PLANT LIFE

AMARYLLIS
YEAR BOOK

1965

Amaryllis cybister

PLANT LIFE

VOLUME 21

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EDITED BY
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The cover design by Penrith B. Goff is based on *Amaryllis cybister* as grown at the Los Angeles State and County Arboretum, Arcadia, Calif.

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GENERAL AMARYLLID EDITION

3. GENETICS AND BREEDING

4. AMARYLLIS CULTURE

PLANT LIFE, VOLUME 21, NOS. 2—4, INC. 1965
GENERAL EDITION

ILLUSTRATIONS

CORRIGENDA

THE GENERA OF AMARLLIDACEAE, BY HAMILTON P. TRAUB PUBL. 1963

See Plant Life 20: p. v. 1964 for earlier corrigenda.

Page 27, in lower part of page, between "INFRAFAMILY" and "PANCRATIOIDINAE" change "III" to "II".

Page 31, under "1.MILULA", 3rd line change "11" to "161".

Page 76, under "Subgenus 2. ELISENA", 1st line, change "19: 77. 1963" to "21:96. 1965."

under "Subgenus 3. PSEUDOSTENOMESSON", 2nd line, change "78. 1963" to "21:96. 1965."

under "Subgenus 4. ISMENE", 1st and 2nd lines, change "19: 88. 1963" to "21:96. 1965."

under "93. EURYCLES", 2nd line, change "Herb." to "Bak."

CORRIGENDA

LINEAGICS, BY HAMILTON P. TRAUB

Published Aug. 6, 1964

CORRIGENDA

Page 18, second line, change "332" to "322".
Page 19, under 1865, first line, change "ingetitance" to "inheritance".
Page 22, under "1963—(d)", change "Maryr" to "Mayr".
Page 27, Table 1, at end of 2nd line, delete "the".
Table 1, II, change "cretaceous" to "cetaceous".
Page 33, 6th line from top, change "1662" to "1622".
Page 34, second to last paragraph, beginning with "Microorganisms, etc.", first line, change "1660" to "1680".
Page 37, in section heading "(B)", change "ANDANSONIAN" to "ADANSONIAN".
Page 50, Table 10, 4th line of caption, change "Thompson" to "Thomson".
Page 53, third paragraph, 9th line, after "acceptable" add "group".
Page 61, end of line 16 and beginning of line 17, from bottom, change "func/tion" to "functions".
Page 62, Figure 2, caption, third line, change "meterology" to meteorology".
Page 69, fifth paragraph, 6th line, change "(age)" to "(eage)".
Page 85, under "(a)" REALITY OF, AND TERMINOLOGY FOR, HIERARCHIC LINEAGES OR PHYLONS", change "above" to "based on".
Page 91, under "PARALLELISM", third paragraph, 3rd line, change "common" to "related".
Page 92, 5th line from bottom, change *"venleestenii* to *"vanleestenii"*.
Page 96, third line from bottom, change "includs" to "includes".
Page 99, Table 15, align "5a" with "(b) impediolinon"; change second "5a" to "5b", and align it with "(c) desinolinon".
Page 102, second line from bottom, change "12" to "13".
Page 103, first paragraph, 11th line, change "inclusive" to "inconclusive".
Page 108, under section "(b)", 2nd line, after "often", insert "of".
Page 112, under "(C) FROM AUTOTROPHY TO SECONDARY HETEROTROPHY", second paragraph, after fifth line, insert missing line, "autotrophs, known as *obligate autotrophs,* obtain their nutrition".
Page 117, paragraph below Table 21, second line, change *"Spirochetebacae"* to *"Spirochetobacae"*. In the following paragraph, 6th line, between "from" and "standpoint", insert "the".
Page 121, 5th line from bottom, between "with" and "state", insert "the".
Page 123, 6th line from top, after "pointed" insert "out", and in fourth paragraph, center, 6th line down, at end of line add "(b)".

Page 126, under "THE HIERARCHIC TAXA", end of first line, change "were" to "was". And line 11 from bottom, insert comma "," between *"order"* and *"class"*.

Page 127, 2nd line from top, delete "that". And 21st line from top, change "of" to "or".

Page 129, under section "D", top, 3rd paragraph, 2nd line, change "are" to "is".

Page 132, last line of first paragraph, after "Andrews et al" insert "Virol".

Page 133, middle of page, the paragraph beginning with "Physum 8. *Myxobacae",* first line, change "red-shaped" to "rod-shaped".

Page 138, under SUBKINGDOM 3. *ANIMALIA,* 6th line, change "subkingdoms" to "infrakingdoms".

Page 142, under Phylum 5. *CHLOROBACAE,* Family 1. Chlorobiaceae, change "(*Chloronium*)" to "(*Chlorobium*)".

Under Phylum 6. *CHROMOBACAE,* Class 2, Order 1, Family 1, change "(*Phodopseudomonas*)" to "(*Rhodopseudomonas*)".

Page 150, under "(b) CONVERSION FROM LINES, etc.", 1st column, 2nd line from bottom, change "30.45" to "30.48".

Page 155, after entry, "Just, T., etc.", insert entry, "Keith, The Theory of Human Evolution. 1949."

Page 157, after entry, "Rothmaler, W. etc.", insert the entry, "Royal Society, The, of London, Notes and Records, 14: No. 1. 1959."

ADDENDA TO "TRAUB, LINEAGICS" (1964)

THE LINEAGICIST IS A SCIENTIST, NOT A KEEPER

Due to space limitations in Chapter 3, it was not possible to consider the matter suggested by the above title in "Lineagics" (Traub, 1964). It does appear now that this subject should not be put off until the publication of the complete text later, and this is a sufficient reason for this brief addenda note.

Unfortunately, the role of the lineagicist has been misunderstood all these hundreds of years, and in our time he has often been given the title "curator" (sometimes even "keeper"). "Curator" signifies "a person having the care of anything, an overseer, keeper, or custodian of a museum". In the present case it refers to the housing and care of preserved specimens of organisms fossil and recent, and/or parts thereof. The care of such specimens can be entrusted to anyone with an adequate *technical* training, but the role of the lineagicist transcends such a technical role (see Traub, 1964). He should be a full-fledged scientist who works in the field of lineagics. He makes use of preserved specimens of organisms, and a wide variety of other tools, and his role should never be confused with that of a mere "keeper". Lineagicists therefore have the right to receive titles commensurate with the important scientific function that they perform. Such titles could consist of the following:

Director, of the section of lineagics, in the division of biology
Chief Lineagicist, or *Professor of Lineagics**
Lineagicist, or *Associate Professor of Lineagics**
Assistant Lineagicist, or *Instructor in Lineagics**

* When research and teaching functions are combined.

The title of "curator" should be reserved for those who have adequate technical training in (a) the making of slide preparations of, and the culturing of, procaryotes, microscopic plants, hetertroplants (fungi) and animals; and (b) preserving microscopic plants, heteroplant (fungi) and animal specimens, and (c) the care of such preparations and specimens. Such workers, who have not received a comprehensive scientific training could make a career in this field, or they may work on a temporary basis while pursuing graduate work to prepare themselves to join the ranks of the lineagicists. Appropriate titles in this field could include:

Chief Curator, in the section of lineagics, in the division of biology
Curator
Associate Curator
Assistant Curator

LITERATURE CITED

Traub, Hamilton P. Lineagics. 1964.

ALTERNATE FOR "PRIMARY HETEROTROPH" HYPOTHESIS

In Traub (Lineagics. 1964), Chapter 4, under "(a) Hypotheses on the Coming into Being of Organisms" (pages 72-73), the alternate hypothesis of Needham ("The Origination of Life", in Quart. Rev. Biol. 34: 189-209. 1959), should be considered.

Needham (1959) has recently subjected the 'primary heterotroph' hypothesis, which he characterizes as an 'ametabolic view', to criticism. He proceeds on the assumption that the origination of life was "a spontaneous, natural sequence of 'most probable' events. Survival by natural selection is a particular example of a most probable event, and therefore operated at all stages of the origination. True evolutionary novelties have been most probable responses to new environmental conditions, and may have become rarer as the rate of change of the causal conditions decreased." He explains that "it is more probable that all significant materials and actions were acquired early, panglobally and in quantity, and that subsequent evolution was restricted (a) to most probable innovations . . . . and (b) to less fundamental changes, depending in part on changes in the biological environment itself. In general there has been biological simplification during evolution, rather than the converse." According to Needham (1959), an 'ametabolic' view such as that proposed by Oparin and others "leads to the questionable conclusions that there were originally no autotrophs, no photoactivated endergonic syntheses, no need for solar energy, and no decay, that the initial heterotrophs could feed indefinitely on a limited store of pristine compounds, and that generally reducing conditions prevailed on the early earth. This view fails to recognize that the general level of oxidation

is less important than the maintenance of a potential difference in free energy between organism and environment. It also tends to overlook the relative rapidity of the circulation of organic materials through living systems, and the evolutionary implications of this.''

It should also be added that apparently there is no evidence for evolution from heterotrophy to autotrophy and this is in harmony with the principle of irreversibility. Once a heterotroph always a heterotroph.

LITERATURE CITED

Oparin, A. I. The Origin of Life. Dover, N. Y. 1953. See also Oparin, A. I. The Chemical Origin of Life. Academic Press. N. Y. 1964.

Needham, A. E. The Origination of Life, in Quart. Rev. Biol. 34: 189-209. 1959.

Traub, Hamilton P. Lineagics. 1964.

PLANT LIFE LIBRARY—continued from page 162.

ONIONS AND THEIR ALLIES, by H. A. Jones and L. K. Mann. Leonard Hill (Publ.), London; Interscience Publ., New York; and John Wiley & Sons, 605 3rd Av., New York, N. Y. 10016. 1963. Pp. 286. Illus. $12.50. This is the latest item in the important World Crops Books series. It is authored by two outstanding authorities in the field covered. The book is adequately illustrated, and will be welcomed not only by scientists and research workers but also by others concerned with the production of onions and allied crops. The topics covered include world onion production; history; grouping and identification; morphology and development; food value and chemical composition; genetics and cytology; breeding; adaptation of cultivars; growing and handling onion sets, transplants and seedlings; harvesting and handling; weed, disease and pest control; onion products; garlic and other onion allies. Highly recommended.

BOTANY—AN INTRODUCTION TO PLANT SCIENCE, 3rd Edition, by W. W. Robbins, T. E. Weier and C. R. Stocking. John Wiley & Sons, 605 3rd Av., New York, N. Y. 10016. 1964. Pp. 614. Illus. $8.95. This third edition of an outstanding first course in botany will be welcomed. Without decreasing the emphasis on the plant as a whole, and its relation to its environment, the authors have added the new dimension of subcellular form and function made possible by recent developments in biology. This clearly written, adequately illustrated text is highly recommended.

