded with creamy or greenish white inflorescences and it is hoped that rains will come at the proper time for seed setting this year. There is not a large proportion of seedlings or young palms in the grove. Accidental fires and high winds keep the tall palm trunks fairly clean of old leaves. One unrooted *Sabal* was flat on the ground and still growing.



Fig. 27. The Texas Sabal Palm Sanctuary. **Left**, Inside Sabal forest. Tallest palms, 25-30 feet; trunks cleaned by fire. They normally keep their leaf bases, which probably helps to make them hardy. **Right**, Edge of Sabal Palm Forest, showing old leaf bases; some palms have fuller "skirts", protected by wind from fire. Photos by Morris W. Clint III, aged 13 years.

Well sprayed with mosquito repellent (which had to be replenished before the end), we made a circular tour in a little over an hour. In the shaded interior of the Sanctuary, the *Texas Ebony* tree is fairly common, although the *Sabal* predominates. Since the *Sabal* is a fairly rapid grower in this area, I imagine that density varies with growing conditions through the decades. Walking along the outer perimeter during our short visit, we saw the following woody plants growing with the palms: *Retama*, *Tenaza*, *Mesquite*, *Anaqua*, *Palo Blanco*, *Mexican Persimmon*, *Cassio (Youpon)*, *Granjeno*, *Huisache*, *Catsclaw*, *Brazil*, *Tepeguaje*, *Guayacan*, *Guajillo*, *Colima*, *Snowberry*, *Dewberry* and *Wild Turk's Cap*. *Carizo* (Giant or Water Cane) and *Sand Bar Willow* grow toward an old resaca bed. All of these interesting vernacular names are used currently and may be found in the general index of Robert A. Vines' *Trees, Shrubs and Woody Vines of the Southwest*, University of Texas Press, Austin. 1960.

GARAVENTA'S "GENUS ALSTROEMERIA IN CHILE"

HAMILTON P. TRAUB

Through the kindness of Dr. C. G. Ruppel of Argentina, Mr. Floor Barnhoorn in South Africa, received a reprint of Augustin H. Garaventa's "Genus *Alstroemeria* in Chile" which was published in Anal. Museo Hist. Nat. Valparaiso. 63 pp. in 1971. Mr. Barnhoorn had the article translated into English and kindly sent a copy to us.

The objective of the present article is to furnish a key to the 19 species, one variety and two forms, of *Alstroemeria* in Chile, for *Alstroemeria* enthusiasts in the United States.

KEY TO THE **ALSTROEMERIA** SPECIES OF CHILE ACCORDING TO
AUGUSTIN H. GARAVENTA

- 1a. Plants normally higher than 30 cm.; leaves resupinated, ciliated:
 - 2a. Leaves ciliated:
 - 3b. Flowers reddish-yellow. Aconcagua and Malleco1. **haemantha** R. & P.
 - 3b. Flowers not yellow:
 - 4a. Flowers intense purple-violet. Prov. Coquimbo2. **sierrae** C. Munoz P.
 - 4b. Flowers very pale violet-lilac; Province Coquimbo3 **gayana** R. A. Phil.
 - 2b. Leaves not ciliated:
 - 5a. Flowers with mucro, rose, violet or whitish:
 - 6a. Leaves grass-like:
 - 7a. Flowers intense rose color; 12-18 mm. long. Coastal mountains and Andes of central Chile to Prov. Coquimbo and south to Cautin4. **revoluta** R. & P.
 - 7b. Flowers pale rose, 25-35 mm. long, Coquimbo and Concepcion5. **angustifolia** Herb.
 - 6a. Leaves not grass-like:
 - 8a. Flowers white-toned:
 - 9a. Flowers white or slightly rose; 25-45 mm. long. Coquimbo and Talca6. **pulchra** Sims
 - 9b. White, or slightly rose-violet; 50-60 mm. long. Valparaiso, Aconcagua and Catemu6a. **pulchra** var. **maxima** R. A. Phil.
 - 8b. Flowers violet toned:
 - 10a. Flowers intense lilac colored; Prov. Antofagasta to Coquimbo 6b. **pulchra** forma **lilacina** Garaventa
 - 10b. Flowers intense violet colored; Prov. Antofagasta to Coquimbo7. **violacea** R. A. Phil.
 - 5b. Flowers with sharp-pointed mucro; reddish, yellow to orange:
 - 11a. Flowers reddish, mucro of coffee to red color; Concepcion and Osorno8. **ligtu** Linn.
 - 11b. Flowers yellow to orange:
 - 12a. Flowers yellow, mucro coffeeish-red; Concepcion and Osorno
 - 8a. **ligtu** forma **flavens** Garaventa
 - 12b. Flowers golden yellow to orange; green mucro Concepcion & Aysen 9. **aurantiaca** D. Don
 - 1b. Plants less than 30 cm high; leaves not resupinated:
 - 13a. Leaves grass-like:

- 14a. Flowers whitish or pale rose.
Antofagasta and Atacama10. **graminea** R. A. Phil.
- 14b. Flowers yellow:
15a. Internal and outer tepals without stain.
Atacama11. **kingii** R. A. Phil.
15b. Internal and outer tepals with stained purple, and violet spots, Colchagua to Linares12. **tigrina** R. A. Phil.
- 13b. Leaves not grass-like:
16a. Leaves non-spatulate, semi-embracingg, tightly "lauced"; flowers yellow, 30-36 mm. long.
Prov. Talca13. **crocea** R. A. Phil.
- 16b. Leaves spatulate:
17a. Leaf margins regular:
18a. Leaves pilous; greenish yellow, stained violet, 12-25 mm. long. Prov. Coquimbo14. **venustula** R. A. Phil.
18b. Leaves glabrous:
19a. Flowers pink, 20-25 mm. long.
Prov. Coquimbo15. **andina** R. A. Phil.
19b. Flowers white or pale pink, 15-17 mm. long.
Prov. Atacama16. **polyphylla** R. A. Phil.
- 17b. Leaf margins irregular:
20a. Leaf margins slightly wavy, never "cripated" (crispated); flowers intense pink, 25-35 mm. long, Andes of Central Chile and north Chile between provinces of Coquimbo and Curico17. **spathulata** Presl
20b. Leaves undulated or with "crispated" margins:
21a. Leaves with margins markedly "crispated". Prov. Coquimbo18. **crispata** R. A. Phil.
21b. Leaves with margins undulated; flowers intense yellow. Prov. Aysen and Magallanes
19. **patagonica** R. A. Phil.

PLANT LIFE LIBRARY

AN ILLUSTRATED HISTORY OF GARDENING, by Anthony Huxley. Paddington Press, 95 Madison Av., New York City 10016. 1978. Pp. 352. Illus. \$24.95.—One of the outstanding events in the gardening world for 1978 was the publication of Anthony Huxley's monumental **History of Gardening**. The author, the eldest son of Sir Julian Huxley, writer, photographer, lecturer on horticulture, plant science, plant exploration, and travel, has produced a text which will appeal to gardeners generally the world over. The 25 full pages in color illustrations and the additional ones in black and white, are outstanding in quality. The comprehensive text pages are devoted to the origins of gardens; how gardens developed; parts of the garden; instruments of gardening; essential operations; advanced cultivation; plants under cover; the lawn; specialization, and today and tomorrow. A selected bibliography and index complete the volume. Very highly recommended.

TIME LINES, by the Diagram Group. Paddington Press, 95 Madison Av., New York City. 10016. 1978. A series of six booklets (each with 5 to 7 accordion bellows-like page faces between covers) at \$2.95 each.—The Diagram Group consists of a team of researchers, illustrators and designers, who have now created a number of best-selling booklets in the **Time Lines** series of six: (1) Science and Technology, (2) World History through the

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

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[A Committee of the American Plant Life Society]

[AMERICAN AMARYLLIS SOCIETY, continued from page 6.]

(c) REGISTRATION OF PLANT NAMES

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Correspondence about the registration of plant names should be sent directly to the Registrar, and a self-addressed, stamped envelope should be enclosed if a reply is expected.

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1. **AMARYLLIDACEAE: TRIBE AMARYLLEAE**, by Traub & Moldenke (including the genera *Amaryllis*, *Lycoris*, *Worsleya*, *Lepidopharynx*, *Placea*, *Griffinia*, and *Ungernia*; Manila covers; 194 pages, incl. 18 illustrations. \$8.00 postpaid.

This is required reading for every amaryllid enthusiast.

2. **DESCRIPTIVE CATALOG OF HEMEROCALLIS CLONES, 1893—1948**, by Norton, Stuntz, and Ballard. A total of 2695 *Hemerocallis* clones are included and also an interesting foreword, and explanatory section about naming daylilies. Manila covers; 100 pages (1—X; 1—90), includes a portrait of George Yeld. \$5.00 postpaid.

3. THE GENERA OF AMARYLLIDACEAE, by Hamilton P. Traub. Includes a general introduction, a key to the subfamilies, infrafamilies, tribes, subtribes and genera of the Amaryllidaceae, and descriptions of all the genera. Every member of the Society should have this book for constant reference. Manila covers; publ. 1963; 85 pages. \$8.00 postpaid.

4. LINEAGICS, by Hamilton P. Traub. This is the first outline text for the undergraduate student on the grouping of organisms into lineages. The text is divided into four parts: (a) the history of lineagics and lineagics as an integrated science; (b) basic lineagics, principles and procedures; (c) applied lineagics, principles and procedures; and (d) research methods in lineagics. Recommended for the student in biology. Publ. 194. Manila covers, 163 pages, incl. 8 illus. \$8.00 postpaid.

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Dr. Thomas W. Whitaker, Executive Secretary,
 The American Plant Life Society,
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PLANT LIFE

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EDITED BY

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