PLANT LIFE

Amaryllis argilagae

AMARYLLIS
YEAR BOOK

1967

THE AMERICAN PLANT LIFE SOCIETY

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All editorial correspondence should be addressed to: Hamilton P. Traub, *Editor, The American Plant Life Society*, 5804 Camino de la Costa, La Jolla, Calif.

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DR. THOMAS W. WHITAKER, *Executive Secretary*
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EDITED BY
HAMILTON P. TRAUB
HAROLD N. MOLDENKE

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GENERAL AMARYLLID EDITION

PLANT LIFE, VOLUME 23, NOS. 2—4, INCL., 1967
GENERAL EDITION

ILLUSTRATIONS

PLANT LIFE LIBRARY—continued from page 154.

BAU UND FEINBAU DER PFLANENZELLE, by Von Dr. Peter Sitte. Veb Gustav Fischer Verlag, Jena. 1965. pp. 231 28-MDN. Peter Sitte, Professor für Zellenlehre und Biologische Elektronenmikroskopie, Universität Heidelberg, has authored a thorough and detailed study of the gross and fine structure of the plant cell. Thoroughness and mastery of detail is typical of German scholarship in biology. The book under review is an excellent example of this traditional technique.

There are single chapters on Cytological Methods; Molecular Morphology of the Cell; the Nucleus; Cytoplasm and Cell Organelles; Plasma Membranes and Vacuoles; Cell Wall; and a final chapter on the Organization of the Cell. It is a relatively small book, but packed with information served-up in usable form. There are 450 references to original works collected in the rear of the book, along with independent Author and Subject indices. In a separate section there are also from 1 to 8 general references to each sub-chapter topic. This convenient and practical feature will allow investigators to easily increase their information about specific subjects. The illustrations are of high quality except the photographs of mitosis and meiosis. These photomicrographs are either poorly reproduced or the originals were not as sharp as they should have been for good reproduction. An excellent reference book with much original research.—*Thomas W. Whitaker*

A HISTORY OF GENETICS, by A. H. Sturtevant. Harper & Row, New York. 1965. pp. 165. $5.50. Biologists in general and geneticists in particular will welcome this lively history of genetics by one who has lived through and contributed much to the exciting discoveries of this still young disciplne. Professor A. H. Sturtevant tells the story of genetics from pre-Mendelian times to about 1950. The work on the structure and coding of NDA and RNA are purposely omitted as being beyond the scope of the book. Likewise, newer developments in several other important fields such as population genetics, ciliate genetics, etc., are passed over. As Prof. Sturtevant suggests, these subjects have been adequately, and in some cases repeatedly covered by current reviews and special symposia.

Prof. Sturtevant's contribution may not be history as historians understand it, but it is certainly the resource upon which future historians will have to depend for source material. Dr. Sturtevant was either a contributor to, or had first-hand knowledge of, many of the landmarks of classical genetics. As such he writes entertainingly, with authority, and unusual insight.

The book is graced with two exceptional features: Appendix A, Chronology; and Appendix B, Intellectual Pedigrees. The Chronology arranges the great discoveries that are the core of genetics into a time sequence along with the name or names of those responsible for the particular advance. The Intellectual Pedigrees are skillfully done. They demonstrate impressively that a few great teachers along with their students have led the advancing frontiers of genetics for almost half a century.

This delightful book of 165 pages is terminated with an 11 page bibliography and a satisfactory Index.—*Thomas W. Whitaker*

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PLANT LIFE, VOL. 23, NO. 1, January, 1967

AMARYLLIS
YEAR BOOK
1967

Year Book of
The American Amaryllis Society
34th Issue

GENERAL AMARYLLID EDITION

EDITED BY
HAMILTON P. TRAUB
HAROLD N. MOLDENKE

THE AMERICAN PLANT LIFE SOCIETY
Box 150, La Jolla, California 92037

THE AMERICAN PLANT LIFE SOCIETY

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

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[THE AMERICAN AMARYLLIS SOCIETY—continued on page 155.]

PREFACE

The cover design, by Prof. Penrith B. Goff, of the University of Kentucky represents the new *Amaryllis argilagae* as grown by Dr. C. G. Ruppel in Argentina. We are all indebted to Prof. Goff for this beautiful cover.

This thirty-fourth edition of the AMARYLLIS YEAR BOOK is dedicated to Dr. Martin Cardenas, the noted phytologist and plant explorer of Bolivia, who received the 1967 HERBERT MEDAL in recognition of his outstanding contributions toward the advancement of the amaryllids. The Medal is presented to him with the congratulations of all the members. Over a number of years, Dr. Cardenas has discovered various new *Amaryllis* species, and other amaryllids. To the present edition, he contributes an autobiography, a note on the reduction of "Lepidopharynx Rusby" to *Amaryllis* L., and an article on the *Amaryllis* species of Bolivia.

Other articles on *Amaryllis* include breeding reports by V. Roger Fesmire, Joseph Mertzweiller and Clarence J. Crochet; reports on the introduction of new *Amaryllis* species by Claude W. Davis; experiences with the clone 'Senorita', by Keith Brown; accelerating blooming in *Amaryllis* with bottom heat by J. L. Doran; cultural notes by Burr Clouette and Mrs. Fred Tebben; and the annually eagerly awaited report on the *Amaryllis* season of the past year, by Robert D. Goedert.

There are various articles on other amaryllids. These include notes on *Paramongaia* by Dr. Seibert; *Nerine* notes by Emma D. Menninger, and *Nerine* breeding in England, by J. T. Gallagher; and notes on freedom of flowering in *Nerine sarniensis* by Prof. Ken Douglas.

Dr. Vargas contributes notes on *Eustephia* species; Prof. Ravenna reports on the status of *Nothoscordum felipponei* and its chromosomes; Dr. Flory and S. Bose discuss the chromosomes of *Sprekelia;* and Prof. Wilsenach reports on the chromosomes of *Tulbaghia.*

Fred B. Jones contributes an article on *Crinum strictum* in coastal Texas; L. S. Hannibal reports on *Crinum* clone 'June Harris' and the Milk-and-Wine Lily confusion; Mrs. Morris Clint on the culture of *Crinum luteolum* in Texas; and Dr. Zorbach on the culture of Crinums in Maryland.

Quinn Buck contributes a daylily report; L. S. Hannibal reports on *Hannonia hesperidium;* Burr Clouette writes about *Ungernia* culture; Prof. Claude W. Davis reports on *Lycoris* culture in the lower Gulf Coast region; and Dr. E. G. Corbett favors us with an article on the asexaul propagation of *Lycoris.*

A number of new amaryllid species are described,—*Amaryllis argilagae, Eucharis korsakoffii, Hymenocallis azteciana, Allium howardii,* etc.

There are reports on the 1966 Amaryllis shows, In Memoriam notices on Ira S. Nelson, Frank Harrison, Mrs. Emma Louise Davis Hayward; and notes on early daylily hybridizers by Mrs. Nicolet. And there are various other articles and notes as shown by the table of contents.

Contributors to the 1968 issue of the AMARYLLIS YEAR BOOK are requested to send in their articles by August 1, 1967, 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-and-white prints made, and to submit these with their articles.

December 15, 1966,
5804 Camino de la Costa,
La Jolla, California 92037

Hamilton P. Traub
Harold N. Moldenke

PLANT LIFE LIBRARY—continued from page vi.

WEDDING FLOWERS, DECORATIONS AND ETIQUETTE, by Virginia Clark, 2nd ed. Hearthside Press, 381 Park Av. S., New York, N. Y. 10016. 1966. Pp. 160. Illus. $6.95. This is a complete book on the planning and carrying through the wedding. The members of the Society will be particularly interested in the advice on flowers, foliage, designs, church and home decorations, and the making of corsages, boutonnieres and bouquets. Highly recommended.

THE PICTURE BOOK OF ANNUALS, by Arno and Irene Nehrling. Hearthside Press, 381 Park Av. S., New York, N. Y. 10016. Pp. 288. Illus. $6.95. This attractive new book on annuals by outstanding authorities on the subject will be welcomed by all gardeners. In part I, the annuals, arranged alphabetically (A-Z), are described in popular language, and are profusely illustrated. This part alone is worth the price of the book. In part II, the growing of annuals from seeds is detailed; and in part III, the use of annuals is considered. Highly recommended to all gardeners.

HOME AND GARDEN CALENDAR, 1967,. Hearthside Press, 381 Park Av. S., New York, N. Y. 10016. Paper with plastic ring binding. Desk ed. $1.50; purse ed. $1.00. Illus. The Federated Garden Clubs of New York sponsor an annual flower arrangements calendar contest. In this little book, some of the outstanding photographs of flower arrangements with text accepted are reproduced in calendar form for 1967. Recommended to all interested in flower arranging.

1967 ROSE CALENDAR. Hearthside Press, 381 Park Av. S., New York, N. Y. 10016. Paper with plastic ring binding. Illus. $1.50. In this little book, rose arrangements, and other rose subjects, with text, are arranged in calendar form. Recommended to all interested in roses, and flower arrangements in general.

THE FLOWER ARRANGEMENT CALENDAR, 1967, by Helen Van Pelt Wilson, 21st ed. Wm. Morrow & Co., 425 Park Av. New York, 16, N. Y. Paper with plastic ring binding. The publishers sponsor an annual flower arrangement calendar contest. In this little book, the 21st edition, some of the outstanding photographs of floral arrangements accepted by the publisher are reproduced, with text, in calendar form for 1967. This edition includes among others, four color plates. Recommended to all interested in flower arrangements.

THE GARDENER'S BOOK OF VERSE, edited by Helen Van Pelt Wilson. Wm. Morrow & Co., 425 Park Av. S., New York 16, N. Y. 1966. Pp. 128. Illus. $4.50. This is volume one, and contains poems for five seasons—winter, spring, summer, autumn, and Christmas. The poems are selected from the literature of the world—Coleridge, Cowper, Whittier, Frost, Hardy, Wordsworth, Songs of Solomon, Shakespeare, and many more. Recommended to all gardeners.

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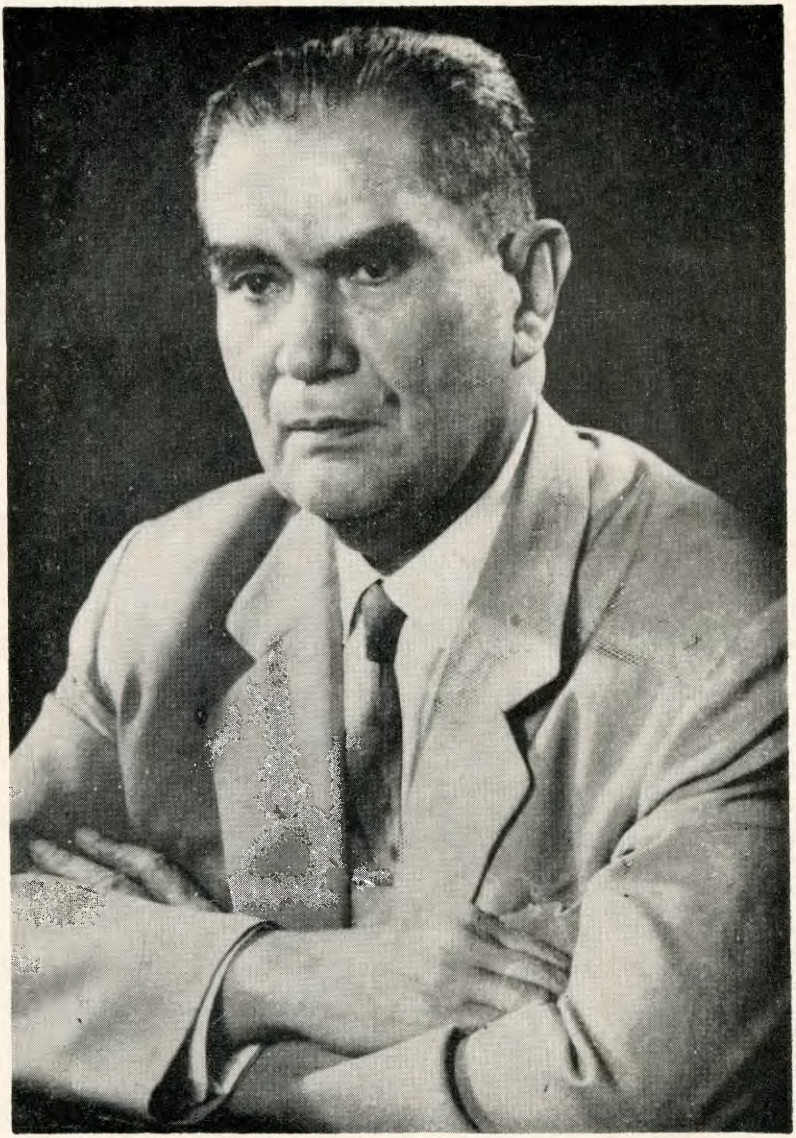
Dedicated to
Martin Cardenas Hermosa



HERBERT MEDALIST—MARTIN CARDENAS HERMOSA

MARTIN CARDENAS HERMOSA

An Autobiography

I was born in the City of Cochabamba, Bolivia, on November 12, 1899. At the age of seven, I started attending the primary school in Cochabamba. In my twelfth year I entered the high school, Sucre, also in the same City. In December 1917, I received the "Bachiller en Ciencias y Letras" degree, and in the following, I enrolled at the Universidad de San Andres in La Paz for the 4-year course at the Instituto Normal Superior in the Section of Biological Sciences.

In 1921, just four months before graduation date, I joined the Mulford Biological Exploration Expedition of the Amazon Basin under the direction of the late Doctor of Medicine and plant scientist, Dr. Henry Hurd Rusby, as the Bolivian Government associate. After nearly one year of plant science exploration in the Amazon Valley with Dr. Rusby and the plant scientist of that Expedition, Dr. Orland E. White, I returned to La Paz, and was awarded the Professor of Biological Sciences degree.

From 1922 to 1930, I was lecturer in Biological Sciences at the Instituto Normal Superior at La Paz, where I taught my students with particular reference to the flora of Bolivia. During 1931 I visited Chile and attended the various sections of the Museo de Historia. From 1932 to 1933 I was Director of a High School in the famous City of Potosi and there had the opportunity of collecting plants in the high Andes.

From 1934 to 1935, I joined our armed forces then engaged in the Chaco War; serving as a member of the Sanitary Corps.

In 1935, I was sent by the Bolivian Government to the U. S. Department of Agriculture, Washington, D. C. in order to study the possibilities of optimum culture of *Cinchona* species in Bolivia. I was already familiar with the subject on the basis of my plant explorations of the *Cinchona* forests in the Department of La Paz. These explorations were undertaken at the request of the Bolivian Government at the time of the Chaco War with the objective of establishing a quinine factory at La Paz.

In 1937, I was elected Rector of the Universidad de San Simon in Cochabamba, and was awarded the Doctor in Sciences "Honoris Causa" degree. Since 1937, I have been lecturing at the Universidad de San Simon on plant science, genetics, plant pathology and economic plant science.

In the years 1938, 1948 and 1958, I represented Bolivia at the three South American Plant Science Congresses. I resigned the University Rectorship in 1946, but have continued lecturing. In 1948, I attended the Amazon Hylaean Conference as President of the Bolivian Delegation. During the same year, I was also Bolivian Delegate to the Natural Resources Conference which convened at Denver, Colorado. In 1944, I was invited by the British Council to spend one year at the

University of Cambridge in connection with potato research work at the School of Agriculture. From September to December 1945, I was the guest of the U. S. Department of State, and had the opportunity of visiting several American universities and agricultural experiment stations. I have attended the Latin American Conferences of Phytotechnicians held at Bogota in 1955, at Santiago in 1958, and at Lima in 1964. In 1960, I traveled in various countries of Europe, visiting museums and making lineagic revisions at some of the herbaria, particularly at those of Kew and Paris. In 1963, I again visited Europe during the summer and attended the IOS Congress at Vienna as President.

During my vacations, I have traveled through almost all of the South American countries, interested always in plant science exploration. When opportunity offered, during 35 years, I have traveled in the interior of Bolivia; collecting plants and taking photographs of plants and of objects of ethnological importance. I have collected nearly 6,500 numbers of Bolivian plants, including several duplicates which have been sent to various foreign herbaria.

Since 1930, I have been engaged in plant taxonomy; becoming a specialist in the grouping of the Bolivian Cactaceae, *Solanum* (Tuberarium), *Amaryllis* and economic plants. I have proposed four new genera, and 120 new species of Bolivian Cactaceae, seven new species of *Amaryllis*, and 20 new species of wild potatoes.

My vocation of plant science began when I was a high school student under the direction of a teacher who asked us to make herbarium specimens although he was not able to identify them. After my graduation from the University, my tour with the Mulford Expedition as Dr. Rusby's assistant, completed my field training, and my capability of identifying the families of plants. My main specialty has been the Bolivian flora. My diagnoses of new taxa have appeared in various specialized periodicals in Europe and the United States. Some of my cactus diagnoses have also been published in our Revista de Agricultura. I plan to write a monograph on the Bolivian species of *Amaryllis*, and also monographs on Cactaceae, wild potatoes, and various economic plants.

I have been awarded several high distinctions, including the Universidad de San Simon Meritus Medal, the Mary Soper Pope Medal, and the First Interamerican Agricultural Medal. I have been honored with election as corresponding member of the American Botanical Society, Life member of the Potato Association of America, and Foreign Member of the Linnaen Society of London. And now I am honored by the receipt of the William Herbert Medal of the American Plant Life Society.

At present I am Director of the Department of Applied Botany and Lecturer in general genetics at the Universidad de San Simon in Cochabamba.

June 28, 1966,
Universidad de San Simon,
Cochabamba, Bolivia.

COLLECTING AMARYLLIS IN BOLIVIA: REMINISCENCES OF MY ASSOCIATION WITH PROF. IRA S. NELSON

MARTIN CARDENAS, *Bolivia*

My particular interest in collecting and studying *Amaryllis* species began in 1954, when Prof. Ira S. Nelson, of the University of Southwestern Louisiana, visited me at the Department of Plant Science at the Universidad de San Simon, in Cochabamba, and requested information about the herbarium material and living *Amaryllis* plants at our institution. Then I realized that I had collected several *Amaryllis* species in connection with plant science exploration since 1921, when I was a member of the Mulford Expedition into the Amazon Basin.

Prof. Nelson received from me several bulbs of unidentified amaryllids, which were later described as *Chlidanthus boliviensis* Traub & Nelson, *Amaryllis mollevillquensis* Cardenas, and some forms of *Amaryllis belladonna* L. Encouraged by the work of Prof. Nelson, my interest in this group of plants increased very much, and since that date I have brought into cultivation quite a number of amaryllid species, and also interspecific hybrids made by myself. In 1958, Prof. Nelson made a second trip to Bolivia, and I became associated with him.

In October 1958, we made a very interesting trip to San Ignacio de Velasco where we saw many clonal forms of *Amaryllis divigranciscii* Cardenas, and also two different forms of *Amaryllis belladonna* L. We spent nearly two weeks as guests of the Franciscan Mission of San Ignacio, and we were assisted particularly by Padres Lorenzo Hammerschmidt and Carlos Probst. Padre Lorenzo accompanied us in all our journeys in the vicinity of the Mission. On November of the same year, I planned for Prof. Nelson a long trip to the Yungas of La Paz, where I expected interesting findings. This journey through La Paz, El Chaco, Chulumani, Rio Solacama, Irupana, Miguilla, and Espia required five days. At El Chaco, we collected what appears to be *Amaryllis forgetii* (Worsley) Traub & Uphof. At Rio Solacama, we discovered the new species now known as *Amaryllis yungacensis* Cardenas & Nelson. When we arrived at the extremely broad bed of the La Paz River, I pointed out to Prof. Nelson the place named Espia across the River. At the time of the Mulford Expedition we had camped there. This spot is actually covered by inaccessible bushes, and is the type (nomenifer) locality of the so-called "Lepidopharynx deflexa Rusby". We discussed the possibility of crossing the three fords of the River between us and Espia in order to obtain bulbs of the amaryllid already mentioned. The River was in a frightening state of flood. It was now a question of going back to Irupana where we had to spend the night, or attempt to cross the river fords in order to reach Espia, where 37 years in the past "Lepidopharynx" was collected by Rusby, but apparently no one had collected there since that time. After considering the matter carefully, Prof. Nelson decided that we make the crossing to the place which was 300

yards across the raging River. When we were crossing the second ford in the river, I was frightened when the water reached the height of the engine of our jeep, but fortunately the engine did not stop, and we reached our objective which was several bulbs of "Lepidopharynx deflexa" at its very type (nomenifer) locality.

When we came back to La Paz, Prof. Nelson would have liked to go on to Apolo in search of the green-flowered *Amaryllis viridiflora* (Rusby) Traub & Uphof. Unfortunately, it was the beginning of December and the rainy season was coming up.

By the middle of 1959, I was notified by the Interamerican Institute of Agriculture at Turrialba, Costa Rica, that I was awarded the first Interamerican Agricultural Medal and was to receive it in April 1960. When I informed Prof. Nelson of this matter, he asked me in the name of the Louisiana Society for Horticultural Research, to go on from Costa Rica to Lafayette and address the members of the Society at the Annual Meeting in March of 1960. I brought along several herbarium specimens for Prof. Nelson; among them one unique labeled by me *Amaryllis crociflora* (Rusby) Traub & Uphof.

The subject of my address at the LSHR Annual Meeting was on Bolivian *Amaryllis* which was illustrated with several Kodachrome slides. I spent a week as the guest of Prof. and Mrs. Nelson, who graciously offered me their hospitality and the shelter of their home during my stay at Lafayette.

In 1963, I received a letter from him reporting that the bulbs collected at Espia had flowered, and that it was in fact a form of *Amaryllis cybister* (Herb.) Traub & Uphof. I was astounded by this news, and thought at first that it might be due to an intermixture of labels. However, after looking at the original published illustration made from a drawing based on an ink sketch, I also came to the conclusion that it was in fact a form of *Amaryllis cybister*. I wrote to Dr. Steere, a friend of mine, and director of the New York Botanical Garden, asking for a photograph of the type (nomenifer) specimen of *Lepidopharynx deflexa* Rusby. This arrived in July 1965, when I was invited to attend in Mexico the 49th Annual Meeting of the American Potato Association and to address the members on "The Potential Germplasm of Native Potatoes in the Andes." After this meeting I decided to go on to the United States to visit some plant science colleagues, and then to go eastward to New York City where I would enjoy the World's Fair.

By the beginning of September 1965, I had made two visits to the New York Botanical Garden, and I saw the type (nomenifer) specimen of *Lepidopharynx deflexa* Rusby, which as anticipated was a true form of *Amaryllis cybister* (Herb.) Traub & Uphof. I left a label on the specimen giving the true name.

After stopping off in Brasil, I searched in the Organ Mountains at Teresopolis, near Rio de Janeiro, for *Amaryllis caylptrata* Ker-Gawl. I found it on a tree with a ripe seed-pod.

I returned home to Cochabamba by the beginning of October, and was anxious to write to Prof. Nelson about the interesting findings with

regard to *Lepidopharynx,* when I received a cable from the Dean of the Horticultural Department of the University of Southwestern Louisiana reporting the tragic death of Prof. Nelson in an automobile accident on the way between New Orleans and Lafayette. The news distressed me very deeply. The thought flashed into my mind that we were exchanging plans on the preparation of the handbook for Amaryllis Breeders which was intrusted to him by the University. I also realized then that in the United States there were only two plant scientists extensively acquainted with the amaryllids—Dr. Traub and Prof. Nelson; and that there remained unexplored spots in the Peruvian and Bolivian Andes where there still remained undiscovered *Amaryllis* species.

Prof. Ira S. Nelson and myself were very cordial friends and we had in common the background of exploration for new *Amaryllis* species. I had always admired his accuracy in the valuation of the lineagic differences in these very beautiful flowering plants growing unfortunately sometimes in inaccessible places.

June 20, 1966
Universidad de San Simon,
Cochabamba, Bolivia

IN MEMORIAM—IRA SCHREIBER NELSON, 1911-1965

Ira Schreiber Nelson, who received the William Herbert Medal Award for 1960 (see Autobiography, Plant Life 16: 6—9. 1960), died on November 14, 1965, as a result of injuries sustained in an automobile accident.

Ike, as he was known to all, was born in 1911 in St. Joseph, Mo. He received his B.S. and M.S. degrees in Horticulture from Iowa State University, and undertook additional graduate studies at the University of Missouri and Cornell University. Professor Nelson joined the University of Southwestern Louisana faculty in 1941.

He immediately became actively engaged in all phases of ornamental horticulture, spreading his contagious enthusiasm for the Louisiana iris, and he produced several hybrids. He was a Fellow of the American Camellia Society, recipient of the Herbert Medal, recipient of the American Horticultural Society in 1964 (citation), recipient of Silver Seal of the National Council of State Garden Clubs, 1958, and Research Director of the Louisiana Society for Horticultural Research.

Ike is widely recognized for his plant exploration trips, the naming and/or introducing to cultivation of *Amaryllis evansiae, A. starkii, Chilidanthus boliviensis, Habranthus cardenansiana,* and the red Bolivian passion flower *Passiflora coccinea.* He was actively engaged in hybridizing *Amaryllis* species and cultivars. Numerous seedlings, as yet not evaluated or flowered, will be released by the University in the future as a living tribute to this renowned horticulturist.

He was instrumental in building and developing one of the finest collegiate ornamental horticulture centers in the South. This center now bears his name.

Professor Nelson devoted 25 years of his energetic life to teaching, counseling and advising young men and women at Southwestern. His total influence on the lives of these many students can never be fully estimated.

He is survived by his wife, the former Barbara Furnass, and four children, Martha, Leah, Katherine and Jimmy.

August 5, 1966, *James A. Foret*
University of Southwestern Louisiana,
Lafayette, La.

JOHN WILLIAM FRANCIS HARRISON, 1901-1966

Mrs. Morris Clint, *Texas*

William John Francis Harrison was born June 21, 1901 in Baysville, Muscoca, Ontario. He was known to his many friends as Frank (for Francis) Harrison. In 1912, he moved with his family to the city of Chatham, in southern Ontario. After completing his elementary education, he entered Chatham Collegiate Institute. Due to the manpower shortage, he worked for a nurseryman and florist during the last two summers of World War I. After his graduation from the Institute in 1918 or 1919, he continued to work full time in this position.

Even as a small boy, Frank was keenly interested in nature. He was a proficient fisherman, loved animals and was almost obsessed with all kinds of plant life. He not only brought home from the woods and planted many plants and trees, but was always ordering rare seeds from nurseries in the United States. He must have been born with a green thumb, for he was apparently more than successful in coaxing these rarities to grow and thrive.

He was an avid reader and was fortunate in having lots of material both in his home and in the Public Library. No doubt this extensive reading fostered the wanderlust that hit him about 1923. He worked in California for 18 months on the viaduct then being built to provide water for the city of Los Angeles. He returned to Canada in 1925 for a visit with his family and then set out for Mexico.

Whether he traveled over Mexico before settling down is not clear. I do know that in the course of his life there he saw a good part of Mexico. He first settled in the town of Chamal, in the state of Tamaulipas, where there was quite a large American colony. He taught school there and started a fruit farm in one of the nearby valleys. Disaster struck in 1933. In September of that year a severe hurricane destroyed his farm and he contracted a debilitating form of Malaria. His health began to fail and he was advised by his doctor to move to a higher elevation.

In 1935, Frank bought about 60 hectares of land on Cerro del Tigre, in the Sierra de Cucharas, about 8 miles west of Gomez Farias, Tamaulipas, just a few miles south of the Tropic of Cancer, and settled down in the fairyland he called "Rancho del Cielo." He planted a few fruit trees (apples, pears, peaches and plums, since it was too

cool for the more tropical fruits such as bananas, Avacado and Mango, which were raised in quantity around Gomez Farias), bought a few cows, and built himself a rough cabin and a small lath house for his rare plants and seedlings. For his livelihood, he sold fruit and milk (and later Amaryllis bulbs) to the local people. Just when he became so interested in *Amaryllis* is not clear—nor where he acquired his original start of bulbs—but I would guess that it was not long after he moved to the mountains. I do know that he periodically visited nurseries in Cuidad Victoria and other cities of Mexico, ordered seeds from this

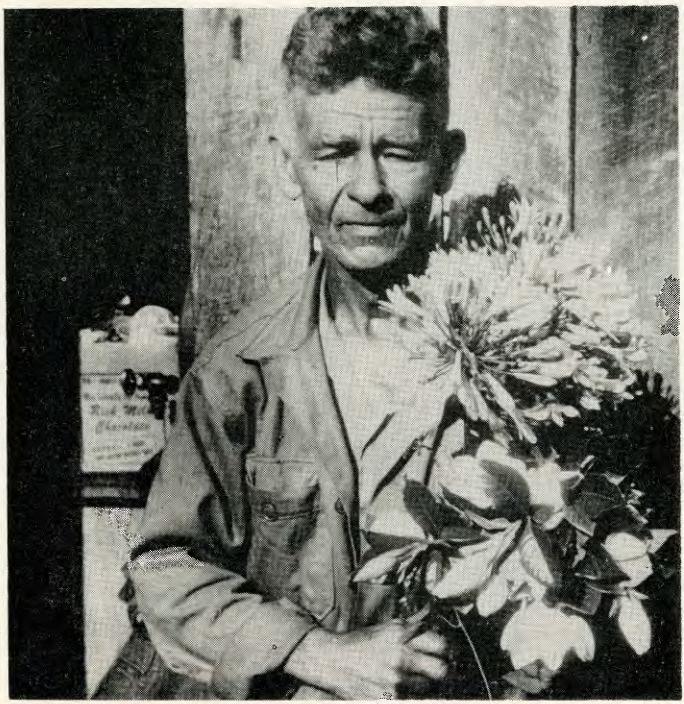


Fig. 2. Frank Harrison with bouquet of Agapanthus from his garden and Magnolia blossoms from the surrounding forest. Photo by Mrs. Barbara Warburton.

country and from Holland, and was furnished seeds and pollen by friends in the United States. It was not long before he had a good stock of bulbs, for his seedlings matured very quickly. From the beginning, he was careful to rogue out the "corrientes" as he called his inferior clones, and he worked continuously on improving the quality and color range of his strain.

I don't know just when the first group of American scientists visited Frank, but it was probably during the 1940s. In any event, the word soon spread and Frank was forced to build a guest house for

these visiting dignitaries. Later, a second and larger cabin was built. This unique area is a bonanza for students of all the natural sciences: its strange mixture of tropical and temperate plant genera and species whose area of distribution lie far to the south or far to the north, its rare and abundant wild life of all kinds, its unusual geological formation and its wealth of Indian mounds. Frank was much more than a competent guide for the area, for the mountain was an open book to him. He knew which barranca was the home of a certain rare new species of Echeveria or what cave housed a strange species of bat or

Fig. 3. Mrs. Betty McInnis and Frank Harrison showing part of rock fence and one of Frank's Begonias; taken at Rancho del Cielo; February 1960.

where to look for the best Indian mounds. He was to learn much from the scientists, also. Incidently, the first rule one must learn at Rancho del Cielo was never to venture alone into the forest, even for a few yards, for fear of getting lost.

Although Frank kept busy and made many friends on the mountain, it must have been a very lonesome life until Fred and Katherine Blesse of Brownsville leased a small piece of land on the clearing near Frank's cabin and built a rough but comfortable cabin where they spent more than half the year. This was about 1951. It was through the Blesses and their guests that we first began to hear about Frank's mountain

paradise, his Amaryllis and Frank, himself. We soon connected him with the W. F. Harrison who had written on growing Amaryllis in Mexico in Herbertia, Volume 14, page 23.

In 1955, a small group of hunters and sportsmen from Brownsville built another cabin on Frank's ranch. Among them were Gordon and Betty McInnis, of Brownsville, who fell in love with "The Mountain" and soon became fast friends with Frank. Other frequent visitors were John and Carolyn Hunter, also of Brownsville. It was through these two couples that we met Frank. We found him to be a very unusual person—quiet and unassuming, he was one of the most genuine persons I have ever met, generous to a fault, kindness itself. He never quarreled or raised his voice and disliked hearing others do so. If sharp words broke out in camp, he would slip quietly away, mumbling something like "got to see about a cow". Meantime, Frank became a frequent visitor in Brownsville. Every Christmas and usually once or twice more during each year he was in Brownsville visiting one or more of his friends.

On numerous occasions, we were urged to make trips to the mountain but to be truthful the hard grueling trip up the mountain by Jeep (at least 2 or 3 hours to cover 8-10 miles) scared us off for quite a while. In addition, we thought there surely must be a touch of exaggeration to the stories of the beauty and charm of Rancho del Cielo. Finally, however, a trip was arranged with John and Carolyn Hunter for the weekend of January 28th, 1957. We have traveled widely over Mexico and have seen many beautiful and interesting places, but from the moment we forded the Rio Sabinas, at the foot of the mountain, we found ourselves in another world. Although someone more gifted with words than I could paint an accurate picture of the place and a movie camera could capture much of it on color film neither could reveal the fascination and charm of the place. The trees are tremendous, from 60 to 130 feet tall, with trunks towering up to 90 feet or more before branching and up to 9 feet in diameter at the base. A species of Red Bud was in bloom, but so high in the sky that we could only get glimpses of them at times in the distance. The lower vegetation was covered with a pale green moss, giving the most eerie effect. Magnificent specimens of *Begonia heracleifolia* were in bloom among the large rocks on either side of the road, with flower trusses often 5 to 6 feet tall. There were large stands of the same tall, black-stemmed, upright maidenhair fern which had so enchanted us at Xilitla, far to the south. John pointed out large tree ferns, which we had so far never seen in the wild and certainly did not expect to find this far north. A beautiful *Chamaedorea* palm was so graceful that we thought at first it was the lovely narrow-leaved *Ceratozamia* species native to Frank's mountain.

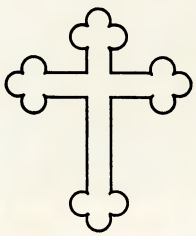
The trip up the mountain had taken a long 5 hours, for we had gotten lost several times, and Rancho del Cielo was a welcome sight. The Amaryllis field was a blaze of color. We were pleased at the overall fine quality of the flowers and found the vigor of the bulbs amazing. Each clone had formed a huge clump of bulbs—a characteristic which makes them invaluable for garden planting, and prolongs the blooming

period. We understand that Frank's *Amaryllis* bloom from late January into May. We had been so busy looking at the *Amaryllis* blossoms that we did not see the Freesias until Frank called our attention to them. They had naturalized all over the field! *Lilium formosanum* had escaped and was established all over the clearing and was even invading the forest. I believe Frank said they bloomed off and on over the year. Frank's *Sprekelia* in two forms were blooming with abandon and *Watsonia* in several shades were a beautiful sight. When we mentioned the *Begonia* we had seen coming up the mountain, Frank proudly showed us his hybrid of this species, which was a much superior plant with larger flower trusses and flowers of a much deeper color. Frank was also interested in *Gloxinia* and grew these to perfection in his lath house. As we walked around, we noted that the trees were lavishly decorated with bromeliads and Orchids of all kinds. We were astonished to find that when any of these epiphytes were dislodged from a tree, they continued to grow on the ground, which is most unusual. The general landscaping now includes *Fuchsia, Azalea, Camellia, Gardenia, Calla (Zantederhia)* and *Agapanthus,* all of which thrive and bloom beautifully. *Cymbidium* Orchids have been mass planted along one of the rock fences. *Impatiens* and Chinese forget-me-not re-seed and bloom almost all year. *Gladiolus* and *Gloriosa* have both naturalized. Guava and Orange trees supplement the fruit supply and there is now a large black walnut tree. Many of these plants Frank raised from seed.

Frank's ranch is situated on a uneven limestone plateau with an elevation of 3500 feet. Cerro del Tigre continues to rise north west of the ranch to an ultimate height of around 8000 feet, thus protecting the property from most of the northers during the winter. Until 1951, when the temperature got down to 23 degrees, his lowest temperature was only 28. The geological formation of this Sierra is unusual, for it is a mass of "tumbled" limestone with literally no bottom. There are numerous sink holes and many caves. Rancho del Cielo has one of the few good springs on this strange mountain of few springs and no creeks. Since the annual rainfall is from 70 to 130 inches, we have often wondered what happened to all of this water. I believe we solved the mystery a few years after our visit there when we saw the tremendous underground river which roars out of the mountain near Cuidad Mante, some 35 miles or so to the south, and furnishes irrigation to the lush farming area for miles around. The unique forest of Sierra de Cucharas is the most northern representative of the middle American cloud forest formation, and reaches a peak on or near Rancho del Cielo. Areas on either side of the Sierra are very dry and desert-like. On or near Frank's place there are at least 5 species of oak, 2 of red bud, hickory, Podocarpus, beech, maple, Magnolia, sweet gum, and many others. Several species of pine start around 5000 feet.

Mr. Hunter bought the Blesse cottage after Mr. Blesse's death. He is one of the trustees for Texas Southmost College, of Brownsville, so it rather naturally followed that small groups of students were frequently invited down for week-end laboratory study. About 2 years

ago, 3 buildings were erected for an Ecological Station by the College on land leased from Frank. The venture was so successful that Frank expressed a desire to will all of his property to the College so that it would be preserved and always available for research. Since this was legally impossible in Mexico, lawyers advised the formation of a non-profit corporation under Mexican law for the purpose of holding the property for educational use. The corporation was duly formed and in July, 1965, Frank deeded his land to the corporation, reserving active control of the entire property for as long as he lived. Frank was extremely happy over the transaction. I shall quote several passages from a letter by John Hunter to one of Frank's sisters, Mrs. Nellie McKay: "Frank wanted to have the property accurately surveyed and



JOHN WILLIAM FRANCIS HARRISON

BORN BAYSVILLE ONTARIO CANADA JUNE 21 1901
MURDERED RANCHO DEL CIELO MEXICO JAN 29 1966

A SINCERE STUDENT AND GIFTED TEACHER

TO HIM WHO IN THE LOVE OF NATURE HOLDS COMMUNION WITH HER VISIBLE FORMS

the week of January 24th (1966) a party of students and two professors from the College took down the official surveyor from Cuidad Victoria and ran the lines and established the corner markers officially. I was not present but the professors told me that Frank remarked that he was happy that this had been done as he felt that 'time is running out with me'." Poor Frank, it was, indeed.

The College party left Rancho del Cielo between 6 and 7 o'clock on the morning of January 29. Frank had breakfast with them and, as they drove off, left for his cabin to do the morning chores. Shortly afterward, he was waylaid and brutally murdered. The shocking news reached Brownsville about 10 o'clock Monday morning and by 1 o'clock a large party left for Mexico, carrying a casket with them. Various legal formalities and necessary arrangements were finally completed and

Fig. 5. Dr. Cooley, Mr. Olivet, Dr. Norton and Prof. Ballard inspecting hybrid **Hemerocallis** seedlings in the Washington-Maryland area. Photo by Mrs. Ben H. Nicolet.

Fig. 6. Left, Dr. Henry A. Jones, Mr. Olivet and Prof. Ballard inspecting hybrid **Hemerocallis** seedlings in the Washington-Maryland area. Right, Dr. John B. S. Norton at the Age of 94 years in 1966. Photos by Mrs. Ben H. Nicolet.

Frank was buried late Tuesday afternoon February 1st "directly in front of the main College building in one of the old Indian mounds that are so abundant on the mountain . . . the location is a beautiful spot. I know he will be an inspiration to many students for years to come."

The Mexican police did excellent work on the case. Within a few days they had arrested two suspects, found an eye witness, and obtained complete confessions. In less than a week they had rounded up the rest of the troublesome group. They were members of an extreme left wing section of the Agrarian movement who had been "squatting" on land close to Frank's ranch. They blamed Frank for the eviction notices which had been served on them that week by the authorities. Under Mexican law, Agrarians have no right to claim land used for educational purposes.

As a final tribute to the memory of a very fine person, I again quote from Mr. Hunter's letter: "I have often thought about the remarkable character of the man who could move into an absolutely secluded spot and over a period of 30 or 35 years build as many friendships as widely scattered and as closely felt as Frank was able to do. I have no man in my acquaintance who has the friends that he had."

EARLY HEMEROCALLIS BREEDERS IN THE WASHINGTON AREA

Mrs. Ben H. Nicolet, *4603 Tuckerman St., Riverdale, Md. 20840*

In the 1930's, I functioned as chauffeur in transporting Dr. John B. S. Norton on many field trips, including trips to the gardens of daylily breeders—including the gardens of Dr. Cooley, Dr. Schott, Mr. Olivet, Prof. Ballard, Dr. Traub's daylily plots at the U. S. Station at Beltsville, and other breeders in the Washington, D. C. area. These are happy memories.

I purchased the brilliant red daylily, 'Berwyn' from Dr. Cooley for $6.00 who was propagating daylilies at that time. This was as much of a plunge for me then as the purchase of a $25.00 clone is to me today. As I progressed with the times, I tried to keep samples of the old daylilies for history's sake, but I lost many of these last summer when the teenagers who do my garden work cleaned out the Bermuda grass that grew high while the drought dried down the daylily foliage. One of my favorites was 'Victory Taierschwang' and I had it in a setting of a lacy variety of "Dusty Miller". I felt that it had some fine qualities and had I been breeding daylilies, I would have tried to carry on its superb ability to withstand adversities of heat and storm and still remain unmarked and velvety.

Recently, some one had reported that Dr. Norton was ill, and I went to see him in February 1966. I send you proof that he wears his years handsomely. (Fig. 6.) I believe he is nearing 95 years. He is alert and talks well, but says he promptly forgets all temporary things while the most minute details of the past stay in his mind. [Dr. Norton died July 12, 1966.]

I enjoyed the California visit, including the visit to the fine spot on the Pacific where Dr. Traub lives. Our winter (1965-66) here in Maryland has been kind and after my return, the garden was brought into order. My species *Crocus* are now blooming, and I am considering the purchase of more daylilies.

IN MEMORIAM—MRS. EMMA LOUISE DAVIS HAYWARD

Mrs. Emma Louise Davis Hayward, 94, mother of Wyndham Hayward, Winter Park Horticulturist, died February 2, 1966, at an Orlando Nursing Home after a long illness. Mrs. Hayward was born in Providence, R. I., in 1871, the daughter of Henry Richard Davis who for more than half a century was secretary-treasurer of the Providence Journal Company. Her husband, Walter Hayward, who died in 1919, was on the editorial staff of the Journal. Before coming to Orlando in 1927, Mrs. Hayward was prominent in horticultural, civic and welfare work in Wickford, R. I., activities which she continued at her new home in Winter Park, Florida.

EDITOR'S MAIL BAG

The Secretary of the Royal Horticultural Society of London informed us under date of May 3, 1966, that Mr. H. W. Pugsley, the noted authority on *Narcissus*, and Herbert Medalist, died on November 18th, 1947, aged 79; and that an In Memoriam notice appeared on page 200 of the Gardeners Chronicle for December of 1947. The members will want to reread Mr. Pugsley's autobiography which appeared in Herbertia 7: 35-36, with portrait (plate 172). 1940.

Mr. Horace Anderson, 400 La Costa Av., Leucadia, Calif. 92024, an outstanding horticulturist and nurseryman, and authority on cycads has been appointed chairman of the Cycadaceae and Alstromerid Committees.

Mr. Wyndham Hayward writes under date of July 1, 1966, that he has sold his property in Winter Park, Florida, to the Presbyterian Church, which has erected a three million dollar retirement home in the Gentile Grove to the South. They will allow Mr. Hayward to live on his property for one additional year.

Dr. John B. S. Norton, 94, professor emeritus, University of Maryland, and specialist in plant pathology and plant lineagics, died July 12, 1966. See Fig. 6. Dr. Norton retired in 1942, and lived at 4922 40th Place, Hyattsville, Maryland. His many friends will greatly miss him.

Under date of October, 1966, Tucuman, Argentina, Mr. Leonard Doran, who is on a plant exploration trip in company with his mother, writes that he expects to find *Amaryllis* and other amaryllids in this area.

Mr. J. Leonard Doran, and his mother, Mrs. Cora B. Doran, 1117 N. Beachwood, Burbank, Calif. visited with the editor on Nov. 9, 1966.

They had recently returned from a plant exploration trip into South America as far down as Argentina.

1. REGIONAL ACTIVITY AND EXHIBITIONS

THE 1966 AMARYLLIS SHOWS

The Official Amaryllis Shows for the year 1966 began on March 27 with the Coastal Bend Amaryllis Show, Corpus Christi, Texas. Then followed the Official Men's Amaryllis Club Show, New Orleans, La., on April 16 and 17; the Official Show of the Greater Houston Amaryllis Club on April 17, and the Official Show of the Southern California Hemerocallis and Amaryllis Show.

Mrs. Sam Forbert, President, writes that the Hattiesburg, Miss., Amaryllis Society Show had to be canceled due to several factors, mainly the premature blooming of most of the bulbs, but they are planning for a quality show in 1967. Mrs. A. C. Pickard reports that the Houston Amaryllis Society Show was canceled due to unseasonably cold weather and excessive rainfall, which resulted in inferior blooms; and that they are looking forward to an excellent show for 1967. No reports have been received from the managers of Greater Gulf Amaryllis Show, and the New Orleans Garden Circle's Amaryllis Show, and it is assumed that these shows were canceled due to unfavorable weather.

COASTAL BEND AMARYLLIS SHOW, 1966

Mrs. Carl C. Henny, *President, P. O. Box 3054, Corpus Christi, Texas*

The Coastal Bend Amaryllis Society held its seventh annual Amaryllis Exhibit in conjunction with the Lola Forrester Flower Show which was held in the Exposition Hall March 26th and 27th, 1966. Due to a cold winter and spring, with little rain and sun, and also due to the fact that the Lola Forrester Flower Show was held about two weeks too early this year, our Amaryllis Exhibit was very small, with only 15 entries. Two of these were cut scapes and 13 were potted amaryllis. Just now (Apr. 11) many of our garden grown amaryllis are in bloom.

Among the Pot Grown Registered Leopoldi Type Amaryllis entered were: 'Apple Blossom', 'Royal Dutch', 'Boquet', 'Ludwig's Dazzler', 'Daintiness', 'Fire Dance' and 'Picotee'. Mrs. R. A. Hornberger, club member, received a blue ribbon on her pot grown 'Apple Blossom' and a yellow ribbon on her pot grown 'Royal Dutch' Amaryllis.

Mrs. Carl Henny received a blue ribbon on her cut scape American variety seedling.

Mr. R. L. Retallack received a yellow ribbon on his pot grown Belladona Type Amaryllis.

Mr. H. E. Lemoine received a blue ribbon on his pot grown "Constant Comment" Miniature Gracilis, and a red ribbon on his pot grown

'Pamela' Gracilis Amaryllis. Mrs. Levi Materne received a red ribbon on 'Sparkling Gem' Miniature Gracilis, pot grown.

Mrs. R. A. Hornberger, club member, scored 97 points on her 'Apple Blossom' pot grown amaryllis and was awarded the "Ludwig Challenge Trophy". Mr. S. C. Tumlinson, a non-member, received a blue ribbon and the "Award of Merit" Ribbon on his 'Daintiness' pot grown amaryllis, which scored 98 points.

Fig. 7. Mrs. R. A. Hornberger received the "Ludwig Challenge Trophy" for her hybrid **Amaryllis** clone 'Apple Blossom' which scored 97 points.

Those receiving the American Plant Life Society "Award of Merit" were: Mrs. R. A. Hornberger, on "Apple Blossom"; Mr. H. E. Lemoine, on "Constant Comment" Gracilis; and Mr. S. C. Tumlinson on "Daintiness".

Mr. Harvey Vogt planted amaryllis seeds and potted 80 seedlings which were distributed to those at the flower show who were interested in growing amaryllis.

Three Accredited National Amaryllis Judges from San Antonio, Mrs. Sam Montgomery, Mrs. Larry Miller and Mrs. Frank Hopwood, judged our Exhibit. Five blue ribbons, 4 red ribbons and 2 yellow ribbons were awarded, making a total of 11 ribbons awarded. The quality of the entries was good despite the small number of amaryllis exhibited.

I am enclosing a picture of Mrs. R. A. Hornberger with the Ludwig Challenge Trophy and the award winning pot grown amaryllis, "Apple Blossom" and "Daintiness".

OFFICIAL MEN'S AMARYLLIS CLUB OF NEW ORLEANS SHOW, 1966

JAMES E. MAHAN, *Show Standards Chairman,*
3028 Palmyra St., New Orleans, Louisiana 70119

The Men's Amaryllis Club of New Orleans, Inc., held its seventh Official, All Horticulture show on Saturday and Sunday, April 16th and 17th, 1966 at the Edward Hynes School in New Orleans. As in the past, attendance was quite representative, visitors having come from

Fig. 8. Part of the exhibits at the 1966 Official Amaryllis Show staged by the Men's Amaryllis Clubs of New Orleans.

many neighboring cities and states; and the consistently high quality of the entries in competition was very gratifying to all.

The show was staged this year according to the nine divisions as defined by the American Amaryllis Society with separate sections for Registered and Named, Unregistered and Unnamed, Species, and Unregistered but named specimens for both cut specimens and potted specimens. It was felt that this is a more realistic approach toward classification of the entries in contrast to classification according to country of origin as had been done in the past. The usual first, second, third and honorable ribbons were awarded along with trophies and sweepstakes ribbons for outstanding entries.

The following trophies and sweepstakes ribbons were awarded: the Walter Latapie Award for the best registered and named specimen to Mr. W. J. Perrin; the Rose Garden Center Award for the best unregistered and unnamed specimen to Mr. W. J. Perrin; the Alatex Construction Service, Inc. award for the best home-bred, grown and developed specimen, either registered and named or unregistered and unnamed to Mr. E. M. Beckham; the James Mahan award for sweepstakes winner in registered and named potted specimen to Mr. E. M. Beckham; the Reuter Seed Company, Inc. award for sweepstakes winner in unregistered and unnamed potted specimen to Mr. E. M. Beckham; the Swetman Amaryllis Garden award to Mr. E. M. Beckham for the most blue ribbons in the registered and named sections, potted and cut scape specimens; the President's Trophy for the most blue ribbons won by a member of the Men's Amaryllis Club of New Orleans, Inc. to Mr. Milo Virgin; sweepstakes ribbon for most blue ribbons won in registered and named potted specimens to Mr. E. M. Beckham; sweepstakes ribbons for most blue ribbons won in unregistered and unnamed potted specimens to Mr. Milo Virgin; and a cup to the best single floret specimen entered in a special section open to members of the Men's Amaryllis Club of New Orleans, Inc. only, to Mr. Stephen Gasperecz.

Mr. Norman Clements acted as Show Chairman with Mr. W. C. Creevy as co-chairman and both discharged their duties admirably. Judging was done by nine accredited judges in three panels of three judges each and the thanks of the club go out to them for their very competent judging and attention to all entries.

An added attraction to the show this year was the setting up of two simulated garden beds in the entry hall to the show with the main attraction in the beds being, of course, amaryllis in bloom. Various other plants were included and even several small trees as a natural background for an outdoor amaryllis garden bed. Sides were built up along the perimeter of the bed with peat moss used as filler to simulate a garden soil. Comments were many and favorable on this idea conceived by our member, Mr. W. J. Perrin, and ably carried out by him with the assistance of member W. C. Creevy. It is hoped that this feature will be continued in future shows and perhaps even enlarged since it received such praise from the visiting public.

OFFICIAL SHOW OF THE GREATER HOUSTON AMARYLLIS CLUB, 1966

Mrs. Sally Fox, *Corresponding Secretary*

"Doublegood" is the most descriptive word to use when The Greater Houston Amaryllis Club had its annual official show in conjunction with The Mens Garden Club Spring Show. The show had been scheduled for April 17th, but due to cool nights and some overcast days the blooms did not develop sufficiently to warrant a show on that date. The Club

asked the Mens Garden Club if they could join them the following Sunday, April 24th, when they held their Spring Show, and were welcomed enthusiastically to have their display in the adjoining Rose Room of The Garden Center.

Unfortunately the seven days were disastrous to gardens with high winds and continuous rain, and although brilliant blooms were displayed in a garden-like setting in the Rose Room to an overflow crowd, the Judges in line with their rules, were not able to give high enough scores to warrant the silver trophies. Only entries in three divisions scored 95 or better. Mrs. A. G. Horsfall won The Greater Houston Amaryllis Club silver trophy for best Dutch specimen in the show with a cut specimen "Royal Dutch", as well as an Award of Merit from The American Plant Life Society. She was awarded the Ludwig Challenge Cup for this same entry, which is given by the Holland hybridizer for the best Ludwig specimen. Kermit L. Warnasch scored 95 for a miniature "Firefly" but since there were only two entries in this class no trophy was given. Mrs. Charles H. Pease scored 97 for an Amaryllid species, but this too was the only entry in this division.

Fig. 9. Official 1966 Amaryllis Show of the Greater Houston Amaryllis Club: left to right, Mrs. A. G. Horsfall, Trophy winner; Mrs. Charles H. Pease, Staging Chairman, and Club President; Mrs. W. S. Wheeler, Vice-Chairman and 1966-67 President; and Mrs. Sally Fox, Show Chairman and 1966-67 Vice President.

Mrs. Charles H. Pease prepared the educational exhibit, which was most outstanding. She was quite pleased to answer numerous questions to interested guests.

Many new Amaryllis lovers were gained through this joint show, as the Mens Garden Club also has quite a number of Amaryllis growers who displayed beautiful specimens competing for the Ludwig Challenge Cup. Judges of the Amaryllis Division of the Mens Garden Club show

selected "Apple Blossom", entered by Kermit L. Warnasch, as the best Ludwig specimen to win the Ludwig Challenge Cup. Mr. H. T. Long was a close second with White Christmas. Mr. Warnasch also won an Award of Merit for a magnificent specimen "Floriade" which was the showpiece of this division.

Mrs. Sally Fox was General Chairman, with Mrs. W. S. Wheeler as Vice Chairman. Both felt the event was well received as the visitors didn't notice the absence of the silver trophies since they were able to view many, many blue ribboned specimens.

Yes, it was a "Doublegood" event long to be remembered.

Fig. 10. 1966 Southern California Official Amaryllis Show: W. Quinn Buck's exhibit of hybrid **Amaryllis** clone 'Wyndham Hayward' for which he received the "Ludwig Challenge Trophy." Photo by Jack V. McCaskell

1966 SOUTHERN CALIFORNIA OFFICIAL AMARYLLIS SHOW

Mrs. Bert Williams, *Show Chairman,*

2601 La Presa, South San Gabriel, Calif. 91777

An Amaryllis Show far better than the preceding year's was held at the Los Angeles State and County Arboretum, 301 N. Baldwin Ave., Arcadia, Calif., on May 14 and 15, 1966, again sponsored by the Southern California Hemerocallis and Amaryllis Society. The show com-

mittee had spent anxious weeks preceding the show because the warmer spring had made so many growers report that their bulbs had all bloomed long before the show date. Everyone was happily surprised at the really fine array of spikes assembled, a big percentage coming from several large growers.

The whole lecture hall of the Arboretum was well filled with many tables for the seven divisions, which included cut spikes as well as potted material. There were 95 competing exhibits, in addition to the hundreds of non-competing displays. A special feature was the impressive group of amaryllis arrangements contributed by Chadwick Gardens, florists of Redondo Beach, Calif., who also displayed very high quality cut spikes, including some lovely pinks and picotees, as well as some superb potted seedlings.

Another special feature was the group of spikes of the Howard & Smith strain furnished by Paul J. Howard's California Flowerland, which is to be closed because of Mr. Howard's death in the spring. This may have been the last time that so many spikes from this famous strain will grace our show.

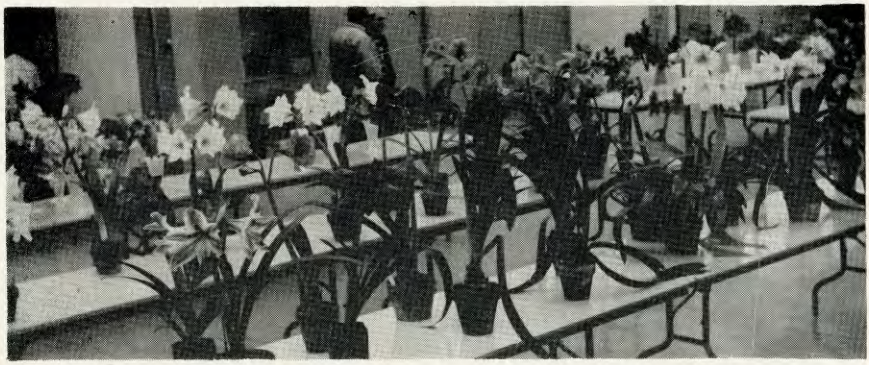


Fig. 11. 1966 Official Southern California Amaryllis Show: part of the exhibits. Photo by Jack V. McCaskell.

The Cecil Houdyshel Perpetual Memorial Trophy, a handsome silver Revere bowl, was awarded to Mr. W. Quinn Buck as the sweepstakes prize. Mr. Buck was given a small replica of the large Trophy for having won it at the 1965 show also.

The Ludwig Challenge Cup, a handsome trophy from Ludwig & Co., Hillegom, Holland, for award to the best specimen exhibited of one of their varieties making a score of not less than 95 points, went to Mr. W. Quinn Buck for his potted 'Wyndham Hayward', which the judges gave 98 points.

For the best single cut specimen a silver tray was awarded to Mrs. Eva Turnquist. Mr. Gilbert Nash was runner-up in this class with one of his fine cut spikes, and he received a copy of the Peggy Schulz book on Amaryllis culture.