ADVANCES IN ENZYMOLOGY AND RELATED SUBJECTS OF BIOCHEMISTRY, Vol. 26, edited by F. F. Nord. Interscience Publ., a division of John Wiley & Sons, 605 3rd Av., New York, N. Y. 10016, 1964. Pp. 453. Illus. $12.50. This volume includes contributions by fourteen outstanding authorities. The topics covered include phytochrome and its control of growth and development; sugar nucleotides and the synthesis of carbohydrates; formation of secondary and tertiary structure enzymes; Die Wasserstoffuebertragung mit Pyridinnucleotiden; bagshaped macromolecules; Fortschritte auf dem Vitamin B-12—Gebiet; and the metabolism of propionic acid. Highly recommended.

EXPERIMENTAL BIOLOGY, by R. W. Van Norman, Prentice-Hall, Englewood Cliffs, N. J. 1963. Pp. 243. Illus. This is an introduction to methods, techniques and instruments used in experimental research in biology, and is particularly useful to the beginning student. The introductory chapters are concerned with science and research in general, and biological science in particular. The main body of the text is devoted to the methods, techniques and instruments commonly used in experimental biology. The concluding chapters are concerned with the design of experiments, the handling of experimental data; and the preparation of manuscripts. Highly recommended.

THE NATURAL GEOGRAPHY OF PLANTS, by H. A. Gleason and A. Cronquist. Columbia University Press, 2960 Broadway, New York, N. Y. 10027. 1964. Pp. 420. Illus. $10.00. This outstanding clearly written and easily readable text on plant geography will be welcomed by the specialist and the amateur. The first half is devoted to the factors involved in plant distribution, such as plant migration and "community life"; and the conditions on which they depend. The second half is concerned with the ten floristic provinces of the United States, and Canada, on the basis of common species and plant communities. The illustrations are outstanding and are worth the price of the entire book. Highly recommended.

FLORA EUROPAEA. Vol. 1. *Lycopodiaceae* to *Platanaceae*, edited by T. G. Tutin, V. H. Heywood, D. H. Valentine, S. N. Walters, and D. A. Webb. Cambridge University Press, 32 East 57th St., New York, N. Y. 10022. 1964. xxxiv + 464 pp. Illus. (maps). $16.00. This is an outstanding book, the first of a planned four volumes. The present project of an European Flora was first discussed by European lineagicists in 1954; this was followed in 1956 by a steering committee of nine. This committee in 1958 published a brief guide for contributors, and appointed an editor for each family with the objective of producing a concise and complete Flora in the shortest possible time. The editors, and all who contributed to the book, are to be congratulated on producing the first volume by 1964. The English Language was chosen because more lineagicists can communicate adequately in that language than any of the others. The families are arranged according to Engler and Diels as of 1936, but the Monocots follow the Dicots. The magnitude of the project can be judged from the fact that more than 40 committee members, advisors and consultants, and 51 contributors, have cooperated in producing this first volume.

After the introduction, there is a synopsis of the 79 families (to *Platanaceae*) included; keys to the major taxa of the families included in Volume One, and also to those which are to appear in the three volumes to follow; and explanatory notes on the text. Then follows the main text with descriptions of the families, genera, species, and subspecies. The appendices include keys to the abbreviations of authors, books and periodicals referred to in Volume One; a glossary of technical terms; vocabularium anglo-latinum; the index to families, genera, species and subspecies; and maps showing subdivisions of Europe.

This wonderful book cannot be praised too highly, and will be welcomed by all interested in plants. It is a handsome, easily readable volume which is highly recommended.

PLANT LIFE LIBRARY—continued on page 4.

PLANT LIFE, VOL. 21, NO. 1, January, 1965

AMARYLLIS YEAR BOOK 1965

Year Book of
The American Amaryllis Society
32nd Issue

GENERAL AMARYLLID EDITION

EDITED BY
HAMILTON P. TRAUB
HAROLD N. MOLDENKE

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

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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PREFACE

Again Prof. Goff has provided an outstanding 1965 cover design featuring *Amaryllis Calyptrata* as grown at the Los Angeles State and County Arboretum at Arcadia, Calif. This shows the extreme in the direction of the orchid-flowering *Amaryllis.* Next year the other extreme will be pictured on the cover, the regular-flowered *Amaryllis leopoldii* which has been rediscovered by Dr. Cardenas of Cochabamba, Bolivia.

This issue is dedicated to Robert Daly Goedert of Jacksonville, Florida, who received the 1965 William Herbert Medal in recognition of his outstanding contributions toward the advancement of *Amaryllis* culture. He is a commercial dealer in *Amaryllis,* and other amaryllids, of the highest stature. He stands for the highest quality in registered named *Amaryllis* clones, encourages the breeding of new kinds of hybrids by the introduction of new species even when these represent a financial loss to him. He has introduced two large quantity lots of seeds of the Blue Amaryllis, *Worsleya rayneri,* from Brasil, and a large number of lots of *Amaryllis* species collected for him in the wilds in South America. Some of these are bound to be of the same species, but species are often variable. It is worth while to have different lots of the same species in order to locate worth while varieties. The congratulations of all of the members go with the award of the HERBERT MEDAL to Mr. Goedert, who presents a charming autobiography in the present issue.

The 1965 AMARYLLIS YEAR BOOK represents a rich harvest. The rediscovery of *Amaryllis leopoldii,* already indicated, will make it memorable in the annals of amaryllid history. In addition Dr. Cardenas describes three other new *Amaryllis* species. Mr. Goedert contributes an extensive summary of the 1965 *Amaryllis* season. Mr. Buck writes about *Amaryllis cybister.* Mr. Boshoff-Mostert describes vegetative propagation of *Amaryllis* for the amateur, and the professional grower. Mr. Frank A. Turner, a 7th grader, describes his science project concerned with *Amaryllis* propagation. Mrs. McCown reports on hybrid *Amaryllis* for desert regions. Mr. Caldwell writes about the control of *Amaryllis* pests, and Mr. Campbell on leaf disease control. The 1964 regional *Amaryllis* Shows are briefly reviewed.

The other amaryllids are not neglected. Mr. Hannibal writes about the crinums and other amaryllids of Australia and the Pacific Islands; and Dr. Zorbach reports on outdoor *Crinum* culture in Maryland. Mr. Hoerl contributes notes on *Haemanthus katherinae.* Mrs. Herold and Mr. Cloudette report on seedling development in the Blue Amaryllis. Dr. Rueppel in Argentina writes about amaryllid culture in his country. Mr. Caldwell contributes further notes on *Lycoris* breeding. Drs. Smith & Flory present a paper on the chromosomes of *Tulbaghia;* and Prof. Wilsenach reports on the chromosomes of five South African amaryllids. Dr. Howard contributes articles on the Blue Western Star, *Androstephium caeruleum,* and the genus *Nothoscordum.* Mr. Buck writes about *Hymenocallis fragrans,* and Daylilies in 1964. Dr. Howard reviews

his collecting trip into Mexico and Guatemala. There are still other articles as shown in the table of contents.

Hamilton P. Traub
Harold N. Moldenke

November, 28. 1964,
La Jolla, California

PLANT LIFE LIBRARY—continued from page [x].

GENERIC NAMES OF ORCHIDS, by R. E. Schultes and A. S. Pease. Academic Press, 111 5th Av., New York, N. Y. 10003. 1963. Pp. 331. Illus. $12.00. This new book by two outstanding authorities on the origin and meaning of generic names of orchids will be welcomed by all who are interested in these plants. In the introduction the grouping of the orchids is considered on the historical basis; the importance of a stable nomenclature is emphasized, and the morphology and economic importance is discussed. The main part of the book consists of an adequately illustrated dictionary which explains the etymological history of the 1250 generic names of the *Orchidaceae;* the geographical distribution and tribal or subtribal grouping of the genera; and the place of first publication of the names. The scientific names of orchid generic hybrids are listed in the appendix. This book is indispensable to all who are interested in orchids. Highly recommended.

THE CHEMICAL ORIGIN OF LIFE, by A. I. Oparin. Trans. by Ann Synge. Chas. C. Thomas, Publ., 301-327 E. Lawrence Av., Springfield, Ill. 1964. Pp. 124. Illus. $6.75. Dr. Oparin is the pioneer in the field covered by this book, having published on this subject as early as 1924. His earlier text has gone through a number of revised editions. Now, 40 years later, he presents his ideas clearly and concisely in the light of recent developments in this field. He discusses three stages in the evolution of organic substances which preceded the appearance of life on earth—the initial stages in the evolution of carbon compounds; the formation of "primaeval broth"; and the origin of the earliest organisms. He then considers further evolution of the earliest organisms. This is required reading for all interested in biology. Highly recommended.

THE LIFE OF PLANTS, by E. J. H. Corner. World Publ. Co., 2231 W. 110th St., Cleveland 2, Ohio. 1964. Pp. 315. Illus. $12.50. This gifted author is to be congratulated in presenting a refreshing new book on the bioevolutionary course for plants and fungi. He traces their development from free cells in the ocean; to the attached vegetation of the sea; to a partial migration to the shore; and finally to the forest, grassland and desert vegetation. Such a charming and unconventional book could not be used as a main text in phytology and mycology, but *should be designated as required reading* for students to supplement the text for the regular biology course. Highly recommended to all others who are interested in plants and fungi.

PLANTS IN PERSPECTIVE; A LABORATORY MANUAL OF MODERN BIOLOGY, by E. H. Newcomb, G. C. Gerloff, and W. F. Whittingham. W. H. Freeman & Co., 660 Market St., San Francisco 4, Calif. 1964. Pp. 218. Illus. $3.75. The objective of the authors in this introductory course in phytology is to utilize recent advances in biology in order to obtain a more unified treatment of the subject, including the basic properties and principles relating to plant life, and with emphasis on experimentation. The topics covered are adaptability of life; some basic laboratory tools; properties of living substance; reproduction and inheritance of variation; growth, differentiation and morphogenesis; factors in growth and development; and bioevolution. Highly recommended.

PLANT LIFE LIBRARY—continued on page 38.

Dedicated to
Robert Daly Goedert

Herbert Medalist—Robert Daly Goedert

ROBERT DALY GOEDERT

An Autobiography

I can't remember when I was not interested in flowers. Of course there must have been some short period in my early life before they began to fascinate me. I do remember as a small boy gathering wild flowers that grew in abundance in the woods near my home. My favorite wild flowers were the violet and sweet bay (swamp magnolia). I also remember picking great armfuls of native *Zephyranthes atamasco* which we as children called "Easter Lilies."

The first seed I remember planting was a packet of pansies. This was when I was about 9 years old. I believe every seed came up and eventually I set out some hundred or so plants. They were a blotched variety and I thought they were about the most beautiful things in the world. I was very proud of them and have loved pansies ever since. After this first experience my interest in flowers has never waned.

My father loved flowers and as long as I was at home he purchased seeds and bulbs each year which I planted or helped to plant. Of course as I remember it, I did the work. The arrangement was one from which, I am sure, I got the greater enjoyment. I felt that each flower that bloomed was something I had created. I know my father encouraged me and is partly responsible for the fact that my interest in flowers has always been very strong.