Fig. 12. 1966 Official Southern California Amaryllis Show: arrangements from Chadwick Gardens, Redondo Beach, Calif., **upper right** low flat bowl arrangement combining **Cymbidium** blooms with large salmon **Amaryllis** flowers; **upper left,** arrangement of picotee **Amaryllis** seedlings combined with several types of handsome foliage, accented with a cluster of pepper fruits; **lower left,** tall arrangement of salmon-scarlet **Amaryllis** and clipped **Cyperus** foliage, accented with peppers, and imported porcelain duck; **lower right,** tall arrangement of **Amaryllis** in harmonizing tones of rose-purple, combined with Cymbidiums and beautiful **Asparagus** foliage. The colors of the **Amaryllis** made this the most beautiful group in the show. Photos by Jack V. McCaskell.

Those winning most blue and purple first place ribbons were Mr. W. Quinn Buck, Mrs. Eva Turnquist, Mr. Sterling Harshbarger, Mr. Gilbert Nash, Mr. H. F. Colby, and Chadwick Gardens.

Two special awards were made, rosettes going to Mr. Leonard Doran for his bouquet of a beautiful *Zephyranthes* species collected in Peru on one of his trips; and to Chadwick Gardens in recognition of the great merit of their superlative amaryllis arrangements.

American Amaryllis Society awards included an Award of Merit to Mr. W. Quinn Buck for his specimen of 'Wyndham Hayward'; and Preliminary Commendations for meritorious seedlings exhibited went to Mr. Gilbert Nash, Mr. Sterling Harshbarger, and Mrs. Kenneth B. Anderson.

Three tables of daylily flowers were shown by W. Quinn Buck. The warmer spring weather had brought many of the earlier types into bloom by this date. Many fine large tetraploid seedlings were shown, and these were foiled by types with bold, dark eyes that made wonderful contrast.

HOUSTON AMARYLLIS SOCIETY

Mrs. A. C. Pickard, *Chairman, Official Show Standards*

The Houston Amaryllis Society show was cancelled for 1966 due to unseasonably cold weather and excessive rainfall. This resulted in inferior blooms throughout the blooming season.

As for the gardens, they are mostly small, though very distinct. All of them are large enough to contain a representative collection of the finest Dutch hybrid Amaryllis now available in the world.

When the gardening public can see the results of the ability of the bulbs to adapt themselves to adverse conditions, it is the best vehicle to demonstrate the quality for the exhibitor.

We are looking forward to a favorable Amaryllis Season in 1967 and to offering the public another official Amaryllis Show.

WHO JOINS THE AMARYLLIS ROUND ROBINS?

Mrs. Fred Flick, *Carthage, Indiana 46115*

People from many walks of life, and of many professions, have been, or are, members of the Amaryllis Round Robins.

There have been busy housewives and mothers who find time to grow their favorite flowers; a young lad of fourteen, who founded the Gloxinia Society, and grew up to become a magazine editor and author of horticultural books; the retired business man who has started a new business of growing and selling orchids; school teachers who grow flowers in their class rooms; a busy family man and eye doctor, who finds relaxation in caring for his flowers; the beautician who wrote a number of horticultural books; the young man in Texas, having earned his doctorate

has come to an Indiana university to teach; the Canadian housewife who grows many flowers and vegetables; all ages and with varied interests, but all enjoy the beauty of the Amaryllis.

Members are lost due to various reasons; lost interest; old age; ill health and death. The first Amaryllis Robin was started twenty-five years ago with three members, only one of the three is still active; the present Robin director. At one time there were eleven very active Robins flying; at the present time there are five active Robins. Young members are needed at present, so that the Robins may be kept flying for another twenty-five years.

BEAUTY FOR THE BLIND

Mrs. Sally Fox, *Houston*

HAPPINESS is a Club Project! During the Spring of the 1964/65 year, a group from the Greater Houston Amaryllis Club, with Mrs. Jesse Haver as Chairman, took Amaryllis blossoms from their yards and visited the Lighthouse For The Blind, whose Garden Club membership is about twenty-eight members. Each Lighthouse member was given a blossom. Some members of the Lighthouse Club are blessed with a small amount of sight, where others must rely on their other senses. We felt the Amaryllis would be an ideal bulb in which to interest these handicapped persons since the blooms are unusually large, heavy textured, and often have a faint scent—and their sensitive fingers could behold the beauty of the amazing Amaryllis. After the meeting, refreshments were served by Mesdames R. A. Fawcett, T. L. Lawler, Glen Melton and Mrs. Haver.

The response was so enthusiastic that the Greater Houston Amaryllis Club voted to make this their Number Two Civic Project and began preparations for the next year.

October 19, 1965 was set aside for the 1965 meeting. Each member of the Greater Houston Amaryllis Club furnished a blooming size Amaryllis bulb, clay pots were furnished by the Club, and Mrs. Charles H. Pease prepared the proper potting soil. The Lighthouse members were assisted (where necessary) to pot these bulbs by Mesdames Frank S. Bova, Jesse Haver, A. G. Horsfall, Glen Melton and Charles H. Pease. The Lighthouse members then took them home to care for before and after blooming. They received growing hints, as well as after blossoming care suggestions with a great deal of interest.

The Lighthouse Club has monthly meetings, and we know every adjective in the book will be used when they describe to each other their little portion of BEAUTY FOR THE BLIND.

We hope this Number Two Project of our Club will be as rewarding to the Lighthouse Garden Club members as it is to our Club.

HERBERT MEDAL PRESENTED TO MR. BOSHOFF-MOSTERT

In a ceremony at the Kirstenbosch Gardens tea-room, Mr. Le Roux, Minister of Agricultural Technical Services, Republic of South Africa, presented the 1966 WILLIAM HERBERT MEDAL to Mr. Leon Boshoff-Mos tert, February 3, 1966, on behalf of the American Plant Life Society. Among those present were the wife of the Prime Minister, and Mrs. Boshoff-Mostert. The reader is referred to the 1966 issue of the Amaryllis Year Book for the autobiography of Mr. Boshoff-Mostert.

Fig. 13. Mr. Le Roux presenting the 1966 William Herbert Medal to Mr. Leon Boshoff Mostert on behalf of the American Plant Life Society, Feb. 3, 1966. Photo Cape Times.

AMARYLLIS JUDGES CERTIFICATES

Since the last report in the 1966 Amaryllis Year Book (pages 39 and 40), the following numbered Amaryllis Judges Certificates have been issued by the American Amaryllis Society:

155. Mrs. H. Ward Blair, 5405 Cornish, Houston, Tex. 77007 (Horticulture only)
156. Mrs. R. C. Wille, 102 Cherrywood, Bellaire, Tex. 77401 (Horticulture and Arrangements)
157. Mrs. R. H. Haase, 2510 Watertown Mall, Houston, Tex. 77027 (Horticulture and Arrangements)
158. Mrs. Glen Melton, 1225 Archley Drive, Houston, Tex. 77055 (Horticulture only)

159. Mrs. C. L. Mercer, P. O. Box 56, Westfield, Tex. (Horticulture only)
160. Mrs. John Ellett, 7531 Satsuma, Houston, Tex. 77025 (Horticulture only)
161. Mrs. A. G. Horsfall, 110 Clifton, Houston, Tex. 77011 (Horticulture only)
162. Mrs. G. B. Slover, 3006 Castlewood, Houston, Tex. 77025 (Horticulture only)
163. Mrs. Samuel F. Johnson, 39 West Rivercrest Drive, Houston, Tex. 77042 (Horticulture only)
164. Mrs. Clyde Duplissey, 15105 Lakeview, Houston, Tex. 77040 (Horticulture only)
165. Mrs. R. F. Cox, Rt. 3, 1431 Sweet Gum, Humble, Tex. (Horticulture only)
166. Mrs. B. Carrel Tharp, 8218 Mallie Court, Houston, Tex. 77055 (Horticulture only)

PLANT LIFE LIBRARY—continued from page 4.

FLOWERS NATIVE TO THE DEEP SOUTH, by Caroline Dorman. Claitor's Book Store, 241 North St., P. O. Box 239, Baton Rouge, La. 70821. 2nd. ed. 1959. Pp. 176. Illus. $7.50: In this attractive book, including 33 color plates, and 102 text figures, Dr. Dorman has captured the delicacy and charm of native flowering plants of the Deep South. The text is clearly written for both the gardener and scientist. The illustrations by the author alone are worth much more than the price of the book, and it is most highly recommended to all gardeners.

NATIVES PREFERRED, by Caroline Dorman. Claitor's Book Store, 241 North St., P. O. Box 239, Baton Rouge, La. 70821. 1965. Pp. 217. Illus. $5.00. In this companion to her earlier book, Dr. Dorman explores the use of native trees and other plants "for every location". The subject matter includes rock gardens, bulb culture, the shady trail, herbaceous perennials, flowering trees, and shrubs, evergreens, vines, ground covers, pond culture, wild *Iris,* and growing wild flowers from seeds. Again, the fine text illustrations are by Dr. Dorman. Highly recommended to all gardeners.

A MONOGRAPH OF LEMNACEAE, by Edwin H. Daubs. University of Illinois Press, Urbana, Ill. 1965. Pp. 118. Illus. Cloth $4.50; paper, $3.50. This comprehensive monograph on the *Lemnaceae,* the first since the one by Hegelmaier (1868; 1896), will be welcomed by all plant scientists. After considering the fossil record and chromosomes numbers, the lineagic treatment covers in detail the 28 species which are grouped under four genera. The keys, comparative tables of species for the four genera; the 21 plates, and bibliography, greatly enhance the value of the work. Highly recommended to all biologists.

BIBLIOGRAPHY OF MEXICAN FERNS, by George N. Jones. University of Illinois Press, Urbana, Ill. 1966. Pp. 297. $5.00. This bibliography of the principal literature to Mexican ferns will be welcomed by plant scientists. After listing the abbreviations of periodicals cited, the main part of the book is devoted to authors and titles to the published work. Then follow various finding indices, and geographical and systematic indices. A supplement, and indices of plant names and personal names, completes the work. Highly recommended to all plant scientists.

JAPANESE GARDEN AND FLORAL ART, by Mrs. Paul Kincaid. Hearthside Press, 381 Park Ave., S., New York, N. Y. 10016. 1966. Pp. 189. Illus. $6.95. This new book provides an introduction to Japanese aesthetics, flowers, gardens, Zeb and Tea Cult houses, bonkei, bonseki, bonsai, and ikebana. This attractive book is adequately illustrated and is highly recommended.

ADVANCES IN MORPHOGENESIS, VOL. 5. Edited by M. Abercrombie and Jean Brachet. Academic Press, 111 Fifth Av., New York, N. Y. 10003. 1966. Pp. 340.

$14.00. In this 5th Volume of the series, with contributions from six outstanding authorities, the subjects covered include feathers and patterns; the initiation of organized development in plants; the stimulus to hypertrophic growth; the ultrastructure of the cytoplasm of the developing amphibian egg; embryonic determination of neural connections; and the vitelline membrane and cortical particles in Sea Urchin eggs and their function in maturation and fertilization. Recommended to all biologists.

FUNDAMENTALS OF PHYTOMORPHOLOGY, by A. D. J. Meeuse. Ronald Press Co., 15 E. 26th St., New York 10, N. Y. 1966. Pp. 231. Illus. $10.00. In this outstanding new book, Prof Meeuse presents a new outlook on the subject of plant morphology. He contrasts the old static morphology with a new evolutionary concept. Thus, for instance, he explores phylogeny with respect to the gymnosperms and angiosperms; and again, he discusses the phylogeny of the megasporangium with respect to the ovule and the carpellate pistil. This new approach promises to solve various difficult problems in phytomorphology. Prof. Meeuse is to be congratulated on a stimulating book—a land mark—and it is required reading for all plant scientists, students and professionals alike.

BOTANICAL LATIN, by Wm. Stearn. Hafner Publ. Co., 31 E. 10th St., New York 3, N. Y. 1966. Pp. 566. Illus. $16.75. This represents the first complete guide and handbook to botanical Latin, an international technical language developed over the years for the naming and description of plants. The four parts of the book include an introductory section devoted mainly to the development of botanical Latin terminology, and the Latin alphabet and pronunciation; Latin grammar, syntax and other matters; and vocabulary and bibliography. Dr. Stearn is to be congratulated on an important contribution; a book which should be included in the library of all plant biologists.

JOHN TORREY, by Andrew D. Rogers III. Hafner Publ. Co., 31 E. 10th St., New York 3, N. Y. 1965. Pp. 352. Illus. $7.50. This stimulating biography of John Torrey will be welcomed by all plant biologists. He was the mentor of the prominent North American plant lineagicists of his day, including Asa Gray. His activities represent the true beginning of plant lineagics in North America. He received and interpreted the plant materials gathered by the great expeditions of his time. His crowning achievement, in cooperation with Asa Gray, was the production of the first comprehensive North American work in plant lineagics. This is required reading for all plant biologists.

THE LIVING CYCADS, by C. J. Chamberlain. Hafner Publ. Co., 31 E. 10th St., New York 3, N. Y. Facsimile reprint edition 1965. Pp. 172. Illus. $4.00. The classic 1919 original edition of Chamberlain's "The Living Cycads" has been long out of print, and it is a notable event when this was reprinted in 1965. In Part I, Chamberlain discusses the living western, Australian and African cycads; in Part II, he details the life-history of the cycads, and in part III, he considers the evolution and phylogeny of the cycads. Recommended to all plant biologists.

A MYCOLOGICAL ENGLISH-LATIN GLOSSARY, by Edith K. Cash. Hafner Publ. Co., 31 E. 10th St., New York 3, N. Y. 1965. Pp. 152. $8.50. This is Mycological Memoir No. 1, sponsored by the New York Botanical Garden and the Mycological Society of America. The extensive English-Latin glossary of mycological terms will be welcomed by mycologists as well as plant biologists in general.

PRINCIPLES OF ANGIOSPERM TAXONOMY, by P. H. Davis and V. H. Heywood. D. Van Nostrand Co., 120 Alexander St., Princeton, New Jersey. Revised ed. 1965. Pp. 558. Illus. $15.00. The authors consider lineagics as a science of synthesis, incorporating data from various disciplines such as cytology, genetics, embryology, and phytochemistry. The subject is developed under the subject headings, the roots of taxonomy; systematics after Darwin; units of classification; the concept of characters; taxonomic evidence; field, herbarium and library; presentation of data; modification of the phenotype; variation within populations; populations and the environment; evolution and the species; and hybridization and taxonomy. This stimulating book belongs in every lineagic library for constant reference.

PLANT LIFE LIBRARY—continued on page 95.

Fig. 14. Natural Arch at San Miserato Hill above Santiago de Chiquitos, Bolivia, the type locality of **Amaryllis starkii** Nelson & Traub. Photo by Martin Cardenas.

2. LINEAGICS

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

BOLIVIAN SPECIES OF AMARYLLIS L.

MARTIN CARDENAS, *Bolivia*

Most of the known species of Amaryllis in the Andes thrive in humid shady locations. However the Bolivian species are found under rather variable ecological conditions. Most of them are found of course in the ecological formation called "Yungas" or the areas on the eastern slopes of the Andes covered by very humid forests ranging from about 1,200 to 1,800 m. to sea level. This formation is characterized by the predominance of tree ferns, *Ericaceae, Begoniaceae, Melastomataceae,* fuchsias, tall grasses and so on. Here belong the short tepaltubed, handsome flowered species, *Amaryllis pseudopardina* Card., (= *A. leopoldii* T. Moore), shown in Fig. 16; *Amaryllis yungacensis* Card. & Nelson, *Amaryllis forgetii* (Worsley) Traub & Uphof and *Amaryllis pardina* Hook. f. In this same ecological formation, grow in a semicultivated status, *Amaryllis vittata* var. *tweediana* and *Amaryllis belladonna* L. In a similar habitat but in a more open though still shaded places appear under bushes the most handsome bolivian Amaryllid, *Amaryllis Mandonii* (Baker) Traub & Uphof, near the village of Sorata at about 2,700 m. (see Fig. 15). The only two white and long-tepaltubed species growing in the Southern "Yungas" of Bolivia, are *Amaryllis fragrantisima* Card. (see added note, below); and *Amaryllis chionedyantha* Card. The very rare short-flowered species with a locality known by us only at second hand—*Amaryllis incachacana,* comes also from an upper "Yungas" habitat in the center of Bolivia.

Amaryllis reginae L. appears in semi-cultivated habitats, or under cultivation in the borders of the forests where probably there were settlers before the highways were built, on the "Yungas" formation at Yungas de Corani, and the present section of the highway near El Palmar at an elevation of 700 m. The plants seen by the late Prof. Nelson were under cultivation at Comarapa.

The second ecological habitat for the Bolivian Amaryllis is the mesothermic interandine high valleys at the center of the country ranging between the Departments of Cochabamba and Potosi from 2,000 to 3,000 m. high. Here are found the small flowered *Amaryllis mollevillquensis* Card., the scented white-flowered *Amaryllis umabisana* Card. and the most odd flowered species *Amaryllis cybister* (Herb.) Traub & Uphof. The two former taxa occur in a true xerophytic habitat under thorny bushes. The third one is strikingly ubiquitous since it appears at Comarapa east of Cochabamba at only 2,000 m. high, then at various localities near Cochabamba at about 2,500 m. and finally down at La Paz in the Hill Muela del Diable, over 3,600 m. Yet, *Amaryllis cybister* (Herb.) Traub & Uphof thrives in clayish hard soil, among rocks or in loose rich

soil with flowers which might be red-greenish or yellow-greenish (Fig. 17).

Fig. 15. **Amaryllis mandonii** (Bak.) Traub & Uphof. This represents the first published illustration of this species. Photo by Martin Cardenas.

The beautiful *Amaryllis evansiae* Traub & Nelson grows wild into the low, rather dry forests covering the low eastern foothills of the Andes, near the City of Santa Cruz.

Fig. 16. **Amaryllis pseudopardina** Cardenas (=**Amaryllis leopoldii T.** Moore), as it grows in its native habitat. Photo by Martin Cardenas.

A third habitat for *Amaryllis* in this country is centered in the low grassy lands of Mojos in the North and the Eastern savanna formations. At the Pampas de Mojos from outskirts of Reyes to the vicinity of Lake Rogoagua, grow one long-tepaltubed, white-flower species which was erroneously determined by Dr. H. H. Rusby as *Hippeastrum viridiflorus* Rusby. In our opinion this should be a new species. At the eastern savannas of the Provinces of Nuflo de Chavez, Velasco, Chiquitos and Chaco grow among grasses *Amaryllis divifrancisci* Card., and an undetermined variety of *Amaryllis belladonna* L. In the "pajonales" of southeastern Chaco are found *Amaryllis aglaiae* Castellanos and *Amaryllis parodii* (Hunz. & Coccu.) Traub. Dr. Th. Herzog has collected in the Bolivian Chaco two species which might be referred to *A. aglaiae* Castellanos and *A. parodi* although they were identified in 1910 as "*Hippeastrum brachyandrum* Baker" and "*H. solandriflorum* Herb." by Kranzlin. Among the very old sandstone rocks and growing in a rather loose soil, Prof. Nelson discovered the rare species *Amaryllis starkii* Nelson & Traub in the Province of Chiquitos (see Fig. 14).

A fourth habitat for our *Amaryllis* species, is in the upper Amazon basin areas. Here and still on the slopes of the Andean Mountains, appear *Amaryllis viridiflora* (Rusby) Traub & Uphof, *Amaryllis pardina* Hook, f., *Amaryllis belladonna* L. and *Amaryllis crociflora* (Rusby) Traub & Uphof. The species *Amaryllis pardina* Hook. f. which occurs in this area and about Apolo, Department of La Paz, seems to us the true species brought up to England by Pearce since the other type found in Yungas of La Paz, has on its tepalsegs blood red streaks instead of red dots. The type of *Amaryllis crociflora* (Rusby) Traub & Uphof which we have seen last year at the N. Y. Botanical Garden Herbarium is closely similar to *A. belladonna* L. whilst the one specimen we have collected at the type locality (Rio Guarutumo) in 1959 and given to the late Prof. Nelson, is different though we took it in 1960 before having seen the type, as *A. crociflora* (Rusby) Traub & Uphof. From the Bopi River regions and from Tipuani Mountains come various specimens collected years ago by B. A. Krukoff and G. H. Tate, actually at the N. Y. Botanical Garden Herbarium, determined as *Hippeastrum puniceum* Urb. or *H. Mandonii* Baker by E. J. A. and H. Rusby which however seem to us as new Amaryllis species. From the upper Rio Beni (Amazon Basin) was collected by M. A. Garriker Jr. what is now *Amaryllis belladonna* var. *Haywardii* (Traub & Uphof) Traub & Moldenke.

The Amaryllis species which grow in Yungas of La Paz, bear thick and succulent roots which might remain alive for several days. The bulbs of these are thriving on rather superficial very thin soil covering rocks. The species belonging to the mesothermic central valleys have medium thick roots and bulbs are entirely below the surface, and sometimes are deeply buried in a clayish soil. The roots of these bulbs may dry out in a few days. The thinnest roots are found in *A. starkii* Nelson & Traub since this grows in a loose quite pure sandy soil and consequently they dry out quite soon.

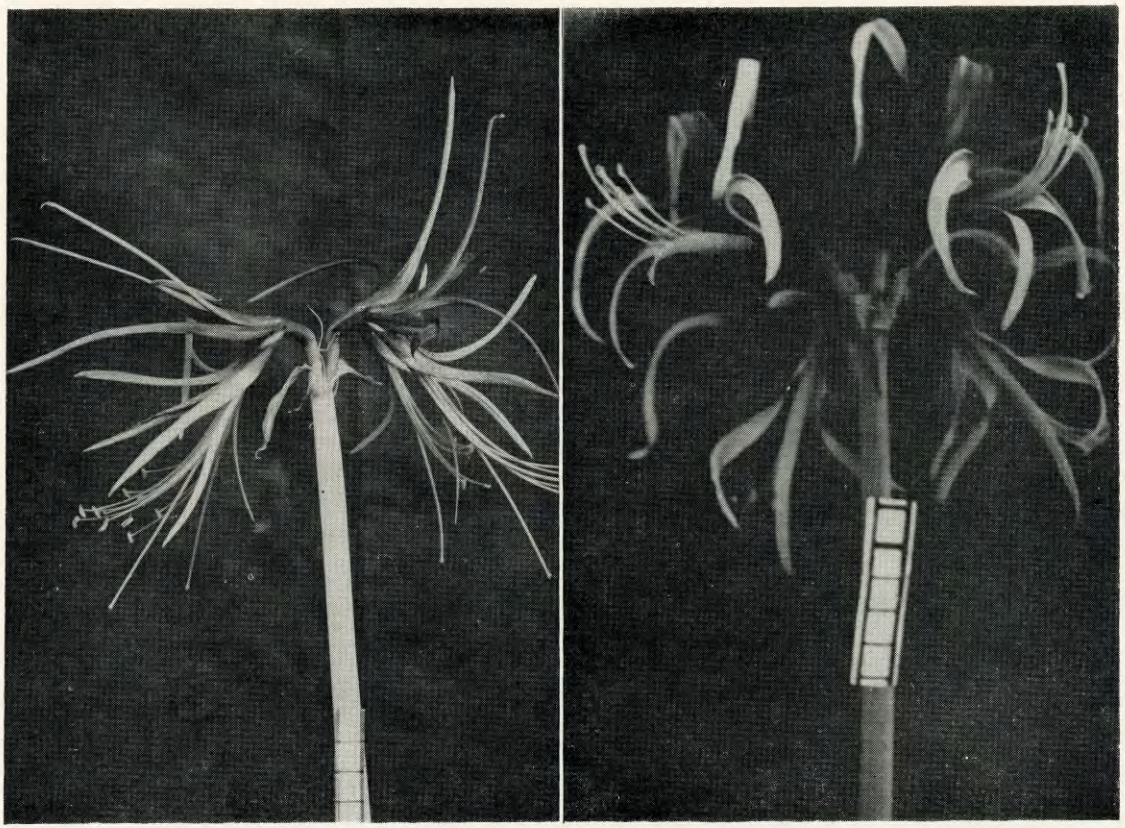


Fig. 17. **Amaryllis cybister** (Herb.) Traub & Uphof, **left,** the form with narrow tepalsegs which led Rusby to the erroneous conclusion that it was new, and the type of his "Lepidopharynx deflexa". **Right,** the form with wider tepalsegs. Photos by Martin Cardenas.

Fig. 18. The "type specimen" of the superfluous "Lepidopharynx deflexa Rusby". See also Fig. 16 for the form of **Amaryllis cybister** with narrow tepalsegs. Photo New York Botanical Garden.

We assume that in Bolivia one might expect *Amaryllis* species almost everywhere and that there still may be many yet to be discovered.

ADDED NOTE: THE TRUE LOCALITY FOR AMARYLLIS FRAGRANTISSIMA CARD.

In the 1960 Amaryllis Year Book, I described the species *Amaryllis fragrantissima* Card., based on a cultivated plant given me by a student of Agronomy as coming from Yungas de Corani, Province of Chapare, Dept. of Cochabamba. About March of this year (1966), my former assistant, Miss Ana M. Krueger while collecting plants for me near Tablas, happened to find several *Amaryllis* plants without flowers. The bulbs she brought back were planted here at the University, and one bulb is now in flower (October), and it is *Amaryllis fragrantissima* Card. It is native near the Village of Tablas at about 1,800 m. The locality given with the original description was Yungas de Corani, and Yungas de Tablas is next to this locality, and both are in the Province of Chapare. Like other *Amaryllis* species, this one is dichogamous with the anthers dehiscing pollen before the stigma becomes receptive. This insures that some of the progeny are cross-pollinated.

"GENUS LEPIDOPHARYNX" REDUCED TO SYNONYMY

MARTIN CARDENAS, *Bolivia*

The Genus *Lepidopharynx* in the Family Amaryllidaceae was proposed by the late Prof. Dr. Henry Hurd Rusby, Dean of the School of Pharmacy, Columbia University, and published in Memoirs of the New York Botanical Garden 7:205-387, 1 Mr 1927. Since that date the species *Lepidopharynx deflexa,* the only one included in that genus, was not collected again until November 1958 when Prof. Ira S. Nelson and myself collected it at the type locality (Fig. 17). These bulbs which turned up to be *Amaryllis cybister* (Herb.) Traub & Uphof. In 1965 at the beginning of September, I examined the type specimen of the *Lepidopharynx deflexa* Rusby at the New York Botanical Garden Herbarium and verified that it was *A. cybister* (Herb.) Traub & Uphof. The drawing illustrating the proposed genus *Lepidopharynx* does not agree well with the dry specimen in the details of the tepalseg habit. I am familiar with several forms of the very variable *A. cybister* and I am convinced that *Lepidopharynx deflexa* Rusby does not represent a valid taxon. Consequently the Genus *Lepidopharynx* must be reduced to the synonymy of *Amaryllis L.* Traub, in "The Genera of Amaryllidaceae" (1963) page 77 had indicated that the genus *Lepidopharynx* might have to be erased, and Traub (Plant Life 1966, p. 5) reduced the genus to the synonymy of *Amaryllis L.,* and the species to *A. cybister* (Herb.) Traub & Uphof. The type specimen of *Lepidopharynx* is shown in Fig. 18.

Universidad San Simon
de Cochabamba, Bolivia
June 20, 1966

Fig. 19. **Left,** Mrs. R. J. Seibert holding a bouquet of **Paramongaia weberbaueri** Velarde ("Cojomaria") flowers. **Right,** Mrs. Seibert purchases "Cojomaria" from Amerindian children, above Pariacoto, Huaraz, Casma Road, Dept. of Ancash, Peru, January 1965. Longwood Gardens. Photo by R. J. Seibert.

"COJOMARIA"—PARAMONGAIA WEBERBAUERI VELARDE, FROM PERU

RUSSELL J. SEIBERT, *Director,*
Longwood Gardens, Kennett Square, Penna.

To see a fine new ornamental plant is exciting to me. However, to find such a plant in its natural local habitat is a memorable experience and probably explains why, for the past 30 years of my graduate student and professional life, plant exploration has attracted me to other parts of the world. This attraction, like a compatible marriage, does not wane with maturity. It becomes even more magnetic.

Fig. 20. Habitat of "Cojomaria", **Paramongaia weberbaueri** Velarde, above Pariacoto, Huaraz-Casma Road, Dept. of Ancash, Peru. Longwood Gardens Photo (January 1965) by R. J. Seibert.

While returning from Huaráz and the Callejón de Huaylas to the Coast of Peru via the Huaráz-Casma Road on January 22, 1965, we were attracted by a sizeable bouquet of large yellow flowers being carried by a lone Andean Indian on horseback. The flowers, he said, were called "Cojomaria" and were found growing further down the road. A short drive and several high Andean switchbacks down, we encountered three children attending several bouquets of the same large, yellow amaryllidaceous flowers (Fig. 19). Obviously, the bouquets were for sale but since the children spoke no Spanish, our Quetcha proved insufficient to communicate well. We surmised that the plants grew

in an area further down the Andean slopes and that for a 5-Sole note, we could purchase a sizeable bundle of flowers. What remarkable blooms! At first sight, they remind one of giant daffodils, some 6 inches in diameter, butter yellow and very fragrant (Fig. 19).

Further down the Andes at somewhat less than 10,000 feet and along the steep slopes immediately above the village of Pariacoto, Department of Ancash (Fig. 20), we suddenly observed huge quantities of the flowering bulbous plants growing within a rather restricted area

Fig. 21. **Left,** young flowering plant of "Cojomaria", **Paramongaia weberbaueri** Velarde, Pariacoto, Peru. **Right,** cultivated **Paramongaia weberbaueri** Longwood Gardens #572124, Kennett Square, Penna., note offsets (see text). Longwood Gardens photos (January 1965) by R. J. Seibert

of perhaps less than 1000 acres. The soil appeared to be a decomposing granite. The natural vegetation was sparse scrub, almost chapparal-like. The plants were growing on extremely steep slopes which made their collection both difficult and precarious. With the aid of a car jack handle and digging to depths of 1 foot, entire plants, including the bulbs, were recovered (Fig. 20). The plants all appeared to bloom before the presence of mature foliage. None of the seven bulbs collected showed any evidence of off-sets. Two flowering bulbs were collected and

these were up to 2½ inches in diameter. Of the 5 younger, pre-flowering bulbs collected, diameters ranged from ¾″ to 1″. The young foliage was exceptionally clean and fresh looking.

These flowers were kept for several days and a few lasted until returning to Lima 4 days later, at which time, some of the flowers and one of the flowering sized bulbs were presented to Dr. Ramon Ferreyra, Director, Muséo de Históríal Naturál "Javier Prado". It was not, however, until sometime later while discussing the plant with Dr. Jorge Leon, A.I.D. Botanist in Lima, that its identification was determined. The plant apparently is not well known outside its natural habitats of the Department of Ancash. According to Dr. Leon, it has been tried in Lima on at least one occasion, but with little success as a garden plant.

Six bulbs of flowering size were shipped to the Plant Inspection House in Miami, Florida, and in turn forwarded to the USDA Plant Introduction Station at Coconut Grove for continuing the growth cycle. When established, 5 pre-flowering size plants were forwarded to Longwood Gardens in mid-April 1965, where they are accessioned under our number 65522. The plants were dried off from May to August. In December, they renewed their growth withont flowering.

Another accession of *Paramongaia weberbaueri,* Longwood Gardens #572124 (Traub #T-248) consists of four plants resulting from seeds distributed to us by Dr. Hamilton Traub in 1957. Two of the four plants produced their first flower this year, one from January 17-28; the other, February 7-15, 1966 (Fig. 21). Their origin, according to correspondence from Dr. Traub, traces to "Bulbs from Department of Ancash, Lomas de Lupin, between Huarmey and Barranca, 225 km, north of Lima, on the Pan American Highway, along the Coast." Possibly because of their first flowering, the flowers of both these plants average only slightly more than half the size of the flowers observed on the plants collected in the indigenous Pariacoto habitat. Young offsets are forming on each bulb of the Traub accession. None, however, were noted on the wild plants near Pariacoto. It will now be interesting to observe these two accessions growing together for future comparisons between plants of coastal origin and those of mountain origin.

NERINE NEWS NOTES

Emma D. Menninger

The Nerine Society has recently been organized in England "with hopes that it will be truly international." An attractive folder has been sent to me with a beautiful black and white photograph of Nerine 'Inchmery Kate' on the cover. The objects of the society as stated are:

1. To make the genus more widely known.
2. To discover and make known the best cultural techniques.
3. To establish a Register of names and descriptions in accordance with the International rules of nomenclature.
4. To encourage the improvement of the forms in cultivation.
5. To provide facilities for Members to exchange ideas, information and material. "It is proposed to publish a regular bulletin." The subscription is $2.00. Further information can be had from the secretary, Mr. C. A. Norris, Clent House, Clent, Worcestershire, England.

Mr. J. T. Gallagher, who contributed to Plant Life 1966, has a comprehensive paper on "Greenhouse Nerines" in the journal of the Royal Horticultural Society for May 1966. Besides describing the culture of Nerines in England, the article is enhansed by a page of Mr. Gallagher's beautiful colored photographs of the following clones: 'Mariloo' AM, RHS, 'Nena', 'Tancred', 'Eddy', 'Bagdad' and 'Highdown Orange'.

The June issue of the Journal of the Royal Horticultural Society has an article "Greenhouse Nerine Cultivation" by Mr. C. A. Norris, the Secretary of the new Nerine Society.

In last year's Plant Life, I wrote of my interest in pure white Nerines. From Mr. Gallagher, I learned of the giant snow white 'Vestal' at Exbury. I have been promised a bulb of this clone next year. Further reporting on my 24 seedlings from my white clone 'Crystal Palace' ♀ with pollen from other pure whites, there are as of the 1965 season: 5 unflowered, 4 pure white which I named 'Glacier', 'White Swan', 'Taj Mahal' and 'Cumulus'. The other 8 clones were tints of pink. Of the five unflowered clones, I hope to have at least one more pure white. One of the two seedlings from 'Star White' mentioned last year produced a white with some pink only in the bud—its name 'Carrara,'

A South African enthusiast of Nerines is Mr. Ken Douglas, Kingswood College, Grahamstown. He is preparing a monograph on Nerines. He has a comprehensive collection of Nerine species including a white variety of *N. undulata*. Being in the vicinity of the habitats of the various species of Nerines, Mr. Douglas' monograph should give much information on the ecological demands of these species including the many rare ones.

Mrs. Sima Eliovson of Johannesburg gave a fine illustrated lecture at the Los Angeles State and County Arboretum in Arcadia recently on the flora of South Africa. I asked her about the pure white *N. sarniensis*

from Table Mountain. She replied that it is very scarce and is not available in South Africa, but I might get it from England!

The tempo of *Nerine* interest has certainly increased this year and these beautiful flowers are getting the publicity they have so long deserved.

Greenoaks,
700 North Old Ranch Road,
Arcadia, California, 91006

NEW EUSTEPHIA SPECIES

Cesar Vargas, *Cuzco, Peru*

Until recently, only three species of *Eustephia* Cav. had been described. In 1954 and again in 1960, the present writer proposed new species, and also a variety of the original species was described in 1944.

(1) *Eustephia coccinea* Cav. (1790)
var. *coccinea*
var. *multiflora* Vargas (1944)
(2) *Eustephia pamiana* Stapf (1929)
(3) *Eustephia armifera* Macbride (1951)
(4) *Eustephia longibracetata* Vargas (1954)
(5) *Eustephia darwinii* Vargas (1960)

Eustephia var *coccinea* is widely distributed in Peru, and grows at altitudes of 3000 to 3600 m., but the variety *multiflora* is known up to the present only from one locality around the town of Lares, Calca, Cuzco, alt. 3200 m. The Latin and Spanish descriptions may be read in "De Nobis Especiebus Florae Peruvianae", in Bo. Hist. Nat. "Javier Prado", vol. VIII, nr. 30-31, page 215. 1944, Lima, Peru; holotype CVC 3586. The English description follows:

The *bulbs* of the variety are larger than those of the original species, and there is a well-developed *bulb-neck*, the *plant* is more robust, including the *scape*, which is longer and thicker, purple, and angular; the *spathe-valves* are purple, and longer and wider; the *umbel* is about 8—10-flowered; the *pedicels* are 6.5 cm. long; the *perigone* is shorter, purple; the *setepalsegs* are provided with a longer claw at the apex, and the *teeth* on the *stamen-filaments* are shorter and wider.

Eustephia longibracteata Vargas (1954), in Rev. Univ. Cuzo, nr. 107, 2nd semester, page 152, fig. 1. 1954. This species is endemic to the Ollochea Valley, Puno, Peru, and it is closely related to *Eustephia armifera* Macbride (1951), but differs in the following characters: *Bulbs* oblong, robust, *bulb-neck* long, 12—15 cm. long; the *scape* is robust, angular, 26 cm. long, and 10 mm. in diam.; *spathe-valves* are longer than the flowers, purple; *pedicels* 2.6 cm. long (in *E. armifera* they are only 1.5 cm. long), the *tepalsegs* are purple, shorter and wider, the *setepalsegs* shorter; the *stamen-filaments* are wider, and the *teeth* are wider and curved, acute (quite different from those of *E. armifera* Macbride). This description was made from living specimens.

Eustephia darwinii Vargas (Bol. Fac. Cien. Univ. Nac. Cuzco, nr. 1, page 7, fig. 3, 1960). The following description was made from living material which is under cultivation at Cuzco. The *bulb* is oblong, 7 cm. long, 4 cm. in diam., *bulb-neck* 15 cm. long, 2.3 cm. in diam.; *leaves* lorate, 9—12, appearing after the flowers, 123 cm. long, 3 cm. wide; *scape* robust, angular, 45 cm. long, 1.8 cm. in diam., red, *spathe-valves* 6 cm. long, 1.2—1.4 cm. wide at the base, somewhat triangular; *umbel* 5—9-flowered; *pedicels* 3—4.2 cm. long, red; *setepalsegs* red, green tipped, short-spatulate, 4.5—5 cm. long; *petepalsegs* as long as the setepalsegs, but wider, pink, whitish and green and yellow at the apex; *stamens* somewhat exserted; the *stamen-filaments* winged and the teeth 4 mm. long; *stigma* slightly lobulate. This species is quite different from the others.

REPORT ON "EUSTEPHIA JUJUYENSIS"

Hamilton P. Traub

For a number of years attempts have been made to trace down the name, "Eustephia jujuyensis", given to a plant collected by Harry Blossfeld of Sao Paula, Brasil. Under date of November 16, 1965, Mr. Blossfeld reported:

"The only thing I can inform you about "Eustephia jujuyensis" is that I gathered a number of samples in 1935 in northern Argentina and sent live material of all of these to Messrs. Van Tubergen of Haarlem, Holland; botanical samples also were sent to the Dahlem Botanical Garden, where I was a student at the time. Among this material was *Amaryllis immaculata* and "Eustephia jujuyensis." The species name of the latter points to its origin, the Province of Jujuy, where I gathered both of the above mentioned plants. I do not remember, nor can I now trace who gave me these identifications, Dahlem or Van Tubergen. The herbarium specimens I obtained then—about 1,000 sheets of dried plants from Argentina—the whole lot was lost when our truck stuck in the water of the Rio Branco near Salta; the lighter weight part of our luggage was immediately swept away by the current."

The writer has a bulb of what is reported to be "Eustephia jujuyensis" growing in his garden, and hopes to report a detailed description in PLANT LIFE when it flowers. Two other species of *Eustephia*, *E. coccinea Cav.*, and *E. darwinii* Vargas, thrive in his garden, blooming two or three times each year. However, they all set no seeds, and this has retarded the wider distribution of these choice amaryllids. They are especially recommended for outdoor culture in California, and similar climates.

NOTHOSCORDUM FELIPPONEI BEAUV. ITS STATUS AND CHROMOSOMES

PEDRO FÉLIX RAVENNA

Owing to the fact that the present species has been transferred successively to several genera, it appears desirable to give a description and a brief discussion of its nomenclature. In addition, its chromosomes are here reported for the first time.

STATUS OF NOTHOSCORDUM FELIPPONEI

Nothoscordum felipponei Beauverd, Bull. Soc. Bot. Geneve, ser. II, 13 : 267. 1921. *Triteleia sellowiana* Kunth, Enum. Pl. 4 : 466. 1843; *Milla sellowiana* (Kunth) Baker, Journ. Linn. Soc. Bot. 11 : 383. 1871; *Brodiaea sellowiana* (Kunth) Baker, Garden Chron. ser. III. 20 : 459. 1896; *Brodiaea felipponei* (Beauv.) Herter, Flora Urug. 2 : 47. 1930; *Beauverdia felipponei* (Beauv.) Herter, Boissiera 7 : 510. 1943; *Beauverdia sellowiana* (Kunth) Herter, loc. cit.; *Ipheion felipponei* (Beauv.) Traub, Pl. Life. 11 : 128. 1955; *Tristagna felipponei* (Beauv.) Traub, Pl. Life 19 : 61. 1963; *Tristagma sellowianum* (Kunth) Traub, loc. cit.-Excl. syn.: *Nothoscordum ostenii* Beauverd, Boissiera, ser. II, 8 :996, fig. 1-J-M. 1908 (a different species).

Plant 25-80 mm. high. *Bulb* almost ovoid covered with ochraceous coats, with a short neck, about 12-16 mm. long, 10-13 mm. in diam. *Leaves* crowded, spreading, entirely glabrous, often firm in texture, dark green, oblong-lanceolate or linear, canaliculate but not carinate, becoming narrower at the apex, about 3-8 cm. long and 2-7 mm. wide. *Scapes* often several to each bulb, becoming decumbent from their base after flowering, about 2-5 cm. long. *Spathe* bivalved, valves brownish, membranaceous, ovate-lanceolate, about 11-13 mm. long, 3,5-7 mm. in. wide, united at their base for 3,5-4 mm. of their length. *Umbel* 1-flowered, flowers yellow, often very large, about 18-32 mm. in diameter. *Pedicels* about 2.8-6 mm. long. *Tepalsegs* oblanceolate, subequal, united at the base for 1.4 mm, ascending for 4-7 mm., then spreading, about 14-22 mm. long, 5-7 mm wide. often acute, outer tinged with brownish-red in the outside. *Filaments* subequal, erect, somewhat flattened, becoming narrow at the apex, about 5.5-7 mm. long attached at the same level at the base of the tepalsegs. *Anthers* versatile, oblong, yellow, about 2-2.2 mm. long. *Ovary* ovoid or oblong-ovoid, green, about 4.3-5.5 mm. long, 2-2.7 mm. in diam. *Style* elongated nearly 5.5 mm. long or sometimes less; *stigma* capitate, obscurely bilobed or trilobed. Chromosomes 2n=10.

Exsiccatae.-Uruguay, Montevideo, Cuchilla Pereyra; leg. *F. Felippone* 3493 (isetypus SI). Montevideo; leg. *F. Felippone* 3471 (SI). Without locality; leg. *F. Felippone* 5763 & 6029 (SI). Montevideo, Cerro; leg. *Herter* 434 (80842), apr. 1926 (SI). Brasilia meridionalis; leg. *Sello* s/n (phototypus ex K).

Despite the locality data (probably incorrect) of the Sello's material, this beautiful species seems to be endemic to the rocky hills of central and

southern Uruguay. It was originally classified as *Triteleia sellowiana* by Kunth, but this was never recognized as a *Nothoscordum.* In the same work this author gave a description of another species, calling it *Nothoscordum sellowianum* Kunth. Owing to this fact, the name *sellowianum* cannot be used for our plant. Incidentally, Beauverd described *Nothoscordum felipponei* as a new species. Later, after having been transferred by Baker (1871, 1896) to another genus, it was included by Herter (as both *N. felipponei* and *Triteleia sellowiana*) in *Beauverdia.* This genus was untenable because it was a mixture of discordant elements: some of the species belonged to *Nothoscordum* and the rest to *Tristagma.* Lately, *N. felipponei* was transferred by Traub (1959), with the rest of the species of *Beauverdia* to *Ipheion,* and, recently, when the latter was interpreted as a synonym of *Tristagma,* to this genus (1963). Actually Beauverd's interpretation of *Nothoscordum* was correct. With mostly free tepals, filaments subequal and a clearly visible ovary, our species must be considered as a genuine *Nothoscordum.*

In order to assist in distinguishing *Nothoscordum* from *Tristagma,* the following key is presented:

1a. Tepals more or less united in a tube or narrow cup which conceals the ovary. Filaments very dissimilar in length, attached at different levels often inside the tepal tube .....*Tristagma*

1b. Tepals more or less united at the base, often forming a funnel which does not conceal the ovary. Filaments often subequal, attached almost at the same level at the throat of the tepal tube .....*Nothoscordum*

NOTHOSCORDUM SPECIES RESTORED

The following listed taxa, which were included or transferred to *Beauverdia, Ipheion* and *Tristagma,* are *Nothoscordum* species:

Nothoscordum lorentzii (Hert.) comb. nov.—Syn.-*Beauverdia lorentzii* Herter, Boissiera 7: 509. 1943; *Ipheion lorentzii* (Hert.) Traub, Pl. Life 5: 50. 1949; *Tristagma lorentzii* (Hert.) Traub, Pl. Life 19: 61. 1963.

The present, an amazing almost always tetramerous species, I select as the type-species of *Beauverdia* Hert.

Nothoscordum hirtellum (Kunth) Herter, Ind. Sem. Montev. 1928-29.—Syn.-*Triteleia hirtella* Kunth, Enum. Pl. 4:465. 1843; *Milla hirtella* (Kunth), Baker, Journ. Linn. Soc. Bot. 11: 385. 1871; *Brodiaea hirtella* (Kunth) Baker, Gard. Chron. ser. III, 20: 459. 1896; *Nothoscordum canescens* Beauverd, Bull. Herb. Boiss. ser. II, 8: 997, fig. 1-A-D. 1908; *Beauverdia hirtella* (Kunth) Herter, Boissiera 7: 509. 1943; *Ipheion hirtellum* (Kunth) Traub, Pl. Life 5: 50. 1949; *Tristagma hirtellum* (Kunth) Traub, Pl. Life 19: 61. 1963.

Nothoscordum lloydiiflorum Beauverd, Bull. Herb. Boiss. ser. II, 8: 998, fig. 2 1908.—Syn.-*Beauverdia lloydiiflora* (Beauv.) Herter, Boissiera 7: 510. 1943; *Ipheion lloydiiflorum* (Beauv.) Traub, Pl. Life 5: 50. 1949; *Tristagma lloydiiflorum* (Beauv.) Traub, Pl. Life 19: 61. 1963.

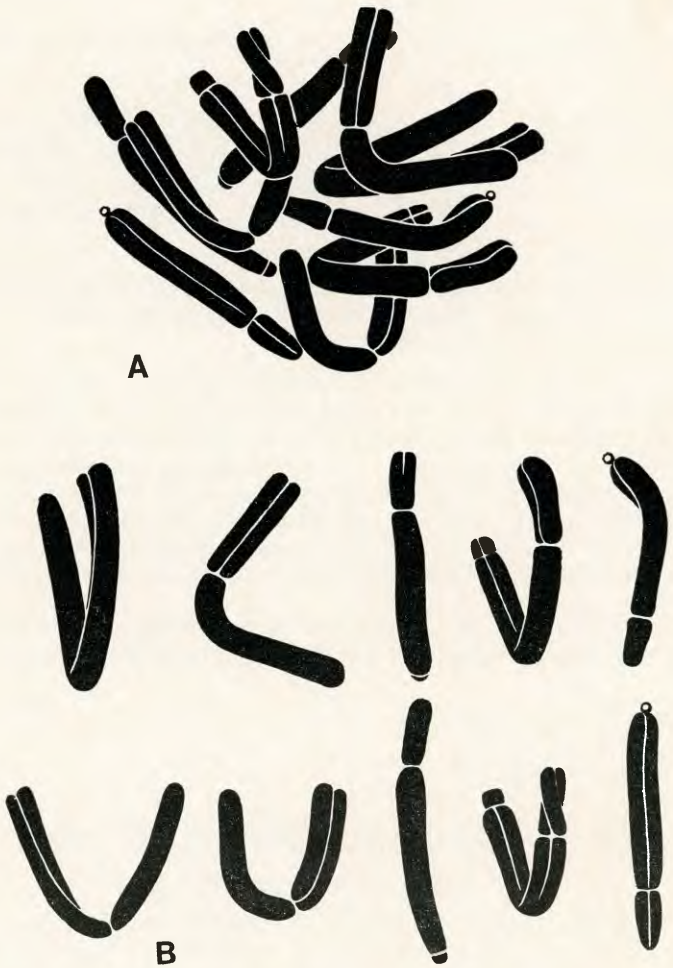


Fig. 22. The chromosomes of **Nothoscordum felipponei** Beauv. Drawing made with a camera-lucida at a table magnification of approx. X2300, and reduced approx. by 22% in reproduction.

CARYOLOGY

This work was carried out in the Genetics II Laboratory, Faculty of Sciences, University of Buenos Aires.

The previously reported chromosome numbers in *Nothoscordum* Kunth, are indicated in Table 1.

Table 1. Chromosome numbers reported in **Nothoscordum** Kunth, up to 1966. x=8, 9 (triploids apomiptic).

Species	2n	Authority
bivalve (as **striatum**)	16	Levan, Hereditas 20: 289. 1935
bivalve	18	Beal, Bot. Gaz. 93: 278. 1932
inodorum (as **fragrans**)	16, 24/3	Messeri, Nuovo G. bot. ital. 38: 409. 1931
	18	Levan, Hereditas, 20: 289. 1935
	16, 22	Garber, Amer. J. Bot. 31: 161. 1944
	19	D'Amato, Caryologia 1: 291. 1949
neriniflorum	16, 17	Sato, Jap. J. Bot. 12: 57. 1942

MATERIALS AND METHODS

Bulbs of *Nothoscordum felipponei* were collected in 1958 at Verdun, Mina Dept., Uruguay. They were cultivated in my private collection where they flowered each year.

Toot-tips were pre-treated in saturated aqueous solution of paradichlorobenzene for nearly four hours, fixed in Carnoy 3:1 for 48 hours, washed in distilled water, hydrolyzed in 2 normal hydrochloric acid, and stained in acetic-orcin solution. The drawing was made with a camera-lucida at a table magnification of approximately X2300, and reduced by about 22% in reproduction (see Fig. 22). Preparations were made permanent by removal of the cover slips, smearing cover slips with Mayer's albumen, dehydrating both slides and cover slips, and mounting in Euparal.

As shown in Fig. 22, the diploid chromosome number of *Nothoscordum felipponei* is 2n=10, a number not previously reported in this genus.

Instituto de Botanica Agricola,
Castelar, F. D. F. S.,
Buenos Aires, Argentina

HYMENOCALLIS AZTECIANA, SP. NOV.

Hamilton P. Traub

In 1966 Mr. Horace Anderson of Leucadia, Calif., presented two potted plants of a *Hymenocallis species* which had been collected by his friend Sra. Jacoba Garcia de Frias near the small ranches of Cabos and Batio about three hours' walk from the City of Jalpa, in the State of Jalisco. One was a flowering-size bulb, and the other a smaller seedling. When the larger plant flowered in June, 1966, it was at once apparent that it was new to science. It had a prominent, thick pseudo-stem produced by the sheathing of the leaves below. While annotating the *Hymenocallis* specimens from the Missouri Botanical Garden Herbarium at about the same time, it was noted that D. P. Gregory & G. Eiten no.

254 (MO 1744709), "State of Jalisco, Cerro Viego, south face, above Zapotitan de Hidalgo, a village about 1 mi. n. of Highway Mex. 15; about 25 mi. due s., or 45 road mi. from Guadalajara. Shaded woods, rich black loam, alt. approx. 2300. Tepalsegs narrow, white, carnation odor. June 28, 1956", is identical with the plants obtained from Mr. Anderson. This served as verification of the species.

Since the ancient inhabitants of Mexico have been relatively neglected in the naming of plants, the new species has been named for the Aztec Amerindians, *Hymenocallis azteciana.* The plant is easily cultivated in a rich loamy soil mixture, and in at least half shade.

Fig. 23. **Hymenocallis azteciana** Traub, from the State of Jalisco, Mexico.

Hymenocallis azteciana Traub, *sp. nov.*

Foliis liberis 5 anguste ellipticis deorsum vaginatis, pseudocaulem validum tubulosum 11.5 cm. longum 2—3 cm. latum conficientibus; scapo usque ad 63 cm. lato; umbella 9-flora; floribus albis viridibusque; ovulis per loculam 5; tubo tepalorum usque ad 6.4 cm. longo; segmentis tepalorum gracilibus 10.5—11.3 cm. longis; cupula staminali 2.7 cm. longa; filamentis 4.5 cm. longis; antheris versatilibus; polline auranteo; stigmate capitato.

Bulb globose, 5.5 cm. long, 4 cm. in diam., bulb-neck 4 cm. long, 2.2 cm. in diam. Free sessile *leaves* 5, narrowly-elliptic, 7.5—9.3 cm. long, acuminate, 2.9 cm. wide at the base, up to 8.3 cm. wide at the middle;

green above, mid-rib lighter green, prominently keeled whitish to light greenish, and glaucescent on the under side at first, later turning green; sheathing below, forming a thick pseudo-stem, 8—11.5 cm. long, 2.1x3.1 cm. in diam., somewhat flattened, with roundish edges, deep green reticulations on lighter whitish-greenish background. *Scape* up to 63 cm. long, 1.3x1.7 cm. in diam. (base), 1x1.3 cm. in diam. (apex), medium green, flattish, with rounded edges, solid. *Spathe-valves* 2, lanceolate, 9.5—10 cm. long, 3 cm. wide and overlapping at the base, acute or bluntly acute; 2 bracteoles relatively wide, the remainder smaller; green at first, changing to brown on drying. *Umbel* 9-flowered; flowers first opening in the evening, white, except ¼ of tepaltube green, upper ¾ of filaments and style, green; tepalsegs spreading, florets straight in bud, tepaltube curved in lower ⅓ on flowering; delightfully perfumed. *Ovary* sessile in the umbel, oblong, 1.3 cm. long, 6 mm. in diam.; ovules 5 per locule. *Tepaltube* 6.3—6.4 cm. long, 5 mm. in diam. (base), 8 mm. in diam. (apex). *Tepalsegs* linear acute; setsegs 11.3 cm. long, 5 mm. wide; petsegs 10.5 cm. long, 6.5 mm. wide. *Staminal cup* 2.7 cm. long, narrowly funnel-shaped, including the tubular base (1.2 cm. long); *filaments* 4.5 cm. long; *anthers* 2.4 cm. long, attached toward one end below the middle, versatile, pollen orange-colored. *Style* overtopping the stamens; stigma capitate.

Holotype: Traub No. 1031a+b+c (TRA), 6-8-66, grown from bulb collected by Sra. Jacoba Garcia de Frias about three hours' walk from the City of Jalpa, State of Jalisco, Mexico. *Paratype:* D. P. Gregory & G. Eiten No. 254 (MO 1744709), State of Jalisco, Cerro Viego, south face, above Zapotitan de Hidalgo, about 1 mi. n. of Highway Mex. 15., June 28, 1956.

SPREKELIA CHROMOSOMES

W. S. Flory and S. Bose,

Wake Forest College and University of Calcutta

During the past 30 years several persons have reported chromosome numbers for the Mexican monotypic *Sprekelia formosissima.* These numbers have varied somewhat, but have been high in each case. Somatic chromosome numbers of approximately 110 were reported by Inariyama (1937), of from 110 to 117 by Sato (1938), of about 121 by Snoad (1952), and of 116 by Mookerjea (1955).

Several tentative counts, on commercial bulbs of *Sprekelia,* were made, some 15 years ago, with approximately 120 chromosomes being found at somatic metaphase. In October, 1952, a number of bulbs of this species were collected in a barranca just west of Cuernavaca, and these were found to each have 60 somatic chromosomes. When these Cuernavaca bulbs matured they produced flowers with narrower perianth segments than the flowers from commercial bulbs. Shortly thereafter, a more detailed analysis of *Sprekelia* chromosomes was started.

Thirty-two plants were selected for these studies. Six were from commercial sources, with the type flower most frequently observed. Five

with narrower-segmented flowers were from near Cuernavaca. Twenty-one bulbs were selected, from a large supply furnished by Dr. T. W. Whitaker; these particular selections produced flowers with a larger, wider-segmented appearance.

Details of the study have been described in several recent reports (Bose and Flory, 1965; Flory and Bose, 1966). The present summary is provided for the readers of Plant Life at the request of its editor.

As indicated above, the plants from Cuernavaca each had 60 somatic chromosomes. These ranged from 5 to 12 microns in length, following a pretreatment of the root tips for 4 to 6 hours in .2% colchicine. These 60 chromosomes could be divided into 4 types, designated A (2), B (12), C (44) and D (2). The A pair of chromosomes was the longest, and had near-median centromeres. The B chromosomes were the shortest, with 4 of these (B_1) being about 2.7 microns long and having near-median centromeres, while 8 (B_2) averaged 4.2 microns in length and had submedian constrictions. The C chromosomes all had subterminal centromeres, and varied from 5 to just over 8 microns in length. The C chromosomes could be divided into 6 subtypes (C_1, C_2, C_3, C_4, C_5 and C_6) on the basis of different lengths and variation in centromere positions. The two D chromosomes had subterminal centromeres, and averaged 5 microns in length—excluding the satellite subtended by each.

In 6 commercial bulbs with usual flower types the 2n chromosome number was about 120. From 12 cells in which unquestioned counts were recorded the following 2n numbers (with number of times) were observed: 117 (1), 118 (3), 120 (2), 122 (1), 123 (3), 124 (1) and 127 (1).