I think my interest in flowers through the years had run a complete cycle until some eight years ago when I made *Amaryllis* my main interest. *Amaryllis* had always interested me. My father had a bed of the Mead strain hybrids he had collected by purchasing a few each spring when they were in flower. After the old home place was sold, some years back, I obtained permission to pollinate the *Amaryllis* that had been left. From these I raised several hundred very nice hybrids and flowered them for a number of years. Each year my interest in *Amaryllis* grew and I wanted to improve the collection. Finding few sources in the United States where the finer clones could be purchased, I started importing a few each year from Holland; first for myself and then for friends. Finally about 8 years ago I decided to try advertising and selling to others. While this experience has been interesting it has not been profitable for the problems of the *Amaryllis* bulb dealer are many and very trying.

I have accumulated a sizeable collection of *Amaryllis;* hybrids and species, and in future years hope to spend more time hybridizing new types.

On December 10, 1912, I was born in Nashville, Tennessee, where my father was working as a salesman for the East Tennessee Meat Packing Company. He had met my mother in Blue Ridge, Georgia where she was working as a bookkeeper, I was to return there some 20 years later to meet my wife. My father was born in Iowa and had come south

as a young man. My mother was born near Murphy, North Carolina in a small farming community called Peachtree.

I was the second son of six children, four boys and two girls. My older brother to whom I was very attached was drowned on a fishing trip when he was seventeen and I, only fifteen.

The first years of my life were spent between Nashville and Murphy, North Carolina, where my mother spent several months with her family each year. We moved from there to Jacksonville, Florida where my father had obtained a job. My father eventually became a partner in one of the largest meat packing plants in Florida and finally owner.

My home has been made in Jacksonville, Florida, except for brief periods, ever since. Once during the First World War we moved to Houston, Texas; then to Green Bay, Wisconsin, and then to St. Paul, Minnesota; finally returning to Jacksonville, all within a period of a few years.

I attended elementary and high school in Jacksonville going on to the University of Florida to study Chemical Engineering. During my youth I suffered greatly from headaches. They were particularly bad during my college days. This, together with the disappointments of the depression years in the 1930's when many college graduates were having to take common labor jobs, was possibly responsible for the fact that I dropped out of school after a year and a half. I worked for my father in the meat packing business for a short while. Then, wanting to get out on my own and prove my self, (always a strong urge within me) I went to North Carolina where my mother's people lived. An uncle got me a job as a brush cutter in a survey party doing land surveys for the United States Forest Service.

My love for the mountains and the beautiful flowers that grow in them made this a very pleasant time in my life. However, there was a vacancy in the office for a computer. Since mathematics is a very easy subject for me, I was able to obtain the job in the office at Blue Ridge, Georgia, where I did geodetic calculations and drafting.

That fall when school started, as in all small towns, several young out of town teachers came for the school year. I started dating one of the teachers, Miss Cathryn Highnote of Richland, Georgia. We were married in the spring of the next year.

I was soon transferred to the main office of the Chattahoochee National Forest in Gainesville, Georgia. That year, 1936, our first son was born. After about a year, the land purchasing program of the Forest Service was reduced and my work was terminated. I returned to Jacksonville, to work several months for my father.

In November 1937, I took a job with the Bureau of Public Roads doing Engineering work on the Natchez Trace Parkway. First I worked in the office in Jackson, Mississippi; then as inspector at Ridgeland and Kosciusko, Mississippi. Having a fondness for the outdoor life and particularly the mountains, which I dearly love, I returned to North Georgia when the Forest Service notified me they had an opening. When I was a small boy, my mother and we children spent several weeks each

summer at her family's farm in the mountains of North Carolina. I spent many hours wandering over the mountains picking flowers and berries. I fell in love with the mountains at an early age so it was a natural thing for me to return at the first chance.

However my return was to be for a very short time. The Second World War was brewing and many civilian departments of the U. S. Government were being curtailed. Funds ran out for the job I held so the Forest Service asked me to transfer to Raleigh, North Carolina. I found out that they were to lay off another man in order to make a place for me and therefore I declined the job and returned to Jacksonville where I again worked with my father doing plant maintenance and construction work. When the war did actually start, possibly wanting to do more for the war effort and attracted by the high salaries in the engineering field, I took a job with a company doing engineering work for the Army Engineers at Bases on the west coast of Florida. During 1942-43 I worked on the construction of a number of facilities from Panama City to Naples, Florida.

By this time we had three children, two daughters and one son. Being away from home over long periods of time proved very difficult so I quit my job and started looking for work where I could be with my family. In December of 1943, I went to work for the Engineering Division of the Public Works Department of the United States Naval Air Station, Jacksonville, Florida. At first I was a draftsman, then chief Civil Engineer and finally Director of the Engineering Division, a position I still hold.

When I returned to Jacksonville late in 1943 my father let me use some vacant lots he had to carry on my hobby and I settled down to pursue it with great determination. First I grew a lot of vegetables as well as numerous kinds of flowers. Each year I expanded my planting and each year I gave away great numbers of flowers. Eventually I started selling to the local florists.

My general interest in flowers began to turn to more specific interest. My father had always loved dahlias and during my childhood had almost every year planted several new clones. They are showy and very impressive and my interest in them grew. The vegetables I had grown gradually disappeared and many of the annuals. My dahlia collection grew until I had several hundred hybrid clones. I saved seeds each year and raised hundreds of seedlings, always saving a few of the best rootstocks. I maintained this large collection for several years and had some outstanding seedlings in rare colors. I kept my dahlia collection stored in bushel baskets in my garage in winter. One year early in the spring we had a sudden freeze and I lost practically my entire collection. My interest in them did continue for several years and I did have one fine clone introduced. This one is a small yellow miniature named 'Tropicana' which is still one of the better miniature yellows today.

Being discouraged after losing my dahlia collection my interest gradually turned to gladiolus. Beginning with a dozen or so of a few kinds my collection gradually grew until I had practically every named

clone then in commerce. I bought some acreage and seriously set about growing flowers for the local cut flower trade. After several years I had two acres under cultivation. About this time the Korean War started. The military had a rapid build up. I had to abandon my gladiolus in favor of my job and let several thousand dollars worth of bulbs grow up in weeds. During this time I worked 12 to 16 hours a day practically 7 days a week doing engineering for the Navy. I helped plan the Aircraft Carrier Base at Mayport and many airfields and other facilities in the north Florida area.

When the Korean War was over and things again returned to normal about all I had left in my flower garden were the *Amaryllis* I had planted from seed several years before. These flowered each year and I had selected some of the best to keep and disposed of the others. That winter I bought about $500 worth of the Dutch bulbs from Johnson Bros., in New Jersey. These impressed me very much so I crossed them with the Mead strain I had selected. When the crosses flowered they were very beautiful and my interest was spurred on. During this period I had started corresponding with many people seeking information regarding new and different clones and types of *Amaryllis*. Being one who always pursues a hobby in earnest I became seriously interested in this flower and I purchased bulbs from Holland, then India and other areas. At this time there were few United States companies that offered *Amaryllis* and those who did asked much higher prices than the Dutch firms. Partly as a public service since I had had such a hard time finding a source of named *Amaryllis*, and partly to work up something that I might turn into a livelihood when I retired, I decided to import and sell bulbs at the same price the Dutch companies offered them.

The first year I purchased possibly $1000 worth and sold them with little effort but as I remember it cost me between $500 and $1000 to sell them. The next year I increased the number I bought, and again sold them at what it cost me to buy them. Each year I have expanded my listing and usually at the end of the season I am poorer, more tired and possibly a little wiser. An *Amaryllis* bulb dealer's plight is one of frustration and hard work with little or no return for his effort except meeting and making some wonderful friends all over the world. Only the determination that I shall find a profitable method of marketing *Amaryllis* encourages me to continue. I have not found the solution but I do feel I have learned many things. I also feel *Amaryllis* have commercial possibilities and that they will become more popular in the future.

I have accumulated a very wonderful collection of *Amaryllis* hybrids and species. At present in the spring I am still busy with correspondence and orders and have little time to segregate my collection into types. I hope to arrange my work in the future so that I can give more attention to this and hybridizing.

I hope the effort I have made will be profitable to me in the satisfaction that I had some part in popularizing a wonderful plant, *Amaryllis*. I believe I have helped to make available better types and through

my advertising have introduced these bulbs to a number of flower lovers who had never seen these improved types.

I also hope that through my efforts in finding collectors in South America, I will have introduced new species and helped in verifying habitat information and in finding the extent and distribution of different species in the wild.

I am sure that at times my methods have been criticized. First to the scientific mind I may appear a little unorthodox. One might say I have introduced and sold species without proper identification and some of these species may be duplicates. To this I must answer that I believe I have obtained as many *Amaryllis* species from different habitats as almost anyone in the past few years. My customers often paid a considerable price for these; some bought as named species have turned out to be something else. I can assure you, in most cases, I have subsidized the cost of the species. I often have paid the collectors several times what I received for the bulbs. The important point is that these species have been introduced into the United States and almost all in sufficient quantities that they will play a part in future hybridizing. In addition, it should be explained that there is *variation within the species*, and collections from different localities will bring these to the *Amaryllis* breeder.

Last season, after listing *Worsleya rayneri* seed for several years, I had $50.00 in orders. I had been promised seed of this for several years. Each year my collector would promise to try to get the seed but each year he had failed to get anyone to collect them. Last season I told him to get the seed at my expense. This he did. It cost me several times the amount I got for the seed. This is the story of the *Amaryllis* dealer who desires to sell species from the wilds. I am very proud that I have been able to obtain between 25 and 50 different shipments of amaryllis species from South America. All have been numbered and I am sure they will all eventually be identified properly. I do obtain habitat data now on most shipments. At first it was a struggle just to get a collector interested but dollars overcame some of this problem. To obtain any large number of a single species one has to turn from the professional to the commercial collector. To instill in the commercial trader the fact that you want the truth about his collecting and habitat data one often has to accept bulbs at an exorbitant price. There is no bargaining for price in collecting species and one has to be a little at the mercy of the collector as far as expense is concerned if reliable information is expected.

I have tried in my dealings with the growers to establish the highest standards in grading to insure quality and that clones are labeled true to name. Improvement still needs to be made; however. I feel the American Amaryllis Society can be proud of the progress its officers have made in this area in the past few years, especially in getting new introductions registered. We must be tolerant and patient in our efforts to get all *Amaryllis* clones named and registered for one must

realize that the Dutch Growers control the market on these and only through their cooperation and honest desire to have the clones named will this be accomplished.