Of 21 bulbs producing apparently larger flowers, one was 2n=ca. 150; in 20, 2n=ca. 180. Unquestioned counts in 7 cells of the plant with about 150 chromosomes showed the following 2n numbers (with number of times observed): 144 (1), 148 (2), 150 (2), 151 (1), 154 (1). Unquestioned counts in root tip cells of plants with about 180 chromosomes (with number of times observed) were: 164 (1), 165 (2), 167 (2), 169 (2), 172 (4), and 178 (2). It has been determined that the same major types of chromosomes are present in the 2n= about 120. 150 or 180 plants, as in the 2n=60 plants from Cuernavaca, and in the same proportions. This is also true of the subtypes of chromosomes B and C.

It is likely that increase in chromosomes to the high numbers encountered here would in itself decrease mitotic efficiency because of crowding, or some other disturbance of nuclear balance. This could plausibly account for higher than expected numbers of chromosomes entering some cells, with lesser numbers going to sister cells. It could explain the number of cells with more or less than 120, 150, or 180 chromosomes in the *Sprekelia* euploid series. Such chromosome crowding caused by increase of chromosome number was suggested by Menzel and Brown (1952) as a probable cause for the varying chromosome numbers associated with mosaic formation in their hexaploid (2n=78) *Gossypium* hybrids. With considerably higher numbers of chromosomes, in most of our *Sprekelia* accessions, such crowding would here

seem an even more likely cause of uneven division resulting in cells with aneuploid numbers.

BASIC CHROMOSOME NUMBER IN **SPREKELIA**

With a euploid series of 60, ca. 120, ca. 150, and ca. 180 chromosomes being known, a base number of 30 chromosomes for Sprekelia occurs, of course, as a strong possibility. If this is the case, then taxa which are essentially diploid, tetraploid, pentaploid and hexaploid have been dealt with. Actually, in counts with races having more than 60 chromosomes, cells which are aneuploid deviates are more frequent than are those with exact multiples of 30 chromosomes. The numbers of each different type of chromosome observed would seem to substantiate the reasoning that 30 is a base number; only 2 chromosomes of type A, 2 chromosomes of type D, and 4 chromosomes of type B_1, have been observed with 2n=60, with similar representation of these types in the races with higher numbers.

It is conceivable, and perhaps more logical, to think that a basic number of n=30 was derived, at least, from a lower base number. The most recent arrangement of the genera of Amaryllidaceae (Traub, 1963) places *Sprekelia* in tribe Zephyrantheae. In this tribe *Habranthus, Cooperia, Zephyranthes,* and perhaps other genera, quite obviously have 6 as a basic chromosome number (Flory, 1958). It seems reasonable to suspect that the basic chromosome number in *Sprekelia* also is 6, rather than 30. If 6 is the base number in *Sprekelia,* it would mean that in the process of karyotype evolution, translocations, or other cytological changes have occurred, since the chromosome types now encountered in *Sprekelia* are not present in the proper numbers to satisfy this conception, otherwise. It is of probable significance that *Sprekelia* occurs in geographical areas where *Zephyranthes* is represented by a number of species, and where *Cooperia* and *Habranthus* are also prevalent.

Data has also been secured on perianth segment length and width, and on certain other flower and inflorescence characters, where 2n=60, ca. 120 and ca. 180. A positive correlation is apparent between flower size and chromosome number.

SUMMARY

It has been found that an approximate euploid series of 60, about 120 (118 to 124), about 150 (148 to 155) and about 180 (164 to 178) occurs in *Sprekelia.* The chromosomes are comparatively large, furnishing a total chromatin mass suggested to cause crowding resulting in mitotic irregularities and frequent aneuploidy, especially where numbers are in excess of 100.

In general, the higher chromosome plants produce the largest flowers, with a positive correlation between flower size and chromosome number. Selection for commercial flower types in *Sprekelia* has quite apparently been accompanied by the unconscious selection of plants with increased chromosome number.

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AMARYLLIS ARGILAGAE SP. NOV.

HAMILTON P. TRAUB

In the 1966 issue of Plant Life (pages 41—42), Dr. Joseph C. Smith gave a general description of an *Amaryllis* species collected by Dr. C. G. Ruppel on the banks of the Uruguay River in the Province of Cor-

Fig. 24. **Amaryllis argilagae** Traub, the new dwarf **Amaryllis** of the Striata Alliance. Photo by Dr. C. G. Ruppel.

rientes, Argentina. This plant flowered for Dr. Joseph C. Smith in 1965 when the holotype was prepared. This species was also collected by the United States Crops Exploration Division. Plants were sent to

Fig. 25. **Amaryllis argilagae** Traub, after a pencil drawing by Prof. Penrith Goff.

Dr. Thomas W. Whitaker who flowered it in 1966.

At the request of Dr. C. G. Ruppel, the species is named in honor of his good friend, Mr. Paul Argilaga.

Prof. Penrith B. Goff, of the University of Kentucky, made a pencil drawing of the species from a color slide furnished by Dr. C. G. Ruppel. This is reproduced in Fig. 25.

Amaryllis argilagae Traub, sp. nov.

A. striato affinis sed minor; bulbo parvo 3.3 cm. longo 2.7 cm. diametro bulbosis numerosis gerenti, prope basin squamato; folis usque ad 7 oblanceolatis; umbella 4-flora; floribus cinnabarinis, tepalis 6.5—7 cm. longis initio regularibus demum gradatim aliquantum irregularibus, tubo tepalorum 1.5 cm. longo.

Bulb small, pear-shaped, 3.3 cm. long, 2.7 cm. in diam., neck very short (8 mm. long); plant is related to *Amaryllis striata*, and like it produces numerous bulblets, *Leaves* up to 7, more or less evergreen, usually 18-22 cm. long, (up to 38 cm. long under cultivation in very rich soil), oblanceolate, 1.3 (—1.7 in well-fertilized plants) cm. wide (base), 2.3—2.6 (—3.6 in well fertilized soil), cm. wide above the middle, bluntly acute, deep green. *Scape* up to 17 cm. long, slightly compressed, with round edges, 8x10 mm. in diam. (base), 5x8 mm. in diam. (apex), dull green, reddish near the base. *Spathe-valves* 2, lanceolate, tinged reddish, 4.2—4.5 cm. long, apex acute. *Umbel* 4-flowered, flowers held more or less horizontally, at first tepal-segs are regular, gradually changing to somewhat irregular; the upper setseg and 2 side setsegs reflexed, 2 side petsegs twisted in upper 1/3, color vermilion (HCC 18/1), white band in center of segs about 2/3 up, except band very narrow and only ¼ up in lower petseg; filaments and style vermilion. *Pedicels* 0.6—0.8—1.7—2.2 cm. long at anthesis. *Ovary* 8 mm. long, 5 mm. in diam., green. *Tepaltube* 1.5 cm. long. *Tepalsegs*: *setsegs*: upper, 6.9 cm. long, 2.2 cm. wide, oblanceolate, acute; 2 side setsegs, 7 cm. long, 1.6 cm. wide, narrowly oblanceolate, bluntly acute; *petsegs*: 2 side, 6.5 cm. long, 2 cm wide, oblanceolate, falcate, acute; bottom petseg 5.7 cm. long, 0.7 cm. wide, very narrowly lanceolate, acute. *Paraperigone* apparently absent. *Stamens* about 2/3 as long as the segs, attached slightly below the apex of the tepal-tube. *Style* shorter than the segs, and slightly longer than the longest stamens; anthers 4 mm. long, oblong, pollen creamy-white; stigma trifid, lobes 2 mm. long.

Holotype: Joseph C. Smith s.n. (= TRA 1014), cult. La Mesa, Calif., 10-28-65, from bulbs collected by Dr. C. G. Ruppel, Uruguay River, Santo Tomé, Corrientes, Argentina. Paratypes: #768 TRA, USDA P. I. 202235, Rio Grande do Sul, Brasil, 3-11-60; and #1028 TRA, La Jolla, Calif. 6-1-66, 6-1-66.

Notes.—This is the species discussed by Dr. Joseph C. Smith in the 1966 PLANT LIFE, page 44. It is particularly valuable to the breeder interested in miniature hybrid Amaryllis. We are grateful to Dr. C. G. Ruppel who first sent this plant to us from Argentina. The species has been named in honor of Dr. Ruppel's good friend, Paul Argilaga, of Santo Tomé, Corrientes.

AMARYLLID GENERA AND SPECIES

HAROLD N. MOLDENKE

[In this department the descriptions of amaryllid genera and species, particularly recent ones, translated from foreign languages, will be published from time to time so that these will be available to the readers.]

Schoenoprasum lineare H.B.K., Nov. Gen. et Sp. 1: 277. 1816 leaves linear, flat, glabrous, shorter than the striate terete scape; umbels many-flowered. It grows in the mountains of New Spain between Santa Cruz de la Sierra and Mount El Gigante, at 7800 feet altitude. It blooms in September. Bulb ovate, the size of a cherry, with numerous fibers at

the base; leaves narrowly linear, flat, striate, glabrous, very thinly membranous at the base, sheathing, 4 inches long; scape erect, terete, striate, glabrous, 5 or 6 inches long; umbels 12- or 15-flowered; flowers pedicellate; pedicels terete, glabrous, 14—18mm. long; spathe ovate-lanceolate, withered, striate, glabrous, half as long as the pedicels, reflexed; calyx-segments oblong, rather acute, patulous, whitish, with a median red longitudinal line; stamens as long as the calyx; filaments glabrous, subulate; anthers oblong; pollen gray; ovary ovate, trigonous; style subequaling the stamens.

Schoenoprasum longifolium H.B.K., Nov. Gen. et Sp. 1: 277. 1816 leaves linear, flat, glabrous, surpassing the terete striate scape; umbels sub-8-flowered. It grows near Queretaro, Aroyozarco, and San Juan del Rio, Mexico, at an altitude of 6090 feet. It blooms in August. Bulb subglobose, the size of a large cherry, tunicate, with numerous fibers at the base; leaves narrowly linear, flat, obtuse, striate, glabrous, conspicuously dilated and very thinly membranous at the base, 8 or 9 inches long, 2 mm. wide; scape erect, terete, striate, glabrous, 6 inches long; umbels sub-8-flowered; flowers pedicellate; pedicels subequal, glabrous, patulous, an inch long during anthesis, an inch and a half long when in fruit; spathe bifid, reflexed, the segments ovate-lanceloate, acuminate, striate, withered, glabrous half an inch long; calyx segments lanceolate; stamens shorter than the calyx; filaments subulate; capsule oblong the size of a small pea; seeds angulate, black.

Haemanthus canaliculatus M. R. Levyns, J. S. Afr. Bot. 32: 73-75, pl. 1. 1966 bulbous very smooth herb; bulb about 9 cm. in diameter, the tunic divided into 2 parts; leaves 2 or sometimes 3, hysteranthous, narrowly linear, involute at the margins, channeled, almost 36 cm. long; peduncle thick, rosy; bracts lanceolate, slightly acute (we would say subacute—HNM), reddish, patent; flowers numerous, crowded, reddish; perianth tube about 5 mm. long, the lobes about 29 mm. long; berry globose; seed ovoid, chestnut-colored, shiny. Betty's Bay and Rooi Els, western Cape Province.

Allium tubiflorum Rendle, J. Bot. Lond. xliv: 44-45, pl. 476, figs. C, 8—11. 1906 plants glabrous, a foot tall or smaller; bulb ovate to subglobose, solitary, the tunic whitish, scarious, entire; stem erect, subcompressed, rather roughly striate-angulate, leafy at the base, slightly surpassing the narrowly linear leaves; spathe 1-valved, laterally split, shortly acuminate, about half as long as the loosely many-flowered umbels; pedicels unequal, 3 or more times longer than the perigonium; petals deep rose, united at the base into a small cup, finally reflexed, oblong, obtuse, marked with a deeper colored median nerve (=vein), more than twice as long as the stamens; filaments subulate, springing from the tube of the perigonium; ovary ovoid, crowned with a subequal style and 3-lobulate stigma.

Tristagma chubutense Gandoger, in Bull. Soc. Bot. France 1919, 66: 292. 1920. It differs from *T. nivale* by its rigid somewhat broader leaves which are not circinate at the apex, the bracts, flowers, tube and divisions of the perigonium at least half smaller. It grows in Patagonia,

along the river Carrenlenfi, Chubut (Skottsberg no. 541). Scape enveloped at its base by broad, white, membranous scales; flowers 2—3 cm. long, the tube 10—11 mm. long, the segments recurved-stellate, sublinear; root thickened-fibrous. The remaining specimens sent by Philippi from the Chilean Andes perhaps represent a new species with the circinate leaves half as long as the scape, the (perigonium) tube deeply striate (along with the segments), at least 2.5 cm. long; hence should be named *Tristagma philippi* Gandoger.

Hymenocallis traubii Moldenke, *sp. nov.* Planta nana 10—17:5 cm. alta; foliis 3 vel 4 lanceolatis 7.5—12 mm. latis; umbella biflora; floribus viridibus albisque satis fragrantis; ovario subsessili usque ad sessili oblongo; ovulis per loculo 4 vel 5; tubo tepalorum 3.3—3.9—4.6 cm. longo; segmentis tepalorum linearibus usque ad angustissime ellipticis 8.5—10 cm. longis; cupula staminali 3.5—4.5 cm. longa, basi breviter tubuloso sursum late infundibuliformi; filamentis 5.3—5.5 cm. longis; antheris introrsis erectis; polline flavo. Holotype: H. P. Traub #1056 (TRA), 7—15-1966; isotype #1057 (TRA); grown from bulbs collected by E. L. Brasol, near Daytona Beach, Florida.

Nerine x traubianthe Moldenke, *hybr. nov.* Planta inter N. filifoliam ♀ et clones varios hybridos Nerine ♂ hybrida, vigorem hybridum manifeste praebentes; scapis longissimis; floribus ilis N. filifoliae similibus sed plus majoribus; foliis linearibus 6 mm. latis. Holotype: H. T. Traub #1063 (TRA), 10-29-66.

Chlidanthus x *traubii* Moldenke, *hybr. nov.* Plantae hybridae reciprocae inter *C. fragrans* et *C. boliviensis;* habitu intermediae. Holotype: Traub #905 TRA, 5-14-62; paratype #910 TRA, 5-24-62.

ALLIUM TRAUBII SP. NOV.

T. M. Howard, *Texas*

While collecting various bulbous plants during my plant exploration excursions into Mexico and Guatemala, I have at various times collected a number of unidentified summer- and autumn-flowering *Allium* species in growing (and sometimes in flowering) condition. One of these, taken on Labor Day (September 6, 1965), in the State of Nuevo Leon, west of Monterrey, on top of a dry mountain just inside the Nuevo Leon-Coahuila State line, near the Coahuila border, was in full bloom. The mountain was reached by an excellently maintained new road which led to a tower at the summit, presumably a satellite tracking station or relay station, just off highway 40 (Saltillo-Monterrey highway) and Cuesta de los Muertos (Grade of the Dead). The elevation was approximately 6000 feet (approx. 1830 m.). The membranous coated bulbs reproduced vegetatively by division, and bore loose umbels of 8-16 flowers with light lavender tepals on scapes 15—25 cm. tall. This same *Allium* was taken again a month later in flower at Cerro del Obispado, a historic landmark (battle ground) within the western edge of the City of Monterrey, State of Nuevo Leon, October 3, 1965.

It differs markedly from the previously known species such as *A. glandulosum* and *A. kunthii* which are robust plants, with relatively

long upright leaves. In the Nuevo Leon plant, the leaves are relatively shorter, more slender, lax, glaucescent, medium green on the upper side, prominently 3-ridged on the underside, particularly when cultivated. It was given the collection number Howard #65-84. This species, along with several others from Texas, Mexico, and Guatemala were sent to Dr. Hamilton P. Traub in 1966 for study and identification. Dr. Traub informed me that several of these were apparently new, and that he would be pleased to assist in identifying them. It is with much pleasure that I name this new *Allium* #65-84, *Allium traubii* T. M. Howard *sp. nov.,* in his honor for his interest in this oft-neglected genus, and without whose help the identity of these plants might have continued to remain obscure. *Allium traubii* should be a welcome addition to the small group of fall-flowering half-hardy Alliums suitable for pot culture in the North and gardens in the South. Sub-freezing temperatures of short duration do not bother them in San Antonio, Texas and it is likely that they will be hardy further north as well.

Allium traubii T. M. Howard, *sp. nov.* Bulbo oblongo, deinique in bulbis duis verticaliter fisso, tunicis membranaceis; foliis deorsum vaginatis, partibus liberis 4—6, 11—19 cm. longis 2.5—2.75 mm. latis, supra glaucescentibus, subtus 3-carinatis; scapo subtereti; umbella 10—16-flora; floribus campanulatis perpallide lavandulaceis, vena media fusciora; pedicellis usque ad 1.2 cm. longis; staminibus quam tepalibus leviter brevioribus.

Bulb oblong, membranous coated, splitting vertically into two bulbs; leaves sheathing below, free portions 4—6, glauscent on upper surface, 3 ridged on under side, 11—19 cm. long, 2.5—2.75 mm. wide; scape subterete; umbel 8-16 flowered; flowers campanulate, very pale lavender, deeper mid-vein; pedicels to 1.2 cm. long; stamens slightly shorter than the tepals. Semi-arid mountains of Monterrey and vicinity, State of Nuevo Leon, Mexico. September-October.

The specimens have been deposited in the Traub Herbarium. Holotype (holonomenifer): T. M. Howard 65-84 (TRA No. 1061), 10-18-66, Mexico: State of Nuevo Leon, W. of Monterrey. Paratypes: T. M. Howard, n. s. (=1064 TRA), w. of Monterrey, Mex.; T. M. Howard n. s. (=1056 TRA), Cerro del Obispado, Mex.

CRINUM STRICTUM HERB, IN THE GUADALUPE LOWLANDS, TEXAS

Fred B. Jones, *Corpus Christi, Texas*

On Nov. 21, 1958, while doing field work in the marshy lowlands of the Guadalupe River between Green Lake and the shore of San Antonio Bay, I noticed a small patch of Crinum on the far side of a wide and rather deep ditch paralleling Highway 35 which traverses the area. The ditch was filled with water from recent rains, but by taking a circuitous route, I was able to reach the clump and take several scapes and leaves for pressing and a bulb or two for planting in my garden. The specimens became my No. 2698 and were deposited in the Welder Wildlife

Foundation and my personal Herbaria (two sheets were later sent to the Traub herbarium in La Jolla, California). The accompanying illustration shows the general aspect of the inflorescence (Fig. 26).

The bulbs were seated about 6 in. deep in the mud, connected by thick underground stems (rhizomes) and anchored by numerous thick-fleshy roots. The bulbs were about 4 cm. thick near base and gradually narrowed upward. Leaves were about 60 cm. long and 4-4.5 cm. wide. Scapes, 50-60 cm. long. Spathes about 6 cm. long. Umbels, at least 3 of them, 6-flowered. Tepaltubes 10-11 cm. long, about 6 mm. in diameter, slightly curved above. Tepalsegs about 8 cm. long, 1.5-2 cm. wide, white, spreading or somewhat recurved (the flowers had opened at least 16 hours before). Stamens ascending, about 5.5 cm. long, purple. Styles surpassing the stamens by about 2 cm., purple. On the fruiting umbels, the tepaltubes, all but the upper 1 or 2 cm., had become rather thick-fleshy and stiffish.

Fig. 26. Flower scape of **Crinum strictum.**

Checking available manuals and floras, I noted that Small, in *Manual of the Southeastern Flora* (1933) allowed *Crinum americanum* L. in Texas and gave Spring-Fall as its blooming season. His description of the species, however lacking in details, seemed to fit the Guadalupe lowland plants, so, being fairly sure that no other species had been reported from the state or was even to be expected, I determined our plant as *C. americanum* and it was so listed in the checklist of South Texas plants published in 1961 by the Welder Wildlife Foundation (Jones, F. B., C. M. Rowell, Jr. and M. C. Johnston, *Flowering Plants and Ferns of the Texas Coastal Bend Counties.*

On several collecting trips to the lowlands made at different times in the summer and fall months of 1959, 1960 and 1961, I saw not a

single Crinum. I presumed that the bulbs simply were out of bloom at these times, or if blooming, were hidden by tall weeds, grasses or woody vegetation. When I visited the area on Nov. 2, 1962, however, Crinums were again blooming. There were several small patches in the lowlands near the highway but none could be seen along the ditches. I very much wanted to collect bulbs of the plant, for those that I had taken along the ditch in 1958 had failed to become established in my yard. Looking about for a patch that could be reached without wading through water or mud, I came upon a number of bulbs lying on the ground near the site of a bridge that had been torn out recently (a new highway paralleling the old one was near completion). These bulbs were taking root as best they could and were putting out a few leaves. I took four of the larger ones for my garden.

The four bulbs leafed out in the spring of 1965 and bloomed in the earlier part of June. Two of them produced a second scape. The umbels were 2-3-flowered and the seed were allowed to mature. These germinated, incidentally, where they fell. In the fall, the older leaves yellowed and fell away but there remained a bunch of young, undeveloped leaves at the top of the bulbs. These, however, were eventually killed by frost or sub-breezing temperatures (not below 27 F.) so that the bulbs were leafless and apparently dormant.

In the spring of 1966, the first leaves appeared and about June 12, the first scapes were sent up. Flowers were open on June 23 and I took a scape for my herbarium (No. 6883) and on July 2, immature fruiting material (No. 6890). By pulling away the soil, I found that the bulbs were about 10 cm. long, including the basal plate, and 4-5 cm. thick near base. They were tapered upward and about 2 cm. in diameter at ground level. Leaves were about 60 cm. long and 4 cm. wide. Scapes 50-56 cm. long. Umbels 3-4-flowered. Spathes 8.5 cm. long. Tepaltubes 12-14 cm. long, slightly curved above. Tepals 8-10 cm. long, 1.3-1.7 mm. wide, spreading-recurved, white with traces of purple. Stamens and style purple above, whitish below. Anthers about 1 cm. long, the pollen yellow.

In 1965, I noticed that the buds drooped until nearly ready to open, so I made it a point to observe this peculiar behavior in 1966. When the spathes split, the developing buds are erect, but after a few days of growth, they assume a drooping position, that is, the tepaltubes become arched. On their opening day, they rise to an ascending or even erect position, that is, the tepaltubes become nearly but not quite straight. They finally burst open just before sundown.

Comparing the specimens of No. 2698, taken in the ditch in 1958, and those of 6883 and 6890, from the bridge in 1964 and grown in an ordinary half-shaded flower bed, I can see no significant differences. Of course the scapes from the ditch have 6-flowered umbels, but the 2-4-flowered umbels produced by the garden-grown bulbs may have been a consequence of insufficient moisture or other inadequacies. Not to be overlooked, too, is the disparity in time of flowering between the garden-grown bulbs which flowered in June in two successive years, and those

growing in the wild which, so far as I have been able to determine, bloom in November or in October (there were maturing fruits on some of the November-flowering bulbs). The question of flowering time can only be settled by observing the plants in the lowlands over a period of years.

In the garden, *C. strictum* apparently has no special requirements. It takes about as much space as an ordinary amaryllis, much less than most crinums, and if an occasional young bulb shoots up some distance from the parent, it can be removed if not wanted. The foliage is attractive and graceful, the flowers beautiful and not too fragrant. The blooming season, in my experience, is much too brief, but it could possibly be extended by keeping the soil quite damp or planting the bulbs in a place that stays wet most of the time.

AMARYLLID NOTES, 1967

Hamilton P. Traub

Leucocoryne volkmannii (R. A. Phil.) Engl. ex Traub; *comb. nov.*, syn—*Latace volkmannii* R. A. Phil., Anal. Univ. Chil. 93: 274. 1896; Engl. Nat. Pflamzenfam. 15a: 325. 1930; Traub, Gen. Amaryll. 35. 1963.

Tristagma uniflorum forma *album* (Weathers) Traub, *comb. nov.* Syn.—Weathers, Bulb Book, 117. 1911; *Beauverdia uniflora* f. *alba* Herter, in Boissiera 7: 512. 1943.

Tristagma uniflorum forma *violaceum* (Voss) Traub, *comb. nov.* Syn.—Voss, in Vilmorin, Blumeng. 1116. 1895; *Ipheion uniflorum* f. *violaceum* (Voss) Stearn, Gard. Chron. Aug. 14, 1943, p. 61.

Tristagma uniflorum forma *conspicuum* (Bak.) Traub, *comb. nov.* Syn.—*Triteleia conspicua* Bak., in J. Linn. Soc. Bot. 11: 382. 1871.

Tristagma uniflorum forma *tenuipetalum* (Herter) Traub, *comb. nov.* Syn.—*Beauverdia uniflora* f. *tenuipetala* Herter, in Boissiera 7: 512. 1943.

Tristagma uniflorum forma *roseoplenum* (Herter) Traub, *comb. nov.* Syn.—*Beauverdia uniflora* f. *roseoplena* Herter, in Estud. Bot. Reg. Uruguay IX, Montevideo (1928-1929), color plate & text fig.; Herter, in Boissiera 7: 512. 1943.

Nectaroscordum tripedale (Trautv.) Traub, *comb. nov.* Syn.—*Allium tripedale* Trautv. in Act. Hort. Petrop. 2: 485. 1873.

Pancratium parvum subsp. *malabaricum* (Bak.) Traub, *subsp. nov.* Syn.—*Pancratium parvum* var. *malabaricum* Bak. Amaryll. 119. 1888.

Stenomesson moldenkei Traub, *sp. nov.* (Amaryllidac.), *emend* (Plant Life 22: 62. 1966), Habitat: Peru: near Canta, Prov. Canta, Dept. Lima, on stony soil, alt. 2800-2900 m., Mar. 16, 1950.

Eucharis horsmannii (Bak.) Traub, *comb. nov.* Syn.—*Plagiolirion horsmannii* Bak., Gard. Chron. ii (1883) 38.

Eucharis tenera (Bak.) Traub, *comb. nov.* Syn.—*Calliphruria tenera* Bak. Amaryll. 112. 1888.

Eucharis sanderi subsp. *multiflora* (Bak.) Traub, *comb. nov.* Syn.—*Eucharis sanderi* var. *multiflora* Bak., Bot. Mag. 111: pl. 6831-B. 1885; Amaryll. 111. 1888.

Hymenocallis duvalensis Traub, *sp. nov.* Foliis 3 vel 4 usque ad 56 cm. longis, partibus superioribus linearibus, supra mediam 1.7 cm. latis, basi usque ad 1 cm. angustatis; umbella biflora; tubo tepalorum 5.5—6 cm. longo; segmentis tepalorum 7 cm. longis linearibus 3—4 mm. latis; cupula staminali 2.8—3 cm. longa; filamentis 1.8—2 cm. longis.

Bulb ovate, 3.5—4 cm. long, 2.5 cm. in diam., bulb-neck 6.5—8 cm. long, 1.5 cm. in diam., tunics brown. *Leaves* 3—4, up to 56 cm. long, linear in upper part, 1.3—1.5—1.7 cm. wide above the middle, narrowing toward the base, 1 cm. wide (base), apex bluntly acute. *Scape* 49—50 cm. long, slender. *Spathe* 2-valved, 3.3 cm. long, acute. *Umbel* 2-flowered. *Ovary* sessile, 8—9 mm. long, 5 mm. in diam.; ovules 2—3 per locule. *Tepaltube* 5.5—6 cm. long. *Tepalsegs* 7 cm. long; linear; 3—4 mm. wide, acute. *Staminal cup* 2.8—3 cm. long. *Filaments* 1.8—2 cm. long; anthers 1.4 cm. long, introrse, upright. *Style* overtopping the stamens; *stigma* capitate, minute.

Holotype: *G. F. Weber,* s. n. 4-29-28, Fairbanks, Fla., swamp (FLAS Nos. 6296 and 6297); Isotype—*Lillian Arnold & E. West,* s. n. Apr. 2, 1935, along stream in Hogtown swamp, (FLAS two sheets 6301 & 6302); & Paratypes: *J. R. Harris* C21135, St. Marys River, Ga., May 1. 1921, US No. 143572; *R. M. Harper,* Chatham County, coastal plain, Apr. 30, 1904, US No. 511197; *Chapman Herbarium* s. n. Apr. 1892, Apalachicola, Fla. U. S. No. 784926; *N. C. Fassett* no. 21162, Apr. 21-22, 1941, Escambia County, Fla., east of Pensacola, U. S. No. 1898650.

Notes.—In reviewing the genus *Hymenocallis* Salisb., in the southeastern United States, it was noted that a distinct species in s. e. Georgia and n. e. Florida had in the past apparently been included in a wider concept for *H. rotata* (Ker-Gawl.) Herb. This species is quite distinct and has been named in honor of Duval County, Florida.

Hymenocallis limaensis Traub, *sp. nov.* Parte ⅔ superiore foliorum 1.5—1.9 cm. lata, foliis deorsum angustatis; scapo ca. 28 cm. longo, gracili; spatha lanceolata usque ad 5.5 cm. longa; umbella uniflora; pedicellis 5 mm. longis; tubo tepalorum 4.6 cm. longo; segmentis tepalorum 5.7—6 cm. longis; cupula staminali 2.6 cm. longa infundibuliformi; filamentis 2.5 cm. longis; stigmate breviter 3-lobato.

Bulb 4.3 cm. long, 2.8 cm. in diam., tunics brown. *Leaves* about 3, sheathing below, 1.5—1.9 cm. wide in upper ⅔, acute, narrowing below. *Scape* about 28 cm. long (in specimen), but may be longer; slender. *Spathe* lanceolate, up to 5.5 cm. long, membranous. *Umbel* 1-flowered. Pedicel 5 mm. long. *Ovary* 6 mm. long, 4 mm. in diam. *Tepaltube* 4.6 cm. long, slender. *Tepalsegs* 5.7—6 cm. long, narrow-linear. *Staminal cup* 2.6 cm. long, funnel-shaped. *Filaments* about 2.5 cm. long. *Style* overtopping the tepalsegs; stigma shortly 3-lobed.

Holo-nomenifer (type): Mr. and Mrs. J. N. Rose No. 18634 (US 1319866), flowered in Washington, D. C. greenhouses in 1926 from bulbs collected in the vicinity of Lima, Peru, above Santa Clara.

Hymenocallis sinaloaensis Traub, *sp. nov.* Umbella 2—5-flora; ovario sessili, ovulis per loculam 2; tubo tepalorum 6—7 cm. longo gracillimo; segmentis tepalorum angustissimis linearibus 6.6 cm. longis; cupula

staminali 1.6—1.7 cm. longa; filamentis 3.2 cm. longis; stigmate minuto capitato.

Scape slender; umbel 2—5 flowered; ovary sessile, 7 mm. long, 4 mm. in diam.; ovules 2 per cell; tepaltube 6—6.2—6.8—7 cm. long, very slender; tepalsegs very narrow, linear, 6.6 cm. long; staminal cup 1.6—1.7 cm. long; filaments 3.2 cm. long; style overtopping the stamens; stigma minute, capitate.

Holo-nomenifer (type): J. G. Ortega no. 4176 (US 1083825), La Cruz, State of Sinaloa, Mexico, 1921.

Hymenocallis guatemalensis Traub, *sp. nov.* Foliis loratis sub anthesi immaturis usque ad 4 cm. latis; scapo 19—23 cm. longo; spatha lanceolata 5 cm. longa; umbella 5—7-flora; ovulis per loculam 2; tubo tepalorum 8.2—8.4 cm. longo; segmentis tepalorum anguste linearibus 8.2—8.7 cm. longis; cupula staminali 2.5 cm. longa; stigmate capitato.

Bulb globose, 5 cm. long, 4.9 cm. in diam., bulb-neck 2.5 cm. long, 2.1 cm. in diam., tunics brown. *Leaves* immature at flowering time, about 15 cm. long, lorate, acute, up to 4 cm. wide. *Scape* 19—23 cm. long. *Spathe* membranous, narrow, lanceolate, acute, or truncate, 5 cm. long. *Umbel* 5—7-flowered. *Ovary* sessile, 1.2 cm. long, 5 mm. in diam., ovules 2 per cell. *Tepaltube* 8.2—8.4 cm. long. *Tepalsegs* narrow-linear, 8.2—8.7 cm. long. *Staminal cup* 2.5 cm. long. *Style* overtopping stamens; stigma capitate.

Holonomenifer (type): H. Pittier No. 126 (US 472779), Apr. 19, 1905, along the shore of Lake Amatitlan, alt. 1250 m., Guatemala.

Narcissus tazetta subsp. *chinensis* var. *pleniflorus* Traub, *var. nov.*—A forma typica speciei floribus plenis et planta minus valida recedit. A double form *N. tazetta* subsp. *chinensis*. Holotype: Traub #135 (TRA), 11-16-50.

Tristagma uniflorum f. *pauciflorum* Traub, *forma nov.*—A forma typica speciei umbella 2—3-flora recedit.

Hymenocallis floridana subsp. *amplifolia* Traub, *subsp. nov.* A subspeciei typica foliis 2.6—3.5—3.8—4—4.2 cm. (nec. 0.8—1—1.3—1.5—1.8—2 cm.) latis recedit. *Leaves* 2.6—3.5—3.8—4—4.2 cm. wide as contrasted with 0.8—1—1.3—1.5—1.8—2 cm. wide in subsp. *floridana*. Holotype (holonomenifer): F. West, A. N. Tissot & W. B. Tisdale, s.n. May 11, 1935; FLAS 10473 + 10474.

Hymenocallis galvestonensis subsp. *angustifolia* Traub, *subsp. nov.* A subspeciei typica foliis 1.5—1.8—2 cm. (nec. 2.3—2.6—2.8—3—3.2—3.5—3.8 cm.) latis recedit. *Leaves* 1.5—1.8—2 cm. wide as contrasted with 2.3—2.6—2.8—3—3.2—3.5—3.8 cm. wide in subsp., *galvestonensis*. Holotype (holonomenifer): Biltmore Herbarium H/60, Mobile, Ala. Apr. 24. 1899; US No. 980051.

Hymenocallis bolivariana Traub, *sp. nov.* This plant is similar to *Hymenocallis bistubata* Herb. (1844)—See also Sealy, Kew Bull. 239. 1954—in the length (somewhat longer than 5 cm.) and type of the tepaltube, but differs from it in the type of the leaves which are more or less strap-shaped and only 5.8 cm. wide above the middle, narrowed to 2.3 cm. wide at the base, whereas they are subpetiolate, 10 cm. wide in *H. bistubata*—which is more than 4 cm. wider than in our plant. In

addition, our plant has a shorter scape, slightly longer tepaltube and longer tepalsegs. Apparently, this plant from Venezuela cannot be equated with *H. bistubata,* and it is named for the Liberator of South America: *Hymenocallis bolivariana* Traub, *sp. nov.*

Foliis loriformibus supra mediam 5.8 cm. latis; umbella 8-flora; ovario sessili; tubo tepalorum usque ad 14.5 cm. longo; segmentis tepalorum 12 cm. longis; cupula staminali 5.5 cm. longa; filamentis 3—3.2 cm. longis.

Leaves strap-shaped, 5.8 cm. wide above the middle, narrowing to 2.3 at the base, apex acute to bluntly acute, 34—35 cm. long. *Scape* above 28 cm. long (preserved only in part). *Spathe* about 6.5 cm. long, ovate, acute. *Umbel* 8-flowered. *Ovary* sessile, oblong, 1.3 cm. long, 8 mm. in diam., ovules 5 per locule. *Tepaltube* 14.5 cm. long. *Tepalsegs* 12 cm. long, linear, 6 mm. wide. *Staminal cup* 5.5 cm. long, tubular for 4 cm. below, funnel-shaped above. Filaments 3—3.2 cm. long. *Anthers* extrorse, versatile. *Style* overtopping the stamens by 3 cm. Holonomenifer: F. D. Smith 182 (US 2121420) sheets 1 & 2, June 6, 1950, Caicara, Monagas, Venezuela.

Hymenocallis repanda Otto & Dietrich, *emend.* Traub. *Hymenocallis repanda* Otto & Dietrich, Allg. Gartenz. 11: 123.. 1843; Sealy, Kew Bull. 240. 1954.

Bulb globose, about 7.5 cm. long. *Leaves* broad-lance-strap-shaped, acute, up to 60 cm. long, 7.5 cm. wide, somewhat upright, flat, rather thin, light green, many-nerved. *Scape* about 60 cm. long, compressed, with sharp edges, upright. *Spathe-valves* 2, acute, whitish, about 5 cm. long. *Umbel* about 10-flowered. *Ovary* sessile, trigonous, 1 cm. long, wider than the tepaltube. *Tepaltube* 10 cm. long, slender, greenish below, whitish above. *Tepalsegs* reflexed, as long as or almost as long as the tepaltube, linear, acute, about 4 mm. wide, the base adnate to the base of the staminal cup, snow white. *Staminal cup* pure white, about 5 cm. long, funnel-shaped, about 2.5 cm. across at the apex, the margins between the filaments slightly wavy. *Filaments* a good 5 cm. long, a little longer than the staminal cup, filiform, green; anthers (versatile), attached below the middle, very narrow-linear, arcuate, (pollen) orange. *Style* overtopping the anthers by about 1.25 cm.

Sealy (1954) indicated that it was described from a "cultivated plant with leaves like those of the *caribaea*-alliance, and flowers which agree with those of *H. latifolia* except for the staminal cup which is described as almost 5 cm. long, whereas in *H. latifolia* the cup does not exceed 3 cm." This is correct, excepting that Otto & Dietrich (1843) indicate that in the case of the tepalsegs, the bases are adnate to the base of the staminal cup which places it in the *littoralis*-alliance.

Eucharis butcheri Traub, *sp. nov.* Foliis 2 petiolatis, laminis ellipticis 11 cm. latis; umbella uniflora; floribus albis; tubo tepalorum parte 4/5 inferiore viridi; pedicellis 8 mm. longis; tubo tepalorum recto 4.8 cm. longo sursum gradatim ampliato; segmentis tepalorum ovatis 2.7 cm. longis 1.6—2.2 cm. latis; cupula staminali nulla; filamentis 8 mm. longis, dente 2 mm. longo basi utrinque ornatis; stigmate late 3-lobato.

Holotype: J. N. Giridlian s. n. (= #1051 TRA), 8—10—66, grown at Arcadia, Calif. from bulbs collected by Harry P. Butcher in Panama.

Section *Caulorhizideum* Traub, *sect. nov.*, Genus *Allium L.* Bulbis caespitosis in rhizomatibus iridoidibus productis; vestimentis bulbi striatis, cellulis elongatis serialibus verticalibus regularis et fibris persistentibus parallelis formatis; foliis planis; ovario rarissime cristato. Type: *Allium validum* S. Wats.

Section *Lophioprason* Traub, *sect. nov.*, Genus *Allium* L. Ovario plerumque cristato saepe manifeste cristato; vestimentis bulbi sine reticulo fibroso persistenti. Type: *Allium sanbornii* Wood.

Subsection *Cernuae* Ownbey ex Traub, *subsect. nov.*, Sect. Lophioprason Traub, Genus *Allium* L. Foliis per scapum ultra 2; ovario cristato; bulbis plerumque elongatis. Type: *Allium cernuum* Roth.

Subsection *Falcifoliae* Ownbey ex Traub, *subsect. nov.*, Sect. *Lophioprason* Traub, Genus *Allium* L. Foliis per scapum 2 (vel 1) saepe planis vel falcatis; cristis ovarii plerumque debiliter evolutis; scapo plerumque complanato; seminibus saepe per modam volutatim despersis. Type: *Allium falcifolium* Hook. & Arnott.

Subsection *Sanbornae* Ownbey ex Traub, subsect. *nov.*, Sect. *Lophioprason* Traub, Genus *Allium L.* Folio per scapum solitario (praeter species una foliis per scapum duis); ovario manifeste 6-cristato, partibus saepe laceratis. Type: *Allium sanbornii* Wood.

Subsection *Acuminatae* Ownbey ex Traub, *subsect. nov.*, Sect. *Lophioprason* Traub, Genus *Allium* L. Species cellulis interioribus vestimentorum interiorum bulbi incrementum secundarium efferentibus plerumque designata; foliis per scapum 2—4, rare 1; ovario plerumque inconspicue cristato. Type: *Allium acuminatum* Hook.

Subsection *Campanulatae* Ownbey ex Traub, *subsect. nov.*, Sect. *Lophioprason* Traub, Genus *Allium* L. Species cellulis interioribus vestimentorum interiorum bulbi incrementum secundarium efferentibus plerumque designata; foliis per scapum plerumque duis; ovario manifeste 6-cristato. Type: *Allium campanulatum* S. Wats.

TRAUB: AMARYLLID NOTES, 1967—continued on page 110.

AMARYLLIDS FLOWERED IN SOUTHERN CALIFORNIA

Hamilton P. Traub

During the year 1966, various amaryllids flowered at the home of the writer in La Jolla, California. Snap-shots were obtained of some of these and are reproduced with this brief article.

CRINUM BRASILENSE

This species was described in the 1966 PLANT LIFE (page 45). It bloomed again on July 4, 1966 when the snap-shot was obtained. As grown in southern California, the leaves appear as a sub-rosette as shown in Fig. 27. It is a beautiful plant, with fragrant flowers, but the flowers are not long lasting.

Fig. 27. **Crinum brasilense** as flowered at La Jolla, Calif., July 4, 1966.

CRINUM LUTEOLUM

The two forms of *Crinum luteolum* which were kindly supplied by Mr. William Morris of Australia, again bloomed in 1966 at two different times. The form with relatively long tepalsegs (Fig. 28) is somewhat superior to the one with shorter, wider tepalsegs. During the first blooming period, the plants in each case were selfed, and only one or two seeds were obtained. During the second flowering period, the two forms were crossed reciprocally with surprising results as shown in Table 1.

Table 1. Seeds obtained by crossing two forms of **Crinum luteolum** reciprocally in 1966. A single scape was involved in each case.

	Number of seeds per fruit	Total
Form with short tepalsegs	13—15—13—14—10—11—9—10—10—8—1	114
Form with longer tepalsegs	15—6—6—5—1—3—3	39
	Grand Total	153

Thus it will be noted that when different seedlings are cross-pollinated a large number of seeds were obtained. This makes it possible to increase this beautiful plant very rapidly.

Fig. 28. Crinum luteolum Traub & Hannibal, a form with relatively long tepalsegs, as grown at La Jolla, Calif., 1966.

CHLIDANTHUS X TRAUBII

It has been reported before that *Chlidanthus fragrans* is not a dependable bloomer. When grown in a semi-arid location, it produces scant foliage and 2-flowered scapes, but may skip some seasons. When grown with normal summer watering, it produces abundant leaves and the umbels may be 2—3—4—5-flowered. After a few years it makes a large clump with many long leaves and flowering declines to a few flowering umbels. Thus, it is an unsatisfactory plant unless one can work out a culture which discourages rapid formation of offsets. Some

have suggested planting deeply but the writer has not experimented with this procedure.

Chlidanthus boliviensis is a plant from the semi-arid mountains in Bolivia and gradually declines under ordinary garden culture, and finally dies. However, before it died, the writer crossed it with *Chlidanthus fragrans* and obtained a very vigorous hybrid intermediate between the two species. This hybrid can be grown under ordinary garden culture and blooms each season without forming large clumps. It solves the problem for those who wish to have a fragrant *Chlidanthus* in their garden. It sets some seeds when hand pollinated so that rapid increase can be obtained.

Fig. 29. **Chlidanthus x traubii** Moldenke as flowered at La Jolla, Calif., 1966.

HYMENOCALLIS VELARDEI

Hymenocallis velardei blooms each season in the garden (July), sometimes again in the late fall or winter. As the illustration (Fig. 30)

shows, it is not a brilliant success as a flowering plant, but it should be useful in making additional hybrids with *Hymenocallis narcissiflora* and *H. amancaes* or even other *Hymenocallis* species. Such hybrids should be fine companions to the well-known *Hymenocallis* x *festalis* Worsley (1905).

Fig. 30. **Hymenocallis velardei** Traub, as flowered at La Jolla, Calif., July 2, 1966.

EARLY FORM OF BRUNSVIGIA X PARKERI

A few years ago, Mr. William Morris of Australia kindly sent a large bulb of an amaryllid resembling *Brunsvigia josephinae,* but with somewhat larger flowers. He asked that it be identified. When it flowered in 1965 and again in 1966 (fig. 31) it was at once evident that it represented an early form of *Brunsvigia* x *parkeri* which was illustrated in a past issue of Plant Life (see Traub & Hannibal, Plant Life 16: 39-62. 1960). The color of the flower is a beautiful deep pink and the presence of fragrance proves that *Brunsvigia rosea,* the Cape Belladonna is one of its ancestors. This is a beautiful addition to any garden with a Mediterranean type of climate. It has to be kept relatively dry, with only occasional watering during the summer, and copious watering during the growing season in winter.

Fig. 31. **Brunsvigia x parkeri,** one of the original hybrids between **Brunsvigia rosea** and either **B. josephinae** or **B. grandiflora.** Its hybrid nature is given away by the fragrance inherited from **B. rosea.** Photo by Mrs. Marjorie Anthes.

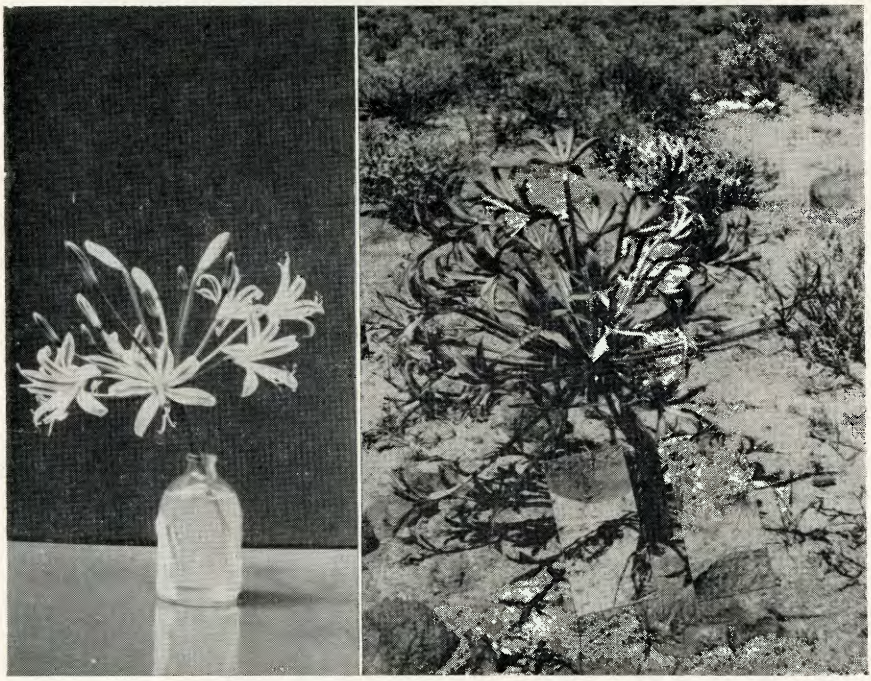

Fig. 32. **Left, Brunsvigia grandiflora,** from Eastern Cape Province; and **right, Brunsvigia radulosa,** from central (Great) Karoo of Cape Province. Photos by Leon Boshoff-Mostert.

BRUNSVIGIAS IN THEIR NATIVE HABITAT

The following subjects did not flower in the writer's garden, but represent illustrations (Fig. 32) sent in by Mr. Leon Boshoff-Mostert who observed them in their native habitat in South Africa. At the left is shown *Brunsvigia grandiflora*, with umbels up to 30-flowered. It is native to the Eastern Cape Province from Uitenhange and Alexandria Division eastward to Natal. At the right is shown *Brunsvigia radulosa* which is native to Bechuanaland, the central (Great) Karoo of Cape Province, Orange Free State, Lesotho, Natal and Transvaal.

ON THE KARYOLOGY AND PHYLOGENY OF TULBAGHIA

ROUX WILSENACH, *Dept. of Botany, University of the Witwatersrand, Johannesburg, South Africa*

According to previous reports (Whitaker and Flory, 1955; Riley and Hoff, 1958; Mookerjea, 1955; Sharma, 1956; Flory, 1955 and Smith and Flory, 1965,) the basic chromosome number of *Tulbaghia* is 6, but both diploid and tetraploid forms have been reported. In the present report 6 was again found to be the basic chromosome number, but greater variation was recorded.

Tulbaghia and *Agapanthus* are commonly grouped in one tribe, but Traub (1963) separated them completely, grouping *Tulbaghia* with genera like *Allium* in the tribe *Allieae*. In the present study some suggestions are made on the phylogeny of this genus.

MATERIAL AND METHOD

Most samples were collected in their natural habitat, their root tips were fixed in Craf for at least 12 hours and subsequently transferred to 70% alcohol, followed by dehydration and paraffin wax embedding. Sections of root tips were 14-20 microns thick.

Sections were stained in a 1% aqueous solution of Crystal Violet, following the method of Smith (1934). Drawings were made with the aid of a netmicrometer in the eyepiece.

RESULTS

The longest chromosome pair is often over 20 microns in length and the shortest over 10 microns. It is often difficult to identify the different chromosome pairs (see eg. Chromosomes B, C, D and E of *T. alliacea*).

In the idiograms the chromosomes are generally arranged from the longest to the shortest, but exceptions occur (eg. chromosome C is occasionally longer than chromosome D) in order to facilitate comparison of the idiograms of the different species.

1. *Tulbaghia alliacea* L. f. . . . *2n=12* (collected in Peddie district, Cape Province). This species has a very symmetric karyotype, there is

little variation in length of the chromosomes and all the pairs have sub-median centromers. No secondary constrictions could be identified; see Fig. 33 (1) and Fig. 35 (13).

2. *Tulbaghia ludwigiana* Harv. Cultivated. *2n=12.* The karyotype of this species is very similar to that of *T. alliacea* as described above. Occasionally tetroploid cells are noticed amongst the normal diploid cells in the root tips. These tetraploid cells are bigger than the adjoining diploid cells; see Fig. 33 (2, 3) and Fig. 35 (14).

3. *Tulbaghia violacea.* Baker *2n=12* (Collected in the Alice district, Cape Province). Chromosomes A, B and D have sub-median centromeres whereas chromosome C has a proximal arm less than a third of the length of the distal arm (sub-terminal centromere), chromosome E has a median centromere and chromosome F has a secondary constriction in addition to the sub-median centromere; see Fig. 33 (4) and Fig. 35 (15).

4. *Tulbaghia galpinii.* Schltr. *2n=12* (Collected in the Alice district, Cape Province). This idiogram is very similar to that of *T. violacea* as described above, but chromosome C has a much longer proximal arm and chromosome F has no secondary constriction and a very short proximal arm; see Fig. 33 (5) and Fig. 35 (16).

5. *Tulbaghia fragrans,* Verdoorn. *2n=12.* This species was collected at three places: Cultivated in Pretoria, cultivated in Johannesburg, and in its natural habitat at the Letatsa river. The idiograms were practically identical.

Three chromosomes (A, B and F) have median centromeres and the other three have sub-median centromeres. No secondary constrictions could be identified.

In one root tip of the plant cultivated in Pretoria all the dividing nuclei showed 13 chromosomes. Two chromosomes (or chromosome derivatives) were much shorter than the others (labelled fr. 1 and fr. 2 in Fig. 33 (7)).

In one of these a centromere could be identified, but not in the other. The most apparent explanation of this phenomenon is that one of the long chromosomes (perhaps chromosome A) fragmented close to the centromere. Riley and Hoff (1958) recorded such an occurrence in *T. violacea* also. This would mean that the one fragment was without a centromere and one would expect such a fragment to become lost from some nuclei, but this was not the case in this root tip. Lima-de-Faria (1955) has demonstrated in rye that such a fragment with a deleted centromere can be capable of movement at anaphase and it will then divide regularly. This seems to be the explanation also in the anomalous root tip here observed; see Fig. 33 (6, 7) and Fig. 35 (17).

6. *Tulbaghia leucantha,* Baker. *2n=12.* From Alberton district, Transvaal.

The idiogram of this species is very similar to that of *T. violacea* as described above, but no secondary constrictions could be observed; see Fig. 33 (8) and Fig. 35 (18).

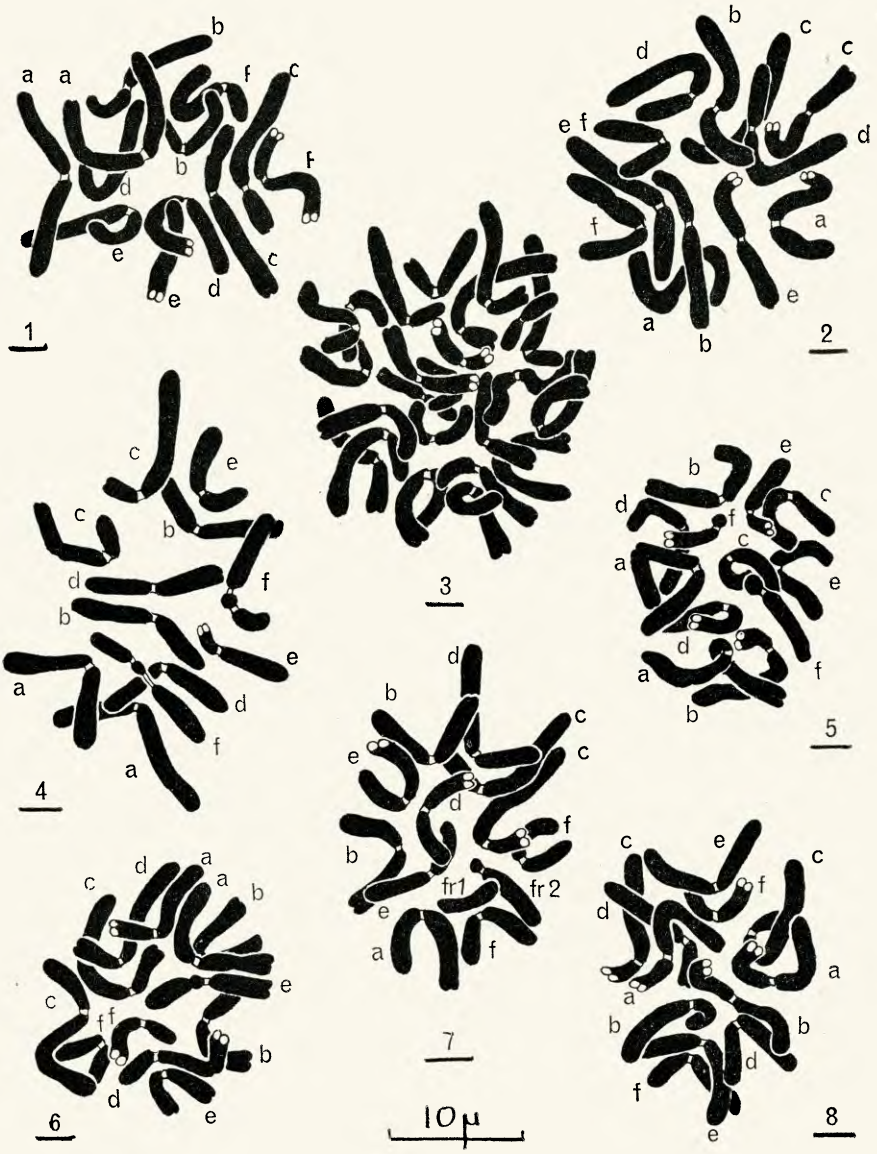

Fig. 33. **Tulbaghia** chromosomes: **1.: Tulbaghia alliacea** 2n=12; **2.: T. ludwigiana** 2n=12; **3.: T. ludwigiana,** an occasional tetraploid cell; **4.: T. violacea,** 2n=12; **5.: T. galpinii** 2n=12; **6.: T. fragrans** 2n=12 (from Letaba); **7.: T. fragrans** (cultivated), showing two fragments **fr. 1** and **fr. 2; 8.: T. leucantha** 2n=12.

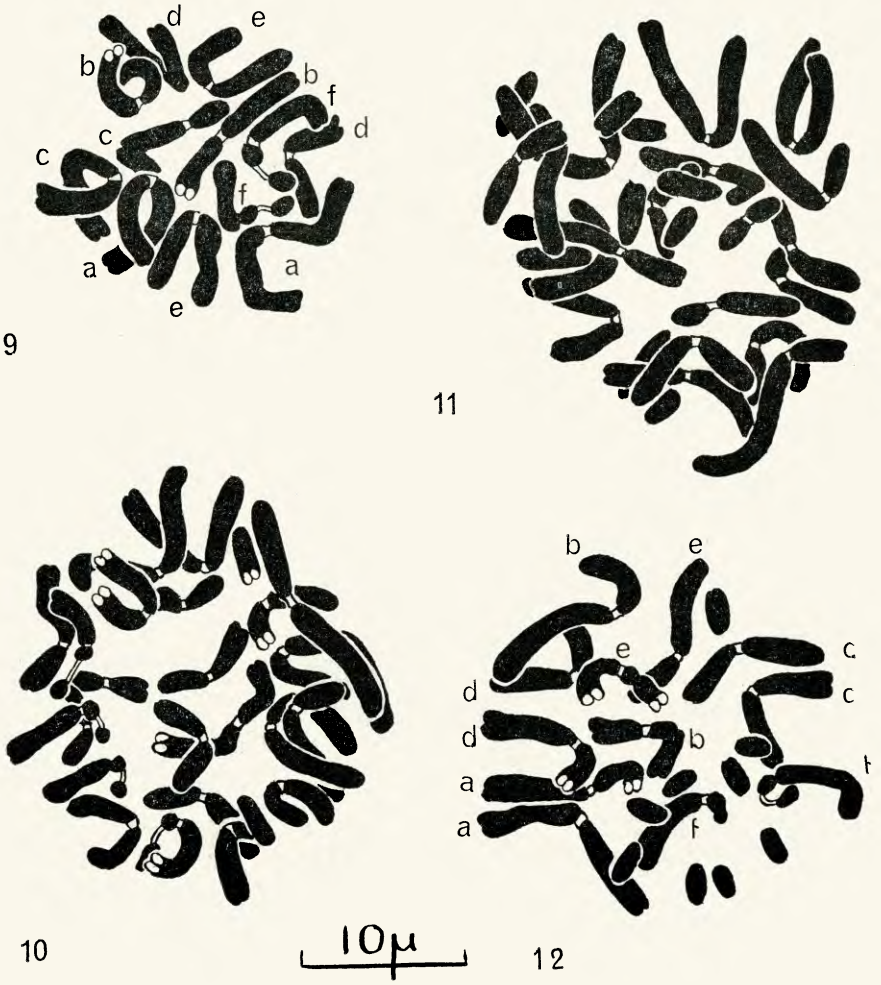

Fig. 34. **Tulbaghia** chromosomes: **9.: Tulbaghia** species collected at Linmeyer, 2n = 12; **10.:** same species, showing tetraploid cell in tetraploid root of a diploid plant; **11.: Tulbaghia** species collected at Nelspruit, 2n = 28, interpreted as a tetraploid with 4 extra chromosome derivatives or B chromosomes; **12.: Tulbaghia** species collected at Hammanskraal, 2n = 12, but in addition to these there are 9 B chromosomes.

7. *Tulbaghia* species collected at Linmeyer, Transvaal. *2n=12* Chromosomes A, B and E have median centromeres, the others have sub-median centromeres. Chromosome F had a very pronounced secondary constriction in the proximal arm. This constriction is often so pronounced that the satellite is connected to the rest of the chromosome by rather long slender thread.

On a diploid plant one root was found in which all the cells were tetraploid; see Fig. 34 (9, 10) and Fig. 35 (19).

8. *Tulbaghia* species collected at Nelspruit, Transvaal. *2n=28.*

No idiogram could be prepared because the chromosome complex is very difficult to analyse. In contrast to most of the other species investigated some (±8) chromosomes were very much shorter than the rest.

At telophase four nucleoli were formed in the nuclei; see Fig. 34 (11).

9. *Tulbaghia* species collected at Hammanskraal. *2n=12+8 or 9 B chromosomes.*

The idiogram of this species is quite similar to that of the Linmeyer specimens, but in addition to the normal 12 chromosomes there were usually 9 (occasionally 8) much smaller chromosomes. The centromeres could not be identified with any certainty in these small chromosomes.

These chromosomes have been interpreted as B chromosomes, because they were much smaller than the others and because they occur in both odd and even numbers (Darlington, 1956). Their behaviour was not studied at meiosis to determine whether they paired or not with the A's (according to Darlington B chromosomes don't pair with A's at meiosis), with the result that their description as B chromosomes must be considered as a tentative one only; see Fig. 34 (12) and Fig. 35 (20).

DISCUSSION

The genus *Tulbaghia* is in need of revision. Some species are well defined, but it is often difficult to identify plants. The species *T. leucantha,* for example, differs from *T. acutiloba* mainly in the colour of the perianth which is white in *leucantha* and green in *acutiloba.* In one community near Alberton all the possible variations in perianth colour were found. These plants were tentatively named *"T. leucantha".*

The idiograms of *T. violacea, T. fragrans, T. leucantha, Tulbaghia* from Linmeyer, *T. alliacea* and *T. ludwigiana* were remarkably similar and all have 12 somatic chromosomes. Only minor structural chromosomal changes could have been involved in speciation in these plants.

Polyploid cells have been found in normal plants by Mookerjea (1955), and by the present author in *Tulbaghia ludwigiana.* In the plants collected at Linmeyer one tetraploid root was found. The *Tulbaghia* collected at Nelspruit was a tetroploid, but there are apparently also four fragments or B chromosomes in this complex.

Smith and Flory (1965) reported for *T. leucantha* from South Africa 12 as the diploid number and 24 for plants of the same species collected

in Rhodesia. In the plants collected in South Africa in the present study 12 was also reported as the diploid number.

For *T. ludwigiana* Smith and Flory (1965) reported 2n=24 as the chromosome number. They suggested the possibility that *T. ludwigiana* has been derived from *T. alliacea,* but they mention also the possibility that the plant could have arisen by allopolyploidy. In the present study 2n=12, has been reported for *T. ludwigiana,* but occasional tetraploid cells were also recorded. *T. ludwigiana* must there-

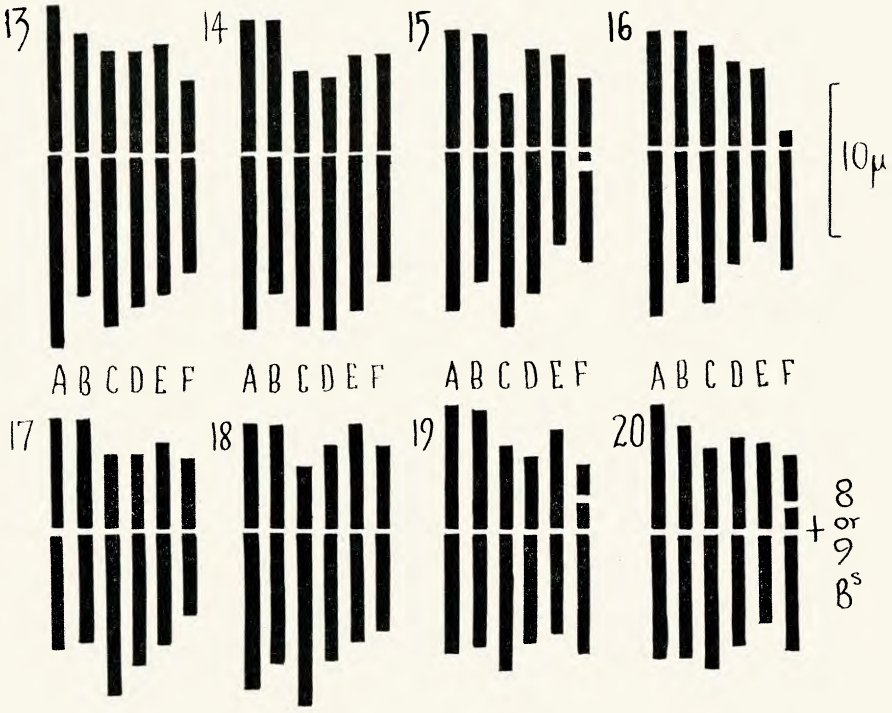

Fig. 35. Idiograms for the species: **13.: Tulbaghia alliacae; 14.: T. ludwigiana; 15.: T. violacea; 16.: T. galpinii; 17.: T. fragrans; 18.: T. leucantha; 19.: T.** species (Linmeyer); **20.: T.** species (Hannanskraal).

fore also be considered as a species with two levels of ploidy as was reported for *T. leucantha* by Smith and Flory (1965).

Polyploidy thus occurs in: (a) isolated cells of one plant; (b) in whole roots of some plants; (c) in some communities of some species; (d) some species appear to be polyploid (eg. the species from Nelspruit).

Smith and Flory (1965) did remark on the presence of SAT chromosomes in *Tulbaghia* and their absence in the genus *Agapanthus.* This must not be considered as an important difference, because no secondary

constrictions could be observed by the present author in six of the taxa here investigated, whereas they were most conspicuous in other species of the same genus.

Smith and Flory (1965) found two sec. constrictions in *T. alliacea* (one of which was very conspicuous) but the present author could not observe any in this species. These differences must be due to the fact that the secondary constrictions are often very inconspicuous and that these inconspicuous secondary constrictions may become clear in some pretreatments and different fixations. *T. fragrans,* for example, has no apparent secondary constriction when fixed in Craf, but the present author has often used this as class material for students (fixing in Carnoy) and it is then occasionally possible to see a secondary constriction in the typical position for this genus is very close to the centromere in the proximal arm. The absence of secondary constrictions can therefore only be assumed after various fixatives and pretreatments were tried.

B chromosomes and/or fragments were also recorded in the present study, and in one case this was also recorded in a polyploid. Variation in the basic chromosome number in this genus, may be due to this phenomenon, but this aspect will involve a detailed study. In plants of *T. acutiloba* the present author found 14 somatic chromosomes, but because it was impossible this far to find out whether the extra two were mere fragments or extra chromosomes the result was not reported in detail in this account.

ON THE PHYLOGENY OF TULBAGHIA

Hutchinson (1934) and Pax and Hoffman (1930) grouped *Tulbaghia* and *Agapanthus* in one tribe. Mookerjea (1955) saw no karyological evidence against grouping them together and although Smith and Flory (1965) did not commit themselves, they pointed out that karyological and morphological differences are present between the two genera.

Traub (1963) has separated them completely, bringing *Tulbaghia* much closer (in fact in the same tribe) with *Allium.* The present author is in agreement with Traub (1963) that *Tulbaghia* and *Agapanthus* should not be considered as closely related, because of: (a) chromosome size differences; (b) differences in basic number; (c) the presence of a corona in *Tulbaghia.*

In a description of *Cryptostephanus vansonii* Verdoorn (1943) remarked that she had to consider both the genera *Tulbaghia* and *Clivia* (*Tulbaghia* because of the presence of a corona, and *Clivia* because of its remarkable vegetative resemblance to this plant.) It is therefore not unreasonable to suggest that *Cryptostephanus* occupies an intermediate position between *Tulbaghia* and *Clivia.* Gouws (1949) included *Cryptostephanus* and *Clivia* in one tribe on karyological data, and so did Traub (1963). The suggestion that *Tulbaghia* may be more closely related to *Cryptostephanus* is however a new one.

Cryptostephanus has 24 chromosomes and when the idiogram of Gouws is studied a striking feature is noticel: the "haploid" set can be arranged into six pairs, four of which are almost identical. It thus seems possible that *Cryptostephanus* could have evolved from a 2n=12 ancestor by polyploidy. A possible relationship between the *Tulbaghia* and *Cryptostephanus* can be shown as in Fig. 36 (Diagram 1).

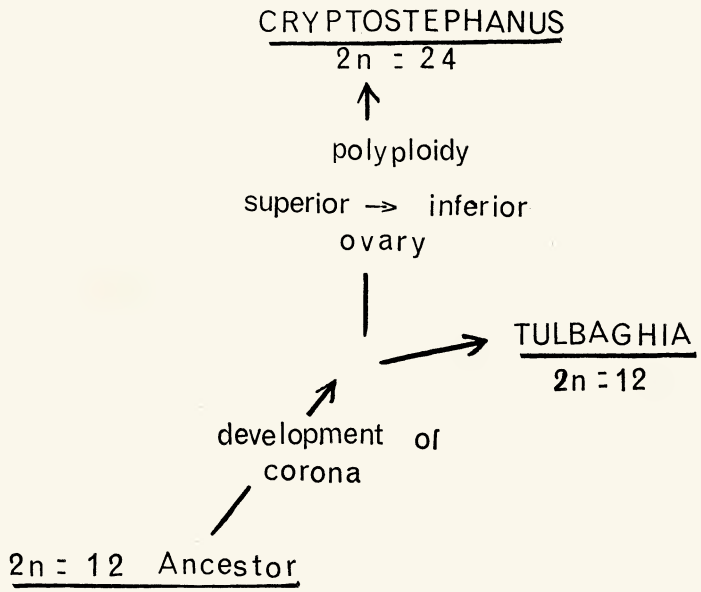

Fig. 36. Diagram 1.

SUMMARY

Twelve has been reported as the diploid chromosome number for eight taxa of *Tulbaghia* in this study, and this supports previous reports so that 6 can be assumed to be the basic chromosome number.

Polyploidy occurs quite commonly in this genus and can be seen in: (a) a few cells only; (b) in some roots of diploid plants; (c) in some individuals or communities; (d) in some species.

Fragments without centromeres have been recorded, and these apparently can move at anaphase.

B chromosomes have been recorded in some taxa. It was suggested that *Tulbaghia* and *Agapanthus* should not be included in the same tribe, and a hypothesis that *Tulbaghia* may be linked to *Cryptostephanus* by a common ancestry was offered.

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REGISTRATION OF NEW AMARYLLID CLONES

Mr. W. D. Morton, Jr., *Emeritus Registrar*
Mr. Edward F. Authement, *Registrar*
Mrs. Emma D. Menninger, *Associate Registrar*

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. This may be obtained at $2.50 prepaid from: Dr. Thos. W. Whitaker, Executive Secy., The American Plant Life Society, Box 150, La Jolla, Calif. Catalog of Hybrid Nerine Clones, 1882-1958, by Emma D. Menninger; and Catalog of Brunsvigia Cultivars, 1837-1959, by Hamilton P. Traub and L. S. Hannibal, were published in 1960 Plant Life, with additions to both in Plant Life 1961. In Plant Life 1961, the first edition of The Genus X Crinodonna was published which serves also as a catalog of cultivars. In Plant Life 1964, the first edition of "Catalog of Hybrid Amaryllis Cultivars, 1799 to Dec. 31, 1963" was published. Other catalogs of cultivated amaryllids are scheduled for publication in future issues.

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 addressed to Mr. Edward F. Authement, *Registrar,* 2214 Gallier St., New Orleans, Louisiana 70117. The registration fee is $2.00 for each clone to be registered. Make checks payable to AMERICAN PLANT LIFE SOCIETY.

NEW AMARYLLIS BREEDERS 1966

Abbrev.
Beck., E. M.—Mr. E. M. Beckham, 1452 Glenmore Ave., Baton Rouge, La.
Rob.—J. J. Robertson, 8218 Nelson St., New Orleans, La.
Pahls—Lydia C. Pahls, 3035 S.W. 15th St., Miami, Fla.
Schmidt—J. T. Schmidt, Rt. 1, Box 48, Prairieville, La.

AMARYLLIS CLONES REGISTERED IN 1966

EDWARD F. AUTHEMENT, *Registrar*

Registered by Mrs. Lydia C. Pahls, 3035 S.W. 15th St., Miami, Fla.

'Frank Pahls' (Pahls—1965), R; A-843, D-7; U-2fld; 17″h; fls.7″ diam; solid red, light streaks in throat; spr.

Registered by Mr. E. M. Beckham, 1452 Glenmore Ave., Baton Rouge, La.

'Salmon Halo' (Beck., E. M.—1966), R; A-844, D-5A; U-4fld; 23½″h; fls.7″ diam; jasper red (HCC-018/1), greenish throat blending to white midirbs, picotee edged; spr.

'Midget' (Beck., E. M.—1966), R; A-845, D-8; U-6fld; 15-16″h; fls. 3-3½″ diam; turkey red (HCC-721), slight whitish midrib halfway up segs.

Registered by J. J. Robertson, 8218 Nelson St., New Orleans, La.

'Maxine' (Rob.—1966), R; A-846, D-5A; U-4fld; 19″h; fls.7″ diam; blood red (HCC-820/1), glossy throat, greenish midrib on setsegs only.

Registered by Mr. Frederick B. Schmitz, Rt. 1 Box 438, Port Sulphur, La.

'Phoebe' (Schm.—1966), R; A-847, D-5A; U-3-4fld; 15″h; fls.7″ diam; vermilion (HCC-18/1) with pale green throat blending to white, minute vermilion spots each side of midribs; spr.

Registered by Ludwig & Co., Hillegom, Holland.

'Indian Orange' (Lud.—1966), R; A-848, D-5A; U-4fld; 28-30″h; Fls. 9″ diam; indian orange with a suggestion of azalea pink in middle of the petals; spr; de.

'Red Flag' (Lud.—1966), R; A-849, D-5B; U-4fld; 25-27″h; fls.8″ diam; orient red (HCC-819); spr.

'Red Lining' (Lud.—1966), R; A-850, D-5B; U-4fld; 24-26″h; fls.8″ diam; pure white, red edged, petsegs slightly red speckled; spr; de.

'Red Man' (Lud.—1966), R; A-851, D-8; U-5-7fld; 20″h; 5-6″ diam; scarlet, with slight darker throat; spr; de.

'The Alamo' (Lud.—1966), R; A-852, D-5A; U-4fld; 26-28″h; fls.8″ diam.: blood red with darker glossy throat; spr; de.

'Twinkling Star' (Lud.—1966), R; A-853, D-8; U-4-5fld; 20-22″h; fls.5-6″ diam; white, picotee edged; spr; de.

Registered by Mr. J. T. Schmidt, Rt. 1, Box 48, Prairieville, La.

'Manchac Peach' (Schmidt—1966), R; A-854, D-5B; U-4fld; 19″h; fls.7″ diam; peach pink to salmon pink, white midrib in two lower setsegs, white midrib bordered red in two upper setsegs; spr; de.

NEW HYBRID CYRTANTHUS CLONES

Registered by Aleck Korsakoff, 7634 Oriole St., Jacksonville, Fla. 32208

Cyrtanthus x *henryae* clone *'Meta'*. Named in honor of his wife. The flower color is fire red (HCC 15/2) outside of the tube, and brick red (HCC 16/2) inside the flare of the tepalsegs; scape about 10 inches long, pedicels 1¼ inches long.

Cyrtanthus x *henryae* clone *'Tanurochka'*. Named in memory of a childhood friend. The flower is porcelain rose (HCC 620) outside of the tube, and Delft rose (HCC 020/2) inside the flare of the tepalsegs, about ⅝-inch across the apex of the flower; scapes about 13 inches tall.

EUCHARIS KORSAKOFFII SP. NOV.

Hamilton P. Traub

In 1965, Mr. Lee Moore, of P. O. Box 504, Kendall, Florida and Casilla 498, Iquitos, Peru, the plant explorer, collected an amaryllid

Fig. 37. Lee Moore on expedition on which **Eucharis korsakoffii** was found at the Hierra Waterfalls, about 40 km. from the City of Moyobamba, Dept. of San Martin, Peru.

which turned out to be new to science. He has requested that it be named in honor of Mr. Aleck Korsakoff of Jacksonville, Florida.

The plant was found at an altitude of 1500 meters in deep shade at the base and sides of the banks by the waterfalls named Hierra, about 40 km. by foot from the city of Moyobamba in the Department of San Martin, Peru. (see Figs. 37 and 38). The bulbs were found growing in peaty soil or leaf mold in soft areas with good drainage usually between cracks in large rock formations on sides of cliffs.

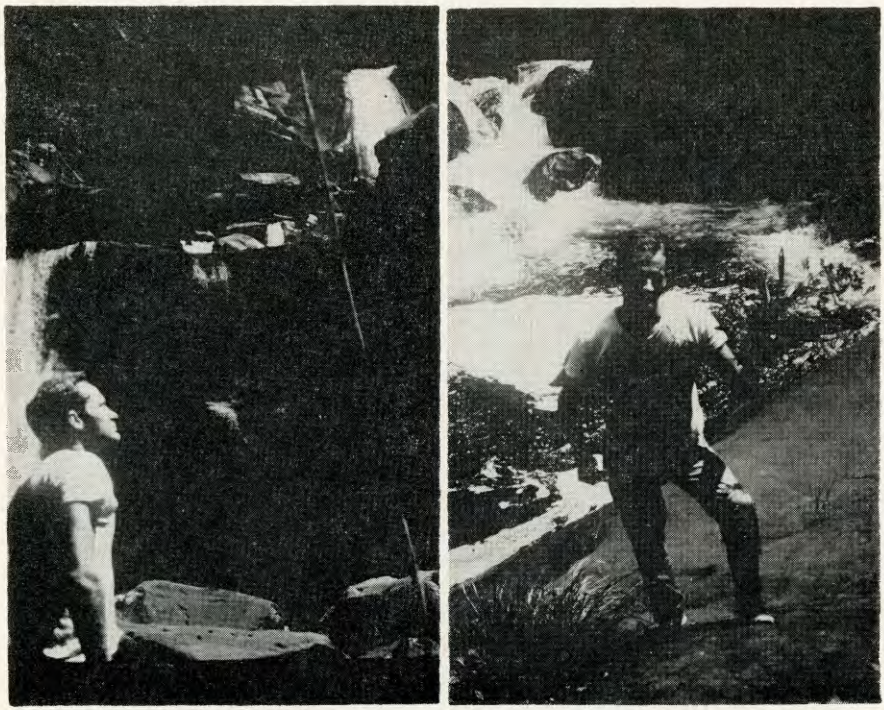

Fig. 38. **Left,** Hierra Waterfalls, where **Eucharis korsakoffii** was found by Lee Moore; **right,** Handful of the new species held by Lee Moore, after they were pulled from crevices in the rocks, about 40 km. from the City of Moyobamba, Peru.

Mr. Moore sent the bulbs to Mr. Aleck Korsakoff at Jacksonville, Florida, and to Mr. J. N. Giridlian, at Arcadia, California. Mr. Giridlian flowered it and sent a living specimen in flower to the writer. This was mounted as the holonomenifer (name bearer) specimen. The species has been named in honor of Mr. Aleck Korsakoff, the well-known plant enthusiast.

Eucharis korsakoffii Traub, **sp. nov.** Amaryllidac.

A E. fosteri laminis foliorum latioribus, per umbella plus floribus,

pedicellis longioribus, et tubo tepalorum breviore praecipue recedit. Habitat in Peruvia.

Bulb globose, 3 cm. long, 3.2 cm. in diam. *Leaves* petiolate, thick in texture, petioles slender, 5—10—15 cm. long; blades elliptic, 11—12—14.5—17.5 cm. long; 3.5—4—4.4—5 cm. wide, thick in texture. *Scape*

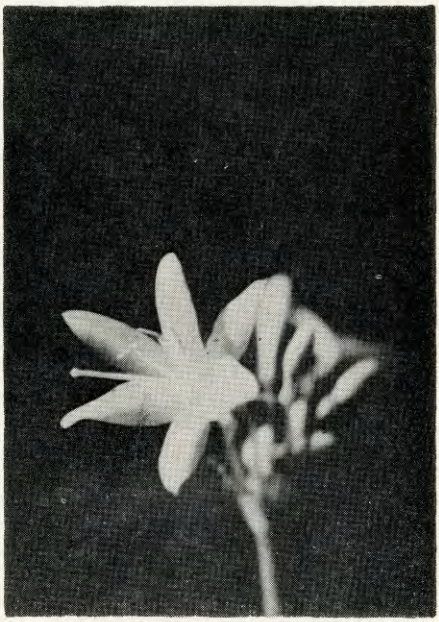

Fig. 39. Flower umbel of **Eucharis korsakoffii** Traub in its native habitat in Peru. Photo by Lee Moore.

up to 28 cm. long, slender. *Spathe* lanceolate, 2.5 cm. long. *Umbel* 11-flowered; flowers pure white. *Pedicels* slender, 4.4—4.6—5 cm. long at anthesis. *Ovary* 5 mm. long, 4 mm. in diam.; ovules about 3 per locule. *Tepaltube* 6 mm. long. *Tepalsegs* oblong, 1.8 cm. long, 6—8 mm. wide. *Stamens* 1.1 cm. long; anthers 4 mm. long. *Style* 2 cm. long, stigma trifid.

HOLONOMENIFER (name bearer): J. N. Giridlian s.n. = No. 1060 (TRA), cult. Arcadia, Calif., 7-16-66, from bulbs collected by Lee Moore at the Hierra waterfalls, about 40 km. from the City of Moyobamba, Dept. of San Martin, Peru.

Notes.—This species is related to *Eucharis fosteri* and is of interest to those interested in breeding the smaller statured *Eucharis.*

SUBSECTION **MEXICANAE** OF SECTION **AMERALLIUM**, GENUS **ALLIUM L.**

Hamilton P. Traub

Of the *Allium* species native to Texas, New Mexico and Arizona in which the bulbs *are not* inclosed in a persistent reticulum of fibers, but have thin membranous coats with sparse vertical veins, only (a) *Allium cernuum*—of the *Cernuae Alliance*—with white or pink flowers, and *conspicuously* 6-crested ovaries; and (b) *Allium kunthii (longifolium)*, *A.* glandulosum (and possibly *A. rhizomatum*)—of the *Kunthii* (longifolium) Alliance *—are reported as extending their ranges into Mexico. Thus, newly collected *Allium* species in the border area and in Mexico not agreeing with the four species mentioned, would be examined as to their status as possible additions to the two Alliances indicated, or possibly to other Alliances.

Thus matters stood when Dr. T. M. Howard started collecting *Allium* species in 1957 in the U. S.—Mexican border area, and also in Mexico, and more recently also into Guatemala. Of the 15 lots collected by Dr. Howard prior to 1967, ranging from southwestern Edwards County, Texas, to Nueva Leon, Durango, Hidalgo, Mexico State, Michoacan, Jalisco, San Luis Potosi, and southwestern Guatemala, one was identified as *Allium glandulosum* (Hidalgo), one from Michoacan, etc., as *A. kunthii (longifolium)*, four proved to be new to science, and others remain to be identified.

On the basis of the study of living material whenever possible, this brief review of the Subsection *Mexicanae* of the Section *Amerallium*, genus *Allium* L., is presented.

For the second subsection—Subsect. II. *Canadensae*—including 11 species, the reader is referred to the comprehensive treatise by Ownbey & Aase (1951; 1959).

It is of interest to note, that in his extensive exploring trips south of the border, Dr. Howard has observed that "These are mainly summer and fall blooming. Some grow well in fairly wet places (due to frequent rains) but always where drainage is good. Others grow in nearly semi-arid country, but at good altitudes. I have never found them in tropical or semi-tropical low areas. They favor the plateau country. . . . The outstanding feature that impressed me is the bulb-bearing underground stems (rhizomes) produced by many of them. I had never seen this before in other Alliums that I have known."

The apparent affinities are tentatively indicated in the following key. Six of the eight species are described in detail. Two new species will be described later.

* There is a probability that the epithet **kunthii** has to give way to **longifolium**, and for that reason this group is hereafter referred to as Subsection **Mexicanae**.

KEY TO THE SPECIES OF SUBSECTION **MEXICANAE**, SECTION **AMERALLIUM**, GENUS **ALLIUM**

1a. Bulbs coats thin, membranous, with vertical veins fairly widely spaced; ovary sometimes crested; species usually flowering in summer and autumn, rarely in spring:

SUBSECTION I. **MEXICANAE**

2a. Spring and early summer-flowering species:
3a. Spring-flowering species; umbel 10—30 flowered in March and April; flowers campanulate, tepals white or pinkish. Range.—Texas: e. Bexar and adjacent Wilson and Atacosa counties ....1. **elmendorfii**
3b. Early and mid-summer-flowering species:
4a. July-flowering; flowers pink Range.—s. w. Guatemala: s. of Huehuetenango (to be descr. later) .....2. **guatemalense**
4b. July-flowering; roots **coarse**, bulbs oblong; flowers lavender. Range.—Tamaulipas, Mex. (to be descr. later) ....3. **mexicanum**
2b. Late summer—and autumn-flowering species:
5a. Plants not robust; leaves several, relatively slender, tax:
6a. Bulbs not produced on long slender rhizomes:
7a. Plant glabrous throughout; August-September flowering; leaves light green, smooth; scape lateral, umbel centripetal, many-flowered; flowers white, tepals spreading. Range.—Texas: s.w. Edwards County, 5 mi. s.e. of Carta Valley .....4. **howardii**
7b. Leaves glaucescent, bulbs splitting in two vertically; scape central; umbel centripetal, 8—10—16—flowered; in October, flowers campanulate, light lavender, with deeper mid-vein. Range. —Nueva Leon: w. of Monterrey .....5. **traubii**
6b. Bulbs produced on long slender rhizomes; umbel few-fld in August; tepals pale, with purplish or pinkish mid-vein. Range.—New Mexico: Gila Hot Springs .....6. **rhizomatum**
5b. Plants relatively robust; leaves relatively longer, upright:
8a. Flowers in September-October, brownish red (mahogany); nectaries on ovary opposite the 3 petepals; tepals spreading. Range.— Central Mexico: Hidalgo: n. of Jacala, etc.; and southern Honduras .....7. **glandulosum**
8b. Leaves relatively longer, erect, thick, slightly concave in lower part, subterete in upper part; flowers in late autumn; umbel few-many-fld; flowers campanulate, tepals white or pink. Range.— Central Mexico: Michoacan; Mexico State & Jalisco, etc. .....8. **kunthii (longifolium)**

1b. Bulbs enclosed in a reticulum of fibers:

SUBSECTION II. **CANADENSE** Ownbey ex Traub

(For species nos. 9 through 19, see Ownbey & Aase, Res. Stud. State Coll. Wash. 23(4). 1955; and Rhodora 61: 70-71. 1959.)

Section I. AMERALLIUM Traub, **sect. nov.**

Vestimentis bulbi tenuibus membranaceis, venis aliquot verticalibus ornatis, vel vestimentis bulbi reticulo fibroso persistenti ornatis; ovario interdum cristato. Species vernali vel aestivali vel autumno florentes.

Bulb-coats thin, membranous with some vertical veins, or bulb-coats with a persistent reticulum of fibers; ovary sometimes crested; species flowering in spring, or summer, or autumn. Type: *Allium canadense* L.

Subsection I. **MEXICANAE**

Vestimentis bulbi tenuibus membranaceis, venis verticalibus aliquantum late dispositis ornatis; ovario interdum cristato. Species vernali vel aestivali vel autumno florentes.

Bulb-coats thin, membranous, with vertical veins fairly widely spaced; ovary sometimes crested; species flowering in spring, or summer, or autumn.

1. Allium elmendorfii M. E. Jones ex Ownbey, in Res. Stud. State Coll. Wash. 18: 218—219. 1950; "*Allium elemendorfii*" M. E. Jones, in Contrib. West Bot. No. 18, p. 20, 1935, *anglice*.

nf.: M. E. Jones 29071 (P), Bexar County, Texas, Apr. 3 (= Apr. 1). 1932.

Bulb ovoid, bearing a few short-stalked basal bulblets, innermost coats whitish, the cells of the inner epidermis vertically elongate or contorted, with very sinuous walls, outer coats (tunics) thin, membranous, without persistent fibers, fleshy bulb-scale 1, mildly garlic-flavored. *Leaves* 3 or more per bulb, channeled, concave-convex in cross-section, 1—2 mm. wide, entire, equaling or exceeding the scape in length, green at anthesis. *Scape* 15—40 cm. long, terete or nearly so, sometimes two produced successively from a single bulb. *Spathe* membranous, acuminate, breaking before anthesis into 3 or 4 ovate, acuminate, 3—5 nerved, separate or partially united valves. *Umbel* 10—30-flowered, erect. *Pedicels* usually more than twice as long as the perigone, elongating in fruit, becoming subequal in length, rigid, and somewhat flexuous. *Perigone* campanulate, *tepals* about 5 mm. long, lanceolate, obtuse, entire or nearly so, somewhat spreading, white or pinkish, withering away from the fruit, with the midribs slightly thickened. *Stamens* shorter than the perigone, *filaments* subulate, dilated below and united into a staminal cup at the base, *anthers* oblong, obtuse. *Ovary* crestless, *style* linear about as long as the filaments; *stigma* entire or distinctly lobed. *Seeds* black, shining, finely alveolate, alveoli smooth.

Range.—Endemic to Texas, collected only on the Carrizo Sands of eastern Bexar and adjacent Wilson and Atascosa counties.

Notes.—Flowering in March and early April. Easily distinguished from *A. kunthii* and *A. glandulosum* by the cluster of stipitate bulblets at the base of the main bulb, and by the very sinuous walls of the cells of the inner epidermis of the innermost bulb coats. When these are replaced and forced outward by the growth of the bulb, these "cellular reticulations" are then found on the now dead outer coats. *A. elmendorfii* in some respects also resembles *A. runyonii* of subsection *Canadensae*.

2. Allium guatemalense (to be described later); July blooming; flowers pink. Range.—s. of Huehuetenango, s. w. Guatemala.

3. Allium mexicanum (to be described later). Range.—vicinity of Marcello & Hermosa, Tamaulipas, Mex.

4. Allium howardii Traub, *sp. nov.*

Bulbo ovoideo 2.2 cm. longo, 1.4 cm. diametro, tunicis membranaceis; foliis deorsum vaginatis, partibus liberis 4—6 linearibus acutis 14.5—18 cm. longis 2—3 mm. latis glabris pallide viridibus laevibus; scapo laterali; spatha monophylla; umbella multiflora; floribus albis umbellam compactam centripetlaem conficientibus; pedicellis usque ad 1.2 cm. longis; segmentis tepalorum 9 mm. longis 3 mm. latis patentibus; staminibus 7 mm. longis; filamentis subulatis; ovario 3-lobato minute 3-cristellato, cristulis pallide viridibus; ovulis per loculam 2. Type: Traub No. 1058 (TRA), cult. from bulbs collected by Dr. T. M. Howard in s. w. Edwards County, Texas.

Bulb ovoid, 2.2 cm. long, 1.4 cm. in diam., tunics white, with vertical veins rather widely spaced, membranous. *Leaves* sheathing below for 4.5 cm., (only 1.3 cm. above ground) forming a pseudo-stem 3 mm. in diam, slender; free portions of the leaves 4—6, linear, acute, in a lax cluster, 14.5—17—18 cm. long, 2—3 mm. wide, glabrous, light green, smooth, slightly concave to almost flat in upper part, rounded below. *Scape* lateral, up to 37.5 cm. long (above ground), somewhat flattened, 2 x 2.7 mm. in diam., light green. *Spathe* monophyllous, white, membranous, rupturing to one side by the pressure from the expanding flower buds, 1.5 cm. long. *Umbel* many-flowered, in a centripetal compact umbel, flowers open 1, 2 or a few at a time over a period of a few weeks, flowers are pure white, except for three minute greenish crests on the ovary; pollen is cream-colored; tepalsegs are spreading (patent). *Pedicels* up to 1.2 cm. long at anthesis, slender, green. *Tepalsegs* 9 mm. long, 3 mm. wide; setsegs lanceolate, acute; petsegs oblong, acute; shriveling after anthesis. *Stamens* 7 mm. long, filaments subulate below; anthers 1 mm. long at anthesis, introrse, versatile, pollen cream-colored. *Ovary* 3-lobed, 2.5 mm. long, 2.5 mm. in diam., white, except for 3 minute light green crests on the ovary; ovules 2 per locule; nectaries are in cavities at the base between the 3 inner stamen-filaments and the ovary, but the nectar is not visible. *Style* white, shorter than the stamens at first, later slightly overtopping the stamens after anthesis. Anthers and the stigma do not mature at the same time (= dichogamy); anthers dehisce within the first 12 hours after flowers open, when style is 1—1.5 mm. long; after anthesis, the style elongates to 4 mm., slightly longer than the stamens. At La Jolla, Calif., the pollen is transferred by the beautiful insect, a solitary bee, *Agapostemon* sp. (identified by Dr. A. F. X. Williams, San Diego Natural History Museum), which extends its tongue into the nectary cavities, and in walking over the compact umbel, pollinates the flowers. Stigma capitate, minute. *Capsule* trigonous, obscurely 3-crested on top; (fresh) seeds black, angular, 3.5 mm. long, 2—2.5 mm. in diam.

Range.—Southwestern part of Edwards County, Texas.

5. Allium traubii T. M. Howard, in Plant Life 23: 62. 1967.

Nf.: T. M. Howard, s. n. (TRA 1061), cult. San Antonio, Tex., Nov. 18, 1966, grown from bulbs collected by Dr. Howard in the Mountains in the vicinity of Monterrey, Mex.

Bulb oblong, 2 cm. long, 1.2 cm. in diam., bulb-neck 2.2 cm. long, 4 mm. in diam.; outer tunics membranous, dark brown; bulb splitting

into two bulbs. *Leaves* sheathing below to 5 cm., free portions 11—14—15—17—18—19 cm. long, 2.5 mm. in diam. (up to 2.75 mm. wide under culture), glaucescent, concave, above, 3-ridged, prominently so under culture, on the back, apex acute. *Scape* subterete, 23.5 cm. long, 1.5 mm. in diam. *Spathe* lanceolate, whitish, 9.5 mm. long, rupturing to one side by the pressure of the expanding pedicels and flower buds. *Umbel* 8—10—16-flowered; flowers campanulate, very pale lavender (almost white), with deeper mid-vein, changing to lavender, with deeper lavender mid-vein, after anthesis. *Pedicels* 1—1.1—1.2 cm. long at anthesis, slender. *Tepals* lanceolate, acute, 6.5 mm. long, 2.75 mm. wide, shriveling and conniving in fruit. *Stamens* slightly shorter than the tepals; anthers 1 mm. long, introrse, versatile, pollen very pale lavender. *Ovary* white, 2 mm. long, 2.5 mm. in diam.; *style* white, 4.5 mm. long, stigma minute.

Range.—Mexico, State of Nueva Leon, in the mountains in the vicinity of Monterrey.

Notes,—Collected by Dr. T. M. Howard. Differs from *A. howardii* in its glaucescent leaves, 3-ridged on the back, later flowering season (November), fewer-flowered umbel, campanulate light lavender flowers, absence of ovary crests, and other features.

6. Allium rhizomatum Wooton & Standley, in Contr. U. S. Nat. Herb. 16: 114. 1913.

Nf.: E. O. Wooton (U. S. Nat. Herb. No. 690251, US), collected at the Gila Hot Springs, New Mexico, Aug. 20, 1900. Transition Zone.

Plant about 20 cm. high. *Bulb* ovate, about 1 cm. in diam., the outer coats grayish and opaque, the inner white and hyaline, with a few indistinct vertical nerves but not reticulate; the bulbs arising from slender scaly rhizomes, 2—3 cm. long. *Leaves* 2—3 mm. wide, much broader and clasping at the base, very finely serrulate. *Scape* terete. *Spathe-valves* 2, broadly ovate, scarious, at first pinkish-veined, becoming reflexed and white. *Umbel* few-flowered, erect. *Pedicels* (in young umbels) 1 cm. long or less. *Flowers* small for the genus, *tepals* oblong to oblanceolate, acute, 6—8 mm. long, pale with purplish or pinkish mid-vein, slightly carinate at the base. *Stamens* subequaling the tepals, included; *filaments* dilated at the base and forming a staminal cup. *Stigma* simple; *ovary* slightly crested.

Range.—New Mexico: Gila Hot Springs. Transition Zone.

Notes.—Wooton in a personal communication (Nov. 20, 1944) to the writer, stated that *Allium rhizomatum* is "very conspicuously different" from all material of *Allium glandulosum* Link & Otto that the authors of the species have seen. The present writer has verified this statement on the basis of herbarium studies.

7. Allium glandulosum Link & Otto, Ic. Pl. Rar. Hort. Berol. 1: 33, pl. 17. 1841; Ownbey, Res. Stud. State Coll. Wash. 15: 224-225. 1947; 18: 219-220. 1950.

Syn.—"Allium longifolium Lindl." (misapplied name), in Bot. Reg. 12: pl. 1031. 1826-27, non (H.B.K.) Humboldt, 1835.

Plant robust. *Bulb* obovoid, 1.5 cm. long, 1.1. cm. in diam.; tunics white, thin, membranous, vertical veins rather far apart. *Leaves* sheathing below up to 6.5—8.5 cm., forming a deciduous pseudo-stem, 6—8 mm. in diam., reddish; *free leaf portions* 4—5, upright, 24—28—30 cm. long, 4.5—6 mm. wide in lower part, glaucescent, green, deeply concave in lower ½ to ¾, sometimes nearly flat above, apex bluntly acute. *Scape* central, up to 50 cm. long, stout, deep green, slightly flattened, 4.5x6 mm. in diam., with prominent edges, narrowing gradually to the apex, 1.5x2 mm. in diam., apparently functioning as a photosynthetic organ as leaves somewhat decline; often a second smaller scape, also central, up to 30—40 cm. long, 2.5x3 mm. in diam., arises alongside the same scape, supporting a somewhat smaller umbel with fewer flowers. *Spathe* monophyllous, closed, white, membranous, 2.2 cm. long, lanceolate, soon rupturing due to the pressure of the expanding pedicellate flower buds. *Umbel* many-flowered (approx. 40—45-flowered), centripetal, second umbel, if present, with fewer flowers (approx. 22—25), umbels lax, 1, 2 or a few flowers opening in succession, mostly bending downwards below the umbel-base in fruit; flowers brownish-red (mahogany), tepals spreading (patent), moderately perfumed. *Pedicels* 2—2.2 cm. long at anthesis, slender, elongating somewhat after anthesis. *Tepals: setepals* almost linear, acute, 7.5 mm. long, 2.5 mm. wide; *petepals* elliptic. bluntly acute, 7.5 mm. long, 3 mm. wide, with deeper shining mahogany coloring near the base; tepals shriveling and conniving in fruit. *Stamens* 5 mm. long, subulate, united into a very short staminal cup; stamens slightly shorter than the tepals, bending outwards; *anthers* 1 mm. long, introrse, versatile, pollen ash-gray. *Ovary* conical, 2 mm. long, a nectar gland (circular opening) on ovary less than half way up on ovary wall opposite each of the 3 petepals; nectaries exude large globules of nectar (when absorbed with blotting paper, the nectar gradually reappears; no pollen carrying insects were observed during the day, and thus apparently the perfume may induce insects to visit the flowers at night); style 1—1.5 mm. long at anthesis, elongating to 4 mm. long after anthesis (style matures after anthesis = dichogamy); stigma pointed. *Capsule* trigonous, 4.5 mm. long, 5.5 mm. in diam.; seeds black, angular, 2 mm. long, 1.5 mm. in diam.

Range.—Central Mexico; recently re-collected in the State of Hidalgo by Dr. Howard; and southern Honduras.

Notes:—*Allium glandulosum* ranks among the most distinct species in the genus, and could not possibly be confused with any other. It is a robust plant with strong green scapes which take over the photosynthetic function when the leaves decline and gradually fall away after the flowers fade. The flowers are brownish-red (mahogany) numerous in the umbel with relatively long pedicels; the tepals are spreading; the ovary, and seeds are relatively small. The flowering season at La Jolla was relatively long (from mid-September to the end of October). It differs in these and still other features from its nearest relative, *A. kunthii (longifolium)*.

When the above description was taken down, the presence of rhizomes had not been verified in *A. glandulosum*. After the seeds were harvested in late November, the underground parts were studied, and this revealed *robust, smooth* white rhizomes which are entirely different from the *slender, scaly* rhizomes in *A. rhizomatum*. This definitely validates the latter species which is also characterized by a smaller, slender plant. In *A. glandulosum,* the *stout, green* scapes that carry on *photosynthetic activity,* and which persist after the leaves have been shed, apparently provide the food needed for the full development of the stout rhizomes.

When the spathe ruptures, the lower circle of pedicels are free, but above these there are at least two bundles of pedicels with short, white membranous sheaths at the base. These and the spathe more or less disintegrate by the time the seeds ripen.

Recent specimens: A Molino R. (Standley Herb. 14615 = 2445403 US), 8-14-64; between Las Pacayas y El Frijolar, Dept. El Paraiso, Honduras; Traub n. 1062 TRA, 10-29-66, cult. La Jolla, Calif., from bulbs collected by T. M. Howard, Hidalgo, Mex.

8. Allium kunthii G. Don, Mem. Wern. Soc. 6: 82. 1827; Morton Herbertia 7: 73. 1940 (1941); Ownbey, Res. Stud. State Coll. Wash. 18: 221—222. 1950 (1951).

Syn.—*Schoenoprasum lineare* H.B.K., Nov. Gen. et Sp. 1: 277. 1816, non *Allium lineare* L., Sp. Pl. 295. 1753; (between Santa Cruz de la Sierra and Mt. El Gigante, alt. 1300 hex.; September-flowering); *Schoenoprasum longifolium* H.B.K., Nov. Gen. et Sp. 1: 277. 1816; (Queretaro State: Aroyozarco and San Juan del Rio, alt. 1015 hex.; August-flowering); *Allium longifolium* (H.B.K.) Humboldt, in Sprengel, Syst. Veg. 2: 38. 1835; *Allium scaposum* Benth. Pl. Hartweg. 26. 1840.

Bulb ovate to subglobose, about 2 cm. in diam., tunics thin, membranous, with vertical veins fairly widely apart. *Leaves* sheathing below to 8—15 cm. forming a sheathing stem 6 mm. in diam. (5—12 cm. of the sheathing stem is above ground), usually somewhat reddish; free portions of leaves 3—5, 24—29—32—43—46 cm. long, 3.5—4 mm. in diam., concave on upper side to ¾ of its length, subterete above; deep green, acute. *Scape* 15—30 cm. long, terete or somewhat ridged, often 2 or more produced successively from a single bulb. *Spathe* membranous, acuminate, rupturing by the pressure of the developing pedicels and flower buds. *Umbel* 8—15-flowered. *Pedicels* unequal in length, about twice as long as the perigone, rarely arcuate or flexuous. *Perigone* broadly campanulate, tepals 4—8 mm. long, lanceolate, acute or acuminate, white keeled reddish, withering in fruit. *Stamens* shorter than the perigone, filaments broadly dilated below and united into a staminal cup at the base, anthers oblong, obtuse. *Ovary* crestless; *style* linear, shorter than the perigone, *stigma* capitate, entire. *Seeds* dull black.

Range.—Mexico: central region. Recently re-collected in the state of Michoacan by Dr. T. M. Howard.

Notes.—Markedly different from *A. glandulosum* which has wider, not subterete leaves in the upper part; and the flowers are totally different.

The 1 very short, or 2 longer rhizomes with a bulb at each apex, observed in *A. kunthii,* are similar to the 4 long rhizomes produced in *A. glandulosum.*

Subsection II. **CANADENSAE** Ownbey ex Traub, **subsect. nov.**

Bulbis reticulo fibroso persistenti obtectis; ovario interdum cristato.

Bulbs inclosed in a persistent reticulum of fibers; ovary sometimes crested. Type: *Allium canadense* L.

For species nos. 9 through 19, see Ownbey & Aase, Res. Stud. State Coll. Wash. 23(4): 1955, and Rhodora 61: 70-71. 1959.

TRAUB—SUBSECTION **MEXICANAE,** continued on page 110.

PLANT LIFE LIBRARY—continued from page 33.

PRIMROSES AND SPRING, by Doretta Klaber. Wm. Morrow & Co., 425 Park Av. S., New York 16, N. Y. 1966. Pp. 125. Illus. $3.50. This new book on primroses contains notes for beginners; popular descriptions of European mountain primulas and Asian woodland Candelabra and other bog primroses; primulas for specialists; and growing primroses from seeds. Recommended to all interested in primroses.

RESIN AND GLASS ARTCRAFT FOR FLOWER ARRANGERS AND CRAFTSMEN, by Laura Smith. Wm. Morrow & Co., 425 Park Av. S., New York 16, N. Y. 1966. Pp. 115. Illus. $4.95. This new book is designed to instruct both advanced artists and beginning craftsmen in the art of making resin and glass mosaics, and other colorful objects from the materials. Highly recommended.

ISLAND LIFE, by Sherwin Carlquist. Doubleday & Co., 277 Park Av., New York, N. Y. 10017. 1965. Pp. 451. Illus. $9.95. Subtitled "A Natural History of the Islands of the World", this stimulating, profusely illustrated book is concerned with the organisms that reach and evolve under the special, isolated habitat conditions of islands, and this provides the unifying theme. The rest of the book is concerned with particular examples of island life. This book is required reading for all biologists and is highly recommended.

PLANT PATENTS WITH COMMON NAMES, 1965 SUPPLEMENT 2465 THROUGH 2584. Publ. by the Amer. Assoc. of Nurserymen, 835 Southern Bldg., Washington, D. C. 20005. Pp. 7. $0.50. This is a supplement to the listings of plant patents previously published. The subject matter is arranged under three parts: I. Numerical listings; II. Alphabetical listing under common names; III. Alphabetical listing of names and addresses of originators or discoverers and assignees.

ELSEVIER'S LEXICON OF PLANT PESTS AND DISEASES, compiled by Manuel Merino-Rodriguez. Elsevier Publ. Co., 52 Vanderbilt Av., New York, N. Y. 10017. 1966. Pp. 351. Illus. $16.50. Using Latin as the basic language, the author has compiled a comprehensive number of vernacular names in English, French, Spanish, Italian and German. In Part I, the basic tables are arranged alphabetically within each section according to the Latin name of the living form together with the common name in the other languages. Part II comprises separate cross-keyed indices for each of the languages included in the basic table. This comprehensive lexicon is recommended to all plant pathologists.

BIOLOGY, ITS PRINCIPLES AND IMPLICATIONS, 2nd. ed. by Garrett Hardin. W. H. Freeman & Co., 660 Market St., San Francisco, Calif. 94104. 1966. Pp. 771. Illus. $9.50. This 2nd edition of a stimulating, up-to-date introduction to biology will be welcomed by all biologists. The five parts of the text are concerned with life at the cellular level; equilibria, ecology and evolution; our plant-dependent world, the animal way of life, and heredity. Highly recommended to all students of biology.

FLORA OF JAPAN (IN ENGLISH), by Jisaburo Ohwi; edited by F. G. Meyer and E. H. Walker. Smithsonian Institution, Washington, D. C. 20560. 1965. Pp. 1067. Illus. $25.00. This enlarged and revised English translation of Ohwi's "Flora of Japan" (in Japanese), represents a comprehensive lineagic treatment of the approximately 4,500 species and varieties of plants and ferns of Japan, from Hokkaido to Kyushu, including descriptions and keys to all families, genera and species with their habitats and distribution. This fine English edition represents the first flora of Japan in any western language since 1879, and thus is indispensable to all interested in flowering plants and ferns. Highly recommended.

PLANT BIOCHEMISTRY, edited by James Bonner and J. E. Varner. Academic Press, 111 Fifth Av., New York, N. Y. 10003, 1966. Pp. 1054. Illus. $19.00. This up-to-date book on the biological activities of plants, incorporating contributions from a large number of outstanding authorities, is designed for both students and professional workers in the plant sciences. The five parts are concerned with the plant cell, its substructures and subfunctions; basic metabolism; control; and autotrophy. This stimulating book is recommended to all plant scientists.

SYMBIOSIS; ITS PHYSICAL AND BIOLOGICAL SIGNIFICANCE, edited by S. Mark Henry. Vol. I. Academic Press, 111 Fifth Av., New York, N. Y. 10003. 1966. Pp. 478. Illus. $16.50. This comprehensive first volume, incorporating contributions from nine outstanding authorities, is concerned with symbiotic relationships involving microorganisms, plants, and marine organisms. The subjects covered include intermicrobial symbiosis; lichens; bacterial symbiosis with plants; mycorrhiza and other plant symbioses; symbiosis in marine organisms; cleaning symbiosis in the marine environment; and experimental analysis of behavior in symbioses. Highly recommended to all biologists.

THE ORIGIN OF CULTIVATED PLANTS, by Franz Schwanitz. Harvard University Press, 79 Garden St., Cambridge, Mass. 02138. 1966. Pp. 175. Illus. $4.75. This translation by Gerd von Whalert, from the German edition of 1957, will be welcomed by plant biologists. The author first explains the differences between wild and cultivated plants; and then discusses the genetic bases of the origin of cultivated forms. After considering the influence of the environment on the origin of cultivated plants, he concludes with a history of the science of plant breeding, which he characterizes as an evolutionary process guided by man. This stimulating book is very highly recommended to plant breeders and plant biologists generally.

LIBERTY HYDE BAILEY, by Andrew D. Rodgers III. Hafner Publ. Co., 31 East 10th St., New York, N. Y. 10003. Facsimile Reprint, 1965. Pp. 506. Illus. $10.00. This facsimile reprint of the 1949 edition of the biography of Liberty Hyde Bailey will be welcomed by biologists generally. This is not the usual biography. Here the life and work of this outstanding pioneer scientist are presented in the context of the development of the plant sciences and other sciences related to agriculture, in the United States and Canada. This is summed up as "A Story of American Plant Sciences" in the subtitle. Dr. Bailey's contributions to plant lineagics and cultivated plants is emphasized. This is a book that belongs in the library of every biologist. Very highly recommended.

3. GENETICS AND BREEDING

A YEAR OF ANTICIPATION

V. Roger Fesmire,

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The past year for the writer has been a year of anticipation. Moving to California required adjustments that had to be made, but it also brought new friendships, and opened up new sources of breeding material. As a result, he is now looking forward to some beautiful surprises in the form of new Amaryllis hybrids within the next few years.

Since moving from Colorado to the coastal area of Southern California, a number of problems have been encountered. The soil being so different, and the dried cow manure on the market reputed to contain much salt, it was necessary to decide upon a new potting mixture, which has required considerable experimentation. Having always grown Amaryllis in pots, it was decided to continue doing so, but without the benefit of a greenhouse. From personal observation, however, it was soon evident that Amaryllis would do better with some protection from the sun in summer and from the low temperatures on the colder nights in winter. These problems have been at least partially solved recently by constructing benches along the east side of the house, on which the potted bulbs are placed. These benches have a plastic windbreak on three sides and a hood over them, which is composed of plastic and some shading material such as screen wire. Beneficial results from this protection are already evident. The writer had very little trouble with the red blotch fungus disease of Amaryliss in Colorado, but it seems to be quite prevalent this year in California. It is hoped that these hoods over the Amaryllis, by reducing the amount of cold moisture condensing upon the plants at night, will improve this situation. Although growing Amaryllis in pots on benches may limit somewhat the number of bulbs grown, and a real freeze would have serious consequences, nevertheless there are some advantages to this method. There is no need to get down on the ground to work with the bulbs, there is no struggle with weeds, and the numerous giant snails here in California have given no trouble at all.

The past year has been one of making new friends who are also interested in growing Amaryllis. The writer promptly joined the Southern California Hemerocallis and Amaryllis Society, and has received much in the way of inspiration and help from this local society. Anyone interested in Amaryllis is urged to join a local society if at all possible, for having lived many years in a region where no such organization existed, the writer can testify to the value of one. Several members of this local society have been of considerable assistance to him in his search for breeding material, exchanging mature bulbs, seedlings, seed, and pollen with him. This pollen for example, has

enabled him to make a number of very interesting crosses, such as a Striata hybrid crossed with a Calyptrata hybrid.

Because of our move to California in the middle of last year's growing season, very little has bloomed so far this year, but much new material has been acquired for future hybridizing work. More than twenty additions have been made to the writer's collection of species and direct crosses with species, much of this being from new friends in the local Amaryllis society. This collection now includes twenty-five different species or varieties of species. The direct crosses, having at least one species for a parent, involve the following species: striata (possibly seven different forms of this species), psittacina, vittata, immaculata, calyptrata, evansiae, aulica var., platypetala, belladonna var. haywardii, aglaiae, pardina, reginae (identity of the last two is questionable), and two unidentified species. Much of this material is not yet of blooming size; so the next few years should be very interesting. It might also be noted that some unusual Dutch hybrids have been secured from a local florist who imports his seed from Holland and raises hundreds of Amaryllis yearly. One such was a white with a pronounced yellow tinge, and another was very close to being a true purple. One of the Amaryllis Society members had a hybrid between A. evansiae and A. galaiae in bloom when this yellowish white bulb was secured, it also being in bloom, and the two were cross-pollinated, but without any success.

The primary objective of the writer's breeding program is to develop a recurrent-blooming type of Amaryllis. All of his Striata crosses have been made with this end in view, and the keeping of careful records has revealed that several of these Striata hybrids are dependable recurrent bloomers. One of these is a rather striking red orange of graceful form, which has been used extensively in further crosses. Other recurrent-blooming Striata hybrids have been received from friends in the past year. In addition, the Hadeco clone TANGERINE, and an unnamed Indian miniature hybrid, have also proven to be definite recurrent bloomers. From the reports of friends, it is also likely that a number of recent Dutch hybrids may be recurrent bloomers.

A secondary objective is to develop more summer or fall-blooming hybrids, and some of this new material is directed towards this goal. Through the kindness of Dr. Traub, the early hybrid Amaryllis x acramannii was secured, but it has not yet bloomed for me. From R. D. Goedert was secured a hybrid of A. aulica var. platypetala; this bloomed in September of 1965 for the first time. The flowers were about six inches in diameter, in color a rose red with deep red throat markings, and were held quite erect. The leaves have a definite purple cast to them. All crosses made with this hybrid ended in failure. However, it remained evergreen all winter, and a flower bud was just discovered coming along with new leaf growth as this article was being written in mid-June of 1966, which indicates that it will be a late summer bloomer. Perhaps this year a cross may be successful. Another summer bloomer has just been discovered among some Tunia Australian hybrids raised from seed. This bulb, a sparkling white, bloomed in July of 1965, and is going to bloom again this year about the same date.

From R. D. Goedert was also secured a bulb labeled LM 63-1, which may be A. reginae. This bloomed for the first time in August of 1965. The flowers were rather small, slightly less than four inches in diameter, and were a bright red with a small white star in the throat. Only one of the crosses made with it was successful, and this happened to be with another one of the writer's recurrent-blooming Striata hybrids, a cross between the Houdyshel orange scarlet hybrids and A. striata (reference was made to this cross in the 1966 Yearbook). Just now this LM 63-1 bulb is apparently going into a resting period for the first time; so it may bloom again in late summer. This past winter another Lee Moore bulb labeled PERU #10 was obtained from a member of the local Amaryllis Society, and it bloomed in February, 1966. The flower was very similar to that of LM 63-1, but the leaf growth so far seems to be somewhat different. None of the crosses made with this bulb were successful.

In conclusion, the writer wishes to offer a suggestion to all local Amaryllis societies. One member of the Southern California society has been searching the gardens of her neighbors, and has located several unusual Amaryllis. It is suggested that both hybrids and species believed to be lost or unavailable may actually be growing in some garden, particularly in the subtropical regions of this country, and local Amaryllis societies might do well to organize a search for such material. This could be one phase of a definite program set up by each local society, a program designed to encourage more society members to engage in hybridizing activities. In addition, a list should be compiled of all the species and important hybrids being grown by the members, and then whenever possible, offsets, seed, and pollen should be distributed as widely as possible among those interested. Such a program would certainly create new interest in any local society, and furnish years of anticipation for every member.