I predict that *Amaryllis* will increase in popularity in the future. But for this one must *not* only look to the collector and show enthusiast. We must develop new types for border planting, freer flowering types for the nursery and florist trade and above all satisfactory types for Mrs. Housewife who wants to flower a pot or so of these showy flowers each winter. Until we can cultivate her interest we will not have accomplished our goal. We must have small *Amaryllis,* dainty ones, many colors, and many forms to obtain the attention of Mrs. Housewife for she is the most important person in our lives today as well as being the one who spends most of the Nation's wealth.

CRINUMS AND OTHER AMARYLLIDS IN AUSTRALIA AND PACIFIC ISLES

L. S. Hannibal

A visit to the Plant Quarantine Station in San Francisco during 1943 when World War Two was at its peak was quite an experience as innumerable Crinums were awaiting clearances there to be sent on to friends or relatives of American Troops then in the Pacific Theater. Thus, when the writer took a three months trip down through Hawaii, Samoa, Fiji, New Zealand and Australia he had a fair inkling of the bulbs to be found along the way, but despite his anticipations there were several interesting surprises and discoveries.

The first turned up in Honolulu where we saw great quantities of what is locally accepted as *Crinum asiaticum,* but we soon noted that the scapes of all these plants were 40 or 50 inches in length and that numerous small offsets were tightly grouped about the rather commonly exposed aerial pseudo-stems. In our experiences *Crinum asiaticum* normally increases rather slowly by the parent bulb splitting into twin daughter bulbs, and scapes are seldom more than 36 inches or more in length. In contrast a number of these Hawaiian crinums were bearing flowers having beautiful wine purple shadings, and a portion of these latter had foliage showing various degrees of copper-red tones. A more than casual inquiry at the Bishop Museum disclosed that the crinums with the colored blossoms were known as "Queen Emma" *Crinum* or *Crinum amabile* from Sumatra, and that the white flowered plants were *C. asiaticum.* The latter part of this statement was accepted with cautious reservations as it was quite obvious that the entire Hawaiian *Crinum* population was identical in all morphological characters, except for the floral and foliage pigmentation factors, and normally color by itself does not justify a species separation. The possibility that a *Crinum amabile—asiaticum* hybrid population had developed in the early days and was the cause of this color behavior was duly considered, and may possibly be the explanation, but the bulk of the fea-

tures of all of the crinums are specifically those of *C. amabile*, including the white-flowered forms. And as we learned later similar white and pigmented bulbs are scattered throughout most of the islands of the Central and South Pacific. The Sydney and Adelaide botanical gardens had representative examples including the copper red foliage variant and these were marked as of Sumatra origin. The unfortunate feature is that we do not know if *C. amabile* shows these color variations in its native habitat, nor do we know the degree of variation within the species. However, evidence seems to point to a variable species.

In Florida *C. amabile* rarely sets seeds, but in Hawaii it sets great quantities. In the vicinity of Kaaawa (Pronounced Ka-a-a-wa) the plant is used as a roadside hedge along the highway, and innumerable escapes were seen in the fields. Rainfall in this particular area is about 150 inches yearly and temperatures range from 65 to 70°F. In most gardens it is rather apparent that the white-flowered or copper foliage forms have been selected for floral or foliage quality since many seedlings with inferior blossoms or color can be noted where the plants have run wild. It was noted that there was some pigmentation evident even in the white-flowered forms as some seed pods took on a purple hue while others did not, and it was also found that normally less than 10% of the copper red foliage forms reproduced true to color type when selfed. Many seedlings are of inferior color. All of the variations observed had foliage some five or six feet in height and normally the older bulbs had worked themselves out of the soil to such an extent that the long basal root stumps were supported on or above the soil by the massive root systems. Offsets at the base of the basal root stumps have to be removed periodically to prevent the parental bulbs from becoming a tangled mass of bulbs and foliage. A good example of both the pigment free, white-flowered bulbs and copper red foliage type are to be found in the Foster Gardens in Honolulu, or in the gardens at the Royal Hawaiian Hotel. Fig. 2 shows a typical bulb which has the offsets removed every six months.

Hymenocallis littoralis is also commonly found through Hawaii and the Pacific Isles. It too has become an escape in the vicinity of Haleiwa at the north end of Ohau. *Eucharis grandiflora* was noted in a few gardens and obviously quite a number of older *Amaryllis* species and trade type hybrids are scattered about. *Agapanthus africanus* was observed in some of the drier parts of the islands.

The stop at American Samoa was all too brief to do more than note some *C. amabile* growing near the shore in the vicinity of the airport. Fiji was far more profitable as two local *Crinum* forms had recently been planted in the gardens of the Mocombo Hotel at Nandi and one had a golden cast to the foliage. The color was accepted at first to be due to a phosphate deficiency, but we later learned that a golden foliage form of *C. pedunculatum* is known in the area, so the writer now regrets not having collected some seed. This bulb would be a welcome addition to frost free tropical gardens. The second form was quite similar to the first only that the foliage was a normal grass green. The

tures of all of the crinums are specifically those of *C. amabile*, including the white-flowered forms. And as we learned later similar white and pigmented bulbs are scattered throughout most of the islands of the Central and South Pacific. The Sydney and Adelaide botanical gardens had representative examples including the copper red foliage variant and these were marked as of Sumatra origin. The unfortunate feature is that we do not know if *C. amabile* shows these color variations in its native habitat, nor do we know the degree of variation within the species. However, evidence seems to point to a variable species.

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Fig. 2. The *Crinum amabile* cultivated in Hawaii, usually called *C. asiaticum* in error. Note the long aerial pseudo-stem extending down from the attachment area of the leaves. Offsets have to be removed often to prevent a large clump from forming. Photo by Mike Keesling.

bulbs had been planted rather deeply, thus the bulb shape and arrangement of the leaf base attachment could not be observed to determine if the plants were *C. amabile* or *C. pedunculatum* (*C. pedunculatum* has a large urn shaped bulb which pulls down into the mud. It is topped by a well sheathed neck which comes up to the surface of the ground. *Crinum amabile* has the basal root trunk, as described; otherwise the foliage is quite similar between the two species.)

Our first introduction to *C. pedunculatum* actually growing in the native state was along the Hunter River in N.S.W., Australia. This was some fifteen miles inland from New Castle. The bulbs were located in ditches and tidal flood areas over quite an extended area. Their foliage was three to four feet in length, relatively erect and quite heavy. A mature bulb may be some six or eight inches in diameter. They rarely produce offsets. Reproduction is essentially by seed which can be borne about by water. Hunter River is apparently the most southerly point for its natural range in New South Wales. A wider leaf form is described by John Weathers as native to North Queensland, and Redoute lists a Tahitian variation. William Morris has collected several related *Crinum* forms with narrower foliage from the Rockhampton and Pt. Mcquarrie areas. Thus this group needs further collection and study. The Hunter River form can endure light frosts, but a hard freeze will kill the bulb.

Crinum flaccidum is widely distributed throughout central New South Wales and northern South Australia. In general the bulbs grow in a heavy soil which becomes near boggy during the summer rainy season. They require a summer tropical storm to bring the bulbs into flowering. Winter frosts usually cut the foliage back but since the bulbs drive down 10 or 12 inches in heavy clay or 20 inches in sand they are quite untouched by harsh weather. Natural plantings were observed north of Quirindi, west of Coonamble and in several regions both west and east of Moree. In most instances *Calostemma luteum* was associated with *C. flaccidum* and was in flower at the same time. The latter bulbs drive down seven or eight inches into some very hard clay. Both *Calostemma* and *Crinum* are prolific seeders, but few seedling plants were observed. The wallabies often eat the foliage.

Crinum flaccidum was also observed growing along the bluffs above Mannum on the Murray River and in the Pichi-Richi pass on the west side of the Flinders Range. This last planting is quite unique as the blossoms are a deep creamy yellow. Rainfall normally occurs in South Australia in the winter, but both the Murray River and Pichi Richi beds were so located that the winter rains soaked into the soil between huge granite boulders in such a manner that the heavy clays were quite moist for the better part of the summer. These South Australian bulbs differ in some minor details in tepalseg and tepaltube length from the New South Wales forms mentioned above, but not with sufficient differences to justify a subspecific differentiation. The Quirindi form probably indicates the greatest degree of local group variation as some bulbs have rose-colored blossoms and others display relatively broad elliptical

tepalsegs. Selected clones have promise of being availabe for future breeding purposes, but the rank odor of the blossoms rather discourages the use of these plants in a small garden.

Several clones of Bidwell's variations of *Brunsvigia* x *parkeri* were in flower when we visited the Sydney Botanical Garden. This included Bradley's well known 'Hathor' along with an outstanding variable pink clone known as 'Superba'. The latter bulb is well worth introducing to California. Back in the 1935 issue of HERBERTIA George Cowlishaw reported that the first white flowered Bidwell hybrid had appeared about 1860 in a group of Bidwell's seedlings planted at the Macarthur estate in Camden, some twenty five miles south of Sydney. This well known estate still exists with much of the arboretum quite intact. It was here that Lady Parker as a girl crossed some bulbs, probably of Bidwell's stock, and produced *Brunsvigia* x *parkeri* forms. Presumably plant breeding was no secret to her as her grandfather, John Macarthur, who is well known in early Australian history, developed the Australian Merino Sheep, and her father James and uncle, William Macarthur, had spent years collecting and breeding a vast collection of agricultural and horticultural plants from Europe and America, and much of this work was carried out at Camden. We did not have the opportunity to examine the garden for any evidence of Bidwell's bulbs, but his hybrids are widely distributed throughout Sydney and Parramatta gardens. These can be distinguished by the typical radial umbel which contrasts quite distinctly with the compact phototropic umbel of *Brunsvigia rosea* and *B. major*. In fact very few pure *B. rosea* or *B. major* were to be seen and these were of a different wild form than the clones normally seen in California. It is quite probable that the heavy tropical type of summer rains in Sydney tend to rot species material unless it is grown in very well drained soil.

Adelaide had a vast number of *B.* x *parkeri* and *B. rosea* clones in many gardens, and as mentioned, the Adelaide Botanical Garden had an excellent collection of Crinum species, although most of the subtropical species were suffering from the dire want of more water.

Two forms of hybrid *Brunsvigia josephinae* turned up. The *gigas* form (See plate 14, Plant Life 1960, p.42) apparently develops its great size due to two extra chromosome fragments, whereas a second form grown in the Melbourne area and known to the cut flower trade as the 'Giant Nerine' has only 5% viable pollen. From the color of the blossoms and the uniformly short length of the pedicels this latter plant may be a cross with a Nerine. But irrespective of the missing parent, the plant does produce a beautiful umbel, and the bulbs must exist in the thousands in order to be able to supply the many florists in Sydney with such quantities of cut flowers in mid March.

No amaryllids are native to New Zealand and only a few *Crinum moorei, C. bulbispermum album* and *C.* x *powelli album* were to be seen. However, *Agapanthus* has been very popular; and during January *A. umbellatus, A. africanus* and *A. africanus albus* were to be noted in practically every yard. In a number of instances *Agapanthus*

have become escapes. At the Stevens 'Bastia Hill' gardens in Wanganui we saw several *Bomarea* species, including a spontaneous cross which occurred in the garden. This latter plant is one of the most vigorous bomareas ever observed and it is hoped that rootstock material or seeds can be obtanied in order to propagate the plant over here. I believe that Major Pam furnished Mr. Stevens with one of the parental plants.

One experience is well worth noting. If *Crinum amabile* is to be imported from Hawaii it is necessary to have the bulb cleared at the Agricultural Inspection Station in Honolulu. In order to avoid delay and a costly nematode examination of the roots it is only necessary to have the inspector cut off the roots and lower portion of the basal root trunk. The bulb, which contains the growing plate and trimmed foliage can then be classed as a 'Plant cutting'. The shortened basal stump will regenerate roots in sixty days or so by plunging the bulb into damp sand.

PLANT COLLECTING IN MEXICO AND GUATEMALA

T. M. Howard, *Texas*

For my third year in a row, I returned to Mexico in 1964 for a two weeks summer period of plant collecting and adventure. This time I also took a small peck at collecting in Guatemala as well. Some readers may recall that I first made such a trip in 1953 (See HERBERTIA 1954), but what they may not know is that I have been doing it almost ever since. I made notable collecting trips again in 1954, 1955, and 1957. There was a lull of five years until 1962 in which I devoted my efforts to establishing my livelihood as a small animal practitioner in the Veterinary Medical profession, during which time I managed to devote my gardening activities to plant breeding, with particular emphasis on *Zephyranthes.*

In 1962 I made several trips, driving as far as Oaxaca, in Southern Mexico. In 1963 I went much further, to both Yucatan and Chiapas, almost 150 miles from the Guatemala border. I was determined to explore new territories, as new highways became accessible. In this respect I have been more or less competing with Mr. and Mrs. Morris Clint in a friendly rivalry in searching for new plant material. Because of my five year period of idleness in the collecting of plants, I knew that I had a monumental lead to overcome and the task would not be an easy one. I had to explore in new territories and this meant traveling much greater distances. My last two trips have each covered an excess of 5000 miles.

For 1964 I chose to drive Westward to the Pacific coast and then turn Southward and drive down the coast to Tepic. From there I turned Eastward to Mexico City and then down to Acapulco. Returning Northward, I turned Eastward at Cuernavaca and then drove on down to Oaxaca and then Guatemala. I returned to Texas by way of Mexico City and the Central Highway. The trip took 16½ days,

along with two blown out tires, several flat tires, and the repair of a punctured oil pan. The last named was the result of driving for several hours in the rugged unpaved highways in Guatemala, after crossing the Mexican border. In spite of what you may have read, the Pan American highway, though now open, is a long way from being completed for comfortable vacationing. There are fine sections of paved highways in the Guatemala interior, but roads leading to its Mexican border can really rough up a car, especially during the rainy season.

I left San Antonio, Tex., on a Saturday afternoon, June 27, 1964, in company with Chris Abee, a teen-ager under my employment for several years. He was invaluable in helping me to keep records, and assisting in the digging and counting, as well as cleaning and labeling of the bulbs and plants that we dug. My trip was several weeks after an earlier trip in June made by Mr. and Mrs. Clint. She had informed me upon her return that she had been too early, since the rainy season had not yet really started, and that she felt I would be more successful because I was leaving at a later date. I must admit that I was pretty confident because past experiences had shown me that the first week in July was "prime time" for collecting in Mexico. Indeed the 4th of July Holiday season finds an abundance of rain in Mexico, and flowers in bloom everywhere.

The first afternoon and entire night were spent in entering Mexico and crossing the arid Coahuilan Desert. By early morning I was in the Eastern fringe of the State of Durango. I stopped to make my first plant check and dug a few bulbs of *Zephyranthes longifolia* with withered blooms and seed capsules. This proved to be the only *Zephyranthes* species that we found in the State of Durango, though there are said to be other related species from that state. We were seeking any and all bulbous material, and not confining ourselves to the Amaryllis family alone, and because of this, practically every stop was likely to have something of interest awaiting us. Nearly every region was to be represented by some member of *Oxalis, Milla, Sisyrinchium, Anthericum, Manfreda,* or a member of a bulbous irid allied to *Tigridia.* I shall refer to *Tigridia* and related genera as "Tigridioids", since many of them are still not completely classified.

Our second stop in Durango that morning yielded our first of endless *Anthericum* species of the Lily family to be found in Mexico and southward. This one had not yet come into flower, but it had narrow glaucous green leaves growing in a rosette, and the usual fleshy roots. Not a momentous collection to be sure, but I felt that our luck was warming along with the rising sun. A few miles Westward on Highway 40. I stopped again to dig a few *Oxalis,* some corms of the ubiquitous *Milla biflora,* and an equally widespread little yellow flowered *Sisyrinchium* species with tuberous roots. Both this *Milla* and *Sisyrinchium* or other related species within their respective genera were to be found nearly everywhere that we went in Mexico.

My first major collection for that morning occurred a little later that Sunday morning at Kilometer 860, when I spotted a really beau-

tiful white *Anthericum* species flowering alongside the highway. It was a showy plant of large proportions, with its broad glaucous leaves and sparkling white flowers on stems 1-3 feet high. We dug a number of these plants since it seemed that here might be an *Anthericum* with better-than-average garden value. Our biggest surprise came later that morning as we were about 30 miles East of the city of Durango. There at K 921 we found our first amaryllids, a species of *Hymenocallis* new to me. The recent rains had brought them out of their dormancy and they were in full bloom along the roadsides and adjacent fields in open areas in heavy black soil. I have not yet identified this *Hymenocallis* and it may well prove to be a new species. I had not expected to find any *Hymenocallis* until we reached the Pacific coastal areas, and this one took me completely unawares. I thought perhaps that it might be either *H. sonoriensis* or *H. horsmanii,* since I had seen neither, but if so, it was too far southeast for the former and too far northeast for the latter. I was to learn later that it was neither. This species had 4-6 shiny upright green leaves about an inch wide, of rather compact size, and showy white flowers of typical *Hymenocallis* form. The staminal cup was of good size with rounded "teeth" between the filaments, which made it appear that someone might have done the art work with a pair of scissors. It seemed to lean towards the "Mexicana Alliance" within the genus, but it lacked the dull glaucous leaves which typifies so many species of that group. There were about six flowers per scape, and casually, from a distance, it reminded me a good bit of our native *H. liriosme* from Texas and Louisiana. A closeup inspection proved that this was not the case. Like other members of the Mexicana Alliance, this species produces nearly all its leaves at one time, and remaining green until the end of the growing season, the rainy season. Though it grew in fairly low and flat terrain of the plateau, the ones that we saw for the next few miles could not be called swamp or river bottom plants, though they grew in fairly wet grounds which likely stayed wet for a time after rains. The altitude in which they grew was slightly over 6000 feet elevation. From a gardeners viewpoint, this Durango species is a very pleasing addition to the group. A compact plant slightly over a foot high, it has flowers that are average or better in size of staminal cup, and tidy habits. It differs from *H. sonoriensis* in having longer, wider leaves, and a much larger staminal cup. It is probably larger in other dimensions as well. It does not have the glaucous leaves of *H. horsmanii,* and its foliage is more upright, longer, and more swordshaped. The flowers are larger too, with a larger staminal cup.

After passing through the city of Durango, we climbed into pine forested mountain country and stopped several times to collect several small species of *Oxalis* growing in open areas. One was a plain little lavender-pink species, while another was a compact growing yellow species with thick carrot-like root. The latter reminded me of a little weedy oxalis with small yellow flowers that plagues my bulb beds, but this one had larger, handsomer blooms, and of course, those weird finger

like tuberous roots, orange brown in color. I decided that it had garden value and dug a few. I only hope that it minds its manners under cultivation.

I was still purring over my good fortune in the new *Hymenocallis* East of Durango, when I rounded a mountain curve and spotted another surprise growing above the road. Seeing a flash of red, my first thought was that I had found *Bravoa geminiflora,* a cousin of the common garden Tuberose, in flower. Instead, it proved to be a lovely *Sprekelia* growing in a little colony on this mountain side. We found several more in flower and dug a collection of them. Undoubtedly this was a form of *S. formosissima,* and the medium sized flowers were rather typical of others of that quite variable species that I have found in other areas of Mexico. What intrigued me was finding it in Durango. I had found it much farther south and east, but did not suspect that it grew this far west and north in Mexico. Such is the curse of ignorance. I was later to learn that it extends even farther north, into the state of Chihuahua. But for now, the finding of it was a thrill. Even Chris, who is no flower lover, was impressed with the classic orchid-like form of this red amaryllid.

Shortly after noon, continuing westward, I found my first bulb irid, the beautiful *Tigridia dugesii* flowering in a clearing in a wooded area high in the mountains. This little *Tigridia* is a member of a large, but little known group of species within the genus that grows over a large part of Mexico. Those accustomed only to the popular *Tigridia pavonia* garden hybrids will scarcely recognize these little wildlings as tigridias, as they are much smaller, shorter, and daintier. This species, *T. dugesii,* was later identified by my friend, Elwood Molseed, a student at the University of California who is doing graduate work on the Mexican tigridioids. Thanks to his efforts, a lot of mystery of this group is being cleared up. This particular species has bright golden-yellow flowers, speckled in the center with tiny dots, but in typical *Tigridia* fashion, on 6-10″ stems. After flowering, they grow vigorously for a while until they become dormant. *T. dugesii* and its close allies flower in advance of their foliage, producing but a leaf or two along with the blooms, and then more leaves later. I had been using my camera all morning, and I took full advantage of it in thoroughly photographing the beauty of this little irid. I could not wait to see the color slides later on after my return.

A bit later, we made another collection stop in the mountains to dig other odds and ends in the bulbous line. Alas, I could not begin to identify all of them, as most were not in flower. At one notable spot. I stopped to dig leafy things that appeared to be of the genus *Manfreda.* With them grew other "things" with fleshy tuberous roots and wide deep green leaves growing in a rosette. I had not the faintest inkling of what it might be, save that it was likely in the Lily family, and distantly akin to *Anthericum.* We dug *Calochortus* here too. These are sometimes called *Cyclobothra* in Mexico, but I am not sure how they differ, if at all. The genus *Calochortus* is well represented and dis-

tributed throughout Mexico, but they are little known. Certainly I can't differentiate between them. Since they seem to flower later in the summer, I rarely find them in bloom, but often in leaf. Though widespread, they never seem to be common. Naturally we found a species of *Oxalis* at this spot, but more importantly, I found a very unusual tuberous rooted member of the genus *Tradescantia* that seemed to have more appeal than practically all others of that group. Had I not seen the flowers, I would have never guessed that it was a member of that genus. Though the fleshy tuberous roots were not unusual, they were grossly more like those of *Anthericum* or *Sisyrinchium* than any tradescantias that I have seen. The narrow grassy leaves were not usual for that family either, nor was the stiff little wiry flower stem that rose about 10″ above the slender foliage. Only the small bright rose-purple flower pointed to the family characters. It was as if this little plant wished to pass itself off as a member of some other bulbous family member and was trying to do it from root to flower. It had almost succeeded. One might have perhaps guessed it to be a dainty terrestrial orchid. I dug a few of these and they seem to be growing happily now. This is one jewel that I hope to propagate and introduce for distribution.