AN AMARYLLIS BREEDING PROJECT

JOSEPH K. MERTZWEILLER,
9266 No. Parkview Dr., Baton Rouge, Louisiana

My interest in amaryllis goes back about eight years and resulted from my contacts with Prof. Claude Davis and the late Prof. Ira Nelson. Let me say that these contacts were most interesting and enjoyable and developed as a result of my interest in Louisiana irises, an interest that is still carried on quite extensively.

Original efforts with amaryllis centered around the named Dutch hybrids and seedlings grown therefrom. All of these are grown outdoors as the winters in Baton Rouge are normally very mild. A fairly heavy mulch suffices to protect the bulbs even in exposed areas. The most noteworthy result from growing several hundred Dutch seedlings is a series of picotee whites derived from the cross "Nivalis" X "Apple Blossom". Some of these are exceptionally large and beautiful.

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9266 No. Parkview Dr., Baton Rouge, Louisiana

My interest in amaryllis goes back about eight years and resulted from my contacts with Prof. Claude Davis and the late Prof. Ira Nelson. Let me say that these contacts were most interesting and enjoyable and developed as a result of my interest in Louisiana irises, an interest that is still carried on quite extensively.

Original efforts with amaryllis centered around the named Dutch hybrids and seedlings grown therefrom. All of these are grown outdoors as the winters in Baton Rouge are normally very mild. A fairly heavy mulch suffices to protect the bulbs even in exposed areas. The most noteworthy result from growing several hundred Dutch seedlings is a series of picotee whites derived from the cross "Nivalis" X "Apple Blossom". Some of these are exceptionally large and beautiful.

Although many beautiful seedlings can be obtained by crossing the named Dutch clones, the urge to produce something different won out and about 1960 I began a collection of amaryllis species. The objective was to use the species among themselves and with appropriate Dutch parents to produce forms and colors not otherwise available. This project has moved slowly but it is moving. Most of my species were obtained as small size or seedling bulbs and many are only now reaching blooming size. Then I was to learn of the frustrations of obtaining seed set with species compared to the relative ease of obtaining seed with the Dutch clones. The varied cultural requirements of the species present a real challenge and individual likes and dislikes vary widely. The following are some of my observations and experiences in growing the species.

A. Striata (Vars. *striata* and *fulgida*) and *A. belladonna* (from Bolivia and Brazil) were among my earlier acquisitions and have been good performers in pot culture. Pot culture is normally used for all my species. The pots remain outdoors from April thru October and are kept in a glassed-in patio during the winter. During the summer they get at least ½ day of sunlight and are fertilized with liquid fertilizer each month. These two species are now being tested in outdoor culture in protected areas. Seedlings derived from *A. striata* and *A. belladonna* with white Dutch clones are now 1-2 years old and are growing well.

It may be worthwhile to point out the technique I use for pollen storage. The pollen is placed in ½ ounce glass vials, labeled and stopped with cotton wadding. The vials are placed in a large mouth screw-cap jar in the bottom of which is placed about a ¾ inch layer of indicating "Drierite" (calcium sulfate dessicant available from chemical suppliers). The capped jar is stored on the lowest shelf of the refrigerator. As long as the "Drierite" remains blue it is good, when it turns pink it should be replaced. I have set seed with pollen stored for 5-6 months in this manner. The "Drierite" is a more convenient dessicant to use than zinc chloride and appears to be equivalent in performance.

A. evansiae was also acquired several years ago as a small bulb. The original bulb has bloomed for the last two years and several offsets have now reached blooming size. I have found that this species requires perfect drainage and must be watered only very sparingly during its period of rest in the winter. Excess moisture when *A. evansiae* is not in active growth is almost certain to cause rot. It seems to enjoy a good deal of moisture during its summer growing period. All attempts thus far to use *A. evansiae* as a pod or pollen parent have been unsuccessful.

The "Senorita" hybrids *(A. striata* X *A. evansiae)* developed by the late Prof. Ira Nelson are an outstanding group. Color and form are most unusual. Light pastel pink with creamy blush, or cream with a pink blush—words are not adequate to describe these delicate colors. The up-looking form accents the beauty of the "Senorita" hybrids. Pot culture is quite easy and the plants are vigorous growers and produce offsets freely. Some 200 or more one year old seedlings from

"Senorita" crossed with Dutch parents are ready to be set out in the spring. It will be interesting to see the colors and forms of these hybrids.

One highly prized species which I was fortunate to acquire is *A. pseudopardina.* This species was described by Dr. Cardenas in *Plant Life,* Vol. 21 (1965). The bulb was acquired in the fall of 1964 and potted in a 9″ pot. It has grown very well for me and at this writing is in a state of semi-dormancy. It is treated about the same as *A. evansiae* with respect to watering. This may not be necessary but I don't want to take chances with rot. One small offset has formed and the bulb is about 2¾″ in diameter (an estimated 50% increase in size in one growing season). I hope to see a bloom scape within the next month or two.

Acquisitions during the past year include *A. starkii, A. psittacina, A. aulica* (var. *platypetala*), *A. cybister, A. mollevilquensis,* and *A. umabisana.* Among this group only *A. aulica* has bloomed.

I also have several of the unidentified species imported by Mr. Goedert. Some *striata* and *belladonna* forms have bloomed. One merits special comment. This is a species obtained under number SA 63-20 (from Brazil), which bloomed in January, 1965. Three scapes had 4, 3 and 2 flowers. The flowers differ markedly from the description supplied by Mr. Goedert's collector. The scapes are quite tall (one was 33″, the other two, 25″ and 28″) and the flower is almost 6″ across. The color is light pink with orange veining and a green throat. All 9 flowers were pollinated and, quite remarkably, all set seed pods. Not all of the seed was viable. Good crops of seedlings were obtained from selfing and with the "Davis Hybrid" (*A. evansiae* X *A. agliae*) as the pollen parent. This plant appears to fit reasonably close to the description Mr. Goedert gives for his unidentified species SA 62-3 (*Plant Life,* Vol. 21, 1965, pg. 129), supposed to be *A. striata crocata.* However, my SA 63-20 has a capitate stigma and a rather inconspicuous paraperigone, indicating it may be a *belladonna* rather than a *striata.*

THE BRITISH NERINE SCENE

J. T. Gallagher, *England*

Even with the best stock available it is not long before the enthusiast is tempted to join the bees in giving nature a helping hand. Given an objective programme the chances of success with the breeding of nerines are high and amply repay the small amount of time and work involved.

My own bulbs began to flower quite early last Autumn and although I had planned out my crosses for some time beforehand, I must admit that I was only partially successful in completing my programme. One of the fascinating aspects of some of the crosses I have made so far is the variable number of seeds produced, especially when using hybrids with higher chromosome numbers. This was strikingly exhibited this season by the aneuploid 'Joan'. 'Mariloo' x 'Joan' yielded 125 large very uniform seeds, the reverse cross, 'Joan' x 'Mariloo' yielded only 40 seeds which were very variable in size. Using the pollen of 'Joan'

on the same number of flowers of an unnamed pale pink seedling from Exbury, which I believed to be a triploid, yielded 17 very large pale green seeds all of which have germinated. It will be some time before the results of these crosss will be known and I am beginning to realize the importance of keeping some notes to refresh one's memory!

My friend Mr. Smee of Ipswich in Suffolk wrote to me in great excitement to tell me of one of his new seedlings which had just come into flower for the first time. He had crossed 'King of the Belgians' with pollen from the old triploid 'Rotherside', one of the seedlings had very large flowers of great substance with the individual petals over ¾" wide but spoilt by having a dirty puce colour and very erect pedicels. The flowers so large that Mr. Smee believes the seedling might be tetraploid, but it has not yet been possible to do a chromosome count to determine whether this is in fact the case.

Mr. Smee has developed a method of growing many of his bulbs in heated soil beds in his greenhouse. These are constructed with a base of concrete paving stones with concrete edging stones round the sides to give a depth of approximately nine inches and are filled with the normal soil mix used for growing nerines. The temperature of the soil is thermostatically controlled at 50°F. by means of electric heater cables and the air temperature in the greenhouse is maintained at 45°F. throughout the winter using a fan type heater. Bulbs are planted into the soil leaving the top third above the surface in the normal way. His results using this method are very remarkable both from the size and quality of the flowers and the rate at which the bulbs multiply. On the other side of the greenhouse other bulbs are grown in pots and although grown exceptionally well and convenient for exhibiting, the soil bed flowers are definitely superior. Perhaps his most fascinating nerine is a new white form of *Nerine bowdenii* recently imported from the Transkei which had a magnificent umbel of creamy white flowers on a 4′ scape.

Sir Frederick Stern has been a nerine fanatic for many years as well as being a very distinguished amateur horticulturist. As a close friend of the late H. J. Elwes he obtained many of the latter's better hybrids and has been crossing these, and selecting out and growing on the better seedlings. He very kindly invited me down to Highdown, his famous garden at Worthing, Sussex, which is on the south coast about 60 miles from London. Sir Frederick is a pioneer of the application of scientific principles to planned breeding. Used on many of the plants in his own garden the results speak for themselves as it is hard to think of any grower who has won more major awards for so many different types of plants he has bred. It was under his chairmanship of the board of trustees that a separate department of cell biology and cytology was set up at the John Innes Horticultural Institute some years ago.

When I arrived we immediately went up to the greenhouse where Sir Frederick and Lady Stern were selecting the best seedlings for naming. Most exciting was a new pale orange seedling which was the result of a cross between 'Grilse' x 'Bonnerole'. It is best described as an

orange form of 'Roza Stevenson'. We decided that this wonderful new hybrid should be called 'Sybil' in honour of Lady Stern. Another lovely orange variety 'Gloaming' x 'Jewel' is to be called 'Highdown Orange'. Unfortunately I was too late to see 'Catherine' which flowers early and was given a Preliminary Commendation by the Royal Horticultural Society a week or two before.

I was most anxious to find out as much as I could about Mr. Elwes collection and was fascinated to learn that it was in fact quite small considering the number of excellent hybrids he had bred. Later, during a tour of the garden which is on pure chalk, Sir Frederick told me some of the stories behind the shrubs, many of which are still only known under the collector's numbers, and his experience with them over the years. Following interest after the publication of his book SNOWDROPS AND SNOWFLAKES, he received a large collection of *Galanthus* species from Soviet Russia for comparison and study. I left HIGHDOWN after tea with a present of bulbs of 'Wavell', 'Kenilworth' and 'Firecrest' safely packed in the boot of the car.

One of the more interesting events of the autumn followed the decision by Lady Clarke to auction surplus bulbs from the Borde Hill collection to help with the upkeep of the gardens. Unfortunately too many of the hybrids listed in the sale do not stand up to modern standards, but even so fetched good prices. It is to be hoped that with the great shortage of bulbs of nerine varieties, that purchasers will not be misled into under-estimating the superb qualities of modern nerines, as after all some of the bulbs being sold have been in cultivation for over 70 years and would, of course, be discarded in a modern seedling bed.

However, there were some nice things to be had for the discerning grower. 'Stephanie', one of my favourites, is a really lovely pale pink with smooth petals and very good umbel form. 'Timoshenko' a good strong red. One of the most interesting items, was a cross between *Nerine bowdenii* and *Brunsvigia rosea,* which has small flowers clearly exhibiting the white throat influence of the *Brunsvigia* in the cross. This was listed as "N. BELLADONNA var. MITHRAS", which must not be confused with the Exbury bulb 'Mithras', a pale pink variety with a deeper flushing, as there is no connection in the parentage. One outcome of this auction was the proposal to form a Nerine Society which has since been established as an independent body with Lady Clarke as President.

As we motored through the beautiful heath and woodland of the New Forest towards Exbury, I found it hard to guess what surprises would be flowering for the first time in this great collection. Miss Blackburn greeted me with a twinkle in her eye and sent me off to look for myself while she went to look for Mr. Wood who has been looking after the collection since it was first formed. On arriving at the greenhouse I was greeted by the most fabulous nerine I have ever seen, the twelve flowers were almost 4″ wide on 3″ pedicels and the peduncle was 20″ long carrying an umbel of over 8″ in diameter. One need hardly have looked at the label to know that this was a cross between 'King

of the Belgians' x 'Inchmery Kate'. The colour was a pale shell pink with a darker line down the centre of the petals, I could only stand and gaze at it in wonder as it glittered in the autumn sunlight. At last, glancing past, I saw another 'King of the Belgians' seedling, the ice white 'Vestal' sparkling above the other flowers at the end of the greenhouse. 'Carolside', deep salmon and exhibiting a slight tendency to erect pedicels inherited from its mother 'Rotherside'. 'Audrey' a 'Wellington Koo' seedling, rose pink flushed blue, named after Mrs. Wyniatt who now does all the crossing.

Another seedling 'Trafalga' x 'Inchmery Kate' was also flowering but it was difficult to tell how the final flower will look as this was not a typical example, even so the colour was a lovely cerise purple and the petals heavily waved. Of the older hybrids a batch of 'Dunkirk' were especially good. As Exbury have managed to cross this fine triploid with 'Inchmery Kate' it is surely only a matter of time before we will see the first nerine with five times the normal chromosome count.

As luck would have it the winder of my Starteck camera broke after I had taken only one photograph and as all the best flowers were picked by Mrs. Wyniatt the next day to decorate the table for a dinner party being given by Mr. Rothschild, I was unable to get it mended in time to photograph any more of the flowers.

Returning nearer to London a very good collection of modern hybrids has recently been presented to the Royal Horticultural Society by Mr. B. Smithers of Winchester. These bulbs are now growing at Wisley, Surrey, and I am very grateful to Mr. F. P. Knight, V.M.H., Director of the Society's gardens for giving me a complete list of these varieties.

Looking down the list one of the most interesting, 'Wellington Koo,' originated as an unknown seedling at Exbury and was responsible for many of the unusual blue shades which are appearing among the seedlings in that collection. This variety is no longer grown at Exbury and the Wisley bulbs are the only stock that I know of at the moment. Another interesting variety which I have only seen at Bodnant in North Wales is 'Jenny Wren' which is very free flowering, having very characteristic strap-like petals of cherry pink. Good whites are represented by 'Snowflake' and 'Hailstorm' which has flowered well for the last two years.

Any visitor to London in October should certainly try and visit Wisley, as apart from this excellent collection of nerines there is a very wide range of every other type of plant and shrub.

Lastly I am appealing to readers to write to me if they know of the existence of 'Alice' as the original stock has died and I have been unable to locate any enthusiast who is growing this variety at the present.

Graystead, Bovingdon,
Hertfordshire, England

ADVENTURES IN AMARYLLID BREEDING

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For the past few years we have been hybridizing in several directions. Work with *Amaryllis, Crinum, Zephyranthes, Habranthus,* and *Rhodophiala bifida* and *Spathacea* continues. In the case of some groups, as in *Amaryllis,* the results have been quite satisfactory. In other groups, results are rather disappointing for several reasons. Perhaps the most prominent reason is that so much time will lapse from seed to mature, blooming size bulb. Another is that very often the weather situation is not ideal for the work at hand. Very often frequent rains will not allow pollen to dry in the open and hybridizing will be impossible as a result of this. On the other hand, excessive dryness in the atmosphere or in the soil increases the difficulties encountered by the hybridizer. As a result, hybridizing activity is curtailed. Often flowers which might be worked with on a particular day have deteriorated to the point that they cannot be used. An example of this is *Habranthus.* On very warm, humid days, the small and often fragile flowers last no longer than twenty-four hours. Therefore, one must be constantly alert to the opportunity for hybridizing, when it is presented. In the past, many times, flowers which we had waited to see in bloom completely eluded us because of their small or insignificant size. We have learned that a quick but thorough check of the flower beds every day leaves nothing to chance.

Pollen storing has greatly facilitated the work on our more recent projects. For storing pollen we use small glass vials. These are kept on the top shelf of the refrigerator, tightly closed, and with each vial marked with the name of the pollen parent. Using this procedure has made it possible to keep valuable pollens over a longer period of time.

Amaryllis species acquired from various sources have, as a whole, proved indifferent to our pot culture here. In many cases, they either did not grow and thrive in pots, or have only persisted through several years of effort at trying to provide them with optimum growth conditions. Consequently, we removed said bulbs from the pots early this spring and planted them directly in open beds. The soil in these beds had been improved by the addition of peat moss (Canadian sphagnum) and copious amounts of builders sand (coarse grade). The latter was to be a safeguard against our rainy climate and also a guarantee that the soil around the bulbs would quickly drain. The results were phenomenal. *Amaryllis* which showed no vigor or effort to grow previously have now taken hold and are growing vigorously for the first time. These species and species crosses will be removed and stored for the winter months in paper sacks. Next spring (1967) they will again be planted in open beds. The exception to this will be those bulbs which will bloom before that time. In this event, indoor potting will be necessary. An example of species which require winter potting are *A. striata fulgida,* which is dormant for only short periods. But they also will be planted in open beds early in the spring when the weather permits.

AMARYLLIS HYBRIDS

This group of bulbs presents by far the greatest amount of enjoyment of those mentioned not only because of their great beauty and varied colors, forms, sizes, and generally satisfactory performance, but also for their role in the development of hybrids of breathtaking beauty. The results with this group have been more than satisfactory and gratifying. With the advent of "pastel" hues, they are keeping in step with the times, and choices of color in the future will only be a matter of personal taste. At the present time one can see color ranges from the lightest and softest salmons, pinks, light oranges, purest whites, blazing scarlets, large flowered picotees whose edges are marked with fine pink or red lines, to the very darkest shades of red and violet red.

Fig. 40. Hybrid **Amaryllis,** very large red with completely reflexed tepalsegs, giving an almost round appearance, grown by C. J. Crochet.

For the last few years we have been carefully selecting those plants which we deemed to be outstanding in color, form, performance, sunfastness, uniqueness, and hybrid vigor. These individual bulbs have been segregated, numbered, and are being re-evaluated each year. From this group we plan to select, register, and introduce those which we consider outstanding. Outstanding is (1) a large white hybrid with brightest scarlet red "brushed" on, and with wide tepalsegs and green throat. The color contrast is most pronounced; (2) a very light salmon "pastel" colored flower with whitish throat and very wide floral parts.

This flower is very flat in form and all edges are ruffled; (3) a large white flower with all segments marked with "eyelashes" of scarlet red. All segments are also markedly imbricated; (4) a large white flower with all floral parts "washed" a light rose color at the tips; (5) a light colored salmon pink with "seersucker" texture; and (6) an orange red colored hybrid with very wide pure white band in the middle of all segments.

Our personal choice in amaryllis flower hybrid form has been the very imbricated "overlapping tepalseg" type, but even above this we value complete-reflexed tepalsegs, giving an almost round appearance (see Fig. 40). A very large red hybrid, with wide floral parts. An almost completely round form (see Fig. 41). Another oddity which has appeared in our hybrids is the red reflexed but angular form (see Fig. 41), reminding one of a hybiscus flower in full bloom.

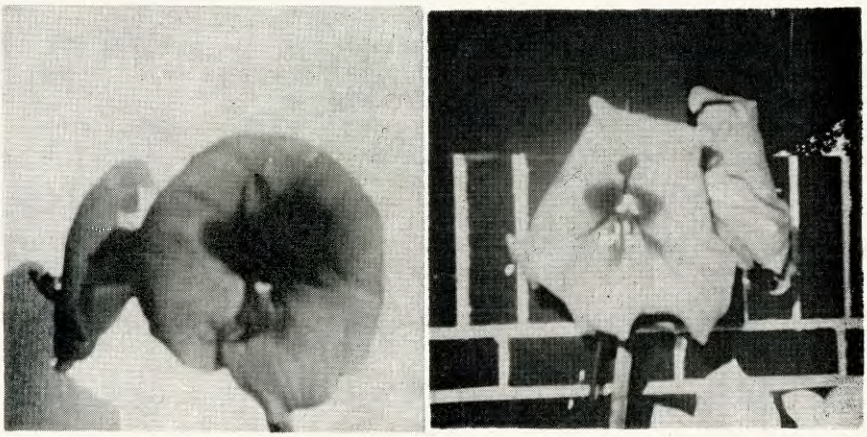

Fig. 41. Hybrid **Amaryllis, left,** large red, almost completely round in form; **right,** showing the red reflexed angular form reminiscent of a **Hibiscus** flower. Grown by C. J. Crochet.

Outstanding are (a) *A. evansiae, A. evansiae* x 'Leading Lady,' a white Dutch hybrid, portraying vividly the contribution of both parents in the resulting hybrid; and (b) the second generation cross of *A. striata fulgida* x 'Five Star General' x 'Sight Show'. The resulting hybrid is of medium size and pink in color, having the short *A. striata* scape height.

CRINUMS

Work with crinums has been somewhat less rewarding than with amaryllis. We do hope however to progress slowly in the future. From many crosses involving *Crinum scabrum* we have selected one seedling which blooms later than the parent bulb and which shows a pink striped keel rather than the "wine" red of *scabrum.* Its value is in both its color and blooming period. Figure 42 shows this *Crinum* hybrid in

full bloom while the species *Crinum scabrum* is at lower right of the picture. Pollen from the light primrose yellow *Crinum luteolum* has also been used successfully in crosses with *Crinum scabrum* and the resulting seeds have been planted. The outcome of this cross will be awaited with great expectations and interest as we already see in our minds a yellow hybrid *Crinum* with the growing habits of *Crinum scabrum* and with the grace and beauty of *Crinum luteolum.*

Fig. 42. Wine red hybrid, involving **Crinum scabrum,** grown by C. J. Crochet, Prairieville, Louisiana.

ZEPHYRANTHEAE

In this group of little bulbs which bloom so often we have bloomed two new hybrids. The first of these involved Dr. Howard's "Apricot Queen" and *Z. citrina,* a reliable gold colored clone. The resulting hybrid was about 12 inches high and very dark yellow in color with brown lines on setsegs only. The other hybrid was more striking. It is from a cross of Dr. Howard's "Helen Wyatt" and "Kitty Clint". This cross produced a hybrid of pink color with white star in the center of flower parts. This combination of colors is very pleasing and delicate.

Habranthus and *Zephyranthes* of the subgenus *Cooperia* have also been used in hybridizing but none of the seedlings have bloomed yet. In this group of amaryllids are many interesting species and hybrids from Mrs. Morris Clint, Brownsville, Texas. She very generously added to the writer's collection of this little known and cultivated group of interesting bulbs.

RHODOPHIALA

The two species of *Rhodophiala (spathacea* and *bifida)* have also been used in hybridizing. The objective was to verify the cross *Rhodophiala* x *huntiana* which has been reported. The intermediate color will prove interesting in further hybridizing. From dozens of crosses came a very light pink hybrid as well as a rose colored one. Tepalsegs on

the hybrids were wider than usual. The types were to be photographed but unfortunately camera equipment was not available at this time. It is hoped that photographs can be made in the future and reproduced in Herbertia.

CRINUM X EBORACEI—'JUNE HARRIS'

L. S. Hannibal, *4008 Villa Court, Fair Oaks, California 95628*

Presumably about 1825 Dean William Herbert crossed *Crinum asiaticum* with *C. bulbispermum* (Then known as *C. capense album*) to effect his hybrid known as *C.* x *eboracei.* The fact that this hybrid or an allied one of *C. bulbispermum* x *pedunculatum* were free seeders and produced robust F-2 plants was of little significance at the time as little was known concerning the genetics of hybrids. Now it is quite a surprise to find that species from subgenera will cross and give fertile seedlings whereas species in the same subgenera are often quite incompatable.

The second record of *C.* x *eboracei* being produced is by the Reasoner brothers who established and operated the Royal Palms Nursery in Florida beginning some 80 years ago. To them goes much of the credit of intercrossing *C. bulbispermum album* with *C. asiaticum* (or *pedunculatum*), *C. americanum, C. kirkii, C. scabrum,* and *C. amabile.* The fact that most of these hybrids have been accepted as species by later horticulturalists in a fact well worth noting. However, according to the Reasoner catalogues their *C. cappedum* cross was a *pedunculatum* x *bulbispermum album.* L. H. Bailey identified it as *C.* x *eboracei* var. *cappedum.* In August 1966 this hybrid was apparently found. It had been growing in the garden of Ivy Powell. Eventually we will be able to compare it with *eboracei* hybrids as well as *pedunculatum* x *bulbispermum.*

Both the Reasoner and Herbert crosses had white flowers. Some ten years ago Charles Harris of Griffin, Georgia, crossed the *C. bulbispermum roseum* with pink blossoms on *C. asiaticum* (presumably *sinicum*) and obtained several clones of a free flowering pink, the best of which he named *C.* x *eboracei* 'June Harris' for his wife. This hybrid is quite hardy and will backcross to produce seed. The plant is nearly as tall as *C. asiaticum* but the foliage resembles that of a slender growing *Agave* more in shape as it is succulent, semierect and the leaves come to long tapered points. Blossoms may occur from May to October in Georgia. These are on 36 to 40 inch scapes, standing above the foliage and the florets stand erect with slender horizontally spreading tepalsegs. There is some similarity to the hybrid 'Twelve Apostles'. The fragrance is quite spicy. Fortunately the Harris bulb produces numerous offsets so it is possible to obtain a large clump within a few years. The fountain like foliage, numerous flower heads and lack of cluttered dead leaves make this plant an interesting garden subject.

The ability of *C. asiaticum, C. pedunculatum,* and *C. americanum* to cross with *C. bulbispermum* and *bulbispermum* hybrids has caused us to examine related plants. All are vigorous and show some level of

fertility. Crosses of *C. asiaticum* and *zeylanicum* have been reported in Calcutta gardens, and crosses between the dwarf Japanese *C. asiaticum* and South African Crinums have been effected by the writer. This group should be particularly hardy. A *C. asiaticum* x *C. americanum* hybrid apparently exists which bears considerable resemblance to a small *C. pedunculatum*, and a *C. americanum* x *C. amabile* was recently found by the late Ira Nelson. There are undoubtedly others but the scant information on unreported hybrids as well as reported gives us little means of evaluating the plants.

TRAUB: AMARYLLID NOTES, 1967—continued from page 69.

Allium canadense subsp. **mobilense** (Regel) Traub & Ownbey, **comb. nov.,** Syn.—**Allium mobilense** Regel, in Acta Horti Petrop. 3: 121. 1875.

Allium canadense subsp. **hyacinthoides** (Bush) Traub & Ownbey, **comb. nov.** Syn.—**Allium hyacinthoides** Bush, in Ann. Rept. Mo. Bot. Gard. 17: 119. 1906.

Allium canadense subsp. **lavendulare** (Bates) Traub & Ownbey, **comb. nov.** Syn.—**Allium lavendulare** Bates, in Am. Bot. 22: 58. 1916.

Allium canadense subsp. **ecristatum** (Jones) Traub & Ownbey, **comb. nov.** Syn.—**Allium reticulatum** var. **ecristatum** M. E. Jones, Contrib. West. Bot. 18: 21. 1935.

Allium canadense subsp. **fraseri** (Ownbey) Traub & Ownbey, **comb. nov.** Syn.—**Allium canadense** var. **fraseri** Ownbey, Res. Stud. State Coll. Wash. 18: 195. 1951.

Allium perdulce subsp. **sperryi** (Ownbey) Traub & Ownbey, **comb. nov.** Syn.—**Allium perdulce** var. **sperryi** Ownbey, Res. Stud. State Coll. Wash. 18: 202. 1951.

Allium geyeri subsp. **tenerum** (Jones) Traub & Ownbey, **comb. nov.** Syn.—**Allium geyeri** var. **tenerum** M. E. Jones, Contrib. West. Bot. 10: 28, fig. 55. 1902.

Allium persimile (Ownbey) Traub & Ownbev, **comb. nov.** Syn.—**Allium tolmiei** var. **persimile** Ownbey, Res. Stud. State Coll. Wash. 18: 29—32. 1951.

Allium cernuum subsp. **obtusum** (Ckll.) Traub & Ownbey, **comb. nov.** Syn.—**Allium cernuum** f. **obtusum** Ckll., in Torr. Bot. Club Bull. 18: 173. 1891.

Allium cernuum subsp. **neomexicanum** (Rydb.) Traub & Ownbey, **comb. nov.** Syn.—**Allium neomexicanum** Rybd., in Torr. Bot. Club Bull. 26: 541. 1899.

Allium nevadense subsp. **cristatum** (S. Wats.) Traub & Ownbey, **comb. nov.** Syn.—**Allium cristatum** S. Wats., in Am. Acad. Arts & Sci. Proc. 14: 232. 1879.

Allium fimbriatum subsp. **purdyi** (Eastw.) Traub & Ownbey, **comb. nov.** Syn.—**Allium purdyi** Eastw. Leaflets West. Bot. 2: 110. 1938.

Allium fimbriatum subsp. **parryi** (S. Wats.) Traub & Ownbey, **comb. nov.** Syn.—**Allium parryi** S. Wats., Proc. Am. Acad. 14: 231. 1879.

Allium fimbriatum subsp. **mohavense** (Tidestr.) Traub & Ownbey, **comb. nov.** Syn.—**Allium mohavense** Tidestr. Proc. Biol. Soc. Wash. 48: 39. 1935.

Allium monticola subsp. **keckii** (Munz) Traub & Ownbey, **comb. nov.** Syn.—**Allium parishii** var. **keckii** Munz, Man. So. Calif. Bot. 87, 597. 1935.

TRAUB—SUBSCETION **MEXICANAE,** continued from page 95.

SECTION **RHOPHETOPRASON,** GENUS **ALLIUM** L.:— Vegetative reproduction in **Allium glandulosum** and **A. kunthii (longifolium)** is so distinct from that of the other Alliums of Subsection **Mexicanae,** Section **Amerallium,** genus **Allium,** L., that it is necessary to group these under the new Section **Rhophetoprason,** in which the current season's bulbs, after flowering (seed setting), produce thick, smooth rhizomes; and the food in the bulbs and rhizomes is **reabsorbed** (leaving vestiges only) and is translocated to form new flowering-sized terminal bulbs.—**Hamilton P. Traub**

4. AMARYLLID CULTURE

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

NEW AMARYLLIS SPECIES INTRODUCED

CLAUDE W. DAVIS

470 Delgado Dr., Baton Rouge, La. 70808

Several new species of Amaryllis have been introduced in the winter of 1965-66 and commercially distributed to interested persons through the cooperation of Dr. Martin Cardenas, Professor and Head of the Department of Botany, Universidad Mayor de San Simon, Cochabamba, Bolivia. These include the following:

A. yungacensis Cardenas and Nelson, which was discovered by the co-authors in the Province of Sud Yungas, Bolivia in 1958. To quote the late Prof. Nelson, "This is a spectacular species. Its flowers are as large as ordinary American hybrid garden sorts and its colors and color pattern are bold. There is strong contrast between the large, yellow-green throat and the deep red of the outer one-third of the floral segments. The near white margins of the segments give it striking contrast with its surroundings. The coloration on both sides of the floral parts is very similar. The bold stripe along the mid-rib is present only on the inner surface of the segments.

"*Amaryllis yungacensis* appears to be easy to handle in cultivation and should be a fine addition to our pot and garden flowers. Its value as breeding stock is yet unknown, but it has several desirable characteristics."

In the experience of the writer this species is fertile and it produces viable seed quite readily when the flowers are pollinated with pollen from another clone.

Amaryllis starkii Nelson and Traub, was discovered in 1958 in a location about two miles from Santiago, Bolivia in the foothills of the Serrania de Santiago range of mountains. The bulbs were growing in an area of exposed rock which contained scattered pockets of sand and organic matter. The striking feature of this small flowered species is that the blooms are held upright on the scape. There are from one to three blooms per scape, depending on the age and size of the bulb. The flowers are a "tomato colored" pink with white throats. This species crosses readily with *A. belladonna, A. evansiae* and with numerous hybrids. It should be potted in a very porous soil mixture and watered very sparingly while in the dormant state.

Amaryllis umabisana Cardenas, comes from the Province Bilboa in Bolivia. It belongs to the Macropodastrum or Elegans Group, with white, trumpet-shaped flowers about 17 cm long. The bulbs obtained during the winter produced foliage which lasted for several months and then went dormant. Because it is native at a high altitude (2,000 m.)

where the air is cool and dry, it probably will not be well adapted to the low altitude and warm, moist atmosphere of the Gulf Coast Region.

Amaryllis mollevillquensis Cardenas. This species has never flowered in the region surrounding Baton Rouge, Louisiana, but it comes from a high altitude and arid climate from Province Bilboa, near Mollevillque, Bolivia. Each umbel bears 2 to 6 small flowers which are orange-red with a greenish base and a white stripe in the center inside.

Amaryllis forgetii Worsley. This is not a new species as it was originally described in 1912, but thus far it has not become widely distributed in the United States. The flowers present a striking contrast in color, being a chrysanthemum crimson, keeled in the lower half with green. The umbel is 2-flowered. This species is self-sterile, but it has been crossed with *A. yungacensis* and the hybrid seedlings are making a very vigorous growth. Apparently this is a species of easy culture which is well suited to either the greenhouse or to an outdoor planting in regions where the winters are mild.

FORCING AMARYLLIS IN WATER

Prof. Agr. Pier Luigi Arduino, Glornalista Agricola, Scrittore, Candia Lomellina, Via Borgoretto 3, Italy, writes under date of January 8, 1966, about forcing *Amaryllis* bulbs in water culture. Those interested should write directly to Prof. Arduino.

EXPERIENCES WITH AMARYLLIS 'SENORITA'

KEITH BROWN,

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Many growers shy away from *Amaryllis* species and simple species hybrids because they feel that such are likely to be difficult to grow and relatively unrewarding in bloom. However, 'Senorita', a hybrid of *A. evansiae* x *A. striata*, for me is very easy to grow and has striking flowers. The florets are borne two per scape and in shape very much resemble the photograph of *A. striata* published on page 128 of the 1965 *Yearbook*. What really makes them remarkable is the color. Prof. Davis, the originator, describes the coloration as "pink changing to soft pink as the flower ages, with a chartreuse star in the throat." To me, this description does not do them justice; my clone is a very wonderful blend of light cream yellow and pastel pink, the cream yellow becoming greenish in the throat. I know of no way to adequately describe it. A person must actually see the flower in order to have a good notion of what it really looks like.

My clone blooms freely from small bulbs. Large numbers of off-sets are produced, and often grow to blooming size within two years. The plants seem to prosper both indoors in a sunny window and in outdoor culture in large containers. Presently I am an apartment dweller with only a limited amount of indoor space and a small patio, but I am looking

forward to the day when I can have a whole bed devoted to 'Senorita' and other similar *Amaryllis*.

There is only one thing about 'Senorita' that is really disappointing—I have not been able to set seed using it either as a seed or pollen parent. However, I will keep trying until either I am successful or I become convinced that the clone is hopelessly sterile. In the meantime, I have ordered seed of other *A. striata* hybrids. I am grateful to 'Senorita' for introducing me to species hybrids; I recommend it to you.

ACCELERATING BLOOMING FROM SEEDS IN AMARYLLIS WITH BOTTOM HEAT

J. L. Doran,
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About two years ago I received some *Amaryllis* seed which I believed was quite interesting and worthy of special effort. Upon making inquiry about methods for accelerating growth and obtaining bloom sooner, I was told that heat would help, but nothing would make them flower in a year. However, I decided to try. A box was made about twelve inches wide, 33-½ inches long by eight inches deep. A one-quarter inch diameter stainless steel tube was placed about one and a half inches above the bottom and three inches in from the side and running the long way of the box. The tube ran through the box at each end, thus supporting itself. A 25-watt heating element was put in each tube, controlled by a thermostat, which was put in the middle of the forward wall of the box. Three sixteenths diameter by 9-inch aluminum rods were placed across the stainless steel tubes one inch apart to distribute the heat evenly. The box was filled with fine sand. Twenty-one three month old sceedlings were planted three and a half inches apart in the box. The thermostat was set to hold ninety degrees one-inch above the rods. The box was watered when needed until bulbs recovered from transplanting shock, then watered twice a week with a solution of one hundred p.p.m. each of N, P_2O_5, and K_2O. These elements were supplied from ammonium nitrate, di-hydrogen ammonium phosphate, and potassium sulphate. A year from the time the seed was planted, the bulbs touched each other. The *first bloom* appeared *fourteen months* from time of seed planting. One bulb had four scapes with a total of seventeen large flowers in twenty months. About one half of the bulbs flowered in two years. All had large off-sets. The box was maintained in a greenhouse that was heated to maintain a night temperature of sixty degrees and went as high as a hundred on summer days.

I believe that if the seeds had been planted directly in the box with bottom heat, the objective to obtain flowering size of all of the seedlings within a year and a half and at most two years, might have been achieved. This will be checked in a later experiment. On the whole the experiment was very much worth while, and it is hoped that others will report on similar experiments.

Fig. 43. **Crinum luteolum** Traub & Hannibal as grown in Mrs. Morris Clint's garden, Brownsville, Texas, June 1965. Photo by Mrs. Morris Clint.

CRINUM LUTEOLUM IN SOUTH TEXAS

Mrs. Morris Clint, *Texas*

About August 20, 1961 Mr. William Morris of Australia sent us a small bulb of the rare, yellow-flowered *Crinum* native to the area near Port Augusta, South Australia, which was later to be named *Crinum luteolum* (see Plant Life 22: 46. 1966). It was planted in a tall juice can and placed on one of the benches in our semi-shaded patio, where it grew very nicely. The severe freeze of January 9-12, 1962 came in sooner and much colder than predicted and the bulb went through at least 8 hours of sub-freezing temperature. It looked a little wilted, but fortunately soon recovered in the warmth of the greenhouse. The winter of 1962-63 was another cold one, so it was not planted in the ground until late in the spring of 1963. Bill Morris had written that the general habitat of this *Crinum* was semi-desert with an annual rainfall of less than 10″, so it was planted on a slope in a well-drained bed of sandy loam soil where it received full morning sun, very light afternoon shade and less than average watering. The bulb grew very slowly but seemed happy enough, so we stopped worrying about it and prepared to wait quite a while for it to bloom.

Needless to say, we were surprised and pleased to discover a scape early in June of 1965. We were even more pleased when the first lovely yellow flower opened on June 9th. The remaining 10 buds opened in pairs on successive days and, since each flower remained fresh well into the third day, there was soon quite a bouquet. A second scape carried 9 blossoms and started flowering about 2½ weeks later. Although we carefully hand-pollinated every flower, only a single seed was obtained. During the entire blooming period the weather was hot, dry and very windy, with abnormally low humidity but the flowers remained fresh and the scape upright. This is most unusual in our climate, for here very few Crinums last a full day and many open so late in the evening and droop so early in the morning that we never get to see them fully open at all. In addition, most of the scrapes must be heavily staked to keep them from falling to the ground.

The winter of 1965-66 was fairly mild with fall, winter and spring moisture well over normal and the bulb remained evergreen all winter. So far this year (July 3), the bulb has produced 3 scapes. The first one, which started blooming on June 4th, had 17 flowers; the second one, with 16 blooms, opened its first flowers on June 18th; the third, with 14. a few days later. Although we were not able to pollinate but a few flowers, seed production looks more promising. The plant is well foliaged, but still rather small—so small that one wonders how the bulb can support 3 such large, robust scapes (about 20-22″ tall) with so many flowers.

Blooming conditions this year were radically different from those of 1965. Except for the first 10 days, when it was hot, still and sultry, it has been cool and humid, with almost no wind. It showered lightly

on June 7th, rained heavily on the 13th and 14th and continued daily showers for over two weeks gave us almost 6″ for the period.

We would place this species close to the top of the *Crinum* list for our area. It seems to thrive under almost any weather conditions and requires little or no care; the blooms are large, gracefully beautiful and very long lasting. The color here is Dresden Yellow 602/2 on opening (which is usually before 4 P.M.), fading to 602/1 the next day. The flower is about 4-5″ in diameter at natural expansion, heavy and waxy in texture, with segments from 1 to 1⅛″ broad, and 2½″ or more in length.

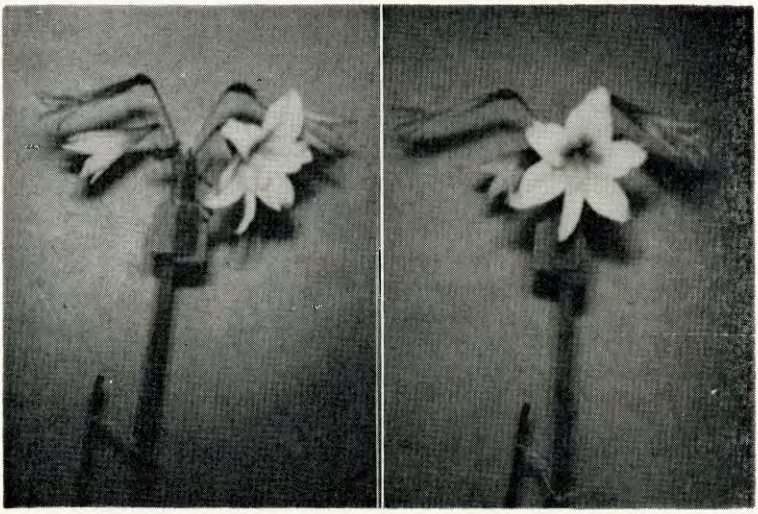

Fig. 44. Unidentified **Amaryllis** as grown by Burr Clouette, Columbia, South Carolina, 1966. See text for further details.

NOTES ON AMARYLLID CULTURE

Burr Clouette, *South Carolina*

AMARYLLIS

In 1962, I ordered some *Amaryllis* bulbs from Mrs. Barry of Pairieville, Louisiana. As one of the extras she sent a small bulb labeled *Amaryllis divifrancisci* Cardenas. She indicated that it was difficult. Her instructions were that it be potted in a very porous, gritty mixture; water was to be sparingly applied, and that it be allowed to go dormant if growth declined. However, as shown in Fig. 44, this is not the typical *A. divifrancisci* as figured in Fig. 11, page 34 of the 1960 Amaryllis Year Book.

I potted it in a mixture of half "Black Magic" and half coarse decomposed granite. It started to grow, and it was regularly but

cautiously watered, and fertilized with fish emulsion at regular intervals. It grew until early winter when it became dormant, and remained so for five months. When growth resumed, it increased slowly in size, and made a few offsets. During the winter of 1963-64 it had another long dormancy similar to the one of the previous season. The same regular watering fertilizing was followed during each growing season. As it

Fig. 45. Three **Amaryllis:** from left to right, the clone 'Cuenca', **Amaryllis belladonna (equestre) x A. evansiae,** and **A. evansiae,** 1966.

increased in size it formed more offsets, and all were moved to larger pots as necessary. When it went dormant in 1965, I removed the remaining offsets (three in number), and potted the parent bulb in a five-inch azalea pot.

Just after the turn of the New Year, a bud started to emerge from the dormant bulb. The first week in February, the scape was 14 inches tall, and the first of the four buds opened. The buds were in two sets.

Two opening a few days apart, and the other two did not open until nearly two weeks later. The flowers were good keepers, lasting over a week in the house under fluorescent lights. As they bloomed under such lights in the house, my description of the color may not agree with that of blooms produced outdoors.

The buds were greenish, becoming yellowish-greenish as they matured. The open flower was quite yellow (Nickerson color fan, 7.5Y 9/8), faintly brushed purplish-red; throat green; style and filaments green below, whitish above; pollen yellow; stigma only slightly trifid. The stigma and anthers were exserted beyond the face of the

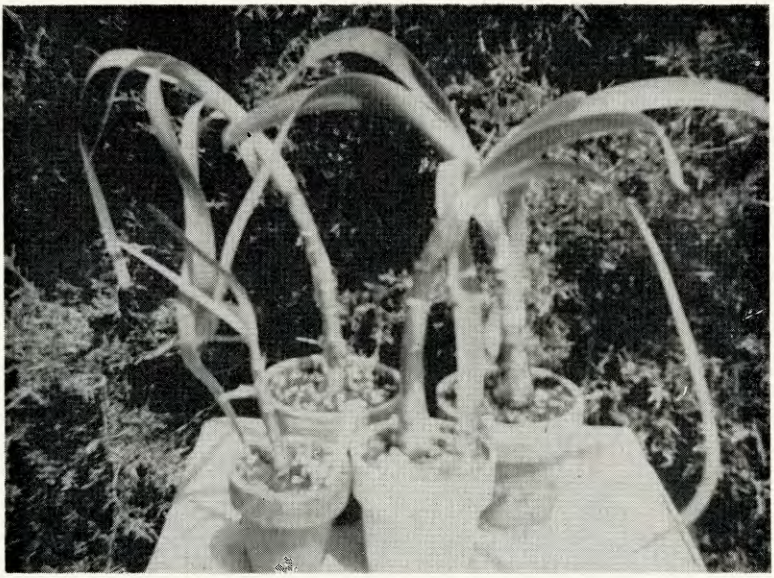

Fig. 46. **Worsleya rayneri** seedlings as grown by Mr. Burr Clouette, Columbia, South Carolina, 1966. Two year old seedlings, the small one in front is of same age as two larger ones in rear; the one in plastic pot, two years old, is from Hummels.

open flower. The flowers were approx. 3 inches in diameter and 2 inches deep, round, flat-faced at maturity, although they were quite conical at first. The 3 widest tepalsegs were over an inch wide; two were less than, and the bottom one only half an inch wide.

I have selfed the unidentified *Amaryllis,* and have used pollen of the yellow Davis hybrid on it, but do not know as yet if seed is forming. I am also using its pollen on most of my other *Amaryllis* as they bloom hoping for something interesting in the hybrids.

A bulb of Goedert's SA 62-4 bloomed in January-February, 1966. It is apparently a form of *Amaryllis belladonna L.* The flowers were a clear tomato red with greenish-yellowish throat.

Among the other *Amaryllis* that bloomed in 1966, the clone 'Cuenca', an *A. belladonna* x *A. evansiae* cross, and *A. evansiae* were notable. These are shown in Fig. 45.

WORSLEYA RAYNERI

Some progress can be reported with the growing of *Worsleya rayneri* from seeds. As shown in Fig. 46. The seedlings have now reached the age of two years, and are assuming their characteristic form.

AMARYLLID NOTES FROM FLORIDA, SEASON 1965-66

Mrs. Fred Tebben,
Box 12, Lake Hamilton, Florida, 33851

Here in Florida the blooming season for *Amaryllis* and other members of that family is a long one. Buds began appearing in late February and the first outdoor bloom opened on March 11th, and continued for two months, on up till about May 10th. Before the amaryllis were done with their lovely bloom, the daylilies started, and now the crinums are lovely and the early blooming daylilies are starting in to give their second display of flowers.

In late January we had a very severe cold spell, with the temperature going way down in the low twenties, but it lasted only one night and while much damage was done to tender tropicals, no harm came to the citrus groves as in 1962. *Crinum* foliage was frozen down, and a few red spots appeared on amaryllis leaves, but no permanent injury to anything.

For the first time since moving to Florida my seedling bed of amaryllis bulbs put up a wonderful show for me. Some of these seedling bulbs are very old for I have babied them along for many years, growing them in beds up in Illinois for the very short growing season there and resting them bare-rooted over winter. They have been in the soil here since November, 1961, and this is their first season of bloom. Many were very lovely and just as good in every way as the so called Dutch clones. All my markers have disappeared in that time and it is rather frustrating not to know just who made these crosses and what their parent bulbs were. A few proved not to be very good but all my neighbors wanted them so I gave away many of the reds that I felt were not worth keeping or were duplicates, and that made room for more of the better ones. There was one just like "Silver Lining", a pure lovely rose pink, a number of really good salmon pinks, some with white center that were especially pleasing, some whites with stripings of red and some with red dots sprinkled over the white, but all very pleasing to me after waiting so long for their bloom.

Among my Dutch bulbs some have disappeared from that bed and I can only conclude that I have lost them, so will stick to the ones that seem to do so well in the borders here. 'Apple Blossom' is outstanding, as are most of the whites. 'Beacon' bloomed nicely, and 'Pink Favorite' was lovely, 'House of Orange' gave a fine display for it had twelve

blooms all open at once, a real bouquet in itself. 'Royal Dutch' was nice and so was 'Rose Queen'. I was given four nice new pinks and they are indeed fine ones. 'Queen of the Pinks' was a nice deep rose with darker center, 'Flora Queen' was a much lighter pink, in fact the lightest of the pinks I have, 'Sight Show' a nice rose pink, but 'Dutch Belle' failed to send up a bud stalk this year. Among those I seem to have lost are 'Delilah', 'Fantasy', 'Purple Queen', 'Pinkster Flower' and 'Bouquet'.

Among the crinums blooming are 'Ellen Bosanquet', one of my favorites, the CHRISTOPHER LILY (*Crinum giganteum* hybrid), which is so fragrant and like a cluster of white tulips in bloom, and Crinodonna 'Fred Howard'. All these are very nice. I like 'Louis Bosanquet' also but it offsets so rapidly it is hard to control. *Crinum scabrum* and several other "Milk and Wine" varieties are also in bloom. *Zephyranthes seem* to disappear from the garden but the two *Habranthus* species *robustus* and *brachyandrus,* seem to do well and multiply rapidly.

Daylilies are gaining very rapidly in popularity in Florida, and the evergreen varieties make nice landscape subjects, though the deciduous ones do well here too, since we seem to have enough cold weather to make them go dormant. There is a daylily grower near here who specializes in the Wheeler hybrids and I visited his garden one Sunday when many lovely ones were in bloom, but no one was there to sell them that day so I will go again.

My husband passed away quite suddenly on April 14, 1965. It has, of course, been a very great blow to me since he had such a short time to enjoy his retirement, and I was at a loss to know just what I should do alone in Florida. But I have fine neighbors and friends, and with my garden to care for, and a few other hobbies such as reading and knitting, I manage to make a life for myself, even though I am very lonely without him.

CRINUM CULTURE IN MARYLAND—FURTHER NOTES

WILLIAM W. ZORBACH

Success in the wintering over of hardy crinums in this area has been maintained now for seven years; previous reports have been given in Plant Life, *19,* 101 (1963) and *21,* 145-148 (1965).

The large clumps produced by *C.* 'Cecil Houdyshel' and *C.* 'Ellen Bosanquet' were dug and separated in the spring of 1965. The bulbs of the latter were planted individually in the raised bed along the east wall of the house, whereas those of *C.* 'Cecil Houdyshel' were planted in clump fashion in a newly prepared, small bed containing sandy soil some eight feet away from the southeast corner of the house. In this relatively unprotected location, the latter bulbs easily survived the winter, despite a blizzard in late January of 1966, which dumped nearly 30 inches of snow in the writer's back yard. Accompanying the snowfall was a severe cold spell which persisted for many days.

The spring which followed was very late; nevertheless, during the first warming, the three subject crinums pushed up readily. Before

growth had advanced, the individual bulbs were fed in a manner similar to that for trees. Around each, several holes were poked into the soil to a depth of 12 inches, and were packed with Bovung. This treatment proved to be most salutory, for the performance of the crinums this year was the best to date. Not only was leaf growth more luxuriant, but there was an increase in the number of scapes, some appearing even from relatively small offsets.

C. scabrum is definitely unsuitable as a hardy plant in this area. A single, blooming-size bulb was secured early in the summer of 1964, and was planted 6 inches deep along the (warm) east wall of the house. Shortly thereafter, it bloomed weakly, but took most of the summer to establish itself. When the frosts arrived, it was covered, but during the following spring its leaf stalk emerged long after those of the other hardy crinums. Nevertheless, it made excellent leaf growth during the summer without blooming. It was also noted that, in sharp contrast to *C. powellii album*, 'Cecil Houdyshel', and 'Ellen Bosanquet', the leaf stalk of *C. scabrum* "kills back" to a greater depth during the winter months. In fact, it is this circumstance and not the hardiness of the bulb *per se* which militates against the wintering over of this species. Because of the very long delay this year (1966) in the arrival of warm weather, rotting had continued downward, destroying the inside of the bulb. At the same time, the exterior segments of the bulb were intact.

It was reported previously that, with proper protection, *C. asiaticum* would withstand Washington winters. For such treatment, the winters should be mild and, more important, the advent of warm weather should be early to late March, for example. But during the past few years, these conditions have not, alas, been observed. During late March and much of April, there has been an alternation of warming and freezing periods, which has proved to be a hardship even for the hardy crinums grown here.

Thus, the long delays in the arrival of permanently warm weather make it difficult for *C. asiaticum* to regain its strength each year and, because growth is so slow in this species, recovery is not adequate for the production of blooms before the frosts occur in the fall. Accordingly, the small specimen planted permanently outdoors in 1962 was dug, and is now handled as a tender bulb.

In June of 1964, two magnificent specimens of *C. asiaticum* were secured from Wyndham Hayward, each measuring nearly 4 inches in diameter. These were planted immediately in a small bed of sandy soil. Each bloomed shortly thereafter; however, the blooms were somewhat weak due to lack of establishment. This species sets seeds extremely readily, and seven of the ones produced by the new bulbs were allowed to ripen. All seven germinated in a small pot containing sand and vermiculite, although the gestation period was, on the average, five months. The seedlings were planted together in a large pot and were carried over this way in a newly constructed conservatory (electrically

heated) abutting the south side of the writer's home. They were planted out in the open soil this summer (1966) and will be treated as tender bulbs.

With the knowledge that *C. asiaticum* does not winter over satisfactorily, the two new specimens were dug prior to the first killing frost in the fall of 1964 and, after trimming, were laid aside until December. They were then planted about 3 inches deep in 16-inch redwood tubs containing very sandy soil, with much bonemeal added, and brought into the conservatory to afford maximum light. Growth was slow, but steady, and in early May the tubs were brought outside in full sun. The two crinums were well watered and fed periodically with Ra-pid-gro. Growth was excellent, and by September 1, each had produced one scape. They were returned to the conservatory in late October, and from that date until May of this year (1966), when they were brought outdoors again, each produced four scapes, providing almost a continuous bloom during the winter months. This summer, growth has been excellent, and the bulbs are now five inches in diameter. In fact, the root systems have proliferated so much that the soil level in each tub has been elevated one inch. At this writing (Sept. 1966), the second ones are about ready to bloom.

Crinum bulbispermum has wintered over with ease, and this summer, one of the two specimens bloomed, albeit weakly. Although perfectly hardy, its performance does not match that of the other hardy species grown here. It appears that its growing conditions are quite different, and, whether this be a function of the soil, amount of water, or sunlight, or a combination of all three has not been determined. Additional experimentation with this species is envisaged.

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UNGERNIA CULTIVATED IN THE UNITED STATES

Burr Clouette, *5225 Spalding, Columbia, South Carolina 29203*

Recently my good friend, Prof. A. A. Samuelson of Richard, Washington, a *Delphinium* and *Amaryllis* enthusiast, sent me a bulb of *Ungernia*, species of which have probably not been cultivated previously in the United States. He had received several bulbs from a friend in Albuquerque, New Mexico, who is collecting, importing and growing plants from the U. S. S. R. The *Ungernia* species came from the Steppes of Kirghis. He also sent an illustration (Fig. 47) and a description in Russian. Mr. Aleck Korsakoff kindly translated these descriptive notes by N. Sikura as follows:

Ungernia (probably *U. ferganica* Vvedensky, 1935) has been grown in the Central Republic's Botanical Garden for the past three years. The attractive oppositely arranged leaves appear in early April, but by mid-June they dry up, and about a month later, the leafless plant produces a compressed scape with a one-sided umbel of rosy flowers,

resembling some other amaryllids. Flowers continue to open for about three weeks and single flowers last from 8 to 10 days. In culture the height of the plant and size of the flowers increase about three times; the height of the scape reaching 55 cm.

Fig. 47. **Ungernia** sp. (probably **U. ferganica** Vvedensky, 1935). Drawing by A. Pirozhenko.

Ungernia increases easily by splitting of the bulbs, which are cut into four parts. In about a month bulblets form on the cut parts which gradually grow into mature plants.

Bulbs are best planted in the fall. If planted in the spring, blooms will be delayed for one year.

Ungernia is a plant with few requirements; when growing on the Steppes, they do not require watering, and get along with the natural rainfall. In the Botanical Garden we multiply the plants and when large enough, they are passed on to the nurseryman.—N. Sikura (translated by Aleck Korsakoff)

Traub & Moldenke, in "Amaryllidaceae: Tribe Amarylleae" (1949) reviewed the genus *Ungernia* Bunge. The reader should refer to this review for further information.

DAYLILY REPORT 1966

W. Quinn Buck, *Chairman, Daylily Committee, American Plant Life Society*

The 1966 season was marked by the blooming in our garden of some fine new daylilies, both tetraploid and diploid. Perhaps the most exciting new diploids should include 'Jewel Case' (Lester), 'Porcelain Doll' (Lester), 'Beauty Pageant' (Fay), 'Prairie Thistle' (Marsh), and 'Prairie Chief' (Marsh).

Mrs. Hugh Lester's 'Jewel Case' proved to be an amazingly beautiful combination of a bright green throat blending into a mixture of cream and clear pink for petal and sepal color, set off by a lavender midrib: it seems a sort of pinnacle for this type of flower, of which there have been some very fine ones in recent years. Its wonderful shape, substance, and finish were enhanced by vigorous growth and excellent reblooming characteristics.

'Porcelain Doll' was an equally delightful small pink-and-salmon cream bicolor, round, flat, and of wonderful finish and substance. 'Carita' (Lester) did not appear happy in California this year, although it was reported as being extremely good on the East Coast.