At another spot, high in a magnificent mountain valley, with bright green meadows surrounded by forests, I dug what I supposed might be a species of *Bravoa,* but since it was not yet showing any signs of flowering, I could only guess. These grew in filtered shade under trees along with a species of terrestrial orchid. I dug some of these "bravoaoids" and paused to soak in this fantastically beautiful alpine country. Flowers were in bloom everywhere and the sight was breathtaking. Everything was cool and green and springlike. It did not take much imagination for me to believe myself transposed to some valley in Switzerland in early summer. Very shortly afterwards in this early afternoon I found my second *Tigridia, T. violacea* flowering along a roadside ditch, many of them standing in water. They were a good deal like the yellow *T. dugesii* we had found a few hours earlier, but these were in many shades of violet, grew in clumps rather than singly, and seemed to have more flowers and buds per scape. Some were nearly white with shadings of palest blue-violet. Others were deeper in hue approaching light purple. We had to remove our shoes and socks and roll up our trousers to dig these out of the mucky clay. We washed these on the spot and placed them in plastic bags so that dehydration would be checked. I found that these plastic bags were indispensable in preserving living material.

That gorgeous afternoon was not to last though, and neither was our plant collecting luck. Before long it began to grow cloudy and then foggy and damp. Though late in June, the cold air of the high altitude forced us to roll our windows up and turn on our car heater. We were beginning to cross the "hump" of the high Western Sierras, and rainy mist and fog dampened our high spirits. The day was getting on, it was wet and cold, we hoped to reach Mazatlan before nightfall,

so we did not make any more stops. I did not see any plants, while driving, that interested me anyway, just forests of pine trees and other deciduous hardwoods. There were no towns, only occasional villages, and tiny ones at that. We did not find any place that we had cared to eat in, so we had skipped lunch. The promise of a seafood supper in Mazatlan spurred me on. As we raced westward towards our Pacific goal, we did begin to drop slightly in altitude and began to see bromeliads growing in the trees in these mountains. The only ones that I recognized were *Tillandsia* species that grow best at high altitudes. I was surprised to find one of these to be *T. prodigiosa*, an epiphytic beauty that I had previously seen only near San Cristobal de las Casas, Chiapas, in the southern tip of Mexico, about a thousand miles to the southeast. The long red colored influorescence lolled over the side of the plants and hung downward below the base of them like red ribbons. We began to drop more in elevation and began seeing more and more *Tillandsia* species and other bromeliads, many of which were terrestrial kinds. Long snaky *Cactus* hung above the roadside against the mountains with brilliant red flowers. I could not identify them nor did I wish to risk my limbs to attempt collecting them. We continued our dizzying descent and the mountain curves seemed endless. I have driven in mountains all over mountainous Mexico . . . thousands of miles of them . . . but this was ridiculous! Mountain after mountain after mountain seemed to extend outward in every direction seemingly to the ends of the earth. It was one continuing curve after another and we wondered if there really was such a place as Mazatlan. I knew that I had not completely lost contact with the rest of the world when I saw a road marker proclaiming that I had crossed into the State of Sinaloa. Our spirits began to rise. But the mountains continued to be as monotonously countless as ever. We had dropped a bit more in altitude. It was not cold anymore, and it was noticeably dryer, though the country had obviously had the beginnings of summer rainfall. I had given up any hopes of finding any more plants for this day. There were only a few hours of daylight left, and we wanted to get to Mazatlan before dark. But the biggest surprise was yet to come.

Hurtling around a mountain curve I saw a spectacle that really fired up my adrenalin into overdrive. There before my eyes was an entire mountainside carpeted with a tremendous colony of a startling *Hymenocallis* species in full flower. I stopped my car and jumped out, and was surprised to find the air heavily perfumed with the fragrance of the thousands of *Hymenocallis* flowers. They grew under trees and shrubs, and in the open clearings as well, showing that they were indifferent to sun or shade. This in spite of the fact that they had startling petioled leaves of bright green, which reminded me of a *Eucharis*. Each flowering plant had four broad leaf blades arranged in a whorl above the petioles. Towering above these leaves was an umbel of pretty white flowers of typical *Hymenocallis* form. I kept my camera busily clicking, taking shots of entire colonies, groups, individuals and closeups. Setting my camera and camera bag containing various lenses and

attachments on a silver painted roadside post, I set upon the task of digging bulbs. I was surprised to find that there was no evidence of a single offset on any of the bulbs that we saw or dug, and the bulbs themselves were quite small in size for *Hymenocallis,* about the size of a ping pong ball. Apparently this species increases very successfully by seeds alone, judging by the size of the colonies. This plant proved to be an enigma. Outwardly it would seem to fit into the *Speciosa* alliance as outlined by Dr. Traub, since it has broad thin foliage with distinct petioles as seen in *H. speciosa* and other members of that alliance. But the growth habits and also the flowers seem to lean more strongly toward the *Mexicana* Alliance. Like the other members of the *Mexicana* Alliance, this new petioled species lies dormant until the rainy season starts, produces all of its leaves at one time simultaneously with the flowers, grows for a short period and then becomes dormant at the end of the summer. Casually the flowers resemble those of *H. horsmanii* and *H. repanda.* Only study will reveal if it belongs in the Speciosa Alliance, or is an offshoot of the Mexicana Alliance, mimicking the former in its foliage. Certainly it is a most distinct plant and not likely to be confused with any other.

Thus Sunday, the 28th of June, 1964, was a red letter day for *Hymenocallis.* I had found two very distinct species that were new to me, and perhaps even new to science. I was very happy as I drove into Mazatlan. I had quite a collection of choice plant material, and I had made Mazatlan before dark. After leaving our collecting spot, I had seen this petioled species by the thousands in huge colonies on mountainside after mountainside, until we dropped to a lower and dryer elevation. After that we did not see them anymore. The country around Mazatlan and southward down to the Sinaloan coast was still bone dry. The rains were late. There were no bulbs to collect anywhere or much of anything else for that matter. This Monday was not my day. Too many tequila cocktails the night before had given me a horrible hangover. I don't know if the many changes in altitude had helped make me sick, but it was a blue Monday. I did not feel up to driving until almost noon. I let Chris do it. When I finally felt up to taking the wheel, we had a blowout! My spare tire was no spring chicken either. I now had no spare. I held my breath and crossed my fingers.

We crossed into the State of Navarit, but it was still too dry to collect. As we neared the City of Tepic, things began to green up, evidence of recent rains, and we were gradually gaining altitude. I stopped to photograph a pretty coral *Stennorynchus* species, a terrestrial orchid, in flower and it was then that I discovered the loss of my camera containing all of the valuable pictures taken to record the events of the day before. I wondered if that camera (with accessorics) was still resting on that silver roadside post by the *Hymenocallis* colony with the petioled leaves. A speedometer check revealed that I was now about 300 miles from that spot and the chances of retrieving the camera were too small and would throw the entire trip out of kilter. I had a spare

camera, but no closeup lenses, and I had lost film that was even more valuable to me at the time than the camera itself. I still wonder just WHO found that camera and what they did with it? If they went to the trouble to process that color film, I'll bet they were surprised to see all the flower pictures. Certainly I had left my camera in a very accessible spot. I was really in a grim mood now, and only something surprising could elevate my spirits. Luckily that was not long in coming.

A roadside stop check in this hilly country revealed a variety of bulbous things. A narrow leaved glaucous *Hymenocallis,* not yet in flower, *Oxalis,* Anthericums, Manfredas, Besseras, *Cipura palludosa,* a pretty early morning flowering tigridioid, *Hypoxis* species, and a plant that looked like a *Crinum* in leaf, but that had fleshy tuberous roots. None of these were yet in flower, but it was obvious that we had again hit "pay dirt". These were dug at K 927, and I was thankful to again be on a highway that had kilometer markers. The highway of the previous day had been poorly marked and I had been at a loss to record my collecting sites. A few more miles southward, at K 892 I found *Hymenocallis horsmanii* in full bloom. This was my first experience with this species. They grew in profusion on the hillsides. I stopped to dig these and found to my surprise that a second *Hymenocallis* species grew along with them so that sometimes mixed colonies of two species could be found growing together. Only *H. horsmanii* was in flower, while the other showed no evidence of buds showing. The foliage of *H. horsmanii* was considerably broader, especially broader at the middle of its length, and the leaves were more lax and lay close to the ground. Bulbs of *H. horsmanii* were smaller, and it was not unusual to find one flowering with a single flowered scape from a bulb less than an inch in diameter! The other species, which had been tentatively identified as *H. repanda,* had narrower, more upright foliage, larger and deeper-seated bulbs. The foliage was more numerous and they flowered later. This was demonstrated by dissecting several bulbs and removing the embryonic buds which were already deep in the neck of the bulbs. Upon returning from my trip, I planted bulbs of *H. repanda* and a few of these flowered in late July and early August. The flowers differed slightly in form from *H. horsmanii,* and this came as no surprise.

Hymenocallis repanda has been kicked about over the years. My opinion is that earlier botanists, for the most part, failed to see that there were two separate species growing in the Tepic area, since they grow together and both have glaucous foliage. The fact that they flower a month apart was likely overlooked. A botanist working such an area one month is not necessarily going to comb the same area several weeks later. He may move on to other territory. Also the fact that *Hymenocallis* are still flowering a month later may not necessarily seem unusual to him. He may assume that they do not all flower at once and that they flower over a long season. Not all taxonomists pay as much attention to leaves as they do to flowers. The few taxonomists that did take note of *H. repanda* were rewarded by having it thrown into synonymy

with *H. Horsmanii.* I earnestly hope that this little mystery can be settled once and for all with a study of collected specimens.

Nearing the Northern limits of the city of Tepic, I spotted a flash of pink along the roadside and I stopped to investigate. Beneath my feet were a large colony of a remarkably showy white *Tigridia* species, *T. passiflora* (Molseed). The flowers were similar in form, but larger than either *T. dugesii* or *T. violacea* that I had seen the day before in the State of Durango. Growing with them were scattered colonies of a pretty pink flowered *Zephyranthes* species. These were our first *Zephranthes* since we had collected *Z. longifolia* the morning of the previous day. Many of these *Zephyranthes* flowered from bulbs only ¼-½″ in diameter. The flowers were of medium-small size and showed very little color or form variation. All had moderately long, narrowish segments, and shiny green leaves. Though pretty and dainty, they seemed rather less distinguished than other *Zephyranthes* that I have collected in Mexico. The following day I was to again find this species growing just east of Guadalajara in the state of Jalisco.

We ate a late lunch at Tepic and then proceeded towards Guadalajara, where I hoped to spend the night. A few minutes after leaving Tepic, we encountered a heavy downpour of rain, but in a matter of minutes we had passed throngh it and were in sunshine again. I stopped to check and collect a few more bulbs of *Tigridia passiflora* at K 869. This turned out to be another wonderland of bulbous material, and we made the most of it. There were white anthericums, *Milla biflora, Bessera* sp., and some large Manfreda-like plants. The Bessera were not yet in bloom, but many of the buds were beginning to show some red coloring. Mrs. Clint had collected both red and violet colored *Bessera* the year before in full flower and had sent me a few of the violet forms. I had flowered one of these before leaving on this trip, and it was obviously different from *Bessera elegans* that I had collected in 1957 in the State of Guerrero. Mrs. Clint had assumed that the red ones that she collected in Nayarit were *B. elegans,* and that the violet ones were something else. It now appears that both the red and violet forms are both color varieties of a single species, but neither of them is the same as *B. elegans* that grows in the state of Guerrero. The latter has coral-red flowers with broader segs, It is more robust, and I have never seen any color variation in it. Even the pollen of these two species differs in color. The red variations in the Nayarit *Bessera* are carmine-red rather than coral-red. More study will be needed to determine if they really are two separate species, but meanwhile gardeners can rejoice in the addition of new color shades to this charming genus.

Continuing eastward on Highway 15, I spotted a large pure colony of *Hymenocallis* in leaf at K 859. The foliage was upright, narrow, and glaucous, and the plants fairly compact. No plants were yet showing any evidence of flowering, though the bulbs were of moderate size. I dissected a few of these bulbs to find that they would be in flower in another few weeks. I am inclined to think that these bulbs were the same species that grew with *H. Horsmanii* North of Tepic, the only diff-

erence being that these seemed to be a bit more robust, perhaps due to better growing conditions.

Entering the State of Jalisco, I stopped to collect an unusually showy large flowered oxalis with dark rose-pink flowers and robust habit. Indeed it is the prettiest *Oxalis* that I have seen of this type, the flowers reminding one of *O. bowieana.* The bulbs of this species were huge, by *Oxalis* standards, some being 2″ in diameter, and growing to a depth of six inches, which made them rather hard to dig without injuring them. The giant leaves were slightly hairy. I have not yet identified this one, but have a hunch that this is likely one that has likely been in cultivation for some time.

Our last collection for that day came just before sundown, just outside the western outskirts of the little town of Magdalena, Jalisco. Some roadside *Hymenocallis* in flower caught my eye and I stopped to check. The rather narrowish swordlike leaves were a dark glaucous dull green and the plants were of medium size. I could not figure out just what this species might be. Certainly it was not *H. repanda,* nor was it Mrs. Clint's #658 (*H. Riparia*?) that grows both north and west of Jalisco. Once again only further study can reveal just where this species fits in. It may turn out to be a variation of Clint's #658, or perhaps another species. Though in flower, it was getting late and we were in a hurry. Rain clouds were building up and there was a storm in the offing. We did not really take the time to study the flower, but there seemed nothing unusual about it at casual glance. I did take enough time though to dig some odds-and-ends of bulbs that were growing along with these *Hymenocallis.* There were some *Hyporis* sp. with heavily reticulated tubers, a few small yellow *Anthericums* and a narrowleaved Bravoa-like little thing that is now a real "Whatzit" in my garden. Though I have not yet flowered it at this writing, I cannot for the life of me figure out what it might be. I am certain that it is akin to *Bravoa* and Tuberose, but that is all. This is one of the things that I really look forward to flowering someday.

By this time it was getting dark, so we drove on to Guadalajara, through rain, and spent the night there in an ultra cheap Hotel, complete with cockroaches. (We were trying to save money). The following morning after much shopping, I bought a used recap tire and tube, and we once more had a spare. It was a good thing too, our former "spare" was beginning to look pretty bald on the ground. It was only a matter of time . . . .

Leaving Guadalajara the following morning, we spotted pink *Zephyranthes* in flower, in an area midway between that City and Lake Chapala. These turned out to be the same species that we had collected just north of Tepic the day before, save that these were a bit more variable in shades of pink. I also found *Allium* species growing in wet spots in this area. These were not in flower, but I presumed it to be *A. glandulosum* or one of its allies. Here too grew a very showy rose colored *Oxalis* species of a very dwarf type, an unusual cream colored little tuberous rooted *Sisyrinchium,* and a violet purple *Tigridia* species.

A few miles closer to Lake Chapala we found another *Hymenocallis,* the old familiar species that Mrs. Clint had collected as #658 in 1955. These were growing in very wet places along the roadside and were in full bloom and growing in large clumps. I did not bother to dig any of these as I had a fair supply in my garden, but I was interested to find them in a new collecting site. Those of Mrs. Clint had come from 25 miles north of Guadalajara, while these grew nearly midway between that City and Lake Chapala. Some people feel that this species is *H. Riparia.* It is a handsome and tidy species, but to me rather undistinguished in flower.

Upon reaching Lake Chapala, I kept my eyes cocked for *Hymenocallis mexicana* (syn. *H. dillenii*) the #604 of Mrs. Clint's earlier collections, which she had found growing near the lake in June of 1955. Since we had always referred to it as her "Lake Chapala" species, I had assumed that it carpeted the area surrounding the lake. It was not until I approached the eastern limits of that Lake and the Michoacan state line that I finally caught a glimpse of a large colony growing among lava rock. These were as thick as thieves and I dug them out of the rocks until I was satisfied. They were in full bloom. It is a very dainty little thing and most distinct, with its unusual outward facing flowers with short curved tubes. Mrs. Clint has found her largest populations in Jalisco, and extending into the adjacent states. Certainly they are well represented in Michoacan as well with heavy populations, where they may be seen growing in abundance along the roadsides in the plateau country on the road to the city of Morelia. It seems to show little or no variation anywhere that I have seen it.

Later that day, at K 488 on Highway 15, we found a colony of pink flowered *Zephyranthes* growing with a large number of *Nothoscordum bivalve* and purple flowered *Tigridias.* We began digging bulbs of these here, but a sudden shower soaked us to our skins before we could finish. Gaining altitude in pine covered mountains, I looked for *Bravoa geminiflora* in flower, but did not find any bulbous plants of any kind. It was a very rainy afternoon and it was still raining when we pulled into Morelia that night. We were lucky in having bought a tire in Guadalajara for a spare that morning, as we had a flat in a small town just before arriving in Morelia. I had to delay leaving Morelia the following morning so that I could have the tire vulcanized and a tube placed in it. Tubeless tires are not yet in vogue in Mexico, and it is best to have tubes placed in any tubeless tires that become flat.

Leaving Morelia the next morning, we stopped just a short distance beyond the eastern limits of the city to trudge up a mountain side to check if there were any sprekelias. We did not find any, but we did find a small hairy leaved yellow *Anthericum,* and some unusually large flowered *Milla biflora. Zephyranthes* also grew along with them, but these had already flowered. Naturally it began to rain again as we dug, and we were about to give up, when it stopped as suddenly as it began. Still not content, we decided to walk still higher up the grass covered mountain side. It was a good thing that we did too, for at a higher level

I came upon a colony of *Bravoa geminiflora* in full flower. I had never before found such a large number of them in bloom, and the 2-3′ wiry stems with their pendent coral-red fire-cracker-like blooms were a most intriguing sight. Growing with them was a species of *Calochortus* showing buds, and a tiny little *Anthericum* species with white flowers and flat, shiny green leaves, pressed against the ground.

Driving a few more miles eastward, at K 282, I made a routine check stop by a wooded mountainside to see if I could find any *Sprekelia.* I walked along the roadside and followed a little trail but found nothing but a few *Calochortus.* I walked back to the car and got in and was just about to drive away when I glanced upward and saw a colony of *Sprekelia* in seed and leaf. The leaves of some were nearly three feet long. They had been right there over my head, but I had been looking elsewhere. These were the largest *Sprekelia* bulbs that I had ever seen. Growing with them were large iris-like plants with tuberous roots. These were undoubtedly the same giant yellow flowering *Sisyrinchiums* that we were to find in flower in Southern Mexico.

Continuing eastward, we stopped at K 222 to dig bulbs of a purple flowered *Tigridia,* the same one we had dug the day before in the rain. These grew in a huge colony along the highway in heavy soil, with many of them standing in water. A robust, but compact growing species, this one should grow well under cultivation. At this spot we found an armful of freshly picked *Bravoa geminiflora* lying on the ground. Apparently these had been pulled by children and then cast aside. One stem still had a bulb clinging to it, and I put this into a sack with our other Bravoas. It is strange how ruthless and wasteful people can be in expressing love for flowers.

Later in the afternoon, as we neared the city of Zitacuaro, at the eastern limits of the State of Michoacan, I stopped at a spot where I had collected in 1957. This was a corn field in which grew an interesting assortment of bulbs, including *Sprekelia, Allium, Sisyrinchium, Bomarea, Anthericum, Oxalis,* and a large colony of *Tigridia meleagris.* To the uninitiated, this *Tigridia* comes as quite a suprise, as it has very un-*Tigridia*-like flowers. The large pendent bronzy-purple flowers hang like large bells at the tips of the scape, much like a *Fritillaria.* The *Allium* species was not flowering, but it may likely have been *A. glandulosum,* a stoloniferous wine colored onion which is one of our Southernmost Alliums. The finding of a *Bomarea* species was an exciting event, though I was unable to keep the plant alive once I got this rare amaryllid home.

We spent the night in Toluca, state of Mexico, and of course it rained. We departed for Acapulco the following morning. Though less than an hour's drive from Mexico City, I decided to bypass the capital in order to save time. It was now Thursday, July the 2nd, and we still had much ground to cover. This highway, Highway 55, led to Taxco, the famous old colonial silver mining town, and I was later thankful that I chose to take this route as I found several new and interesting plants along the way. A few miles South of Toluca, at K 108, I stopped to dig

a few bulbs of a plant that resembled *Polianthes tuberosa,* the common Tuberose, and it was no doubt related to Tuberose and Bravoa, but since it was not flowering, I will have to wait until it does before I can identify it. These grew with stiffish leaves lightly speckled with purple at the base. I am still looking forward to collecting my first wild Tuberose in Mexico, as this plant is supposed to originate there but it seems to be unknown in the wild! A bit further south at K 138 we found many bulbs of *Tigridia meleagris* in full flower along the roadside, and in stopping to check, found another *Tigridia* species in seed growing with it, along with Sprekelias, *Milla biflora, Allium* sp., *Zephyranthes,* Anthericums, and Sisyrinchiums.