Orville W. Fay's 'Beauty Pageant' was a most outstanding new large pink flowered daylily this year; it is wonderfully clean and bright in its color, which contains no salmon and is quite different from Mr. Fay's other pinks. Incredible branching and the size of the flowers made the slender spikes bend a little too much, although this may have been aggravated by the amount of shade from the nearby walnut tree. 'Grace Lenington' (Lenington) as a second-year plant had improved amazingly, being a huge lavender-pink of spectacular quality. Miss Spalding's 'Pink Fluff', 'Zadol,' and 'Lissy' again were among the most pleasant of the clear, bright pinks; 'Pink Fluff' was an especially fine performer, with rounded, nicely shaped flowers.

'Prairie Thistle' (Marsh) was an agreeable addition to the clear lavenders, having no hint of muddiness and being unaffected by our difficult climate; its flat shape had a bit of perkiness because of the spacing of segments. 'Lavender Flight' (Spalding) remained the finest of the lavenders, for clear color, good shape, and smooth finish; its spikes did try to grow too tall this year.

'Prairie Chief' (Marsh) was a remarkably clear dark red that makes one wish to see it again and again in order to find out if it can remain so good in this climate. It had much of the quality of the Claar reds as grown in the East, none of the latest of which have been tried here yet.

Among the tetraploids 'Dazzler Gold' (Childs) did not show as much of its 'Cartwheels' parent as one would have liked. Neither 'Cathedral Bells' (Childs) nor 'Tetra Edna Spalding' had very good color this year, our climate having given them a heavy infusion of muddy salmon to mar the pink. Undoubtedly all three of these clones should improve as the plants get stronger.

Mr. Fay added two more fine tetraploids to his releases in 1966: 'Lady Cynthia' (Fay T63-24, illustrated in Fig. 30 on page 115 of the 1965 *Plant Life*), a pale melon sister of the cream 'Kathleen Elsie Randall' released in 1965, and 'Gertrude Smith', which made such a sensation when it first opened its huge "pongee pink" blooms in Mr. Fay's field, and which he still considers the finest of his cross of 'Crestwood Lucy' X 'Crestwood Ann'. These Fay tetraploids undoubtedly will prove to be wonderful breeding material.

A visit to Dr. Hamilton P. Traub's garden in La Jolla, California, made it possible to see just a few of his newest seedlings. 'Red Butterfly' was a huge flower of very pleasant rose and red tones and of very good shape and finish; the spike was a reasonably good height and in scale. Some of the yellow and gold butterfly-type seedlings tended to be too tall still, as did the lavender and purple seedlings; however, a good percentage are the desired medium height. One of the most outstanding breaks in the Traub garden was a truly everblooming seedling yellow which should be invaluable in giving many everblooming seedlings in this strain.

In the Buck garden the most interesting new tetraploid seedlings as a group were the offspring of 'Tetra Marsha, Russell' some being very fine round ffowers. The beautiful 'Tetra George Cunningham' produced a good seed crop in combinations with other fine varieties, and 'Tetra Quincy' also gave more viable seed. Among treated plants that bloomed for the first time this year were 'Frances Fay,' 'Hilarity,' and the important and beautiful 'Blue Jay,' which should give many interesting crosses from the late fall blooming.

THE MILK AND WINE LILY CONFUSION

L. S. Hannibal, *Fair Oaks, Calif. 95628*

For some years the writer has been trying to unsnarl the overlapping nomenclature of the hardier Florida Crinum types which are commonly rated as the "Milk and Wine Lilies." The first suspicion that some of the presumably valid species were actually hybrids came when several clones were found to be pollen sterile. Then with the importation of true species numerous irregularities became apparent. The final confirmation came when the writer examined a number of old garden catalogues dating from 1885 to 1910. Evidence of hybrid introductions, misnaming, and early confusion became apparent from the start.

In short all of the central African species cross readily with *Crinum bulbispermum album,* which includes *C. kirkii, distichum, yuccaeflorum, sanderianum, scabrum, fimbriatulum, giganteum* (*Jagus* Thompson; recognized name in Hortus III) and others. These tropicals when hybridized with *bulbispermum album* tend to blend their characteristics by yielding foliage something like *C.* x *powelli album,* trumpet flowers with a light red or pink keeling to the tepals, deep growing bulbs and a

fair resistance to wet or cold winters. Some hybrids are fertile to the extent that they produce viable pollen, others are pollen sterile. Sometimes sufficient features show up to make it possible to identify the missing parent. In several instances the crosses have been repeated in sufficient quantity to be fairly certain of the parentages involved. In other cases we are left wondering if *scabrum* x *zeylanicum* or other such hybrid combinations were involved, but the major difficulty is that few of these hybrids bear hybrid names. Practically all have replaced the tropical parents because the latter are not cold hardy.

The first hybrid to be introduced as a species was the *C. fimbriatulum Hort* as the "Milk and Wine Lily" from Nassau in 1887 by P. F. Reasoner of the Royal Palms Nursery. The blossoms are described as three to four inches in diameter, striped white with carmine. It does not appear to be the plant that Henry Nehrling described 25 years later; as Nehrling reports the species is difficult to grow. The fact that it does not give seed suggests a hybrid. However, the plant is significant as it was the original "Milk and Wine Lily."

Reasoner seemingly crossed a number of *Crinum* species as he offered a *C. kirkii* x *bulbispermum album* in 1895 which he reported as similar to *kirkii,* but hardier and of lighter color. The bulbs vigor and greater resistance to frost soon displaced the surface growing, winter tender *C. kirkii.* It is now the sterile *"C. kirkii Hort."* of our gardens. Since the plant was never named we suggest 'P. F. Reasoner' for the clone.

Crinum scabrum crosses very freely with *C. bulbispermum.* The original hybrid is Dean Wm. Herbert's *C.* x *herbertii.* The first commercial clone was introduced by van Tubergen about 1890 and many sibling crosses have appeared since. Even the writer has tried his hand with this one. The form with the prominent red stripe so commonly encountered in the Gulf area has been recommended for the clonal name 'Gulf Pride'.

The cross of *scabrum* or the other *"Milk and Wine"* on *C. bulbispermum roseum* yields solid colored pink to red flowered hybrids in lieu of the red keeled "Milk and Wine." One of the better of these *C.* x *herbertii* crosses is the attractive 'Thaddeus Howard'. It is a robust plant with foliage larger than *C.* 'Cecil Houdyshel' and open, soft red blossoms. Practically all *herbertii* have viable pollen but will only strike on the parental forms or related *scabrum* types such as *C.* 'Cecil Houdyshel', 'George Harwood' or 'Ellen Bosanquet'. Where two red color genes can be brought together as in Mrs. Grace Hinshaw's 'Summer Glow' the solid red trumpet is exceptionally vivid.

Crinum zeylanicum appears to be quite common in Florida and like *scabrum* it is a good breeder. It is often called *C. ornatum* since it is that plant which was featured under the name *ornatum* in the Botanical Magazine at 1171, only to be lumped with *C. zeylanicum* of Burma due to close similarities. In fact if we follow the classification of L. Heritier, *C. zeylanicum* is considered to be a subspecies of *C. latifolium.* With our present day knowledge of plant migration, most of which occurred

in past pluvial periods, the probability of a west African species being closely related to a Burmese species appears rather remote. Unfortunately Dr. Carey's critical analysis of *C. latifolium* and *C. zeylanicum* has been completely ignored, otherwise it would be realized that the Asian form of *zeylanicum* and *latifolium* are rather remotely related. His description in "Flora Indica" also brings out the fact that *zeylanicum* in Asia has little in common with the west tropical African *ornatum*. The former has a narrow deeply channeled leaf with entire margins whereas *ornatum* has semi erect slightly glaucous foliage some 2 inches broad with scaberous edges. Both Wyndham Hayward and the writer are in full accord that the west African form is definitely entitled to its original status. This becomes particularly evident when the *ornatum* x *bulbispermum* hybrid is compared to the Asian and African *zeylanicums*. The hybrid is more representative of the Asian form. The blossoms on the hybrid are borne on a 14-inch scape and in lieu of being compact radiate out like spokes on a wheel. They are striped like the typical "Milk and Wine", but are not so conspicuously flared as *kirkii* or *scabrum* crosses. The pollen is quite sterile.

The small hybrid known as *C. sanderianum Hort.*, is also sterile. From its habits and features it could readily be a sibling of Reasoner's "*C. kirkii* hybridum." The only significant differences are in the sizes of the blossoms. The latter is half the size of the "*kirkii* hybrid."

Before closing we should certainly mention something about *C. amabile, C. augustum, C. erubescens* and *C. kunthianum*. All have narrow tepals which are highly colored. On numerous occasions the writer has heard them referred to as "Milk and Wine", but they do not have the trumpet-shaped blossoms of the latter, or the tapering sharply pointed leaves. *C. amabile* belongs to the Stenasters and all the others to platyasters which means the latter have blossoms shaped like *C. americanum*, although they are colored.

Even though these plants and *C. americanum* belong to different subgeneras they will cross with *C. bulbispermum* and *macowanii* as well as with hybrids like *C. 'Cecil Houdyshel'* or *Powelli album* (taking the pollen of the latter only). In a half dozen instances second generation crosses have been obtained. As a consequence there are far more complex hybrids scattered about than is realized and the identity of some can be quite perplexing. However, Stenaster x Coconocrinum have slender, acutely pointed tepals and Playaster x Codonocrinum semi slender bluntly tipped petals. 'Peach Blow' has long been considered a "Milk and Wine" type but its petal shape is definitely Platyaster x Codonocrinum. The bluntly tipped, strap like foliage rules out any parent with acutely tipped slender tapering leaves. From the dilute color only one parent was colored, the other was white. Unquestionably one was hardy, the other semi-tropical. Other parental factors are the spicy fragrance, the type of veining in the leaves and the finely toothed or scaberous leaf margins. Both *scabrum* and *ornatum* are eliminated as probable parents because the pointed foliage would be apparent in the F-1 hybrid. To meet the majority of conditions our most probable

selection is *C. yemense* x *augustum,* but we must also consider the true *erubescens* and *kunthianum,* and less likely 'J. C. Harvey' x *americanum.* The fact that 'Peach Blow' has viable pollen and will cross with *bulbispermum* may give a clue concerning the parentage.

One may wonder why the interest in tracing parentages. Thus far the writer has checked out some forty hybrid Crinums and we know the breeding capabilities as well as those combinations which give vigor, good form and color, or resistance to cold or summer heat. Breeding progress is being made because we can avoid many sterile combinations and then eradicate poor siblings if the material is not up to expectations. Thus far the production of second generation material is just beginning but it promises to be interesting.

FREEDOM OF FLOWERING IN NERINE SARNIENSIS

KEN DOUGLAS, *Kingswood College, Grahamstown, South Africa*

Although the beautiful *Nerine sarniensis* is native to the Cape Province it is not widely grown here in South Africa. The chief reason for this lack of honour in its own country is that this particular species has gained a not altogether undeserved reputation for being tricky. Often it appears to grow and increase well, but flowering is so erratic and tardy that after a few years many gardeners give it up in disgust and grow the not quite so beautiful but hardier and more free-flowering species such as *Nerines filifolia, humilis* or *bowdenii.* Nevertheless some gardeners regularly produce dazzling displays of these fascinating flowers with apparent ease. Their success may well be due to their thorough understanding of the cultural needs of the plant, but good fortune in obtaining a free-flowering strain of *sarniensis* must also have played a big part in their succes.

Some years ago I was on the look out for a free-flowering strain which would set seed freely. Accordingly I set up a small experiment to test the different available forms of this variable species. I ordered mature flowering-size bulbs from five different commercial sources (Lots A to E) and had three collections made from the wild (Lots F to H). For comparison purposes I used a very free-flowering form of *N. humilis* from Caledon (Lot I) and that well-known, reliable, hybrid nerine "Gaiety" which had been sent to me by Mr. Stanley Smee of Ipswich (Lot J).

Each of the first nine groups (A to I) consisted of 6 bulbs, but only 2 mature bulbs of "Gaiety" were available. I planted these groups in a well-drained, raised bed in the open. The soil was a rich, uniform mixture and I was careful to give all the bulbs similar treatment in the way of water, light, spacing and food. Spacing was four inches apart in rows ten inches apart. For four years I kept careful records of the number of followng stems produced by each group of bulbs. The results of this simple experiment are set out in the Table 1, below.

TABLE 1.

Lot	No. of bulbs.	No. of flowering stems each year. 1st	2nd	3rd	4th	Totals	REMARKS
A	6	2	3	4	3	12	Fair. Insect damage 4th year.
B	6	1	3	0	0	4	Very tardy. Prolific offset production.
C	6	5	2	5	2	14	Free-flowering in alternate years only.
D	6	0	0	1	0	1	Healthy but remarkably tardy.
E	6	4	4	5	6	19	Very free, few offsets.
F	6	1	4	5	7	17	Very free. Bulbs not plump on arrival.
G	6	1	3	2	2	8	Tardy, dwarf form. Many offsets.
H	6	2	3	4	5	14	Fair.
I	6	5	5	6	8	24	Very free-flowering. **N. humilis.**
J	3	2	3	3	5	13	Extremely free-flowering. Gaiety.
Totals		23	30	35	38	(126)	

COMMENTS: Different strains of *N. sarniensis* seem to vary enormously in their ability to produce flowering stems even under uniform conditions. Of the first eight groups only E and F were satisfactory while most of the others were mediocre or poor. Lots B and D were exceptionally poor. It would seem worthless for a gardener to persevere with an inherently poor strain. Good soil, ideal conditions and care will not make up for a built-in resistance to flowering.

It is these poor-flowering strains that have given the whole species its undeserved reputation for tardiness, and commercial growers who propagate and distribute inferior forms are doing their customers and the species a real dis-service. The trouble is that the distribution of poor forms is likely to continue or even to increase because two of the three worst flowerers are healthy growers and are most prolific in their offset production; whereas the excellent strain E produced only 3 smallish offsets from 6 mature bulbs in 4 years under good conditions—a hopeless proposition for the commercial grower.

Some strains (Lot C) appear to follow an inherent pattern of flowering every second year. The lean year follows a season of free flower production and prolific seed setting and is used to enable the bulb to build up its reserves for the following season. Presumably Lot C arrived after a year of rest or perhaps the flowers of the previous season had been cut early for marketing before they could set a crop of seed.

The oft-recorded statement that *Nerine sarniensis* resents disturbance and so will not flower the year it is moved does not seem to be generally true. Under the conditions of my experiment it can be seen that if bulbs of a good strain which have reached flowering size are planted in rich soil at the correct time and given proper care a surprising number will flower the first year, as in Lots C and E for example. The surprising lack of first year flowers in the excellent Strain F was caused by the shrivelled condition of the bulbs when received. When bulbs have been well-fed and acclimatised to their flowering site one would expect the numbers of flowers to increase each year. This is what took place, but there was something of a levelling out during the third and fourth years. Some mature bulbs from which flowers were expected

broke down to produce offsets instead, and by the fourth year the picture became complicated by the flowering of offsets, as for example in Lots I and J. These remarks refer to *Nerine sarniensis* only, for I have found quite a marked falling-off of flowering in the first year after transfer to fresh ground with such species as *N. bowdenii* and *N. flexuosa.*

One frequently reads that to flower freely nerines must become crowded and tightly root-bound. My experience under South African conditions conflicts with this dictum for I have found that my plants flower more freely in the open ground than they do in pots and they do not seem to resent being spaced 4 to 5 inches apart in rows 10 inches apart. On the contrary, they seem to enjoy it. Yet I must confess that I have lost several valuable pot-grown hybrids through over-potting, especially with small or not very vigorous varieties. Pot plants seem to require a great deal more watering than plants in open beds and this extra water soon turns the soil sour unless roots penetrate the potting-soil rapidly before sourness develops. It is a mistake to overcrowd pots so much that most of the bulbs remain in a half-starved state for years so that they seldom get the chance of forming the six leaves usually needed to ensure a flowering stem the following year. The ideal is to have a few bulbs in a smallish pot containing a fertile, freely-draining compost and to repot before overcrowding causes a falling off of flowers.

The experiment confirmed the free-flowering properties of the Caledon form of *N. humilis* which produced more flowers than the best strains of *sarniensis.* Even more spectacular was the performance of the old hybrid Nerine x "Gaiety" which can always be relied upon to produce masses of flowers year after year. In proportion to the number of its bulbs (3 only) it produced more flowers than any of the other varieties tested. In my experience many hybrid nerines are more free-flowering than their species-parents. Some owe this property to their undoubted hybrid vigour; others owe it to their complete or partial sterility which prevents the exhausting process of seed setting: but there are other seed-setting hybrids which are reliably floriferous, because they are the end-product of years of careful selection by breeders who were aiming to produce a beautiful and a free-flowering hybrid. As the good hybrids which contain this property (many beautiful varieties do not possess it, alas) become more widely distributed, I am sure this exquisite beauty will become increasingly popular in the greenhouses of cold countries and in the open garden in countries with warmer and sunnier climates.

LYCORIS IN LOWER GULF COAST REGION

CLAUDE W. DAVIS, *Louisiana*

One of the most satisfactory bulbs for late summer flowering in the Lower Gulf Coast is *Lycoris radiata.* These spectacular, orange red flowers seem to bounce out of the bare ground in September after

rains in August and early September. Foliage growth follows flowering and remains green during the fall and winter, maturing and dying down in the spring.

Bulb division is rapid and within a brief period large clumps are formed. The plant naturalizes readily and will continue to grow and flower for years in the same bed without separating the clump. As a result they are comparatively inexpensive and are extensively used for yard decoration or as cut flowers. The foliage is not affected by the mild winters which generally prevail in the region, but a few years ago a severe spell of cold weather dropped the thermometer to 10 degrees F., the coldest in fifty years, and the foliage was killed. The bulbs were not hurt, but new growth was checked and the bloom crop was light the following season.

The Florida "Hurricane Lily" or *Lycoria aurea,* which is a yellow form, will grow and flower in protected locations, as the south side of a building, as far north as Baton Rouge, La. It is much more tender to cold than is *Lycoria radiata,* but is considered to be more desirable.

Several years ago bulbs labeled *Lycoris radiata alba* were obtained from a grower in Japan. These are not a pure white, but might be described as ivory white. This variety is not quite as hardy as the red form, but the bulbs have survived, increased and flowered for three years. A bed of these makes a very striking appearance, probably due to the great contrast with the more commonly grown red form.

SEED AND PLANT TRADE CATALOGS RECEIVED

APRIL, 1966, OFFERING OF SEEDS, LARGE- AND SMALL & FREE-FLOWERING HYBRID AMARYLLIS. Ludwig & Co., P. O. Box 18, Hillegom, Netherlands.

"LUDWIG AMARYLLIS" 16th EDITION, [1966-67] CATALOG, Ludwig & Co., P. O. Box 18, Hillegom, Holland. Profusely illustrated in color of named and registered Hybrid Amaryllis clones, *Sprekelia formosissima,* and *Cyrtanthus purpureus.* Thirty-two pages, and cover also in color. August, 1966.

UNIVERSITY HILLS NURSERY CATALOG, 1966-67, Claude W. Davis, Proprietor, 470 Delgado Drive, Baton Rouge, Louisiana, 70808, featuring Hybrid Amaryllis, Amaryllis species, Louisiana Iris and other *Iris; Hemerocallis,* Crinums, *Crinodonna,* Chalice Lilies (*Hymenocallis,* etc.), *Gloriosa,* Zephyrantheae, *Curcuma* and *Kniphofia.* 24 pages.

PRESEASON PRICE LIST, 1966-67. Nov. 1966. 7 pages. Robert D. Goedert, Amaryllis Dealer, Jacksonville, Fla. 32205. Hybrid Amaryllis clones, and seeds; *Amaryllis* species; *Lycoris; Eucharis; Haemanthus; Gloriosa,* and Gingers.

THE 1965-1966 AMARYLLIS SEASON

ROBERT D. GOEDERT, *P. O. Box 6534, Jacksonville, Florida 32205*

This past flowering season was one of the best in several years. Particularly fine reports were received from Texas, Louisiana and other parts of the south. It appears that many beds of amaryllis in the south have recovered from damage received during past severe winters. The past growing season was good here and in Holland and other areas which accounts for many of the fine flowers. The bulbs received from Holland were especially good this past season and almost all flowered exceptionally well. At the present time it appears we will have another fine growing season in 1966 and next spring should be even better than that of this year. This should help to stimulate interest in this fine flower.

I received many fine reports from those who have been growing seedlings both in the border in the southland and in pots in the north. More people should try their hand with seed. It is fascinating and with the availability of good seed one can flower sorts not seen in the named varieties. With some understanding of requirements and a little special attention to details one can be successful in flowering seedlings in three years.

Due to many inquiries as to the care of amaryllis I would like to touch on this subject a little and possibly provide some information from my experience that might help those who have experienced difficulty in growing these fine plants. Possibly I may be of help to a number of fanciers to again stir their interest to new heights and keep them from falling into the pit where most amaryllis fanciers find themselves sometime.

THE AMARYLLIS FANCIER AND HIS DEALER: Often someone sees an amaryllis that has flowered and made an exceptional specimen. He immediately falls in love with the flower. With some difficulty he finds where he can buy Imported Dutch Amaryllis bulbs at a reasonable price. He purchases two or three bulbs, follows directions and has reasonable success flowering them. This may happen for several years and he enjoys the hobby. After this his interest grows and he wants to see more varieties, colors and types. He then purchases quite a few. With these 10 to 20 bulbs he finds there are some complete failures. He then notices that the bulbs he had purchased for several years before are not flowering either; in fact, they are shrinking and some have disappeared. What is happening!! The first thing he thinks of is that his bulb dealer must have sent him old worn out bulbs. So he writes his dealer. The dealer answers him politely but firmly saying he furnishes the best bulbs obtainable and can not be expected to grow them for the customer. The dealer does not take kindly to his demanding replacement of those bulbs that were failures.

Now the new fan has tasted failure and he becomes frantic. He feels the bulb dealer has not acted properly by not replacing the bulbs.

Next season he will find another bulb dealer who is more "reliable" even if he has to pay more for his bulbs. He orders some from the new dealer. He may have success the first year but eventually the same cycle happens again and he finds himself writing the new dealer. The new dealer tells him the same thing but usually a little more bluntly. At this point he gives up completely and may forget amaryllis for other flowers or other hobby. He may not completely give up. He may only lose interest for a season or so but his experience has mellowed him. He finds himself writing the original amaryllis bulb dealer. He is asking for advice and the venom is gone. The amaryllis dealer will try to advise him as to where he made mistakes and also that everyone has failures. Once he understands that others are experiencing or have experienced failures he has more faith in himself and growing amaryllis becomes a challenge to him.

The belief that amaryllis are easy to grow is wrong. Most dealers try to send out the best bulbs obtainable. The point I would like to make is that most amaryllis imported from Holland, except for a few like 'Apple Blossom,' 'White Giant' and 'Ludwig's Dazzler,' come from the same sources, unless you happen to trade with some unscrupulous firm of which there are few, if any, as there is little money in this industry and that does not appeal to those looking for a quick and easy profit.

The varieties not raised by the originator, such as 'Apple Blossom,' are generally grown by a grower who is equally as good. The bulbs you buy usually come from the same source regardless of the dealer you trade with. The bulbs should respond as well from one dealer as another. The only difference is in the handling of the bulbs after they are shipped from the grower and the service you get. The bulbs can get over heated or be subjected to extreme cold in transit. This will have some bearing on the results and this is usually unknown to the dealer. He has little control over this except seeing that the shipment is not delayed in transit.

The bulbs often have sweated in shipment and once received the dealer must dry them off quickly so as to prevent rot developing and keep the bulbs dry in storage. He should keep them dry until packed and they should be properly packed to keep them from being damaged by cold in transit to the customer. One of the best assurances that the bulbs do not get damaged by cold in transit is that they be throughly cured before they are shipped and are dry when packed. Other than assuring proper handling the dealer can do little to insure you good results. The growing season has a great deal to do with how your amaryllis will respond. The Dutch know their business; however, even with their know-how every amaryllis bulb they produce does not always give satisfactory results.

The Dutch growers grow amaryllis especially for potting and they select seedlings for propagating that will produce a nice looking bulb in a short time and flower well when forced. This is their criterion and

one must realize this means they are interested in giving you a bulb that flowers well the first season. They do not breed for a continuing flowering habit; however they have to pick vigorous clones and many can be maintained in flowering condition year after year. But some just do not respond well after the first flowering season after they are purchased.

I think if you would ask most dealers, and possibly the Dutch growers, they would prefer the customers who buy a few bulbs each year to flower for their own enjoyment and when the flowers are gone they throw the bulbs over the back fence or give them to a neighbor to try to nurse them along. Next season they purchase new bulbs. This type customer figures when the bulb flowers they got their $3.00 to $4.00 worth and they are satisfied. These customers often have the dealer pick out clones that are easy to flower and due to this fact and the fact that they are satisfied to receive the same clones each year they are more successful than the person who makes a hobby of nursing bulbs along from one season to the next.

Do not feel that I am against the hobbyist for I am one myself. But the hobbyist must get enjoyment from the challenge and the growing and accept the failures. If only the flowers fascinate you, stick with a few new worthwhile clones each year and when you get through with them give them to a neighbor who wants to experiment with the bulbs.

HINTS ON CULTURE: To get back to the fan who has begun experiencing failure. His bulbs seem to shrink each year. Whether they are planted in a bed or in a pot makes little difference. From where I sit, if you want to take the trouble to bring them back, here are a few points that might help.

The main reason amaryllis fail is that they lose their roots or just fail to grow them. The Dutch growers when talking of failure say their amaryllis lost their roots. If your amaryllis are doing poorly you will generally find they have few roots during the growing season. What should you do?

First, most root failure is caused by one of the following, in the order I consider most prevalent: 1. Insects and soil borne fungus; 2. A soggy soil, poor drainage; 3. An acid soil; 4. A poor supply of fertilizer.

If you have amaryllis that are doing poorly I would first suggest you dig them and spread them out on a concrete area or other paved surface that is drained. Let them stay in the weather 6 to 8 weeks. The rain and sun will do wonders to clean the bulbs of insects and fungus. After this find a new area for the bed or new potting soil. The soil must be open textured and well drained. If the soil is acid add some lime. I prefer oyster shell as it tends to keep the soil from becoming too heavy. Make the soil rich in organic fertilizer or start a program of providing liquid fertilizer each 10 days to two weeks. You will find when replanted the bulbs will acquire new life.

Now if you do not have the time to repot the bulbs or make a new bed and the soil is suitable, I suggest you get a good mitecide such as

Cygon and drench the pot or the bed with a solution in water. After the insecticide has been in the soil several weeks obtain a good fertilizer and make a weak solution and water with it for several weeks but let the bed or pot dry some between each application. This will often start growth.

I suggest you drench your potted amaryllis or beds of amaryllis at least twice a year with a good insecticide. I use Cygon with some success. There might be others that are better. One application in the spring, one in mid-summer and spray the foliage each six weeks between. The insects that hurt are the ones you can not see.

WHERE TO GROW YOUR AMARYLLIS: If you have your amaryllis in a bed, pick a place in the open with tall trees to the west. I feel this is best as this gives them sun in the morning and a little shade to rest afternoon; also the sun will peek through under the trees in the afternoon. They need plenty of sun. You will find the white ones will do poorly unless they get lots of sun and they also appear to like a little more lime.

Often I am asked what size pot to use. This depends somewhat on the nature of the particular clone but will range from 5″ to 10″ according to the care you will take of it. Generally if they are to be set out in the open where watering is not controlled, choose the smaller sizes and you will get best results. I generally use a 5″ to 7″ pot.

Where should you place the pot during the growing season? If you are having luck, keep them where they are. If you have one or two pots you might place them in one of the following spots: (1) on the edge of the border up against other low plants that will shade the pot but allow sun on the foliage, or (2) on a box slightly on the edge of a hedge where humidity will be fairly high, yet ventilation is good. One of the best bulbs I ever had was from a pot set slightly under the edge of border grass. Another pot I had great success with was set on a table where azaleas overhung the pot slightly. They do not like wet feet, but a day or two of rain will often clean insects from the roots, and result in new vigor.

A TABLE FOR YOUR POTTED AMARYLLIS: If you have a lot of pots I would suggest you build a table to set them on. For the top use 1 x 4″ with an air space of about ¾ inch between each board. This will allow air flow through the plants and help keep the roots cool, prevent the pot from becoming too wet, and allow evaporation from below to keep the humidity up. You will find such a table will lead to success. It keeps weeds from growing over into the pots, and helps make caring for them much easier from the back. Use treated lumber so termites do not destroy it. Also nail a sleeper to the legs so it does not mire up in the ground. Set it at the outside edge of the foliage of a tree.

Well, enough advice on growing amaryllis. I do hope you will find some of the comments helpful.

THE 1966 FLOWERING SEASON—GROWING SEEDLINGS: Again getting back to the past flowering season I would first like to

comment on the reports of extra fine blooms from seedlings. Many reported super flowers which they said made some named clones look sick. Now, don't low-rate the named clones. Often the first flower from the seedling is its best and never again will it be the same unless great care is taken in culture. Like other hybrid seedlings the maintenance of color and size requires the best of culture. However you will find some that will improve in future years with ordinary culture. You must remember that the Dutch develop many seedlings of similar color in order to introduce a clone and often it is superceded in 5 to 6 years after introduction. Do not get your hopes too high with your seedlings but if you plant good seed you should get many worthwhile seedlings and most will be worthy and have nice clear colors.

NAMED CLONES: Picotee types in the named Dutch varieties remain very popular followed by the pinks and pink-and-whites. The solid colored clones remain popular but bitones, blends and novelty types gain favor.

White clones: The whites have always been popular particularly with the beginner. And like the Japanese, white flowers have always been a favorite with me. The whites are some of the easiest to force, and they make good clones for the beginner. There are many fine free flowering whites. 'White Christmas' is possibly the most popular. It holds roots well in storage and always gives a good account of itself especially as a pot plant. 'White Giant' is a fine large white that is easy to flower. 'Early White' is a new one that gives great promise. It makes fine large flowers. 'Ludwig's Dazzler,' 'Marie Goretti' and 'Winter Carnival' all perform well. In the exhibition class many say 'Oasis' is tops. Van Meeuwen's 'Mt. Blanc' is also a fine exhibition type. Many of the whites are much alike. The C. Warmenhoven whites, none named, caused many fine comments this past season. They are free flowering and have a beautiful ivory cream color when first open. They are large and handsome and to the breeder for yellow they might prove to be a good seed or pollen parent.

Near White Varieties: The near whites gain popularity. 'Picotee' is most popular. 'Peppermint', 'Marion' and 'Siren of Paradise' in white with a fleck of red are popular. 'Peppermint' has more red, 'Marion' is huge and 'Siren of Paradise' is extra tall and large; fragrant and a wonderful exhibition clone.

Bi-tones And Striped clones: I would like to take up the red and white bitones and stripes at this point. This group has always been weak. Ludwig's 'United Nations' and 'Carausel' are notable. Van Meeuwen's 'Orion' is a vigorous growing large flowering clone. If the color was brighter it would be most outstanding, but it is still worthwhile especially in hybridizing. Warmenhoven's 'King of Stripes' is a fine round flat form, however smaller than most clones.

Pink and White: Pink and white is a good color combination especially for the ladies. 'Apple Blossom' still remains popular; however 'Rose Marie,' 'Pygmalion', 'Rosy Dawn' and 'Love's Desire' (with

Cygon and drench the pot or the bed with a solution in water. After the insecticide has been in the soil several weeks obtain a good fertilizer and make a weak solution and water with it for several weeks but let the bed or pot dry some between each application. This will often start growth.

I suggest you drench your potted amaryllis or beds of amaryllis at least twice a year with a good insecticide. I use Cygon with some success. There might be others that are better. One application in the spring, one in mid-summer and spray the foliage each six weeks between. The insects that hurt are the ones you can not see.

WHERE TO GROW YOUR AMARYLLIS: If you have your amaryllis in a bed, pick a place in the open with tall trees to the west. I feel this is best as this gives them sun in the morning and a little shade to rest afternoon; also the sun will peek through under the trees in the afternoon. They need plenty of sun. You will find the white ones will do poorly unless they get lots of sun and they also appear to like a little more lime.

Often I am asked what size pot to use. This depends somewhat on the nature of the particular clone but will range from 5″ to 10″ according to the care you will take of it. Generally if they are to be set out in the open where watering is not controlled, choose the smaller sizes and you will get best results. I generally use a 5″ to 7″ pot.

Where should you place the pot during the growing season? If you are having luck, keep them where they are. If you have one or two pots you might place them in one of the following spots: (1) on the edge of the border up against other low plants that will shade the pot but allow sun on the foliage, or (2) on a box slightly on the edge of a hedge where humidity will be fairly high, yet ventilation is good. One of the best bulbs I ever had was from a pot set slightly under the edge of border grass. Another pot I had great success with was set on a table where azaleas overhung the pot slightly. They do not like wet feet, but a day or two of rain will often clean insects from the roots, and result in new vigor.

A TABLE FOR YOUR POTTED AMARYLLIS: If you have a lot of pots I would suggest you build a table to set them on. For the top use 1 x 4″ with an air space of about ¾ inch between each board. This will allow air flow through the plants and help keep the roots cool, prevent the pot from becoming too wet, and allow evaporation from below to keep the humidity up. You will find such a table will lead to success. It keeps weeds from growing over into the pots, and helps make caring for them much easier from the back. Use treated lumber so termites do not destroy it. Also nail a sleeper to the legs so it does not mire up in the ground. Set it at the outside edge of the foliage of a tree.

Well, enough advice on growing amaryllis. I do hope you will find some of the comments helpful.

THE 1966 FLOWERING SEASON—GROWING SEEDLINGS: Again getting back to the past flowering season I would first like to

a little more color) gain in popularity. All four are fine clones. 'Pygmalion' is earliest and is possibly the most free flowering. 'Artemis' is a new exhibition type that grows tall and large. It should make a name for itself on the show table.

Blended Color Varieties: The blends are popular and many new and worth while clones have been added to this list in the past several years. In shrimp pink and white 'Margaret Rose', 'Sweet Seventeen' and 'Day Dream' are very similar and all are fine. 'Day Dream' is somewhat the largest. Ludwig's 'Gypsy Girl' caused quite a lot of excitement last season. It is large and beautiful.

In orange and white blend 'Golden Triumphator' grows large and is vigorous. 'Cupido' and 'Pinksterflower' are fine but similar. Warmenhoven's 'Catherine Valenti' is exceptionally fine in rose and white with extra large heavy textured flowers. His other clones, 'Television', and 'Mount Everest', although less spectacular, have merit for they lend different color combinations to any collection of blends. 'Floriade,' white and pink, demands top billing and many fine reports are received on it each year. It is fine. 'My Fair Lady' in red and white blend is different, an exciting new color combination.

Beacon is still in a color class of its own being salmon pink and white. It grows large easily. Pink Beauty, a similar variety, in salmon, red and white has fine form. It has more white in it than Beacon.

Pink clones: Ludwig's clones lead the pinks and are about all that are available. 'Heaven Sent' appears to be the favorite. It is a beautiful soft rose pink. 'Dutch Belle', a light rose pink, is second in favor followed by 'Flora Queen' in lavender pink. Clone 101 and 'Sight Show' remain popular. Warmenhoven's 'Little Diamond' is considered by many to be tops in pink; however, it is expensive and not reliable as a substitute for 'Pink Beauty'.

Rose clones: In the rose shades Ludwig's 'La Forest Morton' is a fine light rose and stands out by itself. 'Trixie' is an exceptionally fine formed medium rose red that should be in all collections. 'Violetta', a fine round flat formed violet rose is outstanding and of a color all its own. 'Elvira Armayo', a medium rose lavender, is very large and liked by many. 'Moreno' and 'Bordeaux' still remains the only dark rose reds available.

Reds: Good bold reds are always popular but I find them less dependable than other sorts generally. 'Barbarosa' is a nice bright red. 'Scarlet Leader' holds its roots exceptionally well in storage and is an outstanding free flowering forcing clone. 'Ludwig's Goliath' makes huge flowers and flowers easily. 'Scarlet Triumph' is fine. 'Red Champion' is a popular larger exhibition type. 'Flamboyant' still is sought after. It has exceptionally fine form. 'Mars' and 'Rembrandt' are still favorites in the standard dark reds. Van Meeuwen's new clones, 'Bernice' and 'Queen of the Night', were well received last season. C. Warmenhoven's new dark red, 'President Kennedy', is a fine flower. 'Purple Queen' still remains popular. Ludwig's 'It' is about the darkest red available and a mighty fine new one. 'Mohawk' is the finest

wine red, much like 'Red Master', but with four flowers per scape. Propagation problems keep it off the market so one may have to string along with 'Red Master' although it only makes two flowers per scape.

Salmon clones: There are a number of fine salmons available. 'Rilona' is a soft buff salmon. 'Bouquet' is still one of the finest available. Ludwig's new 'Beautiful Lady', a golden salmon, is exceptionally beautiful and a wonderful color. In still a deeper tone the new 'Hecuba' found favor with many. 'Delilah' is still a fine tangerine colored clone in a class by itself.

Orange clones: Good oranges are still much in demand and there are several that you will find exceptional. 'Orange Orchid' causes the most comment. It is a fine color and appears double. 'Orange Wonder' is still very popular and in demand. Ludwig's 'Home Decorator' is liked by many. 'Mrs. Warmenhoven' is a beautiful new one. 'Cavalier' is possibly the largest in this color.

African Amaryllis: Of the African Amaryllis "Clone 65," a fine scarlet, is possibly the most free flowering. The bulbs shrink a great deal in storage, however this does not appear to affect its free flowering 'habit. The new 'El Toro' is an exceptionally fine orange. It is a sensational bronze orange that is one of the finest oranges ever introduced. 'Rosedale' in rose still flowers well. 'Rosaline,' a brick rose and white, still flowers easily. "Clone 242" is a fine striped clone that most people like. The African amaryllis are popular and each year they give a better account of themselves.

In commenting on clones one can never cover all the fine ones that are available. Each year when I re-read this article in the Year Book I think of clones I should have mentioned. So if I did not mention the ones you hold in high esteem do not feel that it is inferior. I try only to comment on those that impressed me in the previous season and often it may be that a certain clone bloomed when I was too busy to give it special attention (this often happens). Generally I feel that those I comment on have considerable merit.

SPECIES: Last season I did not collect many new species and like most of us who are interested in species, my interest comes and goes as the temperamental ones fail to respond. Generally I find I neglect the species due to lack of time. I lost many species bulbs due to lack of care during this past winter. You do have to give species special treatment.

When you neglect the species there are some rewards and this is to find the ones that are most adaptable for his particular area. In this regard I would like to comment on those species that do best in North Florida.

Amaryllis aulica var. *stenopetala* will naturalize in the North Florida area. It grows well in the Jacksonville area but needs some winter protection if temperatures drop below 25° F. for any length of time. It grows well. However being summer dormant, our rainfall during this period breaks its dormant period so it seldom flowers. It is a tough large flowering vigorous species and should receive the interest of the breeder.

A. belladonna naturalizes here and other areas in Florida. The past cold winters have not been kind to it. It does best here in well drained sandy areas. An abundance of rain in summer gives it enough moisture to grow. *A. belladonna* grows in low ground along the Amazon River where the average temperatures are in the 70° F. range. In areas where winter temperatures are lower it has to have a well drained location so it does not succumb to the cold wet condition. I have found *A. belladonna* is more adaptable to acid soil than other species. I have had luck in growing it in boxes of peat. It takes large quantities of water in summer where temperatures are above 70° F. at night. If night temperatures are lower it must be kept drier to prevent cold damage. I feel *A. belladonna* can be grown successfully in pots if you can keep it well watered and above 70° F. at all times. If you do let it go dormant let it be dry and never below 50° F.

A. striata will naturalize in lower Florida, however it rots easily if given a cool wet condition. It should be kept in an evergreen condition for best results. If you wish to let it go dormant dig it in a green condition, clean the bulbs and keep in a dry state above 60° F. It is a very successful pot plant and will thrive in a large pot. One should give the pot an insecticide drench especially in the south to eliminate mites and other root attacking insects. If the leaves of your plant show modling it more than likely indicates insect trouble on the roots. *A. striata* is very susceptible to insect damage but it is a wonderful plant that makes off sets at a rapid rate and with one bulb you can have several hundred in a few years if properly taken care of. The species SA 62-22 collected from Armacao near Itajai, Santa Catarina at sea level is the most robust of the forms of *striata* I have found. The flowers are medium size 3 to 4″, very vigorous and appear to stand more extremes in temperature and other conditions than other forms of *striata* which I have. I have made several crosses using this form and Dutch strain amaryllis. I believe it is *A. striata* var. *striata.* I have another large flowering form of *striata* from the Island of Santa Catarina which is not hard to grow. Hybrid form SA 63-22 should prove interesting to the hybridizer as it is more insect resistant than other forms of *striata.*

Another species that has done well in the Jacksonville area is SA 63-16 from Teofilo Otoni, Minas Gerais. It grows in full sun on rocks in the wilds. I have it planted in sandy soil. It grows rather vigorously. The few flowers I have had have been of a rather muddy peach color but very large and airy. The flowers were up to 7″, tepalsegs fairly narrow but fairly uniform in width. It has a small stem, about 3/8″; however the bulbs have gained considerably in size during this past season and I expect larger flowers next season. It should make a good hybridizing subject for developing amaryllis hybrids for the Florida area.

Before I close there is one lot of species bulbs I collected last season I would like to comment on. This is Lot SA 65-23. These were collected at Figueira, near Pedreira, Santa Catarina and are called Acucena

gigante. It flowers in the wilds in October/November. Where it grows it has a temperature range of 5 to 32° C. It grows on rocks under trees. This lot of bulbs contained three different species. One appears to be a type of *A. aulica.* Only a few of these were in the lot. The others appear to be *A. reticulata striatafolia* and *A. reticulata.* The *reticulata* has a fine white stripe down the center of the leaf which is leathery dark green. The flower was white and purplish, red striped. I have been told by people who have traveled in South America that they have seen this species growing in the mountains, and that it makes large plants with wide leaves 3 feet or more tall. Possibly this is where it gets the name "Acucina gigante". It appears to grow best during cool weather. Those traveling reported that they saw it in the mountains when the weather was chilly. I tried to make mine go dormant last fall and lost most of them. The ones that did not die did not start growth again until September. I plan to keep them evergreen this winter. I assume they will be much like 'Mrs. Garfield' and prefer a fall growing period with a mid-summer or early fall-flowering period. This should prove to be an interesting species but I feel it should be grown as an evergreen or winter growing sort.

I expect to get several new lots of species from new areas of Brazil this winter. Like most fans the species fascinate me but as a commercial adventure they are a failure. Possibly when I retire in several years I will have additional time to care for them and can put them to good use in developing new hybrids which has always been my hope.

ASEXUAL PROPAGATION OF **LYCORIS**

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Although a great deal has been written about propagation of various members of the Amaryllidaceae there is very little in the literature on techniques of propagating *Lycoris.* The usual procedure apparently has been to depend on natural increase of the bulbs or the production of offsets. Recently, the supply of bulbs has largely depended upon imports of bulbs collected from the wild in Japan. Natural vegetative reproduction has been completely unsatisfactory with some species, notably *L. chinensis,* P. I. 162443. Twenty-five bulbs of this plant were introduced by the USDA in 1948 and sent to the U. S. Plant Introduction Station, Glenn Dale, Maryland. The bulbs have produced no daughter bulbs during 17 years at Glenn Dale. This condition, and the fact that most dealers list only 1 or 2 of 17 known species (5), suggested the need to determine some means of propagating *Lycoris* more rapidly.

The standard methods of propagating other members of the Amaryllidaceae have been thoroughly covered in numerous publications such as Plant Life (2), and it would be of no value to recount them here. Taxonomic and popular articles have frequently referred to the close

affinities between *Lycoris* and *Amaryllis* (1, 4). Morphologically the bulbs of *Lycoris* are quite similar to bulbs of *Narcissus* and *Amaryllis,* so similar that they may be easily confused. Therefore it was believed that the methods of propagation used with the two latter genera might be applicable to *Lycoris.* This belief was strengthened by the comments of Caldwell (3) regarding asexual propagation of *Lycoris.* The genus *Lycoris* may be separated quite readily, however artificially, into two groups: those species producing leaves during fall and winter, and those producing leaves in spring. The species all flower during mid to late summer and early fall.

MATERIALS AND METHODS

Bulbs of *L. radiata* P. I. 227995 (leaves produced in fall) and *L. incarnata* P. I. 130621 (leaves produced in spring) were dug on July 20, 1964. These species were selected to represent the two categories based on the time of appearance of the leaves. The bulbs were dried and held until November 7, 1964, at which time they were used in propagation experiment. The treatments were: (1) scooping of the basal plate to approximately two-thirds of the depth of the plate, (2) cross cutting the basal plate into 4 equal segments, (3) sectioning of the bulbs into halves and quarters, and (4) no treatment. The propagules were dusted with a 2:1 mixture of Hormodin #1 and Fermate and allowed to dry for 2 days to promote suberization of the wounded surfaces. The propagules were planted in sand in a greenhouse bench and watered as needed throughout the experiment. The plants were removed from the bench on June 14, 1965 and the results tabulated. The bulbs resulting from the test were planted in a cold frame outdoors to determine the length of time required to develop to flowering size.

RESULTS

The results of the various treatments with both species tested are shown in Table 1. There was a marked increase in the number of bulbs with all treatments involving division of the bulb. Scooping of the basal plate resulted in a slight increase in bulbs, with *L. incarnata* showing the greater response to this treatment. The additional bulbs were the result of splitting of the treated bulbs rather than the production of

Table 1. Results obtained from propagation treatments with 2 **Lycoris** species.

Treatment	No. of Bulbs	Propagules	No. Rotted	Propagations	Percent increase of bulbs
L. radiata 227995					
No treatment	85	85	0	89	4.7
Scooped	85	85	9	88	3.5
Cut	84	84	8	156	85.7
Sectioned ½	39	78	20	63	61.5
Sectioned ¼	37	148	78	79	113.5
L. incarnata 130621					
No treatment	41	41	0	41	0
Scooped	45	45	0	61	33.3
Cut	45	45	0	114	153.3
Sectioned ½	15	30	1	34	126.6
Sectioned ¼	28	112	25	93	232.1

small bulblets as is usually the case with scooping. Table I also shows that the rotting of the propagules was in direct relation to the degree of injury. The loss of propagules through rotting was most severe when the bulbs were sectioned into quarters. These results indicate that division of the basal plate or sectioning of the bulb will promote the production of new bulbs.

DISCUSSION

The results give the impression that, under the conditions of this experiment, methods involving severe wounding, such as cutting the basal plate or sectioning the bulb, are useful in providing a rapid increase in bulbs of the species tested. Although the number of propagules which rotted was much greater when the bulbs were quartered, the net result was still a greater increase in bulbs than by any other method. It is possible that improved techniques during suberization could reduce or eliminate the rotting of the propagules.

Comparison of the sizes of the bulbs as depicted in Figure 48 clearly shows that the smallest bulbs resulted from sectioning. It still must be determined whether these small bulbs can be grown to flowering size within a reasonable period. Another factor that must be considered is field survival of these smaller bulbs. The bulbs have been set in a cold frame and an evaluation of these considerations should be forthcoming.

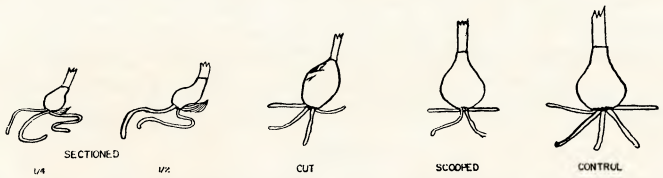

Fig. 48. Comparative sizes of bulbs of **Lycoris incarnata** resulting from the several propagations: sectioned, ¼ and ½; cut; scooped and control. See text and Table 1.

Additional tests with other species must also be undertaken to ascertain whether the techniques are applicable throughout the genus. The timing of the treatments should also be investigated as there is no information on this vital subject. This can be especially important with a plant like *Lycoris* which produces leaves at one season and flowers at another. The cultural requirements of the propagations should also be determined. Again there seems to be no information on this subject, yet herein may lie the answer to the erotic performance of several species as frequently reported (3, 4).

The present results, however, provide evidence that cutting the basal plate or sectioning the bulb will result in a substantial increase in the number of bulbs of *L. radiata* or *L. incarnata.* The untreated bulbs produced almost no new bulbs; the technique of scooping was not much more productive. It should be possible to adapt these methods to field

production thus increasing the availability of bulbs of the several species. This greater availability might help to popularize an ornamental genus which appears to be more widely adapted than has generally been recognized.

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A PRIMITIVE AMARYLLID—HANNONIA HESPERIDIUM

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Attempts to key out *Hannonia hesperidium* fail due to its being one of the most primitive Amaryllids in existence. In plant identification we generally overlook the past ecological histories of an area, but past Arctic

Fig. 49. **Hannonia hesperidium** Braun.-Blanq. & Marie, the amaryllid from Morocco, as grown by L. S. Hannibal, Fair Oaks, Calif. The rule in background is 6 inches long.

and Antarctic ice ages are powerful factors in effecting some change in the climate—all of which causes plants to migrate or to progressively adapt to slowly changing conditions. As a consequence there are few places where plants can survive for several million years without major change but the west coast of Morocco and Spanish West Africa can be so rated, and this is particularly true of the Hercules Peninsula where *H. hesperidum* is localized.

In general morphology *Hannonia* resembles *Sternbergia,* but with petals and other essential parts reduced by desert conditions to a mere vestige of the *Sternbergia* we know. True the plant could be a primitive *Pancratium* or *Narcissus* but there is no evidence of a membrane or cup, and the hard gritty black seed rules out the suggestion of several genera like *Zephyranthes.*

In growth habit the plant resembles a small *Sternbergia lutea.* The first watering in September brings the plant into instant flower and the foliage soon follows. The plant is adaptable to the coast of California but the white flowers are so completely insignificant and short lived that it would never have garden interest.

ADDENDA

The writer notes several articles including that of Dr. Fernandes which relates *Hannonia* to *Leucojum.* Unfortunately there are several distinct morphological features which appear in decided conflict and unless different plants are involved there is good reason for the writer to consider his material, which was received from Gattefosse of Cassa Blanca, to be related to an early form of *Sternbergia,* wherein *Hannonia* is reduced to the bare essentials of *Sternbergia* due to the arid habitat.

First the blossoms of *Hannonia* have a very distinct linear tepaltube some 10 mm. in length by 3 mm. diameter. Secondly the tepals are all equal and linear, being some 14 mm. long x 2 mm. wide. They are keeled on the exterior by a very slender pale green midrib. The filaments are white, spreading uniformly like a *Sternbergia,* are about 10 mm. long and are of the same length as the style. The scape is solid, two edged, and the seeds are a shiny black, elliptical in shape and about 2½ mm. in length when fresh but rapidly dry down to a shriveled pellet.

In *Leucojum* there is a bare suggestion of a flared tepal tube in Subgenus *Acis.* Tubes are lacking in the others and allied genera. No *Leucojum* has linear perianth segments and F. C. Stearn identifies the segments as being distinct from one another.

[EDITORIAL NOTE.—Mr. Hannibal uses only data from gross morphology in determining relationship but data from as many disciplines as possible, chromosomes, embryology, chemistry, etc., in addition to gross morphology are required in reaching a scientific conclusion.]

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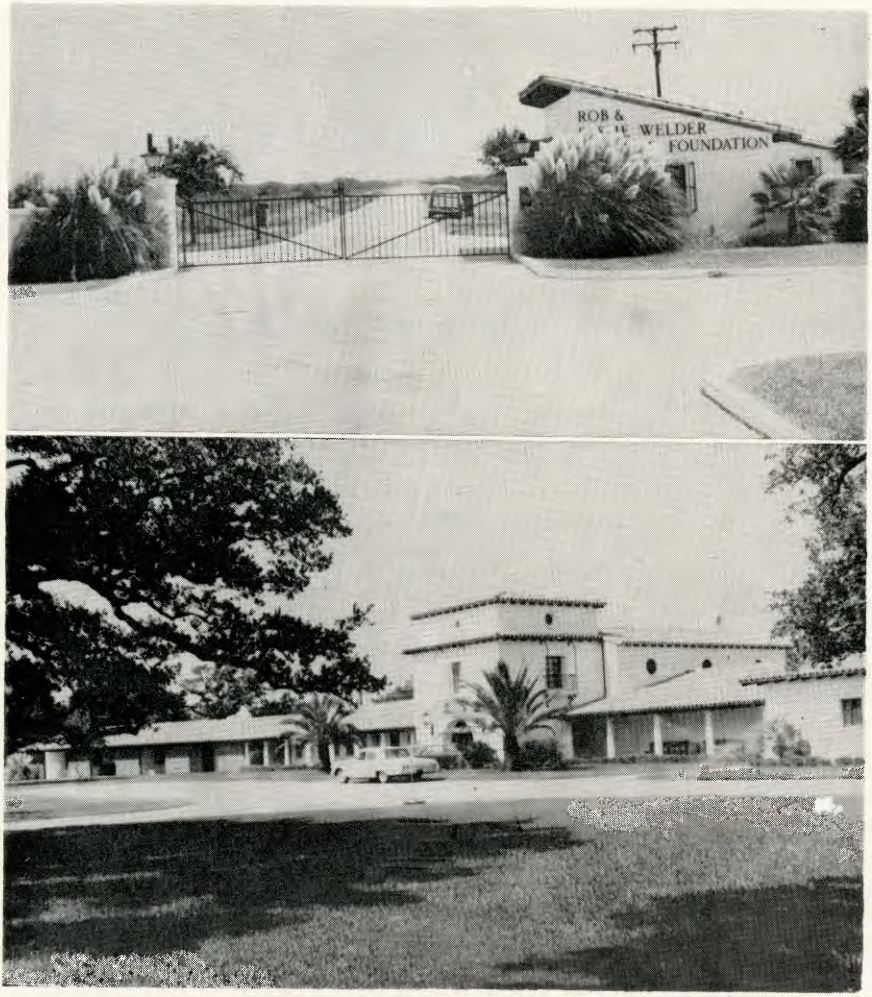

Fig. 50. Welder Wild Life Refuge: **upper:** entrance; **lower:** Main building. Photos by F. B. Jones.

THE WELDER WILDLIFE REFUGE AND ITS AMARYLLIDS

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Only a few associates of R. H. Welder, owner of one of the largest cattle ranches in South Texas, knew that at his death the choicest natural area of his ranch would be retained as a place for the study of wildlife.

Mr. Welder died in 1953. It was his desire and purpose, as stated in his will, "to further the education of the people of Texas and elsewhere in wildlife conservation" and to provide a place where wildlife research could be carried on. By a devise of his will, the Rob and Bessie Welder Wildlife Foundation came into being and a 7800-acre tract of nearly virgin land lying along the Aransas River northeast of Sinton was set aside for its use. This acreage was to be a wildlife refuge, but not strictly a wildlife sanctuary.

In 1955, Dr. Clarence Cottam, formerly Asst. Director of the U. S. Fish and Wildlife Service, became the first director of the Foundation and Mr. Caleb Glazener, previously head of research for the Texas Game and Fish Commission, his assistant. During the first few years, much attention had to be given to the providing of adequate facilities for the students and others who would be coming to the Refuge to work and study. Surveys had to be made, roads making all parts of the area accessible built and artificial lakes dug to insure that the wildlife would not suffer in times of drought. For the headquarters, an open area surrounded by mottes of Live-Oak was selected and a fine building in Spanish colonial architecture erected. In it were well-equipped biological laboratories, a specimen room for scientific collections, a library, a museum for the display of native wildlife, a lecture hall and offices for personnel. Nearby were built a splendid dormitory for the use of resident students and visitors, a screened rotunda for group activities and beautiful homes for the director and assistant director.

By the beginning of 1961, the physical improvements, except the paving of roads, were near completion and in April, a formal dedication was held. It was a gala event with hundreds of invited guests from Texas and beyond in attendance. Many persons well known in nature, wildlife and conservation fields were there.

Long before the dedication, however, the Foundation had begun a program of research and education. From far and near came qualified graduate students holding Welder Foundation fellowships or grants-in-aid to carry on research for their dissertations. By 1966, scores of students had worked extensively on the Refuge and of course other researchers had been there too. The investigations dealt primarily with wildlife and its environment and ranged from studies of fish, snakes, gophers and ground squirrels to soil types, range grasses, predator-

Fig. 51. Welder Wild Life Refuge: **upper:** Encino Lake, photo by F. B. Jones; **lower:** wild turkey, photo by W. C. Glazener.

prey relationships, feeding habits of deer, turkey and javelina and the nesting habits of waterfowl.

The program of educating the people of Texas and elsewhere took many forms—presentations before clubs, releases to newspapers, articles in periodicals, pamphlets and even book-size publications. Youth groups came to spend a day or night on the grounds while high school and college biology classes made field trips to the area. Every Thursday afternoon there was a conducted tour of the Refuge for the general public.

My first visit to the Refuge was in the spring of 1958 when a club I belonged to was shown over the area by Dr. Cottam. Black brush *(Acacia rigidula)* was blooming, its spiny branches crowded with white or cream-colored spikes. Mesquite was putting out its feathery leaves. Here and there in open areas were patches of wildflowers just coming into bloom—Indian Paintbrush *(Castilleja indivisa),* Bluebonnet *(Lupinus subcarnosus* and *L. texensis), Phlox* and *Coreopsis,* to mention a few. The road led down to the river where there were tall Cedar Elm, Hackberry, Anacua *(Ehretia anacua)* and other trees, some of them draped in Spanish Moss *(Tillandsia usneoides)* or supporting giant Mustang Grape. From there we drove perhaps 5 miles over winding roads between mottes of Live-Oak and across a grassy prairie, finally arriving at an area of natural lakes. Circling in the sky was a bird of prey and Dr. Cottam, always on the ready for accurate identification, pronounced it Sennet's White-Tailed Hawk, mentioning that at one time it was common in South Texas but was now becoming scarce and that he knew of a nest on the Refuge. Driving back to the gate in late afternoon, we passed scores of grazing deer and occasional flocks of wild turkey. A lone coyote crossed the road ahead of us.

Since that first visit, I have been on the Refuge many times and have become fairly well acquainted with its vegetation. Over 700 species of flowering plants and ferns representing more than 90 families have been found to date. Around 5000 species are known from the entire state of Texas, so considering that the Refuge is only 7 miles long and averages less than 2 miles in width, it obviously is rich in species. The explanation is the great diversity of habitats. In the river, lakes and ponds and along their edges are aquatic and other moisture- loving plants. Near the river are shady woods harboring species not found elsewhere. Beyond the woods are areas of sandy and loamy soils, some of them loose and deep and covered with grasses and wildflowers, others heavier and supporting Live-Oak, Mesquite and brushy vegetation. A considerable part of the Refuge is a clay prairie with scattered clumps of brush and a profusion of grasses. There are also swales where water stands for days after a rain, and sloping grounds, bluffs and ravines.

The Amaryllis Family is well represented but the populations often go unnoticed because usually, they are mixed with many other plants that tend to obscure them. Twelve species or varieties have been recorded and it is unlikely that more than one of the remaining six species known from this part of Texas will be found here. Generally, the

Amaryllids may be recognized by their linear leaves, leafless stems (scapes) and flowers having 6 tepalsegs and 6 stamens.

KEY TO GENERA

1a. Umbel 1-flowered, by reduction:
  2a. Perigone declined; stamens and style fasciculate, declinate-ascending ..... HABRANTHUS
  2b. Perigone erect; stamens and style erect or ascending ... ZEPHYRANTHES
1b. Umbels few- to many-flowered:
  3a. Tepalsegs 80-110 mm. long, linear ..... HYMENOCALLIS
  3b. Tepalsegs less than 12 mm. long, lanceolate, ovate or elliptic
    4a. Leaves onion-flavored ..... ALLIUM
    4b. Leaves bitterish, not onion-flavored ..... NOTHOSCORDUM

HABRANTHUS. RAIN LILY. COPPER LILY.

H. texanus (Herb.) Steud. *(Zephyranthes texana* Hook.)

Opening in the morning, scentless; perigone usually 2.5-3 cm. long, funnelform, reddish orange outside, orange-yellow within. Frequent on sandy or clayey loams. June-November. Widespread in Texas.

ZEPHYRANTHES. RAIN LILY.

1a. Flower sessile or rarely with a minute pedicel
  2a. Perigone white ..... **Z. herbertiana**
  2b. Perigone yellow ..... **Z. jonesii**
1b. Flower pedicelled
  3a. Perigone white ..... **Z. drummondii**
  3b. Perigone yellow
    4a. Tepaltube about 5 mm. long ..... **Z. pulchella**
    4b. Tepaltube 1.2-2 cm. long ..... **Z. refugiensis**

Z. herbertiana Dietr. *(Z. brazosensis; Cooperia drummondii)*

Opening near sundown, white, very fragrant, tepaltube 6.5-10 cm. long; tepalsegs mostly about 2 cm. long. Frequent on most soils, sometimes in swales. June-October. Common over a large part of Texas.

Z. jonesii (Cory) Traub

Opening in mid-afternoon, light, yellow, fragrant; tepaltube usually 3-5 cm. long; tepalsegs mostly 1.5-2.5 cm. long. Frequent on the more poorly-drained soils, often in swales. July-October. An endemic of South Texas, known mostly from San Patricio and Refugio Counties; the type locality is about 18 miles south of the Refuge near Taft.

Z. drummondii D. Don *(Cooperia pedunculata)*

Opening in mid-afternoon, white, intensely fragrant; tepaltube about 4 cm. long; tepalsegs mostly 3.5-4 cm. long. Abundant on better-drained sandy and clayey loams on the Refuge. March-May. Widespread in Texas.

Z. pulchella J. G. Smith

Opening in the morning, orange-yellow, slightly fragrant; tepalsegs mostly 1.5—2.5 cm. long. Localized in swales on the Refuge. July-November. It ranges over South Texas from Victoria to Gonzales, Del Rio and Brownsville. The type locality is at Corpus Christi, about 25 miles south of the Refuge.

Z. refugiensis F. B. Jones

Opening in mid-morning, medium yellow, pleasantly fragrant; tepalsegs 1.8-2.5 cm. long. Known from a swale on the Refuge and perhaps not abundant. July-November. It is endemic to Refugio, Goliad and San Patricio Counties. The type locality is about 16 miles northeast of the Refuge near the city of Refugio.

HYMENOCALLIS. AMERINDIAN CHALICE LILY.

H. galvestonensis (Herb.) Baker *(H. liriosme)*

Leaves mostly 3-4 cm. wide; scape to 75 cm. tall; umbels 4-11-flowered; tepaltube 7-8 cm. long; tepalsegs 8-11 cm. long; staminal cup 2.5-3.5 cm. long; filaments 2.8-3.5 cm. long. Fairly frequent on low grounds subject to periodic flooding, mostly near the river. April-May. It ranges from Kleberg Co., Texas to Okla. and Ark. Interestingly, the Welder Refuge and other populations in South Texas are closer in some particulars, as in filament length, to *H. caroliniana* (L.) Herb., a S. E. U. S. species ranging as far west as Louisiana.

ALLIUM. WILD ONION.

1a. Bracts of the spathe 3-7-nerved; tepalsegs withering away as the capsule matures
  2a. Bulb without a cluster of small bulblets at base
    3a. Tepalsegs pink or lavender ..... **A. canadense** var. **ecristatum**
    3b. Tepalsegs white ..... **A. canadense** var. **fraseri**
  2b. Bulb with a cluster of stalked bulblets at base ..... **A. elemendorfii**
1b. Spathe-valves 1-nerved; tepalsegs drying and persisting on the mature capsule ..... **A. drummondii**

A. canadense L. var. *ecristatum* (M. E. Jones) Ownbey

Umbels mostly 8-20-flowered; tepalsegs 5-9 mm. long, pink, lavender or pale purple. Locally abundant, mostly on tight sandy loam. March-April. It is endemic to South Texas, known from a few stations lying roughly between Corpus Christi, Victoria and Floresville. The type locality is about 12 miles northwest of the Refuge near St. Paul.

A. canadense L. var. *fraseri* Ownbey

Umbels mostly 25-75-flowered; tepalsegs 5-6 mm. long, white. Known from the Refuge by a few small patches on tight sandy loam (F. B. Jones 6142, April 17, 1964). It ranges widely in Central Texas and northward and apparently has not previously been reported from so far south. Resembling it, but usually pink or lavender and often with a basal bulblet or two, is var. *mobilense* which occurs about 15 miles to the northeast and slightly farther away to the southeast. It may eventually be found on the Refuge.

A. drummondii Regel

Umbels mostly 10-20-flowered; tepalsegs 5-8 mm. long, white, pink, lavender or purple. Fairly common on better-drained sandy loams and clays. March-April. It is a wide-ranging species.

A. elmendorfi M. E. Jones ex Ownbey

Umbels mostly 15-25-flowered; tepalsegs about 5 mm. long, white or sometimes pinkish or lavender. Abundant on deep sands. March-April. It is endemic to South Texas, the few stations for it lying roughly between Corpus Christi and Elmendorf (just south of San Antonio.)

NOTHOSCORDUM. FALSE GARLIC

N. bivalve (L.) Britt.

Flowers opening near noon, white, fragrant; umbels mostly 6-11-flowered; tepalsegs usually 8-19 mm. long. Frequent on various soils on the Refuge. Flowering all year, but mostly March-June and September-October. Widespread in Texas.

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Trust Provisions from the Will of R. H. Welder Creating the Rob and Bessie Welder Wildlife Foundation. Mimeo.

NEW PUBLICATION

Lee Moore's Armchair Adventurer, Vol. 1, No. 1. Jan.-Feb. 1965 has been received. This first number of the new publication, founded and edited by the plant explorer, Mr. Lee Moore, P. O. Box 504, Kendall, Florida 33156, is dedicated to the memory of Ronald Wagner, who lost his life in an airplane crash while searching for new plants. The new periodical is devoted to the exploration for plants in the Amazonian jungles. Those interested in subscribing to this publication should write directly to Mr. Moore.

A WHITE GLORIOSA FROM AFRICA

SYDNEY PERCY-LANCASTER,

National Botanic Gardens, Lucknow, India

Since visiting Africa (see previous issues of Plant Life) I have been particularly interested in two genera—*Gloriosa* and *Sansevieria.* Of the former, a Bulletin (No. 123) has been issued by the National Botanic Gardens, Lucknow, in which are mentioned varieties collected by my son and self. Africa seems to produce the solitary *Gloriosa superba;* Africa has dozens. I brought back a few unnamed varieties of *Gloriosa* at the end of 1963, but only one has proved worth while waiting for it to get acclimatized. Caterpillars took advantage of casual supervision by an overseer and damaged the plants in 1964 and 1965. The entire collection was shifted to a new site and this new variety has been spared to grow to its full height and develop more than the solitary flower it bore last year. The variety has been named 'White Queen'. While it is certainly allied to the Carsonii Group, due to the arrangement of the foliage, the shape of the flower and the leaf is distinct.

Gloriosa—'White Queen'

Length of stem—15 feet.
First basal leaf—2 feet from ground.
Arrangement of foliage—irregular and occasionally alternate.
Leaf measurement—5″ by 1¼″, including tendril 1″ long; some leaves on main stem 6½″ by 2″.
Leaf color—dull green, under surface shining.
Leaf shape—oval, acute.
Flower bud—yellowish green, opening at the base.
Flower—length, 2″; width, 2½″, erect.
Petals—2″ long, ⅝″ wide, edges undulating.
Flower color—palest creamy white, with greenish base and dark maroon dots; fading to white with yellowish flush on the back of the petals, and to dead white on the second day.
Pistil 1½″ long, stamens 1¼″ long.
Number of flowers to the plant—approximately 25.
Flower pedicel—5″ to 7″ long.

KNIPHOFIA PRAECOX IN THE DEEP SOUTH

CLAUDE W. DAVIS, *470 Delgado Drive,*

Baton Rouge, Louisiana 70808

The "discovery" of this "new", December flowering "Torch Lily" by the writer was more or less accidental. It came about through the receipt of a complimentary package of seed of the variety 'Winter Cheer' from R. E. Harrison & Company of New Zealand.

The seed germinated quickly and the seedlings grew lustily in a good loam soil in the open ground. After two years the plants bloomed in December, with fiery or flaming red spikes which were four feet tall and which stood out like sentinels in the garden.

A number of varieties of *Kniphofia praecox* are now available. 'Winter Cheer' has 9″, orange-scarlet torches on stems which are 3 to 4 feet tall. Each spike holds its color during the entire month of a frost-free December. The foliage of this plant is hardy in the Gulf Coast Region, but since freezes frequently come in December, it is advisable to grow the plants in 8″ pots which may be brought inside to protect the flowers from an over-night freeze.

Vegetative increase is rapid. The clumps may be divided after flowering and the divisions reset for bloom the following winter.

PLANT LIFE LIBRARY

PROCESSES OF ORGANIC EVOLUTION, by G. Ledyard Stebbins. Prentice-Hall, Inc., Englewood Cliffs, New Jersey. Concepts of Modern Biology Series. 1966. pp. 191. $2.50. Professor Stebbins is an expert in the field of evolutionary studies, having done much significant and original work as a student of evolutionary processes. Furthermore, Prof. Stebbins probably has a better command of the literature than any investigator now active in this demanding field. Familiarity with the literature permits him to pinpoint relevant examples from his own work and that of others for discussion and interpretation of specific problems.

There is no question about the niche this little volume (191 pages) is designed to occupy as Prof. Stebbins makes clear in the Preface. Essentially he proposes the book should: (1) serve to acquaint students and professional biologists in other fields with the "hows" and "whys" of evolution; and (2) serve as a basic platform for stimulating new advances into this fascinating field.

Reading this book is a rewarding experience. Stebbins writes well. His prose is trenchant, lively, and sparkles with pertinent analogies drawn from contemporary life. There is a pleasing absence of technical jargon, and where necessary to use such terms their meaning is carefully explained (sympatric vs. allopatric, pg. 94). The text is illustrated with an abundance of good figures, graphs, diagrams and photographs. It is a relief to read a scholarly book where subject matter and illustrations are so well integrated they occur on the same page. Teachers will find the Chapter Summary and the Questions for Thought and Discussion at the end of each chapter valuable aids in presenting the scope and meaning of evolution to their students.

There is little that can be faulted in this book; even the typographical errors are at a minimum. Confronted with this situation, the reviewer is reduced to making minor criticisms that have no bearing on the content, accuracy, or usefulness of the book. For example, the analogy on page 3 in my opinion is poorly chosen. The analogy of a group of evolutionary lines changing through time with an automobile being driven along the highway seems cumbersome and slightly exaggerated. Also, certain of the figures (e.g. Fig. 6-5) are not documented either in the legend or the text. This could be distracting to the motivated student seeking further information. Perhaps more copious references would have been an improvement, but this feature would have added materially to the length and cost of the book.

In a final chapter Prof. Stebbins analyzes what is known about the evolutionary processes in man, and boldly speculates on their meaning for the future of *Homo sapiens*. Sociologists, and even some geneticists are not likely to agree with his ideas, but they should stimulate some enlightening discussion in this important field.

For a lucid, concise discussion and explanation of the processes of organic evolution this little book is not likely to be surpassed, now or in the immediate future. In fact, it might well become a classic in this area.—*Thomas W. Whitaker*

PLANT LIFE LIBRARY—continued on page vi.

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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[A Committee of the American Plant Life Society]

[AMERICAN AMARYLLIS SOCIETY, continued from page 2.]

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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. $5.00 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. $5.00 postpaid.

4. LINEAGICS, 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. 1964. Manila covers, 163 pages, incl. 8 illus. $5.00 postpaid.

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(**A**) **HERBERTIA** [**First series,** 1934 to 1948, incl.], devoted exclusively to the amaryllids (Amaryllidaceae), and the workers concerned in their advancement. A complete set of these volumes is indispensable to all who are interested in the amaryllids. Libraries shou'd note that this may be the last opportunity for complete sets.

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REVIEW OF THE GENUS NERINE

by

Hamilton P. Traub

1967

THE AMERICAN PLANT LIFE SOCIETY
Box 150, La Jolla, California 92037

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REVIEW OF THE GENUS **NERINE** HERB.

HAMILTON P. TRAUB

I. BRIEF HISTORY, 1820-1966

The story is told that a trading ship was wrecked off the British Channel Islands and that among the wreckage that washed-up on the shores were bulbs from a foreign land which took root and thrived. Thus, apparently before 1700, a plant commonly known as the "Guernsey Lily" had been naturalized on the Island of Guernsey (Latin,—Sarnia) through the agency of the early traders. At that time, the South African habitat of the plant was unknown. When Linnaeus published "Species Plantarum" in 1753, he included it under the name, *Amaryllis sariensis* L. (=Amaryllis of Sarnia). In the same year, Heister (Braunsvig. 20. 1753; 1755) had placed this plant under the generic name, *Imhofia* Heist. Herbert later ignored Heister's name, and first proposed *Galatea* Herb. in 1820, a later homonym, which he subsequently replaced it with *Nerine* Herb. (Bot. Mag. Pl. 2124. 1820). This was later conserved over the earlier *Imhofia* Heist. Thus, the species are now grouped under the later name, *Nerine* Herb. (nomenifer, or name-bearer, the species *Nerine sarniensis* (L.) Herb.).

In a later edition of "Species Plantarum", the species *Amaryllis undulata* L., was proposed which was referable to *Nerine*. The great naturalist, Nicolaus Joseph Jacquin (1727—1817) proposed four additional species which were referable to *Nerine—Amaryllis marginata, A. curvifolia, A. humilis,* and *A. flexuosa. Amaryllis corusca, A. venusta,* and *A. laticoma* were added by Ker-Gawler.

In 1821, Herbert recognized nine species—*Nerine curvifolia, corusca, rosea, venusta, sarniensis, flexuosa, humilis, undulata* and *pulchella.* In 1837, Herbert again listed nine species, but unfortunately he placed *N. sarniensis* under *N. venusta* as a variety as shown in Table 1.

Baker, in 1888, admitted 10 species, and by 1896, he listed fifteen species as shown in Table 1.

From 1896 to 1966, twenty-one species have been added. Of these, nine, including two varieties later raised to specific rank, were proposed by Winsome F. Baker. Another five species were described by L. Bolus, and one each of the remaining seven species were proposed by various other authors. Thus, as of 1966, thirty-six species were recognized. This number has been reduced to thirty in the present review. Others apparently remain to be discovered. However, it has to be realized that some of the species now recognized, after critical study, may be reduced to synonymy or to subspecific rank.

The biological Latin name, *Nerine,* is from the Greek, *Nereis,* the name of a sea-nymph. The so-called Roman pronunciation of Latin aims to represent approximately the pronunciation of classical time: *e* as in *pet; i* as in *machine.* Words of more than one syllable are accented on the penult (=last syllable but one) if that is long. Thus, *Nerine* would be

pronounced *ne-reé-ne.* But Roman names in common usage today are sometimes pronounced with ordinary English sounds, *i* as in *ice.* Thus, it would be pronounced *ne-ryé-ne.* This is altogether too harsh for a flower named for a sea-nymph. Thus it is clear that the pronounciation should follow the classical Latin, *ne-reé-ne.*

Table 1. The species of **Nerine** according to Herbert (1821) and (1837).

SPECIES AS OF 1821

1. **curvifolis** (Jacq.) Herb. Bot. Mag. 725
2. **corusca** (Kew-Gawl.) Herb. Bot. Mag. 1089
3. **rosea** Herb. Bot. Mag. 2124
4. **venusta** (Kew-Gawl.) Herb. Bot. Mag. 1090
5. **sarniensis** (L.) Herb.
6. **flexuosa** (Jacq.) Herb. Bot. Mag. 172
7. **humilis** (Jacq.) Herb. Bot. Mag. 726
8. **undulata** (L.) Herb. Bot. Mag. 369
9. **pulchella** Herb.

SPECIES AS OF 1837

1a. Perigone regular; filaments and style fascisculate, straighter:
  2a. Umbel centripetal:
    1. **marginata** (Jacq.) Herb.
    2. **curvifolia** (Jacq.) Herb. Bot. Mag. 725
    3. **corusca** (Ker-Gawl.) Herb. Bot. Mag. 1089
  2b. Umbel centrifugal:
    4. **venusta** (Ker-Gawl.) Herb. Bot. Mag. 1090
      var. **sarniensis** (L.) Herb. Bot. Mag. 294
      var. **rosea** (Herb.) Herb. Bot. Mag. 2124
      var. **minor** Herb.
1b. Perigone distorted; filaments and style curved upwards:
  3a. Umbel centripetal:
    5. **flexuosa** (Jacq.) Herb. Bot. Mag. 172
    6. **pulchella** Herb. Bot. Mag. 2407
    7. **lucida** (Burch.) Herb. Bot. Mag. 2124
  3b. Umbel centrifugal:
    8. **humilis** (Jacq.) Herb. Bot. Mag. 726
    9. **undulata** (L.) Herb. Bot. Mag. 369

Table 2. The species of **Nerine** according to Baker (1896).

1a. Scape long, slender:
  2a. Tepalsegs, stamens and style nearly erect:
    1. **sarniensis**
    2. **curvifolia**
    3. **moorei**
  2b. Tepalsegs, stamens and style declinate:
    3a. Filaments not distinctly appendiculata at the base:
      4. **flexuosa**
      5. **angustifolia**
      6. **pudica**
      7. **brachystemon**
      8. **filifolia**
      9. **undulata**
      10. **humilis**
    3b. Filaments distinctly appendiculata at the base:
      11. **appendiculata**
      12. **pancratioides**
1b. Scape short, stout:
      13. **lucida**
      14. **duparquetiana**
      15. **marginata**

The present review of the genus *Nerine* Herb., is a lineagic treatise and is excerpted from the large text of all the *Amaryllidaceae* on which the writer has been working for over a half century. It is reproduced at this time at the request of members of the Society interested in Nerines and will tide them over until the monograph of Prof. Ken Douglas of Kingswood College, Grahamstown, South Africa, can be completed and published. Such a monograph can include also details on breeding, culture, pest control, etc.

II. THE GENUS **NERINE**

Genus NERINE Herb.,

Bot. Mag. pl. 2124. 1820; App. 18-19. 1821; Amaryll. 283-287. 1837; Bak., Gard. Chron. 779-810. 1885; Amaryll. 99—103. 1888; Fl. Cap. 208—215. 1896.

Syn.—*Imhofia* Heist., Braunsvig. 20. 1753; 1755; *Galatea* Herb., Bot. Mag. sub pl. 2113. 1820; *Laticoma* Raf., Fl. Tellur. 4: 12. 1836 (1837); *Loxanthes* Salisb., Gen. Pl. 117. 1866.

Bulb tunicated, sometimes continued into a neck; *leaves* tongue-*shaped* (lingulate), or linear-lorate, or linear, or subterete, or filiform, synanthous or hysteranthous; *scape* robust, or slender; *spathe-values* 2, variously shaped; *umbel* few- to many-flowered; *perigone* fairly regular to markedly irregular, variously colored white, red, pink, magenta, mauve, wine-red, etc.; *ovary* 3-valved, ovules few per cell; *tepaltube* short or very short; *tepalsegs* subequal or equal, variously shaped, hardly at all or more or less crisped; *stamens* suberect or declinate-ascending, 3 shorter than the other 3, filiform, usually thickened at the base, or appendiculate, or alternating with scales, or forming a staminal cup, at the base; anthers oblong, dorsifixed, versatile, *style* filiform, straight, or declinate-ascending, stigma simple or 3-lobed; *capsule* membranous, loculicidally 3-valved, variously shaped, often rupturing by the expansion of the maturing seeds; seeds few per locule, globose.

Range.—southern Africa: Republic of South Africa (R. S. Afr.), Botswana, Lesotho, and Swaziland. One species is naturalized on the Island of Guernsey.

LINEAGIC POSITION

The genus *Nerine* Herb., is a member of the Tribe *Crineae* (see Traub, The Genera of Amaryllidaceae, 1963; and Traub, Introduction to Herbert's Amaryllidaceae, etc., 1967) to which belong also the genera *Ammocharis, Boophone, Crinum, Hessea, Strumaria, Brunsvigia* and *Cybistetes.* Species of *Crinum* have been crossed with those of *Brunsvigia* (= X *Crinodonna* Ragin. ex Stapf); and species of *Brunsvigia* have been crossed with those of *Nerine* (= X *Brunserine* Traub). It is evident that *Nerine* is most closely related to *Brunsvigia* and *Crinum* on the basis of crossing experiments carried on up to the present. However, crossing experiments with species of the other genera should also be attempted in order to determine the limits of genetic compatibility within the tribe. Morphologically, some *Nerine* species resemble those of *Hessea* in some particulars, but crossing experiments are needed to follow up this lead.

Due to the close relationship of *Nerine* to *Brunsvigia,* it is possible that at some future date, the two genera may have to be united on biological grounds. For the present, it is best to maintain *Nerine* as a separate genus.

ECONOMIC IMPORTANCE

At present the economic importance of *Nerine* resides entirely in the value of these species and hybrids (a) as outstanding ornamental garden and pot plant subjects; and (b) as the basis of cut flowers for the florist's trade.

In the future, the alkaloids found in the tissues of these plants may also be of some importance in medicine. The alkaloids reported in these plants as summarized by Hegnauer (1963) include brunsvigin (syn.-ambellin), caramin, crinin, crispin, falcatin, flexuosin, krigein, lycomin, neronin, tazettin, undulatin, and vittatin (see Hegnauer, R.: Chemotaxonomie der Pflanzen. 2: 59. 1963).

CARYOLOGY

The study of the chromosome numbers and chromosome morphology, the behavior of the chromosomes during meiosis, etc., (known as the science of caryology), has only begun in *Nerine*. A number of workers have reported mainly on chromosome numbers in 15 out of a total of presently recognized 30 species as shown in Table 2. It is hoped that studies on the remaining species can be undertaken also. The published results indicate that the basic number is x=11, with diploid numbers usually 2n=22, rarely 2n=24. In a number of cases triploids, 2n=33, have been reported.

Table 2. The genus **Nerine** Herb.: reported chromosome numbers of some species.

	2n number	Authority
SECTION I. **LATICOMAE**, x=11		
marginata	22	Janaki Ammal (1951)*
laticoma (as **lucida**)	22	Janaki Ammal (1951)*
laticoma	22	Gouws (1949)**
duparquetiana	22	Gouws (1949)**
SECTION II. **NERINE**, x=11, 12		
sarniensis	22, 24, 33	Janakai Ammal (1951)
sarniensis var. **corusca major**	22	James & Addicott (1941)#
sarniensis var. **rosea** (as **Nerine rosea**)	22	Muller (1912)##
sarniensis var. **moorei**	33	Janaki Ammal (1951)
sarniensis var. **curvifolia**	22, 24	Janaki Ammal (1951)
curvifolia f. **fothergillii major**	24	James & Addicott (1941)
SECTION III. **BOWDENIAE**, x=11, 12		
bowdenii	22, 24	Janaki Ammal (1951)
flexuosa	22, 33	Janaki Ammal (1951)
flexuosa var. **alba**	22	James & Addicott (1941)
undulata	22, 33	Janaki Ammal (1951)
pudica	22, 33	Janaki Ammal (1951)
angustifolia	22	Janaki Ammal (1951)
filifolia	22, 24	Janaki Ammal (1951)
falcata	22	Gouws (1949)
humilis	22, 33	Janaki Ammal (1951)

SECTION IV. **APPENDICULATAE**, x=11, 12

appendiculata	22	Janaki Ammal	(1951)
masonorum	22	Janaki Ammal	(1951)
	24	Gouws	(1949)
frithii	22	Gouws	(1949)

* Janaki Ammal, E. K.: J. R. Hort. Soc. 76: 365. 1951
** Gouws, J. B.: Plant Life 5: 54. 1949
# James, W. M. & F. T. Addicott: Herbertia 8: 111-116. 1941
Muller, C.: Arch. Zellforsch. 8: 1—51. 1912.

In one hybrid, 'Inchmery Kate', the chromosome number is reported as tetraploid, 2n=44 (see Janaki Ammal, J. Roy. Hort. Soc. Oct. 1951). To date, tetraploids have not been revealed in nature, but when the remaining species are studied it may be possible to show that tetraploids may also occur among wild species.

LINORDINATION OF NERINE SPECIES

Herbert (1837) grouped the *Nerine* species known to him into (1) Regulares: perigone regular, filaments and style fasciculate, straighter; and (2) Irregulares: perigone distorted, filaments and style curved upwards, as shown in Table 1, above. Under these two classes he grouped the species under (a) umbel centripetal, and (b) umbel centrifugal. This is an artificial grouping and was not adopted by Baker (1888; 1896) who dispensed with subgroups as shown in Table 1, above.

In the present review, the species of *Nerine* are grouped under four sections. These are named and characterized briefly in the following key:

KEY TO THE SECTIONS OF **NERINE**

1a. Stamen-filaments thickened at the base, but not distinctly appendiculate, or otherwise modified at the base:
2a. Scape usually short, stout:

Section I. **LATICOMAE** Traub, **sect. nov.**

Filamentis staminorum basi non manifeste appendiculatis; scapo crasso brevi Nomenifer: **Nerine laticoma** (Ker-Gawl.) Th. Dur. & Schinz, Consp. Fl. Afr. 5. 1893.

2b. Scape usually longer, slender:
3a. Perigone, stamens and style nearly straight:

Section II. **NERINE**

Filamentis staminorum basi non manifeste appendiculatis: scapo longo gracili;perigonio staminibusque styloque paene erectis. Nomenifer: **Nerine sarniensis** (L.) Herb. Bot. Mag. sub pl. 2124. 1820.

3b. Perigone, stamens and style declinate:

Section III. **BOWDENIAE** Traub, **sect. nov.**

Filamentis staminorum basi non manifeste appendiculatis: scapo longo gracili; perigonio staminibusque styloque declinatns. Nomenifer: **Nerine bowdenii** W. Watson, Gard. Chron. vol. 36, p. 365.1904.

1b. Stamen-filaments distinctly appendiculate at the base, or alternating with scales, or forming a short staminal cup at the base:

Section IV. **APPENDICULATAE** Traub, **sect. nov.**

Filamentis staminorum basi distincte appendiculatis, vel squamis alternatis, vel basi cupulam staminalem constituentibus. Nomenifer: **Nerine appendiculata** Bak., in Gard. Chron. ii(1894)336.

According to the International Code of Nomenclature, the section which accomodates the nomenifer (name bearing element of the genus, Section II. *Nerine*) has to bear the same name as the genus and does not require an author.

KEY TO THE SPECIES OF **NERINE**

In the following key, 30 recognized species are grouped under the four sections of the genus as explained above. As already indicated, some of these may later be reduced to synonymy after further study. However, such changes have to be based upon solid evidence. Additional species may be discovered in the future. Prof. Ken Douglas, in a private communication, has indicated that he has discovered two new species which will be described later.

In the present review, the somewhat atypical species have been grouped under Section I. *Laticomae.*

(a) *Nerine marginata* apparently has inherited obvious *Brunsvigia* genes that determine the tongue-shaped leaf form, but the genes which are responsible for the flower form indicate an independent line of evolution since the flowers differ from those of *Brunsvigia* and the typical *Nerine.*

(b) The *laticoma-complex,* including five proposed species with synanthous bright green leaves and compressed scapes show slight variation. *N. laticoma* and *N. huttoniae,* with relatively shorter scapes, apparently inherited from a common ancestral stock shared with *Brunsvigia,* most closely resemble species in that genus. *N. flexuosa* var. *sandersonii* and *N. falcata,* with still longer scapes, and more delicate flowers, show still farther divergence from *Brunsvigia. N. krigei* with relatively long scapes only 5 mm. in diameter, comes even closer to the typical Nerines.

Finally, (c), *N. duparquetiana,* similar to the species of the *laticoma-complex* in some particulars, shows still another step in the direction of the typical Nerines in the minute pubescens on the scape and pedicels.

Apparently, the proper disposition of the five groups in the *laticoma-complex* is to consider those proposed later as subspecies under the name-bearer, *N. laticoma,* which happens to show the extreme variation in the direction of *Brunsvigia.*

The remaining typical *Nerine* species have been grouped under the three sections: Section II. *Nerine,* Section III. *Bowdeniae* and Section IV. *Appendiculatae* as already indicated.

KEY TO THE SECTIONS AND SPECIES

1a. Wild species:

2a. Stamen-filaments usually thickened below, but **not** distinctly appendiculate or otherwise modified, at the base, except for fleshy scales at the

base in **N. laticoma** subsp. **huttoniae:**
3a. Scape relatively short, stout, compressed:

Section I. **LATICOMAE** Traub

4a. Leaves tongue-shaped (lingulate), prostrate, hysteranthous; scape 15 cm. long, tepalsegs 3 cm. long, bright scarlet. R. S. Afr.: Cape Province .....1. **marginata**
4b. Leaves strap-shaped (lorate), synanthous, usually with a half twist in upper part; sometimes falcate.
5a. Scape and pedicel smooth; R. S. Afr.: Cape Province, Damaraland, Avamboland, Transvaal, Orange Free State ...2. **Laticoma**
6a. Scape relatively shorter, 7.5—30 cm. long:
7a. Scape 7.5—20 cm. long, 9 mm. in diam.; umbel many-flowered; tepalsegs pale pink, or bright red, with deeper band in center .....2a. **laticoma** subsp. **laticoma**
7b. Scape 15—30 cm. long, 1 cm. in diam., umbel very many-flowered; tepalsegs pink with dark red or brown mid-vein; quadrate scales at the base of the tepalsegs. R. S. Afr.: Cape Province .....2b. **laticoma** subsp. **huttoniae**
6b. Scape relatively longer, 36—43 cm. long:
8a. Scape 1.2 cm. in diam.; leaves 2.7—3 cm. wide, umbel 20—25—flowered:
9a. Leaves not falcate; tepalsegs 4 mm. wide. R. S. Afr.: Transvaal .....2c. **laticoma** subsp. **sandersonii**
9b. Leaves leathery, falcate; flowers more dainty in shape and more delicate in color; tepalsegs 4.5 cm. long, 5 mm. wide, white, rose pink at the apex. R. S. Afr.: Transvaal .....2d. **laticoma** subsp. **falcata**
8b. Scape 5mm. in diam.; leaves narrower, 1.2 cm. wide; Tepalsegs rose-pink with green keel, R. S. Afr.: Transvaal .....2e. **laticoma** subsp. **krigei**
5b. Scape and pedicels covered with a minute pubescens; scape 7—8 mm. in diam.; umbel 15—20-flowered; tepalsegs white; flushed shell-pink at the face, and with a green keel. R. S. Afr.: Cape Province .....3. **duparquetiana**
3b. Scape relatively more slender
10a. Perigone, stamens and style nearly erect (see also **N. filamentosa** and **N. rehmannii** under Sect. III); leaves 1.2—2 cm. wide:

Section II. **NERINE**

11a. Tepalsegs hardly at all crisped:
12a. Leaves glabrous green, suberect; R. S. Afr.: Cape Province .....4. **sarniensis**
13a. Flowers bright crimson ....4a. **sarniensis** var. **sarniensis**
13b. Flowers not **bright** crimson:
14a. Flowers duller crimson or bright scarlet:
15a. Flowers duller crimson ..4b. **sarniensis** var. **plantii**
15b. Flowers bright scarlet:
16a. Flowers produced earlier than in other varieties .....4c. **Sarniensis** var. **venusta**
16b. Leaves broader than in type 4d. **sarniensis** var. **corusca**
14b. Flowers rose-colored or white:
17a. Flowers rose-colored ..4e. **sarniensis** var. **rosea**
17b. Flowers white (Table Mountain) 4f. **sarniensis** var. **alba**
12b. Leaves glaucous, falcate. R. S. Afr.: Cape Prov. .....4g. **sarniensis** var. **curvifolia**
18a. Plant less robust .....4g-a. **sarniensis** var. **curvifolia** f. **curvifolia**

18b. Plant more robust in all its art ....4g-b. **sarniensis** var. **curvifolia** f. **fothergillii**

11b. Tepalsegs distinctly crisped. R. S. Afr. habitat unknown .....4b. **sarniensis** var. **moorei**

10b. Perigone, stamens and style declinate; tepalsegs usually more or less crisped, except in **N. filamentosa** and **N. rehmannii:**

Section III. **BOWDENIAE** Traub

19a Leaves unknown; perigone white; umbel 3—5-flowered; stamens as long as the tepalsegs. R. S. Afr.: Natal ...5. **schlecteri**

19b. Leaves known:

20a. Leaves lanceolate, obtuse, umbel 1—5-flowered:

21a. Leaves prostrate, 8 mm. wide, hysteranthous, spathe-valves reddish purple; perigone rose-pink. R. S. Afr.: Cape Province .....6. **breachiae**

21b. Leaves not prostrate, synanthous. 1.3—2 cm. wide; spathe-valves pink; perigone pale pink. R. S. Afr.: locality unknown .....7. **rydleyi**

20b. Leaves linear-lorate, linear, subterete or filiform:

22a. Leaves linear, or linear-lorate; bright green or glaucous:

23a. Leaves linear-lorate, 1.5—3 cm. wide; bright green:

24a. Leaves hysteranthous, 1.5—3 cm. wide; tepalsegs rose-pink, deeper mid-rib, to 6—7.5 cm. long. R. S. Afr.: .....8. **bowdenii**

24b. Leaves synanthous, 1.5—2 cm. wide, tepalsegs pale pink, 2.5—3 cm. long. R. S. Afr.: Cape Province .....9. **flexuosa**

25a. Leaves bright green:

26a. Typical form .....9a. **flexuosa** var. **flexuosa**

26b. Flowers white .....9b. **flexuosa** var. **alba**

25b. Leaves glaucous; tepalsegs pink, pink with a rose-red keel .....9c. **flexuosa** var. **pulchella**

23b. Leaves linear, 3—13 mm. wide, synanthous, except hysteranthous in **N. alata** and **N. humilis** subsp. **fera:**

27a. Leaves bright green, except glaucous in **N. humilis** subsp. **fera.**

28a. Leaves 3—5 mm. wide:

29a. Umbel 6—12-flowered; perigone magenta-colored. R. S. Afr.: Cape Prov., Orange Free State, Natal, Transvaal. Botswana and Swaziland .....10. **angustifolia**

29b. Umbel 6—12-flowered; perigone mauve-pink. R. S. Afr.: Cape Prov. .....11. **Alata**

28b. Leaves 6.4—13 mm. wide:

30a. Tepalsegs 1.7—2 cm. long, pale pink. R. S. Afr.: Cape Prov., Orange Free State, and Damaraland ——————12. **undulata**

31a. Tepalsegs much crisped ..12a. **undulata** var. **undulata**

31b. Perigone larger and less crisped 12b. **undulata** var. **major**

30b. Tepalsegs 2.5—3 cm. long, bright pink or rose-red. R. S. Afr.: Cape Prov. .....13. **humilis**

32a. Leaves bright green, 1.3 cm. wide 13a. **humilis** subsp. **humilis**

32b. Leaves glaucous, 8 mm. wide R. S. Afr.: Cape Prov. .....13b. **humilis** subsp. **fera**

27b. Leaves glaucescent or glaucous, except bright green in **N. pudica** var. **elwesii:**

33a. Leaves glaucescent, 7—12 mm. wide; spathe 4.5 cm. long, dark reddish-purple; perigone carmine, pale above. R. S. Afr. Cape Prov. .....14. **peersii**
33b. Leaves glaucous, 6—8.5 mm. wide; spathe 2.5—3.8 cm. long. R. S. Afr.: locality unknown 15. **pudica**
34a. Perigone white with pink keel .15a. **pudica** var. **pudica**
34b. Perigone pale rose or white:
35a. Perigone pale rose, with deeper keel; leaves bright green .....15b. **pudica** var. **elwesii**
35b. Perigone pure white ..15c. **pudica** var. **alba**

22b. Leaves subterete or filiform:
36a. Leaves subterete:
37a. Umbel 6—20-flowered:
38a. Leaves 1.5 mm. in diam., umbel 10—20-flowered; perigone bright red, spathe 3.8—5 cm. long. R. S. Afr.: Cape Prov. .....16. **brachystemon**
38b. Leaves 2 mm. in diam., umbel 6—9-flowered; perigone bright rose; spathe nearly 7 cm. long. R. S. Afr.: Cape Prov. .....17. **filamentosa**
37b. Umbel 3—5-flowered; perigone white, rose in lower part; spathe 2 cm. long; leaves 2 mm. in diam. R. S. Afr.: Damaraland .....18. **pusilla**
36b. Leaves filiform, 1—2 mm. wide:
39a. Spathe ovate, acute or oblong, lanceolate, acute:
40a. Leaves 4—5, umbel 2—3-flowered; pedicels glabrous. R. S. Afr.: Cape Prov. .....19. **tulbaghensis**
40b. Leaves 1, rarely 2, umbel about 9-flowered; pedicels pubescent; R. S. Afr.: Transvaal ..20. **rehmannii**
39b. Spathe-valves lanceolate:
41a. Umbel 8—12-flowered; leaves synanthous; tepalsegs rose-pink. R. S. Afr.: Orange Free State ..21. **filifolia**
41b. Umbels 3—8 flowered; leaves hysteranthus; tepalsegs bright mauve-pink. R. S. Afr.: Cape Prov. ————22. **parviflora**

2b. Filaments variously appendiculate, or otherwise modified at the base; or filaments alternating with scales at the base; (see also **N. laticoma** subsp. **huttoniae** under Section I., above):

Section IV. **APPENDICULATAE** Traub

42a. Scape and/or pedicels **not** pubescent;
43a. Leaves 1—2 mm. wide:
44a. Umbels 5—7-flowered; leaves subfiliform:
45a. Filaments appendiculate at the base forming a staminal cup. R. S. Afr.: Cape Prov. and Orange Free State 23. **frithii**
45b. Filaments appendiculate at the base, forming a staminal cup, with lacerate lobes. R. S. Afr. .....24. **transvaalensis**
44b. Umbel 6—20-flowered; leaves linear; filament appendages almost free to the base, somewhat spreading. R. E. Afr.: Cape Prov. .....25. **hesseoides**
43b. Leaves terete, 1 mm. in diam.; tepalsegs wine red, 1.7 cm long, 2 mm. wide. Botswana .....26. **gaberonensis**
42b. Scape and/or pedicels **pubescent:**
45a. Perigone pure white; stamens alternating with square scales. R. S. Afr.: Natal .....27. **pancratiodes**
45b. Perigone **not** pure white:
46a. Perigone pale to deep rose, deeper mid-vein; filament appendages conspicuous, white. R. S. Afr.: Natal .....28. **appendiculata**

Perigone rose-pink:
47a. Tepalsegs rose-pink, with darker central stripe; filament appendages lanceolate. R. S. Afr.: Cape Prov. .....29. **masonorum**

47b. Tepalsegs rose-pink, keeled green above the middle; filament appendages behind the base. R. S. Afr.: Transvaal
30. **gracilis**

1b. **Nerine** hybrids

Section I. **LATICOMAE** Traub

Scape relatively short, stout; stamen-filaments not distinctly appendiculate or otherwise modfied, at the base, except for fleshy scales at the base in *N. laticoma* subsp. *huttoniae.* Nomenifer: *N. laticoma* (Ker-Gawl.) Th. Dur. & Schinz.

1. Nerine marginata (Jacq.) Herb. Amaryll. 283. 1837; Bak. Amaryll. 102. 1888; Dyer, Plant Life 6: 67—69, pl. 7. 1950.

Syn.—*Amaryllis marginata* (Jacq.) Hort. Schoenbr. 1: 34, pl. 65. 1797; *Brunsvigia marginata* (Jacq.) Ait. Hort. Kew, ed. 2. 2: 230. 1810-1813; Ker-Gawl., Bot. Mag. sub pl. 1443. *Imhofia marginata* (Jacq.) Herb. App. 18. 1821; *Elisena marginata* (Jacq.) Roem. Syn. Monogr. Amaryll. 4: 63. 1847.

Bulb ovoid, 4—5—7.6 cm. in diam., tunics dark brown, membranous. *Leaves* 4, produced after the flowers, spreading on the ground, obovate-oblong or long lingulate, obtuse, 15—25 cm. long, 5—6.5—7 cm. wide, with a reddish crisped cartilagenous margin. *Scape* stout, compressed, 12—15—20 cm. long, 1 cm. in diam. *Spathe* 2-valved, deltoid, 2—3 cm. long, shorter than the pedicels. *Umbel* 12—20-flowered, centripetal; perigone more or less regular, erect, bright scarlet. *Pedicels* 3.8—5—7 cm. long. *Ovary* moderately 3-angled, turbinate, 1—1.5 cm. long, 6 mm. in diam. across the angles. *Tepaltube* very short, 5—7 mm. long. *Tepalsegs* lanceolate, 3 cm. long, 6.5 mm. wide, spreading, recurved, slightly undulate on the margins. *Stamens* suberect, nearly straight, a little longer than the tepalsegs; anthers oblong, 6—8 mm. long. *Style* straight, a little longer than the stamens. *Capsule* up to 2 cm. long, 1.5 cm. in diam.

Range.—R. S. Afr. Cape Province: Tulbagh, Wellington, Ceres Paarl.

Notes.—*Nerine marginata* has leaves similar to species of the subgenus *Brunsvigia,* genus *Brunsvigia,* and flowers unlike the typical flowers of either *Nerine or Brunsvigia.* It is apparently closely related to *Brunsvigia.*

2. Nerine laticoma (Ker-Gawl.) Th. Dur. & Schinz, Consp. Fl. Afr. 5 (1893); 256. (1895).

Syn.—*Amaryllis laticoma* Ker-Gawl., in Bot. Reg. 6: pl. 497. 1820-21; *Amaryllis lucida* Burchell, Travels 1: 536. 1822; D. Dietr. Syn. Pl. 2: 1181. 1839-52; *Nerine lucida* (Burch.) Herb., in Amaryll. 283, pl. 26, fig. 3. 1837; Bak. Amaryll. 102. 1888; Fl. Cap. 6(2): 214. 1896; Pole Evans, Fl. Pl. S. Afr. 4: pl. 134. 1924; *Imhofia lucida* (Burch.) Kuntze, Rev. Gen. 704. 1891; *Imhofia laticoma* (Ker-Gawl.) Schinz, in Bull. Herb. Boiss. 4: App. 3. p. 46.

Bulb globose, 4—(7.5—10) cm. in diam.; bulb-neck about 4 cm. long. *Leaves* 6—8, produced in summer and persisting at flowering time

in autumn, strap-shaped (linear), obtuse, bright green, 18—30—36 cm. long, 1.2—(1.8—2) cm. wide. *Scape* lateral, moderately stout, compressed, with rounded edges, 7.5—10—12—20 cm. long, 6x9 mm. in diam. *Spathe* values ovate-lanceolate, membranous, 4 cm. long. *Umbel* 19—20—22(—40)-flowered, centripetal; perigone 3.8—4—4.2—(5) cm. long, pale pink, or bright red with narrow deeper-colored band in center of the tepalsegs. *Pedicels* 4.5—7.6—8—10 cm. long, stiff, moderately stout. *Ovary* obtusely-trigonous, 5—6.5 mm. long, 11 mm. in diam. *Tepaltube* 3 mm. long, 4 mm. in diam. (base), 5 mm. in diam. (apex). *Tepalsegs* lanceolate-linear, obtuse, 3.7—3.8 cm. long, 6—6.5 mm. wide, hardly at all crisped. *Stamens* declinate, nearly as long as the tepalsegs; filaments bright red; anthers oblong, 3—4 mm. long. *Style* bright red, declinate-ascending, as long as the stamens; stigma capitate. *Capsule* depresso-globose, 8—13 mm. in diam.

Range.—R. S. Afr.: Western portions of Cape Province; Damaraland and Avamboland; Transvaal, Orange Free State.

Notes.—*Nerine laticoma* resembles a dwarf *Brunsvigia* in general habit, but differs from that genus by the obtusely angled ovary and the less zygomorphic perigone. The relatively stout scape is also present in the three other subspecies of *Nerine laticoma.* The scape is relatively longer in plants grown under good garden culture.

The above description was checked against the existing ones, and includes the data from living cultivated plants, and the herbarium specimen No. 1055 (TRA), La Jolla, Calif. 7-18-63.

2b. NERINE LATICOMA subsp. HUTTONIAE Traub, COMB. NOV.

Syn.—*Nerine huttoniae* Schoenland, Rec. Alb. Mus. 1: 49. 1903 as *N. huttonii;* Dyer, in Fl. Pl. S. Afr. 29: pl. 1130. 1952.

Bulb ovoid, up to about 4 cm. in diam.; tunics membranous, pale brown. *Leaves* 7—10, produced with the flowers, subdistichous, lorate, 1—2 cm. wide, thin, and up to about 30 cm. long, shiny, finely ribbed, obtuse when young, but tip withers with age in its natural habitat; concave along the upper side; ascending in the lower half, recurved above. *Scape* green, arising from outside the leaves (lateral), 15—30 cm. long, 1 cm. in diam., flattened. *Spathe-valves* 2, dry, brown, ovate, cuspidate, about 3.5 cm. long. *Umbel* 20—75-flowered, may average nearly 40, pedicels arising from 3 extremely short growing points in the umbel; with the flowers from each growing point opening from the outside or base, giving the impression of a random opening of the flowers throughout the umbel. *Pedicels* angled, straight or slightly curved towards the flower, usually 8—12 cm. long. *Ovary* 3-angled. *Perigone* with very short tepaltube, 2.5—3.2 cm. long, the size probably depending somewhat on the number of flowers in the umbel; tepalsegs pink with dark red to brown mid-vein, oblanceolate-linear, spreading, recurved, slightly undulate. *Stamens*: filaments slightly shorter than the tepalsegs, red, with small lateral appendages at the base, and thickened dorsally; anthers reddish-brown, about 6 mm. long, turning black. *Style* red, about as long as the stamens. *Seeds* as large as peas, nearly globular.

Range.—Cape Province: Great Fish River Valley, near Craddock to Committees; near Sheldon.

Notes.—Named for Mrs. Hutton. Closely related to *N. laticoma,* but habitats are fairly widely separated.

2c. NERINE LATICOMA subsp. SANDERSONII (Bak.) Traub, COMB. NOV.

Syn.—*Nerine flexuosa* var. *sandersonii* Bak., Amaryll. 101. 1888; Fl. Cap. 6: 211. 1896; Pole Evans, in Fl. Pl. S. Afr. 4: pl. 139. 1924.

Bulb globose, 7 cm. in diam. *Leaves* about 7, usually twisted, 30 cm. long, 2.7 cm. wide, strap-shaped. *Scape* up to 40 cm. long, elliptic in cross-section (compressed with sharp edges). *Spathe-values* ovate, acuminate, 4 cm. long. *Umbel* about 25-flowered. *Pedicels* up to 7 cm. long, slender. *Ovary* globose, obscurely 3-angled. *Tepaltube* short. *Tepalsegs* crisped in the upper half, about 4 cm. long. *Stamens* declinate; filaments almost as long as the tepalsegs (when mature). *Stigma* simple.

Range.—R. S. Afr.: Transvaal.

2d. NERINE LATICOMA subsp. FALCATA (Barker) Traub, SUBSP. NOV.

Syn.—*Nerine falcata* Barker, in Fl. Pl. S. Afr. 13: pl. 511. 1933.

Bulb globose, 5—7 cm. in diam. *Leaves* 5—7, appearing with the flowers, falcate, erect or patent, with a half spiral twist, dark green, margins scabrous, 26 cm. long, 3 cm. wide, apex obtuse. *Scape* angular, 43 cm. long, 1.3 cm. in diam. *Spathe-valves* oblong, 4.8 cm. long, 1.8 cm. wide, membranous. *Umbel* 20—25 flowered, centripetal. *Pedicels* 9 cm. long, 2—3 mm. in diam. *Perigone* zygomorphic, the lower tepalsegs diverging widely from the stamens, 5—6 cm. in diam; tepalsegs ***white,*** patent, then recurved, linear acute, slightly undulate towards the apex and *rose-pink,* 4.5 cm. long, 5 mm. wide. *Stamens* declinate, filaments 3.2 cm. long, rose pink. *Ovary* obtusely angular, 4 mm. in diam.; style declinate, 4 cm. long.

Range.—R. S. Afr.: Transvaal, Ventersdorp.

Notes.—According to Barker (1933) *N. Falcata* appears to be most nearly related to *Nerine flexuosa* var. *sandersonii* (illustrated in Fl. Pl. S. Afr. pl. 129), both having a long slender angular scape, a centripetal umbel, non-appendiculate stamens, but the flowers of *N. falcata* "are more dainty in shape and more delicate in coloring" and this species also differs in having leathery falcate leaves, with scabrous margins, and obtuse apex; the falcate leaves most closely resemble those of *N. laticoma* (figured on Plate 124, Fl. Pl. S. Afr.,) but they are always raised well above the ground and not prostrate, as seems to be the rule in *N. laticoma.*

2c. NERINE LATICOMA subsp. KRIGEI (Barker) Traub, SUBSP NOV.

Syn.—*Nerine krigei* Barker, S. Afr. Gard. 22: 137. 1932; Fl. Pl. S. Afr. 15: pl. 567. 1935.

Bulb ovoid, 4 cm. in diam., continued into a neck, 2.5 cm. long, tunics papery, dark brown. *Leaves* 4—5, produced with the flowers (synanthous), erect, firm, spirally twisted, narrowing gradually to the obtuse apex, 27 cm. long. 1.2 cm. wide. *Scape* compressed and two-angled, spirally twisted, 36 cm. long, 5 mm. in diam. *Spathe-valves* 3.5 cm. long. *Umbel* 12-flowered, centripetal, up to 17 cm. in diam. *Pedicels*

glabrous, up to 7.5 cm. long. *Tepalsegs* 3.7 cm. long, 5 mm. wide, rose-pink with a green keel, slightly undulate, apex recurved. *Stamen-filaments* declinate, non-appendiculate at the base, almost as long as the tepalsegs. *Ovary* acutely angled, angles compressed and scabrous with minute papillae, 3 mm. long, 5 mm. in diam.; style short at first, finally as long as the stamens. *Stigma* minutely 3-lobed.

Range.—R. S. Afr.: Transvaal, Standerton, flowering in February and March. Incorrectly indicated as from Rhodesia, near Victoria Falls, in the original description.

Notes.—According to Barker (1935) this species belongs to the group of northern species comprising *N. laticoma, N. falcata* and the plant that is at present known as *N. flexuosa* var. *sandersonii* Bak. In common with these three, *N. krigei* has leaves that appear with the flowers (synanthous), the scape is compressed and two-edged, the umbel is many-flowered; the waving of the tepalsegs is obscure, and the stigma is inconspicuous. However, it differs from them all in having narrower leaves and acutely-angled and scabrous ovary; and agreeing with *N. falcata* in the general shape and size of the flowers, and acuminate tepalsegs.

3. NERINE DUPARQUETIANA (Baill.) Bak., Fl. Cap. *6*(2); 214. 1896; Dyer, Fl. Pl. S. Afr. pl. 1118. 1951.

Syn.—*Imhofia duparquetiana* Baill., in Bull. Linn. Soc. Paris ii(1894)1132; Bak. Gard. Chron. ii(1894)624.

Bulb globose, about 6 cm. in diam., bulb-neck present. *Leaves* 4—6, contemporary with the flowers, lorate, 20—26—30 cm. long, 1.5 cm. wide, straight or slightly arcuate, spreading on the ground with age, glabrous, green. *Scape* arising with, but outside the same season's leaves, compressed, about 18 cm. long, 7—8 mm. at its greatest width, and 4 mm. at its least; minutely pubescent with delicate short hairs. *Spathe-valves* 3.5—4 cm. long, lanceolate, scarious. *Umbel* 15—20-flowered, centripetal. *Pedicels* 6—9—10 cm. long, about 2.5 mm. in diam., pubescent with delicate short hairs. *Ovary* about 6 mm. in diam., somewhat obscurely 3-angled, ovules 2 per cell. *Tepaltube* very short. *Tepalsegs* linear-lanceolate, acuminate, not undulated, white within, flushed shell-pink at the face, and with a green keel down the back (with multinerved carmine keel according to Baillon), up to about 8 cm. long and 6 mm. wide; at first 5 tepalsegs spread upwards and reflex, and the 6th subtends the stamens and style, but gradually this rotates from the base, clockwise or counter-clockwise and the others move slightly in the same direction so that they are more or less symmetrically arranged, 3 on either side of the vertical axis. *Filaments* declinate, shorter than the tepalsegs; 3 slightly longer than the others; inserted on the apex of the short tepaltube, without basal appendages but occasionally showing rudimentary shoulders. *Style* at first straight, curving above the dehisced anthers as it matures; stigma capitate, pubescent (pappilose).

Range.—R. S. Afr.: Cape Prov., Kalahari Region.

Section II. **NERINE**

Scape relatively long, slender; stamens-filaments thickened at the base but not otherwise modified at the base; perigone, stamens and style nearly erect. Nomenifer: *N. sarniensis* (L.)Herb.

4. NERINE SARNIENSIS (L.)Herb., Bot. Mag. sub pl. 2124. 1820; App. 19. 1821; Herb. Amaryll. 283. 1837; Gard. Chron. 779-810. 1885; Bak. Amaryll. 99. 188; Fl. Cap. 6(2): 209—210. 1896; Pole Evans, Fl. Pl. S. Afr. 9: pl. 355. 1929.

Syn.—*Amaryllis sarniensis* L., Sp. Pl. ed. 1. 293. 1753; Bot. Mag. 9: pl. 294. 1795; Red. Lil. pl. 33. 1802; Jacq. Hort. Schoenbr. 1: 34, pl. 66. 1797; *Amaryllis dubia* Houtt., Handeiding. . . . Pl. 11: 181. pl. 84, cum. ic. 1773-83; *Haemanthus sarniensis* (L.) Thunb. 58. 1794-1800; Fl. Cap. ed. Schult. 298. 1823; *Amaryllis jacquinii* Tratt., Gartenfl. 43. 1821; *Nerine cochinchinensis* M. Roem. Syn. Monogr. Amaryll. 4: 104. 1847; *Nerine jacquinii* (Tratt.) M. Roem. Syn. Monogr. Amaryll. 4: 105. 1847; *Nerine insignis* Leichtl. Gard. Chron. i(1886)41; *Nerine profusa* Bak., Amaryll. 1888; *Nerine sarniensis* var. *profusa* Bak. Amaryll. 100. 1888.

Bulb globose, 2.5—3 cm. in diam. *Leaves* about 6, appearing after the flowers, 15—30 cm. long, 1.2—1.9 cm. wide, strap-shaped, obtuse, glabrous, bright green, suberect. *Scape* 25—30—46 cm. long, compressed, smooth. *Spathe-valves* 2, crimson, ovate-lanceolate, 3.8—5 cm. long. *Umbel* 7—10—20-flowered, centripetal; perigone erect, 3.8 cm. long. *Pedicels* 1—3(—5) cm. long, of different lengths in the same umbel; terete, glabrous. *Ovary* globose, 2—3—4 mm. in diam. *Tepaltube* very short (3 mm. long?). *Tepalsegs* 3.5 cm. long, 6—13 mm. wide, at length reflexed, oblanceolate, crisped on the margin. *Stamens* erect; filaments scarlet, slightly (1.3 mm.) longer than the tepalsegs; anthers 3—4 mm. long, versatile. *Style* straight, nearly 5 mm. long.

Range.—R. S. Afr. Coast Region, Table Mountain.

Notes.—Known under the common name, "Guernsey Lily". Flowers in September and October in Northern Hemisphere.

4a. NERINE SARNIENSIS var. SARNIENSIS. Flowers bright crimson.

4b. NERINE SARNIENSIS var. PLANTII Bak. Amaryll. 100. 1888. Flower scapes taller than in the other varieties; flowers duller crimson, or rosy-crimson; scape longer; tepalsegs distinctly unguiculate. *Nerine plantii* O'Brien, Flora & Sylva 3: 122. 1805, nomen subnudum, apparently belongs here.

4c. NERINE SARNIENSIS var. VENUSTA (Ker-Gawl.) Bak., Amaryll. 100. 1888.

Syn.—*Amaryllis venusta* Ker-Gawl. Bot. Mag. pl. 1090. 1808; *Nerine venusta* (Ker-Gawl.) Herb. App. 19. 1821; Bot. Mag. 2124. 1820; Herb. Amaryll. 283. 1837; *Nerine venusta* var. *sarniensis* (L.) Herb. in Amaryll. 283. 1837; *Nerine venusta* var. *minor* Herb. Amaryll. 283. 1837; *Imhofia venusta* (Ker-Gawl.) Salisb. Gen. Pl. 118. 1866.

Flowers bright scarlet, produced in September; tepalsegs wavy, quite falcate.

4d. NERINE SARNIENSIS var. CORUSCA (Ker-Gawl.) Bak., Amaryll.

100. 1888; Fl. Cap. 6(2) : 210. 1896.

Syn.—*Amaryllis corusca* Ker-Gawl., Bot. Mag. sub pl. 1430. 1811; *Amaryllis humilis* β Ker-Gawl., Bot. Mag. pl. 1089. 1808; *Nerine corusca* (Ker-Gawl.) Herb. Bot. Mag. sub pl. 2124. 1820; Herb. App. 1821; Amaryll. 283. 1837; *Imhofia corusca* (Ker-Gawl.) Salisb. Gen. Pl. 118. 1866.

Leaves broader than in the typical form, bright green, with distinct cross-bars between the main veins; flowers large, bright scarlet, resembling those of *N. sarniensis* var. *curvifolia.*

4e. NERINE SARNIENSIS var. ROSEA (Herb.) Bak., Amaryll. 100. 1888; Fl. Cap. 6(2) : 210. 1896.

Syn.—NERINE ROSEA Herb. App. 19. 1821; Bot. Mag. pl. 2124. 1820; *Nerine venusta* var. *rosea* (Herb.) Herb. Amaryll. 283. 1837; *Imhofia rosea* (Herb.). Salisb. Gen. Pl. 118. 1866.

4f. NERINE SARNIENSIS var. ALBA Traub, *var. nov. floribus albis.*

Flowers pure white. Range.—Table Mountain.

4g. NERINE SARNIENSIS var. CURVIFOLIA (Jacq.) Traub, VAR. NOV.

Syn.—*Amaryllis curvifolia* Jacq., Hort. Schoenbr. 1: 33, pl. 64. 1797; Ker-Gawl., Bot. Mag. pl. 725. 1804; Red. Lil. pl. 274. 1809; *Nerine curvifolia* (Jacq.) Herb. App. 19, 1821; Bot. Mag. pl. 729; Amaryll. 283. 1837; Bak. Amaryll. 100. 1888; Fl. Cap. 6(2) : 210. 1896. *Imhofia glauca,* Gen. Pl. 118. 1866.

Bulb ovoid, 3.8—5 cm. in diam., tunics pale brown. *Leaves* 6, developed after the flowers, lorate, obtuse, curved laterally, thicker in texture than in *N. sarniensis,* glaucous, closely veined, up to 30 cm. long, 1.3—1.9 cm. wide. *Scape* slender, glaucous, 30—47 cm. long. *Spathevalves* about as long as the pedicels. *Umbel* 8—12-flowered, centripetal, perigone erect, bright scarlet, 3—3.8 cm. long. *Pedicels* 2.5—3.8 cm. long. *Ovary* globose, 4 mm. in diam. *Tepaltube* very short. *Tepalsegs* oblanceolate, 6.5 mm. wide, equally falcate, but little crisped. *Stamens* suberect, about as long as the perigone. *Style* suberect, finally 5 cm. long.

Range.—R. S. Afr.: habitat unknown.

Notes.—Common in gardens in Europe and the United States, where it flowers in the middle to the end of September. This species is retained tentatively until a more critical study can be made.

4g.-a. NERINE SARNIENSIS var. CURVIFOLIA f. CURVIFOLIA. Plant less robust.

4g.-b. NERINE SARNIENSIS var. CURVIFOLIA f. FOTHERGILLII (Andr.) Traub, f. nov.

Syn.—*Amaryllis fothergillii* Andr. Bot. Reposit. 163. 1816; *Nerine fothergillii* (Andr.) Roem. Monogr. Amaryll. 104. 1847; *Nerine curvifolia* var. *fothergillii* (Andr.) Bak. Fl. Cap. 6 : 210. 1896; *Nerine fothergillii* var. *major* Fitzherbert, Gard. Chron. ii(1904)332.

Plant more robust in all its parts; leaves broader; flowers in the umbel numerous, colored between crimson and scarlet.

4h. NERINE SARNIENSIS var. MOOREI (Leicht.) Traub, VAR. NOV.

Syn.—*Nerine moorei* Leichtl. in Gard. Chron. ii(1886)681; Bak., Amaryll. 100. 1888; Fl. Cap. 6(2) : 210-211. 1896.

Bulb globose. *Leaves* produced a little after the flowers, 22—30 cm. long, 1.3—1.9 cm. wide, much curved, slightly twisted, bluntly acute, bright green. *Scape* stout, compressed, shorter than the leaves. *Spathe-valves* lanceolate, longer than the pedicels. *Umbel* 6—9-flowered, centripetal; perigone bright scarlet, erect. Pedicels 2—2.5 cm. long; *Ovary* 3.5 mm. in diam. Tepelsegs oblanceolate, crisped, 3 cm. long, nearly 6.5 mm. wide. *Stamens*: filaments erect, longer than the tepalsegs; anthers oblong. *Style* straight, 3.8 cm. long.

Range.—R. S. Afr.: Habitat unknown. Described from a plant sent to Leichtlin by F. W. Moore, of the Glasnevin Gardens. This may be a hybrid between *N. curvifolia* and *flexuosa*, and is retained here *tentatively* until a more critical study can be made.

Section III. **BOWDENIAE** Traub

Scape relatively longer, slender; stamen-filaments thickened at the base, but not otherwise modified at the base; perigone, stamens and style declinate. Nomenifer: *Nerine bowdenii* W. Watson.

5. NERINE SCHLECTERI Baker, in Bull. Herb. Boiss. 2nd ser. 3: 665. 1903; Plant Life: 9: 76. 1953.

Bulb and leaves unknown, but the latter apparently appearing after the flowers. *Scape* slender, 30 cm. or more long. *Spathe-valves* 2, lanceolate, scarious, 1.2—1.8 cm. long. *Umbel* 3—5-flowered; perigone white, 1.2—1.4 cm. long. *Pedicels* 6—8 mm. long, densely pubescent. *Ovary* depresso-globose, 4 mm. in diam., densely pubescent. *Tepaltube* very short. *Tepalsegs* flat, equal, lanceolate, (1—1.2 cm. long), 4 mm. wide. *Stamens* declinate, equaling the tepalsegs; filaments filiform, without appendages; anthers small, oblong, brown.

Range.—R. S. Afr.: Natal; among rocks on Mt. West, alt. 1800 m.

Notes.—Living material of this species is needed for further study.

6. NERINE BREACHIAE Barker, in Fl. Pl. S. Afr. 15: pl. 566. 1935.

Bulb small, oblong-globose, 1.5 cm. in diam., continued into a short neck. *Leaves* 2—4, appearing after the flowers (hysteranthous), adpressed to the ground, lanceolate, subobtuse, dark green, 5 cm. long, 8 mm. wide. *Scape* terete, glabrous, 26 cm. long, 2.5 mm. in diam. *Spathe-valves* membranous, reddish-purple, 2—3 cm. long. *Umbel* usually 1—5-flowered, rarely up to 8-flowered. *Pedicels* glabrous, 2.5—4.5 cm. long. *Ovary* obtusely angled, 2.5 mm. in diam. *Tepalsegs* rose-pink, linear, apex recurved and undulate, 3.4 cm. long, 4—5 mm. wide. *Stamen-filaments* non-appendiculate at the base, shorter than the perigone, 2.5 cm. long. *Style* conspicuously longer than the stamens throughout the flowering period; stigma when mature distinctly 3-lobed.

Range.—R. S. Afr.: Cape Province, Bredasdorp Division, Bredasdorp.

Notes.—According to Barker(1935), *N. breachiae* flowers in late autumn: the leaves beginning to show as the flowers wither, and when mature are pressed to the surface of the ground, which distinguishes it from all others in this section, and which is shared only by the otherwise different *N. marginata*. It is among the lowliest of the genus; its nearest

ally being *N. humilis,* but this has longer, glaucous, and almost erect leaves.

7. NERINE RYDLEYI E. P. Phillips, in Ann. S. Afr. Mus. 9: 128. 1913.

Bulb globose, 3—4 cm. long, 3—4 cm. in diam., continued into a neck about 4 cm. long; tunics membranous, brown. *Leaves* 4—5, contemporary with the flowers, 7—9 cm. long, 1.3—2 cm. wide in the widest part, lanceolate, obtuse, narrowed at the base, pustulate above, glabrous, dark green above, lighter on under side. *Scape* about 23 cm. long, 3 mm. in diam., terete, glabrous, purplish below, becoming green above. *Spathe-valves* linear-oblong, acuminate, acute, pink, 3 cm. long. *Umbel* 5-flowered, flowers declined. *Pedicels* 3—4 cm. long, 1.5 mm. in diam., subtrigonous. *Ovary* 3 mm. long, globose, brown. *Tepalsegs* about 3 cm. long, 5 mm. wide, the two anterior ones much wider apart than the others, linear, subobtuse, recurved, crisped, with a small glandular papilla at the apex, pale pink, with a prominent midrib beneath (keel) of usually slightly deeper pink, and a distinct red streak on the lower half of the inner face of the tepalsegs. *Stamens* unequal in length, about horizontal, recurved upwards at the ends; 3 shorter filaments 2 cm. long; 3 longer 2.5 cm. long; all terete, pale pink, anthers 6 mm. long, oblong, purplish. *Style* horizontal, recurved above, 3.3 cm. long, terete, pale pink, stigma when mature trifid and papillose at the apex.

Range.—R. S. Afr.: locality unknown. Described from cultivated plant in the Municipal Gardens, Cape Town, May 1913.

Notes.—Considered as near *N. flexuosa,* but differing in the much shorter and comparatively broader leaves, and in the fewer-flowered umbel. Named in honor of G. H. Ridley, Curator at the Municipal Gardens, Cape Town.

8. NERINE BOWDENI W. Watson, Gard. Chron. 1904, vol. 36, p. 365; Bot. Mag. pl. 8117. 1907; Dyer, Fl. Pl. S. Afr. 22: pl. 841. 1942.

Syn.—*Nerine veitchii* Gard. Chron. ii(1911)244, nomen subnudum.

Bulb 5 cm. in diam, 6 cm. long, continued into a bulb neck 6 cm. long. *Leaves* produced after the flowers, up to 8—20—30 cm. long, 1.5—3 cm. wide. *Scape* erect, up to 45 cm. long, nearly cylindric, 5—6 mm. in diam., solid at the base, becoming hollow towards the apex. *Spathe-valves* 2, membranous, lanceolate, unequal in length, up to 5 cm. long. *Umbel* 6—7-flowered (sometimes up to 12-flowered in cultivation), 15—20 cm. across. *Pedicels* trigonous, up to about 5 cm. long, the central ones shorter. *Tepaltube* very short. *Tepalsegs* rose-pink, the midrib darker; up to 6 (—6.4—7.6) cm. long, 7—8 mm. wide, undulate along the margins, above the middle on the recurved portions. *Stamens* without appendages, somewhat shorter than the tepalsegs; upcurved at the tips. *Style* about as long as the stamens, very shortly 3-lobed, the lobes adhering together (obscurely 3-lobed). *Capsule* obtusely and irregularly 3-lobed, up to 1 cm. in diam.

Range.—R. S. Afr.: Cape Province.

Notes.—Named for Mr. Athelstan Cronish-Bowden, who sent the bulbs from Cape Province to his mother in England. Gumbleton decribed it as *N. excellens tardiflora* (Gard. Chron. Feb. 13, 1904, p. 105),

and Veitch exhibited it as *N. excellens* major *tardiflora* (Gard. Chron. Oct. 22, 1904, p. 292).

9. NERINE FLEXUOSA (Jacq.)Herb. App. 19. 1821; Amaryll. 283. 1837; Kunth, Enum. Pl. 5: 619. 1850; Bak., Amaryll. 100. 1888; Fl. Cap. 6(2) : 211. 1896; Barker, Fl. Pl. S. Afr. 15: pl. 561. 1935.

Syn.—*Amaryllis flexuosa* Jacq., Hort. Schoenbr. 1: 35, pl. 67. 1797; Ker-Gawl. Bot. Reg. pl. 172.

Bulb subglobose, 2.5—3.8 cm. in diam., continued into a neck; tunics light brown. *Leaves* 4—6, contemporary with the flowers, linear-lorate, arcuate, bright green, smooth, thin, up to 60 cm. long, 1.5—2 cm. wide. *Scape* slender, subterete, glabrous, flexuose, up to 60 cm. long, 4 mm. in diam. *Spathe-valves* lanceolate, tinged with reddish-purple, 3.8 cm. long. *Umbel* 6—10—20-flowered, centripetal; perigone generally pale pink. *Pedicels* 2.5—3.8—5—7.5 cm. long, slender. *Ovary* globose-trigonous, 4 mm. in diam. *Tepaltube* very short. *Tepalsegs* crisped, oblanceolate, 2.5—3 cm. long, 4 mm. wide. *Stamens* declinate, the 3 longer ones shorter than the tepalsegs, anthers oblong, claret red, 3—4 mm. long. *Style* pale pink, declinate, as long as the stamens.

Range.—R. S. Afr.: Cape Province Central Region; Kalahari Region.

9a. NERINE FLEXUOSA var. FLEXUOSA. The typical form.

9b. NERINE FLEXUOSA var. ALBA Gumbleton, Gard. Chron. ii(1904) 334. Flowers white.

9c. NERINE FLEXUOSA var. PULCHELLA(Herb.)Bak., Amaryll. 101. 1888; Fl. Cap. 6(2) : 211. 1896. Syn—*Nerine pulchella* Herb. App. 19. 1821; Bot. Mag. pl. 2407.

Leaves glaucous, firmer in texture than in the type. *Scape* not flexuose. *Tepalsegs,* pink with a rose-red keel. Stamens and style nearly white.

10. NERINE ANGUSTIFOLIA (Bak.)W. Watson, in Gard. Chron. ser. 3. 6, 1889; Bak. Fl. Cap. 6: 209, 211. 1896; Pole Evans, in Fl. Pl. S. Afr. 17: pl. 658. 1937; R. H. S., Dict. Gard. 3: 1367. 1951; Sealy, Bot. Mag. 70: pl. 244. 1955.

Syn.—*Nerine pulchella* var. *angustifolia* Bak., Saund. Ref. Bot. 5: pl. 329. 1872; *Nerine flexuosa* var. *angustifolia* (Bak.)Bak., in Gard. Chron. n. ser. 24, 779, 1885; et Amaryll. 101. 1888; *Nerine angulata* L. Bolus, in S. Afr. Gard. 20: 148. fig. B. 1930.

THE ELEGANT NERINE. *Bulb* ovate, 2.5 (—3.8) cm. long, 1.7 cm. in diam.; tunics gray-brown. *Leaves* 6, contemporary with the flowers, linear, slightly narrowed in the upper part to the blunt apex, about 33 cm. long, 3—5 mm. wide, bright green, suberect. *Scape* terete, 40—70 cm. long above the ground, bright green, sparsely spreading puberulous, more densely so at the apex. *Spathe-valves* lanceolate, 2.5 cm. long, white, membranous and ribbed at anthesis; bracteoles filiform, 1—1.7 cm. long, white. *Umbel* 6—12-flowered. *Pedicels* 1.3—5(—7) cm. long, densely covered with short spreading somewhat glandular rather thick papilla-like hairs which become brownish in dried specimens. *Ovary* subglobose, 3-locular, about 5 mm. in diam., densely covered with short spreading

hairs like those of the pedicels. *Tepaltube* about 2—3 mm. long. *Tepalsegs* linear-oblong, obtuse, 3—3.3—4—4.3 cm. long, 5 mm. wide; the anterior tepalseg extended horizontally and the other five tepalsegs spreading-ascending, and somewhat recurved, magenta-colored, deeper along the middle of the tepalsegs, 3-nerved in the middle, margins somewhat undulate. *Stamens* adnate to the inside of the tepaltube for about 2—3 mm.; filaments declinate, upcurved toward the apex, free part 2—2.5 cm. long, filiform from a broad base, magenta-colored; anthers dull purplish, 5—5.5 mm. long at first, blackish; about 2.5 mm. long when dehisced; pollen pale creamy yellow. *Style* about 2 cm. long, straight or decurved at first, magenta-colored; stigma 3-lobed, white papillose.

Range.—Southern Africa: R. S. Afr.: n. Cape Province, Orange Free State, n. Natal, and Transvaal. Botswana and Swaziland.

Notes.—According to Sealy(1955), *N. angulata* L. Bolus is conspecific with *N. angustifolia.* He further believes that *N. angustifolia* should be combined with *N. filifolia* as a variety, but the writer does not share this opinion. He states that *N. filamentosa* W. N. Barker can scarcely rank as more than a variety of *N. filifolia,* but again, the writer does not share this opinion.

11. Nerine alata Barker, in Fl. Pl. S. Afr. 15: pl. 563. 1935.

Bulb globose, up to 4 cm. in diam. *Leaves* appearing after the flowers (hysteranthous), linear, obtuse, green, 10 cm. or more long, 9 mm. wide. *Scape* terete, bright green, glabrous, very tall, 60—90 cm. long, 5 mm. in diam. *Umbel* 14—18-flowered, centrifugal, 7—9 cm. in diam. *Spathe-valves* acute, dark reddish-purple, 2.5 cm. long or a little longer, 5 mm. wide. *Pedicels* green, tinged with brown, up to 2.5 cm. long. *Tepalsegs* mauve-link, margins much crisped throughout their whole length, 2.1 cm. long, 2.5 mm. wide, conduplicate in the lower half, widening and flattening, thus forming as it were a cup above the ovary, 5 mm. long, 5 mm. in diam. *Stamens* declinate, finally 1.6 cm. long; anthers dark red before dehiscing, 4 mm. long. *Ovary* obtusely-angled, 2.5 mm. in diam.; style slender, finally as long as the stamens; stigma minute, 3-lobed.

Range.—R. S. Afr.: Cape Province, King William Division, Hogsbeck.

Notes.—*Nerine alata* is closely allied to *N. undulata* but differs from it mainly in the hysteranthous leaves, the very long scape, tepalsegs "distinctly longer than the stamens, and conspicuously widened at the base, with the dilated parts either contiguous or slightly overlapping, so that a sort of cup is formed above the ovary." The type locality (Hogsbeck) has produced no other *Nerine,* and it is unlikely that its range would overlap with that of *N. undulata.*

This species was first collected by Frances Leighton, March 1932.

12. Nerine undulata (L.) Herb. App. 19. 1821; Amaryll. 283, Pl. 45, fig. 2. 1837; Bak., Amaryll. 102. 1888; Fl. Cap. 6(2): 212—213. 1896.

Syn.—*Amaryllis undulata* L., in Syst. Nat. ed. 12; Mill. Hort. Kew, 352, cum ic.; L'Herit. Sert. Angl. 16; Bot. Mag. pl. 369. 1797; Red. Lil.

115. 1805; Jacq. Hort. Bot. Vind. etc. 3: pl. 13. 1776; Tratt. Arch. pl. 393. 1814; *Haemanthus undulatus* (L.)Thunb., Fl. Cap. ed. Schult. 297. 1823; *Nerine crispa* Bak., Amaryll. 102. 1888; Vilmorin in Blumeng. ed. 3. Sieb & Voss. 1: 1008. 1895.

Bulb ovoid, 2—2.5 cm. in diam., tunics pale, membranous. *Leaves* 4—6, linear, contemporary with the flowers, bright green, 6.4—1.3 mm. wide. *Scape* slender, 30—46 cm. long, 6—13 mm. wide. *Spathe-valves* lanceolate, as long as the pedicels. *Umbel* 8—12-flowered, centrifugal; perigone pale pink (rose). *Pedicels* slender, 2.5—3.8 cm. long. *Ovary* globose-trigonous, 3—4 mm. in diam. *Tepaltube* very short. *Tepalsegs* spreading widely from the base, oblanceolate, much crisped, 1.7—2 cm. long, 2 mm. wide. *Stamens* declinate, about as long as the tepalsegs. *Style* declinate, as long as the petalsegs. *Capsule* deeply lobed, 6 mm. in diam.; 1 seed per locule.

Range.—R. S. Afr.: Coast Region below Table Mountain; Wynberg to Port Elizabeth; Kalahari Region; and Orange Free State; and lower Damaraland.

12a. Nerine undulata var. undulata. The typical form. Tepalsegs much crisped.

12b. Nerine undulata var. major (Tratt.)Bak. Amaryll. 102. 1888; Fl. Cap. 6(2): 213. 1896. Syn.—*Amaryllis major* Tratt. Arch. pl. 394; *Amaryllis aucta* Tratt. Thes. Bot 9, pl. 45. 1819; *Nerine aucta* (Tratt.) M. Roem. Syn. Monogor. Amaryll. 4: 107. 1847.

Perigone larger and less crisped. Appears to be nothing more than a form.

13. Nerine humilis (Jacq.) Herb. Bot. Mag. sub pl. 2124. 1820; App. 19. 1821; Amaryll. 283. 1837; Kunth, Enum. Pl. 5: 621. 1850; Leichtl. Bull. Soc. Tosc. Ortic. 15: pl. 5, fig. 2. 1890; Bak. Amaryll. 102. 1888; Fl. Cap. 6(2): 213. 1896;

Syn.—*Amaryllis humilis* Jacq. Hort. Schoenbr. 1: 36, pl. 69, 1797; Red. Lil. pl. 450. 1816; Bot. Mag. pl. 726. 1804.

Bulb ovoid, 2.5—3.8 cm. in diam., tunics membranous. *Leaves* about 6, contemporary with the flowers in November (Northern Hemisphere), linear, bright green, suberect, channeled down the face, about 20 cm. long, about 1.3 cm. wide. *Scape* slender, subterete, slightly glaucous, 15—46 cm. long. *Spathe-valves* lanceolate, green, about as long as the pedicels. *Umbel* 10—20-flowered, centrifugal; perigone bright pink or rose-red, 2.5—3 cm. long. *Pedicels* slender, 2.5—3.8 cm. long. *Ovary* globose-trigonous, 3—4 mm. in diam. *Tepaltube* very short. *Tepalsegs* oblanceolate, acute, crisped, 2.5—3 cm. long. *Stamens* declinate, the 3 longer about equaling the tepalsegs; anthers oblong, purple, 3 mm. long. *Style* declinate, as long as the tepalsegs.

Range.—R. S. Afr.: Cape Province, Coast Region, Table Mountain; Albany Division.

Notes.—Differs from *N. flexuosa* by the centrifugal umbel, its dwarfer habit, and narrower, channeled leaves.

13a. Nerine humilis subsp. humilis. Leaves bright green, umbel 10—20-flowered.

13b. Nerine humilis subsp. fera (Barker)Traub, *comb. nov.*

Syn.—*Nerine humilis* forma *fera* Barker, in Fl. Pl. S. Afr. 15: pl. 564. 1935.

Bulb oblong, 4.5 cm. long, 2.5 cm. in diam.; continued into a neck 3.5 cm. long, tunics grayish. *Leaves* 3—5, appearing after the flowers (hysteranthous), suberect or spreading, linear, obtuse, glaucous green, 16 cm. long, 8 mm. wide. *Scape* terete, glabrous, bright green, up to 31 cm. long, 3 mm. wide. *Spathe-valves* lanceolate, acute, purplish-red, up to 4 cm. long. *Umbel* centrifugal, 6—7-flowered. *Pedicels* glabrous, up to 4.3 cm. long. *Ovary* obtusely-angled, 3 mm. in diam. *Tepalsegs* pink with a red central stripe, only slightly undulate, recurved near the apex, 3.1 cm. long, 4 mm. wide. *Stamens* declinate, nearly as long as the perigone. *Style* declinate, longer than the stamens; stigma minutely 3-lobed.

Range.—R. S. Afr.: Cape Province; Collected by Prof. T. Baron and Paymaster Captain Salter in April 1932.

Notes.—*Nerine humilis* subsp. *fera* differs from the typical form mainly in the glaucous, hysteranthous leaves, fewer-flowered umbel.

14. Nerine peersii Barker, Fl. Pl. S. Afr. 15: pl. 562. 1935.

Bulb depresso-globose, 2.5 cm. long, 3 cm. in diam., continued into a neck above, up to 7 cm. long. *Leaves* 5, appearing with the flowers, linear, obtuse, minutely scabrous on the upper surface, scarcely glaucous, up to 25 cm. long, 7—12 mm. wide. *Scape* terete, bright green, reddening at the base, 32 cm. long, up to 3 mm. in diam. *Spathe-valves* lanceolate, dark reddish-purple, 4.5 cm. long. *Umbel* 5—6-flowered, centrifugal, 15 cm. in diam. *Pedicels* quite glabrous, 4—6 cm. long. *Ovary* obtusely angled, 3 mm. in diam., several ovules in each locule. *Tepalsegs* finally all forming the posticus lip (the stamens and style forming the anticus lip), linear, acuminate, undulate in the upper half, the apex recurved and spirally twisted; the margins in the lower half incurved, and minutely crisped, the base flat and deep carmine, paler above, with a narrow strip near the base on the upper side, 4—5 cm. long, up to 4 mm. wide. *Stamens* as long as the tepalsegs; anthers dark red before dehiscing, 6 mm. long. *Style* throughout the flowering period longer than the stamens; stigma conspicuously 3-lobed when mature.

Range.—R. S. Afr.: Cape Province, Uniondale Division.

Notes.—*Nerine peersii* resembles *N. flexuosa* var. *pulchella* (see Bot. Mag. pl. 2407), but differs in having long-acuminate, narrower tepalsegs, which are more markedly waved at the margins, a more slender scape, somewhat flexuous pedicels; leaves scarely glaucous, and more numerous, and in other particulars.

The species was named for V. S. Peers.

15. Nerine pudica Hook. f. Bot. Mag. pl. 5901. 1871; Bak. Amaryll. 101. 1888; Fl. Cap. 6(2): 212. 1896; Fl. des Serres, pl. 2464. 1880; Leichtl. Bull. Soc. Tosc. Ortic. 15: pl. 5, fig. 3. 1890.

Bulb globose, about 2.5 cm. in diam. *Leaves* 4—6, contemporary with the flowers, linear, glaucous, suberect, persistent, 20—23 cm. long, 6—8.5 mm. wide. *Scape* slender, subterete, 30—46 cm. long. *Spathe-valves* lanceolate, 2.5—3.8 cm. long. *Umbel* 4—6-flowered, centripetal; perigone erect or deflexed, 3—3.8 cm. long. *Pedicels* slender, 2.5—3.8 cm. long.

Ovary globose, 4 mm. in diam. *Tepaltube* very short (5 mm. long?). *Tepalsegs* oblanceolate, thin, plane, scarcely at all crisped, white with a pink keel, 2.5—3.2 cm. long. *Stamens* declinate, the 3 longer a little shorter than the tepalsegs; anthers oblong, 3 mm. long. *Style* declinate, as long as the tepalsegs. Seeds globose.

Range.—R. S. Afr.: locality unknown. First described from a plant that flowered at Kew in 1868.

Notes.—Flowers in September (northern hemisphere).

15a. NERINE PUDICA var. PUDICA. Tepals white with a pink keel.

15b. NERINE PUDICA var. ELWESII Leichtl. ex. Bak., Amaryll. 101. 1888; Fl. Cap. 6(2): 212. 1896. Syn.—*Nerine elwesii* Leichtl., Gard. Chron. i(1886)42, nom. nud.

Leaves much broader, bright green, more persistent, distinctly veined, with a prominent mid-rib; umbel more compact, pedicels shorter, tepalsegs pale rose with a darker keel, thicker and more wavy.

15c. NERINE PUDICA var. ALBA Worsley, Gard. Chron. ii(1911)325. Flowers pure white.

16. NERINE BRACHYSTEMON Bak., Fl. Cap. 6(2): 212. 1896.

Bulb unknown. *Leaves* about 5, subterete, glabrous, 30 cm. long, 1.5 mm. in diam. *Scape* slender, 46 cm. long. *Spathe-valves* 3.8—5 cm. long. *Umbel* 10—20-flowered, centripetal; perigone bright red. *Pedicels* stiffly erect, pubescent, 3.8—5 cm. long. *Ovary* globose, deeply lobed, 4.2 mm. in diam. *Tepaltube* very short. *Tepalsegs* linear, rather crisped, 2—2.2 cm. long. *Stamens* not more than half as long as the tepalsegs; anthers small, oblong.

Range.—R. S. Afr.: Cape Province, Eastern Region, Griqualand East, near Kokstad, alt. 1,524 m.

Notes.—Living material for study is needed.

17. NERINE FILAMENTOSA Barker, in Fl. Pl. S. Afr. 15: pl. 569. 1935.

Bulb 3 cm. in diam., continuous with a short neck, tunics blackish-brown. *Leaves* 3—4, produced with the flowers, straight or slightly flexuous and spirally twisted, semiterete, slightly channeled above, glabrous, up to 34 cm. long, 2 mm. in diam. *Scape* terete, pubescent with short pluricelled hairs, up to 30 cm. long, 3 mm. in diam. *Spathe-valves* lanceolate, acute, suffused with purple, nearly as long as the pedicels. Umbel 6—9-flowered, flowers bright rose, centripetal, up to 18 cm. in diam. *Pedicels* with minute pluricelled hairs, the young ones reddish, the older ones suffused with green, up to 7 cm. long, 1.25 mm. in diam. *Tepalsegs* linear, acute, circinately revolute above, the margin in the upper half undulate, in the lower half flat, up to 5.5 cm. long, 3 mm. wide. *Stamens* scarcely declinate, finally up to 5.7 cm. long. *Ovary* acutely angled, with a few pluricelled hairs, dark purplish-brown, 3 mm. in diam. *Style* lengthening remarkably, finally as long as the stamens.

Range.—R. S. Afr.: Cape Province; Albany Division; Grahamstown.

Notes.—Barker notes that the tepalsegs "for half of their length are curled back in a circinate manner, leaving the long, almost straight and scarcely declinate, slender filaments protruding as conspicuously

from the flower as they do in the otherwise very different section which contains *N. sarniensis.* It is this last character as well as the slender form of the filaments which suggested the name."

This species shows affinities with *Nerine filifolia.*

18. NERINE PUSILLA Dinter, in Neue Pfl. Deutsch-Suedwest-Afr. p. 48. 1914.

Bulb 3 cm. long, about 1.8 cm. in diam., tunics white. *Leaves* subterete, grass-green, 15—20 cm. long, 8 mm. in diam. *Scape* lateral, 7—9 cm. long, 2 mm. in diam. *Spathe-valves* 2, lanceolate, 2 cm. long. *Pedicels* 2.5 cm. long, minutely hirsuate. Umbel 3—5-flowered; perigone white, rose-colored in lower part, tepalsegs keeled brownish-greenish in upper part. *Tepalsegs* 1.7 cm. long, 3—4 mm. wide, apex bearded on inner side. *Stamens*: 3 inner 1.6 cm. long, 3 outer 1.3 cm. long; filaments declinate-ascending; anthers rose-brown. *Style* declinate-ascending, stigma prominently 3-lobed.

Range.—R. S. Afr.: Damaraland, Gobabis and Steinhausen.

Notes.—Dinter collected this plant in 1912, and cultivated it at Okahandia in Damaraland. He remarks on the great beauty of the species.

19. NERINE TULBAGHENSIS Barker, in Fl. Pl. S. Afr. 15: pl. 565. 1935.

Bulb small, globose, 1.5 cm. long, 1.2 cm. in diam. continued into a short neck. *Leaves* 4—5, present with the flowers (synanthous) subpatent, linear, slightly channeled above, obtuse, dark green, reddening at the base, 6—9 cm. long, 2 mm. wide. *Scape* reddening at the base, 10—12 cm. long, 2 mm. in diam. *Spathe-valves* oblong lanceolate, acuminate, reddish-purple, 1.5—2 cm. long. *Umbel* 2—3-flowered. *Pedicels* glabrous, 1—2.5 cm. long. *Ovary* obtusely angled, 2 mm. in diam. *Tepalsegs* pale pink, recurved and margins undulate towards the apex, 2.2 cm. long, 3 mm. wide. Stamens declinate, finally turned up at the apex, filaments non-appendiculate, as long as the tepalsegs. *Style* declinate, longer than the stamens.

Range.—R. S. Afr.: Cape Province, Tulbach Kloof.

Notes.—According to Barker, *N. tulbaghensis* was formerly included under *Nerine humilis* Jacq., but the leaves are synanthous, and they are very narrow. The whole plant is smaller, including the individual flowers; the differences are sufficient to warrant its being raised to specific rank.

20. NERINE REHMANNII (Bak.)L. Bolus ex Traub, comb. nov.; S. Afr. Gard. 20: 148. 1930, without literature citation.

Syn.—*Hessea rehmannii* Bak., Amaryll. 22. 1888; Barker, Fl. Pl. S. Afr. 3: pl. 120. 1923.

Bulb globose, 1.8 cm. long, 1.5 cm. in diam. continuing into a neck, 1—1.5 cm. long; tunics papery. *Leaves* usually 1, synanthous rarely 2, filiform, 9 cm. long, quite terete or with a shallow channel, glabrous. *Scape* 15 cm. long, terete, glabrous. *Umbel* about 9-flowered, centripetal. *Spathe-valves* 2 mm. long, ovate, acute. *Pedicels* 8 mm. long, terete, glabrous. *Ovary* 2.5 mm. in diam., globose, glabrous, with a single ovule in each cell. *Tepalsegs* 8 mm. long, 1.5 mm. wide, linear, much crisped,

with 3 tepalsegs minutely and bluntly apiculate, and with papillae at the apex. *Stamens*: filaments attached to the base of the tepalsegs, 5 mm. long, terete; anthers 1 mm. long, orbicular, basifixed. *Style* 7 mm. long, terete; stigma 3-lobed, papillose.

Range.—R. S. Afr.: Transvaal.

Notes.—This is a very distinct species.

21. NERINE FILIFOLIA Bak., Bot. Mag. pl. 6547. 1881; Amaryll. 101—102. 1888; Fl. Cap. 6(2): 211. 1896.

Bulb globose, under 2.5 cm. in diam., continued into a short neck, tunics pale. *Leaves* 6—10, contemporary with the flowers, grass-green, very slender, suberect, 15—20 cm. long. *Scape* slender, terete, green, finely glandular-pubescent, up to 30 cm. long. *Spathe-valves* lanceolate, green, under 2.5 cm. long. *Umbel* 8—10—12-flowered, centripetal; perigone deflexed, rose pink. *Pedicels* slender, 2.5—3.8 cm. long. *Ovary* angled, minutely puberulous, brownish-green, 4 mm. in diam. *Tepaltube* 2 mm. long. *Tepalsegs* linear, oblanceolate, unguiculate, 2.5—3 cm. long, 3—4 mm. wide, spreading from the center, margins crisped. *Stamens* declinate, shorter than the tepalsegs; anthers oblong, red. *Style* equaling the longer stamens.

Range.—Orange Free State, Kalahari Region.

Notes.—Plants similar to that figured in Bot. Mag. 6547 have not been collected from Orange Free State since it was taken there by Ayres in 1879. A similar plant, *N. parviflora* (description follows) with a totally different flowering season is known to exist in Cape Province, near Grahamstown.

22. NERINE PARVIFLORA (Barker) Traub, comb. nov.

Syn.—*Nerine filifolia* var. *parviflora* Barker, Fl. Pl. Sl. Afr. 15: pl. 568. 1935; Plant Life 9: 163. 1953.

Bulb oblong-globose, about 2 cm. long, 1.2 cm. in diam. continued into a neck about 1.5 cm. long. *Leaves* 2—3, appearing with the flowers (synanthous), filiform, up to 18 cm. long. *Scape* bright green, minutely glandular-pubescent with pluricelled hairs, 23 cm. long. 2.5 mm. in diam. *Spathe-valves* lanceolate, acute, purplish or yellowish, 2 cm. long. *Umbel* 3—8-flowered, centripetal. *Pedicels* minutely glandular-pubescent with pluricelled hairs, tinged with red-brown, up to 2.5 cm. long, 2 mm. in diam. *Tepalsegs* 2.2. cm. long, 4 mm. wide, bright mauve-pink with a deeper central stripe most pronounced near the base, recurved and undulate in the upper half. *Stamens* declinate, non-appendiculate at the base, shorter than the tepalsegs, up to 2 cm. long; anthers dark reddish-purple before dehiscing, 2.5 mm. long. *Ovary* sub-acutely angled, minutely glandular-pubescent, dark reddish-brown; style at first short, and straight, lengthening and recurving in the older flowers, 1.4 cm. long; stigma capitate.

Range.—R. S. Afr.: Cape Province, near Grahamstown.

Notes.—According to Barker (1935), the main characteristics of *N. filifolia* are its few filiform or thread-like leaves that are contemporary with the flowers, the glandular pubescence on the scape, the pedicels and the ovary; the deep color of the zygomorphic perigone, where tepalsegs

diverge very gradually from the center of the flower, and the declinate stamens shorter than the tepalsegs, and the *absence* of appendages at their bases. All of these characters are exemplified in *N. parviflora,* which differs in having smaller flowers, and a much later flowering season, namely in August (Southern Hemisphere), while that of *N. filifolia* extends from January to June(Southern Hemisphere). Thus *N. parviflora* is reproductively isolated from *N. filigolia,* and is apparently evolving along unique lines, and merits specific rank.

Section IV. **APPENDICULATAE** Traub

Stamen-filaments alternating with scales at the base; or appendiculate at the base, or appendages forming a staminal cup at the base. Nomenifer: *N. appendiculata* Bak.

23. NERINE FRITHII L. Bolus, in Ann. Bolus Herb. 3: 79. 1921; Fl. Pl. S. Afr. 18: pl. 691. 1938.

Bulb ovoid-globose, 2 cm. long, 1.7 cm. in diam. *Leaves* often only 2, contemporaneous with the flowers, subfiliform, channeled above, up to 15 cm. long, 1—1.5 mm. wide. *Scape* terete, up to 20 cm. long. *Spathe-valves* long-oblong, long-attenuate, 2.5—3 cm. long; bracteoles 1—1.5 cm. long, thread-like, membranous. *Umbel* 5—7-flowered; perigone pinkish. *Pedicels* pink in the upper ¾, green below. *Ovary* obovate, with 2 ovules per locule. *Tepaltube* very short. *Tepalsegs* spreading, at length recurved, linear, acute, with undulate margins, 1.5 cm. long, 4 mm. wide. *Stamens* declinate, filaments 3.5—6 mm. long, appendiculate at the base, forming a cup 3 cm. long, somewhat lacerated above, with two lobes usually much exceeding the others.; anthers 4 mm. long. *Capsule* globose, 8 mm. in diam.

Range.—R. S. Afr. Cape Province, Kalahari Region, Griqualand West, Kimberley Division, Riverton; Orange Free State, Hoopstadt.

Notes.—According to Bolus(1938), this species is allied to *N. appendiculata* Bak., but may be distinguished by the almost filiform leaves, glabrous pedicels, and fewer-flowered umbel and smaller flowers.

24. NERINE TRANSVAALENSIS L. Bolus, in F. Pl. S. Afr. 18: sub pl. 683, in obs.; sub pl. 681. 1928, in obs.; et in adnot. 1938.

Syn.—"Nerine frithii L. Bolus", Fl. Pl. S. Afr. 4: pl. 132. 1924, misidentified, non L. Bolus (1921); Plant Life 9: 164. 1953.

Bulb ovoid-globose, 2 cm. long, 1.7 cm. in diam. *Leaves* present with the flowers (synanthous), very often only 2, up to 15 cm. long, 1—1.5 mm. wide, subfiliform, channeled above. *Scape* up to 20 cm. long, terete. *Spathe-valves* oblong, long-attenuate, 2.5—3 cm. long; bracteoles thread-like, 1—1.5 cm. long. *Umbel* 5—7-flowered. *Pedicels* up to 3 cm. long. *Ovary* obovate; 2 ovules per locule. *Tepalsegs* spreading, at length recurved, linear, acute, with undulate margins, 1.5 cm. long, 4 mm. wide. *Stamens* declinate, filaments 3.5—6 mm. long, appendiculate at the base, forming a staminal cup, 3 mm. long, somewhat lacerated above, with two lobes usually much exceeding the others; anthers 4 mm. long. *Capsule* globose, 8 mm. in diam.

Range.—R. S. Afr.: Transvaal.

Notes.—According to L. Bolus(1938), although *N. transvaalensis* is closely allied to *N. frithii,* the former is sufficiently different to rank as a distinct species because of its narrower tepalsegs, longer and more slender filaments, and the differently shaped stamen-appendages.

25. Nerine hesseoides L. Bolus, in Fl. Pl. S. Afr. 18: pl. 683. 1938; Dyer, Herbertia 15: 14, pl. 315, fig. 2. 1948.

Plant glabrous, 17—25 cm. tall. *Bulb* ovate, up to 3 cm. long, 1.7 cm. in diam., continued into a neck, tunics thin, papery. *Leaves* 2—7, present with the flowers (synanthous), linear, flat or slightly sulcate above, rounded below, up to 18 cm. long, 1—1.5 mm. wide. *Scape* terete, up to 25 cm. long, scarcely 2 mm. in diam. *Spathe-valves* up to 2.5 cm. long. *Umbel* 6—14-flowered, centripetal. *Pedicels* ascending or erect, 2—3 cm. long. *Tepalsegs* regularly placed as in the genus *Hessea,* linear, widened upwards, broadest near the middle, obtuse, margins conspicuously undulate in the lower part, usually up to 1 cm. long, up to 3.5 mm. wide. *Stamen-filaments* at first decurved, then erect, finally almost regularly disposed in the flower, unequal in length, 4—5.5 mm. long, appendiculate at the base, the appendages almost free to the base, somewhat spreading upwards, narrow, acuminate, usually entire, up to 2 mm. long; anthers before dehiscence 1—2 mm. long, pollen whitish. *Style* at first decurved, finally curved upwards; stigma minutely lobed. *Ovary* at first acutely angled, 1.5—2 mm. long, 1.5 mm. in diam. *Capsule* globose, 6 mm. in diam.

Range.—R. S. Afr.; Griqualand West; Hay Division, Rocklands.

Notes.—According to Bolus(1938), there are four allied species, occurring in the north . . . *N. rehmannii, N. transvaalensis, N. frithii* and *N. hesseoides.* They are all glabrous and have in common slender synanthous leaves, flowers which rank among the smallest in the genus, and tepalsegs distinctly broadest near the middle, with margins closely and conspicuously undulate in the lower part, and obscurely so upwards. *N. rehmannii* is distinguishable by its white perigone and non-appendiculate filaments; *N. transvaalensis* has narrow tepalsegs and longer and more slender filaments than *frithii* and *hesseoides,* and finally, *N. hesseoides* differs from *N. frithii* in its smaller flowers, with the perigone actinomorphic throughout the entire life of the flower, and entire stamen-appendages which are separate from one another almost to the base.

26. Nerine gaberonensis C. E. B. Bremekamp & A. A. Obermyer, in Ann. Transvaal Mus. 16: 409. 1935; Plant Life 9: 75. 1953.

Bulb globose, 1.5—2 cm. in diam., continued into a cylindric neck 2.5—3 cm. long; tunics gray. *Leaves* filiform, glabrous, up to 10 cm. long, 1 mm. in diam. *Scape* terete, glabrous, about 15 cm. long. *Spathe-valves* (triangular), acute, 1.5 cm. long, 3 mm. wide. *Umbel* 14—15-flowered, centripetal; perigone wine-red, 2 cm. long. *Pedicels* terete, glabrous, 1.5—2.5 cm. long. *Ovary* globose, glabrous, 2 mm. in diam., 1 ovule per locule. *Tepaltube* 3 mm. long. *Tepalsegs* linear, or linear-oblanceolate, 3-nerved, obtuse, undulate, 1.7 cm. long, 2 mm. wide. *Stamens* inserted in the throat of the tepaltube, shortly connate at the

base, in two series, the 3 longer 1.7 cm. long, the 3 shorter 1.4 cm. long; anthers 3 mm. long, oblong, emarginate at the apex and base, dorsifixed. *Style* filiform, 2.2. cm. long; stigma obscurely tricuspidate. *Capsule* deeply 3-lobed, membranous.

Range.—Botswana, Gaberones.

Notes.—According to the authors of this species, *N. gaberonensis* is closely related to *N. rehmannii,* but it is distinguished by the short tepaltube, the dark wine-colored and somewhat larger flowers and the gray bulb tunics. The spongy character of the bulb-neck protects the young shoot in the daytime against the excessive temperatures of the surface layers of the soil.

First collected by G. van Son, March, 1930.

27. Nerine pancratioides Bak., in Gard. Chron. ii(1891)576; Fl. Cap. 6(2) : 213—214. 1896; O'Brien, in Flora and Sylva 3 : 122. 1905.

Bulb unknown. *Leaves* above 30 cm. long, bright green, subterete in the lower part, nearly flat towards the apex, 2 mm. in diam. *Scape* robust, terete, up to 60 cm. long. *Spathe-valves* lanceolate, 2.5 cm. long. *Umbel* 10—20-flowered, centripetal; perigone pure white, 2—2.5 cm. long. *Pedicels* 2.5—3.8 cm. long, densely pubescent. *Tepaltube* short. *Tepalsegs* oblanceolate, 4 mm. wide, not crisped. Stamens less than half as long as the tepalsegs. Stamens declinate; filaments filiform, alternating with large, square bifid scales; anthers small, black, oblong. *Style* very short.

Range.—R. S. Afr.: Natal, in a ravine on a hill near Greytown, alt. 1,220—1,524 m.; and Weenen County at Waterfall No. 7, alt. 1,524—1,828 m.

Notes.—Living material is needed for study.

28. Nerine appendiculata Bak., Gard. Chron. ii(1894)336; Fl. Cap. 6(2) : 213. 1896; van Druten, Fl. Pl. S. Afr. 31 : 1211. 1956.

Bulb ovoid, 2.5 cm. long, 2 cm. in diam. *Leaves* 1—3, produced with the flowers, or occasionally absent, linear, deeply channeled, up to 45 cm. long, 2.5—5 mm. wide. *Scape* glabrous, terete, slightly twisted, up to 80 cm. long. *Spathe-valves* 2, lanceolate, membranous, reddish, 3.5 cm. long. *Umbel* 10—20-flowered, centripetal. *Pedicels* 3.5—5 cm. long, tinged with reddish-brown, very finely and densely pubescent with cellular hairs; bracteoles filiform, up to 3 cm. long. *Ovary* 3-angled, 6.4 mm. in diam., pubescent; ovules 2—4 per locule. *Tepaltube* very short. *Tepalsegs* oblanceolate-linear, 2.5—3 cm. long, 3—5 mm. wide, upper half crisped, minute pubescence at the base which sometimes extends along the keel a short distance; the color varying from pale to deep rose (red according to Baker), with deeper mid-vein. *Stamen-filaments* pale to deep rose in color; three 1.5—2 cm. long, three a little shorter, appendages conspicuous, white, up to 1 cm. long, with 2—4 linear teeth; anthers black, 3.5 mm. long. *Style* 8—17 mm. long; stigma minutely 3-lobed.

Range,—R. S. Afr.: Natal.

Notes.—First described by Baker from a cultivated specimen sent to him by Jas. O'Brien in 1894; the more detailed description by van Druten supercedes the sketchy one by Baker.

29. Nerine masonorum L. Bolus, in S. Afr. Gard. 20: 148, fig. A.

1930; Barker, in Fl. Pl. S. Afr. 15: pl. 570. 1935.

Bulb oblong-globose, 1.5 cm. in diam., continued into a short neck, tunics membranous, dark brown. *Leaves* 4—5, appearing with the flowers (synanthous), suberect or spreading, filiform, concave above, convex below, bright green, smooth, up to 20 cm. long, 1.5 mm. wide. *Scape* terete, minutely pubescent with pluricelled hairs, up to 22 cm. long, 2.5 mm. in diam. *Spathe-valves* lanceolate, acute, tinged with purplish-brown, 2.5 cm. long. *Umbel* 4—12 flowered. *Pedicels* pubescent, 1.2—3 cm. long. *Tepalsegs* up to 1.3 cm. long, 3 mm. wide, rose-pink with a darker central stripe, undulate, finally usually all recurved towards the back of the flower and away from the stamens. *Stamens* declinate, with two small lanceolate appendages attached to the base of the filaments, up to 7 mm. long. *Ovary* sub-acutely angled, glabrous, 2.5 mm. in diam.; style declinate, shorter than the stamens, even in the old flowers; stigma minutely 3-lobed, capitate.

Range.—R. S. Afr.: Cape Province, Transkei, near Mquanduli.

Notes.—According to Barker, the two nearest allies of *N. masonorum* are *N. parviflora* and *N. frithii*. It has the slender synanthous leaves common to both allies, and the glandular pubescence of *N. filifolia*. But the small flowers with the final position of the tepalsegs resulting in a perigone flattened in the center, the short stamens appendiculate at the base and throughout exceeding the style in length, are all features shared with *N. frithii*, which differs, however, in being quite glabrous, with more spreading and stiffer pedicels, tepalsegs definitely widest just above the middle, and stamen-appendages much larger and incised.

30. Nerine gracilis R. A. Dyer, in Fl. Pl. S. Afr. 17: pl. 679. 1937; Herbertia 15: 13—14, pl. 315, fig. 1. 1946(1948).

Bulb elliptic-globose, 1.5—2 cm. in diam., continued into a neck 3.5—5 cm. long, tunics membranous. *Leaves* 3—5, contemporary with the flowers (synanthous), up to 30 cm. long, 1.5—2 mm. thick, filiform, subterete, concave or shallowly canaliculate above, very minutely papillate. *Scape* terete, slender, shorter than the leaves, up to 20 cm. long, 2—2.5 mm. thick, very minutely papillate and occasionally with a few scattered hairs. *Spathe-valves* narrowly lanceolate-acuminate, about 2 cm. long. *Umbel* 8—10-flowered, centripetal, the anthers of the flowers maturing before the pistil (protrandrous). *Pedicels* 4—7 cm. long, 1 mm. in diam., terete. *Ovary* triangular. *Tepalsegs* about 1 cm. long, setepalsegs about 4.5 mm. wide, petepalsegs slightly broader, elliptic-oblong, rose-pink (Ridgway XII), green keeled above the middle, margins undulate, minutely cuspidate at the apex. *Stamen-filaments* appendiculate behind the base with oblong deeply 2—3-lobed rarely fimbriate process, at first suberect, later decurved after dehiscing of anthers; anthers oblong, 2.5 cm. long the 3 opposite the petepalsegs maturing before the others. *Style* at first decurved, later erect; stigma minutely trilobed. *Capsule* obtusely trilobed or subglobose, with 1—2 subglobose seeds per locule.

Range.—R. S. Afr.: Transvaal, between Bethal and Ermelo, in grassland, flowering in February (Southern Hemisphere).

Notes.—According to Dyer(1937), *N. gracilis* differs from *N. frithii*

in the smaller, more regularly shaped flowers, and in the short but comparatively broad tepalsegs. It is generally glabrous, but may have a few scattered, transparent hairs, and when fresh is very minutely papillose on both leaves and scape; the papillae, however, disappear in drying.

HYBRID NERINES

William Herbert was among the first to work in this field. As shown in Table 3, Herbert recognized seven *Nerine* hybrids, but according to Baker (1896), these had all disappeared by the 1890's. Baker (1896) gave a list of 14 hybrids which were current at that time as shown in Table 3, but these apparently did not include all of the hybrids grown in his day. However, *Nerine* hybrids not included in his list were few in number.

Table 3. **Nerine** hybrids reported by Herbert (1837) and Baker (1896).

I. HYBRIDS REPORTED BY HERBERT (Amaryll. 1837)

1a. Umbel centripetal:

1. x **mitchamiae** Herb. (curvifolia x undulata); Syn.—**versicolor** Herb.
2. x **haylockii** Herb. (curvifolia x undulata)
3. (pulchella x undulata)

1b. Umbel centrifugal:

4. x **spofforthiae** Herb. (venusta x undulata)

1c. Type of umbel undetermined:

5. (pulchella x humilis)
6. (humilis x undulata)
7. (curvifolia x venusta)

II. NERINE HYBRIDS LISTED BY BAKER (Fl. Cap. 1896)

1. x **amabilis** (pudica x humilis)
2. x **camii** (curvifolia x undulata)
3. x **atrosanguinea** (plantii x flexuosa)
4. x **cinnabarina** (fothergillii x flexuosa)
5. x **o'brienii** (pudica x plantii)
6. x **carminata** (pudica x plantii)
7. x **caerulea** (pudica x plantii)
8. x **erubescens** (flexuosa x undulata)
9. x **elagans** (flexuosa x rosea)
10. x **meadowbankii** (sarniensis x fothergillii)
11. x **mansellii** O'Brien (flexuosa x fothergillii)
12. x **roseocrispa** Cam (undulata x flexuosa)
13. x **excellens** T. Moore, in Florist 1887, pl. 567 (flexuosa x humilis)
14. x **stricklandii** O'Brien, Gard. Chron. xvi (1894)690 (curvifolia x pudica)

Since 1896, no attempt was made to list hybrid nerines until the American Amaryllis Society (now affiliated with the American Plant Life Society), was organized in 1934, when all named amaryllid clones, including *Nerine* hybrids, were again recorded or registered.

The registration activity of the American Plant Life Society was recognized in 1962, when at the XVIth International Horticultural Congress, held at Brussels in August-September, 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* (see Plant Life 1963, page 63).

Emma D. Menninger, Registrar for Nerine Clones, prepared for the American Plant Life Society, a "Catalog of Hybrid Nerine Clones, 1882-1958" which was published in Plant Life 16: 63—74. 1960. Annual supplements have been published in succeeding volumes. In 1966 a revised registration form, worked out by Mrs. Emma D. Menninger, was adopted. The number of named hybrid *Nerine* clones is more than 350.

A comprehensive list of chromosome numbers of *Nerine* hybrids was published by E. K. Janaki Ammal and Margery Bridgwater in the Journal of the Royal Horticultural Society for October, 1951 to which the reader is referred.

Recently, The Nerine Society was organized in England with C. A. Norris, Clent House, Clent, Worcestershire, Great Britain as President and Editor. The first bulletin was published in 1966.

Thus, the Nerines are at long last receiving the attention that they deserve.

BREEDING FOR SIMPLIFIED NERINE CULTURE

The popularization of hybrid Nerines has been retarded by difficulties experienced in mastering cultural problems. The writer has experimented in this area, and limited success has been achieved at least in one direction. This concerns evergreen hybrids which can be grown at least in southern California under ordinary garden and pot culture without resting the bulbs. The clones obtained so far are sterile, but in a few cases some pollen is produced, and there is the possibility that some fertile hybrids may be obtained in the future. The hybrids are all quite beautiful ornamental plants.

Nerine x **traubianthe** Moldk.

(In Plant Life 23: 61. 1967.)

Since various *Nerine* species grow under different climatic conditions, the hybrids developed from them respond best to the culture similar to that needed by one or the other of the parents. The problem is to choose the right parents.

In order to simplify cultural requirements, the writer selected the evergreen *Nerine filifolia* (seed parent) and crossed it with such hybrid clones as 'Rosalba', 'Inchmery Kate', etc. This has given *evergreen, free-flowering* progeny intermediate between the parents, having linear leaves, and very long scapes due to hybrid vigor, and which can be treated as ordinary pot plants (grown in *plastic pots*) that are watered throughout the year. They invariably bloom in September through early November under this neglectful culture. When he has forgotten that they are around, they will surprise the gardener by the profuse flowering. Some of these clones (such as *N. filifolia* x 'Rosalba') increase rapidly by the splitting of the bulbs vertically; others (such as *N. filifolia* x 'Inchmery Kate', with thicker scapes) will have to be *cut into quarters vertically* after flowering and replanted in order to obtain the needed vegetative increase.

At first thought, the relatively long scapes might appear to be a disadvantage. However, when *several bulbs* are grown in a pot, the scapes are a little shorter; and as cut flowers the long scapes are an advantage since the florist or flower arranger may cut them to any desired length.

This series of hybrids, included under *Nerine* x *traubianthe,* is recommended to the amateur and the florist.

Other hybrid combinations, using different parents of easy culture, with the objective of simplifying culture have also been made, and the results will be reported later.