A few miles north of the City of Taxco, in the state of Guerrero, we found another important addition to our collection. My first impression was that perhaps we had found a Giant *Bessera,* as the stiff hollow leaves were 3-4 feet long and a dark bluish green. Closer examination showed old dried flower stalks of the previous year, and the very long angled pedicles and withered seed pods seemed to indicate that it was another *Milla* species or one of its allies. Though the old flower stalk indicated a *Milla,* the leaves were certainly Bessera-like. Apparently this new *Milla* has a restricted range, as we did not see it any more after passing through this area. We ate lunch in Taxco, and it was a strong temptation to linger in this old city with its quaint cobble stone streets. After leaving Taxco, we drove toward the city of Iguala, the Capital of Guerrero, and a junction with highway 95 which lead to Acapulco. We saw many bulbs of *Bessera elegans* flowering along the roadside. Apparently this is a disappearing species, since cattle eat it and it seems now to be found in rocky cliffs and other such places inaccessible to livestock. Little wonder that it has become a rare plant in cultivation lately.

North of Chilpancingo, Guerrero, I stopped to collect a few bulbous irids, and *Calochortus* but these were not yet in flower. I am certain that these irids are the same as those that I collected in 1957 in this same area and which flowered with large golden yellow flowers that looked very much like *Nemastylis* in form. As this area was grazed by livestock, they were to be found growing under dwarf palms and in rocks where they could not be easily eaten. About a mile further South, around the bend we found large colonies of *Hymenocallis glauca,* a few Sprekelias, and scattered plants of *Bessera elegans* in flower. Nearing Chilpancingo, I spotted scattered colonies of an old *Hymenocallis* friend, a species that I had first collected in 1957, my #57-8. This is a rather dwarf type with low, ground-hugging foliage, and few flowered umbels topped by long tubed flowers which have strongly "teethed" staminal cups. Though it grows in the same region with *H. glauca,* this species is never found growing with it, since *H. glauca* likes the mountains, and this species likes low wet places in the valleys. I noted that the Kilometer readings for this species were K 350, and K 317. A bit later in the day I made my last *Hymenocallis* collection for the day, in a roadside river bed. These were wedged between rocks in the river, and also grew on the river banks, but were not in flower. I would not be surprised if this is the

same Chilpancingo species, 57-8, since it grew in the same area at K 344, only six kilometers from my original 1957 collection. Bulbous plants seemed to play out as we approached Acapulco, and we decided to call it quits for that day.

Our 6th day was essentially a return up the same highway 95 from Acapulco to Cuernavaca, Morelos. Because this part of the trip was mainly a rerun, I did not anticipate finding anything new but overlooked from the previous day. As good fortune would have it, I was wrong, as usual. A "Ho Hum" check stop at K 216 in a semi-arid *Cactus* country where *Neobauxbaumia tetetezo* grows in profusion proved to be a bonanza. Growing beneath these columnar giants were numerous *Milla*-like plants with many thready leaves. They grew in profusion in the chalky soil of these dry hillsides. I first found a few dried flower stems and it was obvious that these were unlike ordinary Millias, and perhaps they might be something else. I then found a few of them in bloom and from a distance they resembled Alliums, but closer inspection revealed that some of the little white flowers had reflexed segments. The little corms were typical of the *Millinae* rather than the Brodiaeas; that is the tunics were membranous rather than fibrous. Were it not for this, I would suspect that perhaps they belonged to the genus *Muilla*. Perhaps they may be the long lost *Diphalangium graminifolium*. Only further study under cultivation will solve the riddle, but I am confident that we will know more about these little plants within a year or so. These were dug south of Iguala, Guerrero. Continuing a few more miles northward we found a white flowered bulbous irid, but I could not identify them since all flowers had closed by afternoon. I surmised that perhaps they might be either *Cipura* or *Eleutherine* species.

South of Cuernavaca, Morelos, I stopped to dig a few corms of a large white flowered form of *Milla biflora,* along with some purple-flowered Tigridias, and some orange yellow Antehricums with very slender leaves. I also dug a few *Manfreda*-like plants with purple spotted leaves. At Cuernavaca, I turned Eastward on Highway 115 towards Cuautla and a later junction with Highway 190, the southern leg of the Pan American Highway. Midway between Cuernavaca and Cuautla I stopped to check for evidence of *Hymenocallis graminifolia* which I had found in this area the two previous years. I have been particularly impressed with this very showy and very dwarf member of the Mexican *Hymenocallis* group and figured I could always use a few more. I found neither this *Hymenocallis* species, or the pretty white *Zephyranthes* species that grew with them, but I did find what may perhaps turn out to be another new *Milla* species or variety of *M. biflora.* It looked very much like the common species, save that this was a very dwarf plant with very short 6″ stems bearing but one or two flowers. The foliage was very slender and thread-like. Once again, it will take further scrutiny to determine the status of this most distinctive and charming little *Milla.*

We reached our junction with the Pan American Highway at Izcar de Matamoros, in the state of Puebla and daylight was drawing nigh.

We then turned southward and made a final stop a few miles south of the little town to dig a few bulbs of *Hymenocallis glauca* and *Tigridia meleagris*. Both of these plants seem to be fairly widespread in south-central Mexico. I now have collected bulbs of *H. glauca* (Herb,) Baker ex Benth & Hook, in the states of Puebla, Oxaca, Mexico, Morelos, and Guerrero, and this is undoubtedly the same plant that Herbert named *Choertis glauca* in 1837. This name was later changed to *Hymenocallis glauca* by Baker in 1883, and then to *H. choretis* by Hemsley in 1884. It was still called *H. choretis* in Sealy's REVIEW of THE GENUS HYMENOCALLIS, but Sealy admitted that perhaps the name *glauca* might prove to be more correct. I am inclined to follow Herbert's nomenclature since this is probably the commonest, most distinctive and most widespread species of the Mexican Alliance and undoubtedly was one of the first of the Mexican species to catch the eye of and impress Mr. Herbert, so much so that he even proposed a separate genus for it.

Also in this same area in Southern Puebla, I recollected corms of another old friend, a very pretty night flowering *Milla* species with dark bluish green nearly glaucous rushlike foliage. I had previously collected this plant in 1962 and 1963 a few miles south of Tehuacan, Puebla, but Mrs. Clint had collected it several years before in the State of San Luis Potosi. Oddly, this is a stoloniferous plant as well as being only a night bloomer, two characters that easily separate it from *Milla biflora*. The flowers do not have the peculiar "scalloped" base to each segment as do *M. biflora,* and the green stripes on the backside of the segments is much more distinct. The fragrance is much more noticeable as well. I have not yet identified this species, but it is a welcome addition to this charming group.

We spent the night in Huajuapan de Leon, a small town in the northern part of the State of Oaxaca. This is a very charming peaceful little town, but the Mexican Army was called upon to put down an uprising only as recently as 1962! Early in the morning found us on the road again in hopes of reaching the city of Oxaca by noon for lunch and a day of much needed rest and relaxation. Just a mile or so outside of the city of Huajuapan I collected a little *Anthericum* species with white flower that I had also collected the year before. This little dwarf is very showy and has wonderful garden value, since it blooms each morning from early summer until late autumn. The low glaucous foliage is very tidy and it makes an excellent border plant. It may later develop that many of my Anthericums may turn out to be members of the genus *Chlorophytum*. I do not know enough about their taxonomy yet to classify any of them. Judging by the great number of species I am not at all certain if all of them are yet classified anyway. Surely there are enough of them to merit a lifetime of study. Growing with these little pretty white Anthericums was a sessile white-flowered little *Zephyranthes* that was likely a southern corm of *Z. verecunda,* the familiar little yellow *Sisyrinchium*, and an odd little wine colored afternoon flowering tigridioid. This latter may prove to be a species of *Tigridia* or perhaps a member of another related genus. At K 374 we encountered one of the more

spectacular *Sisyrinchium* species. This orange yellow species grew in the mountains south of Haujuapan and had flowers over an inch in diameter. Later that morning, while driving through a mist in the mountains, north of Yanhuitlan, Oxaca, I found yet another large flower *Sisyrinchium* which had pretty lemon yellow flowers and very narrow foliage. Strangely this species lacked the usual tuberous roots found in the other yellow species in Mexico, but instead had very thin fleshy roots too thick to be fibrous and too thin to be tuberous. This was one of the "oddballs" of our collection.

I was very eager to collect *Fosteria oxacana* (Molseed), a brand-spanking new genus of the tigridioid group, only recently recognized as late as 1963. I had collected this plant myself in 1963, but was unaware that it was unclassified until Mr. Molseed so informed me through correspondence. I found a large colony of them growing in a wooded mountainside at K 460. The small yellow flowers are more odd than showy and very different from anything else in this group. Growing with them was a species of *Schoenocaulen,* a little known member of the *Liliaceae* with plain greenish flowers. This one had peculiar heavily reticulated bulb coats. Later we collected more *Oxalis* species and another yellow *Anthericum,* but by this time I had lost count of the number of Anthericums I had encountered. Our last important collection for this 4th of July was an odd little bulbous irid from the mountains north of the Valley of Oaxaca at Siete Cabrillos, in the Cloud Forests where bromeliads were to be found in abundance in the trees. Surely not a *Tigridia* or anything else familiar to me in this interesting group, I was enchanted by its delicate charm and daintily fragile flowers which seemed to dance on their slender 10″ stems. At a quick glance one might think the translucent white 1½″ flowers were perhaps a species of *Tradescantia* in the Spiderwort family. Closer inspection showed that each bloom had three large showy segments with three tiny little inner segments, reduced to nearly bristles, which were blotched yellow and dotted with tiny purple spots. There were three long yellow stamens with a longer yellow stigma dangling to one side. The very narrow grassy leaves proved to be plicate on closer inspection . . . a characteristic of all tigridioids. There were sometimes two flowers open at one time per scape, and the bulbs seemed inclined to form offsets freely. As always, while collecting plants in Mexico, one is apt to draw curious natives to see what is being dug and this was no exception. Almost before I knew it, a man and his wife and their children were yanking handfuls of these irids and offering me bouquets. I thanked them, but explained that I was seeking only the bulbs and not the flowers. I later learned this little irid is *Sphenostigma conzatti,* a plant described by R. C. Foster in 1947 from material collected by Conzatti in 1907. Mr. Molseed tells me that my 1964 collection is likely the first time it has been collected or even seen since the original collection by Conzatti in 1907. It is easy to see why. This is a very early-morning flowering species and the flowers are usually gone before the suns first rays hit them. The fact that I was able to spot them was because the morning was unusually cold and

misty, no doubt keeping the flowers in fresh condition longer than usual. Also I was up and about earlier than usual that grey chilly morning.

Arriving in the city of Oaxaca, we ate lunch, found a Hotel and napped. After cleaning up and refreshed, we went shopping, and in doing so, found a shop where a Kinkajou was for sale. This pretty little animal is sometimes known as a Honey Bear, and they make delightful pets. I made a down payment on the little animal and told the shop keeper that I would pay the balance when I returned from Guatemala in a few days and would pick up the little animal then. The next day, July 5th was a fairly dull day for collecting. We had a long trip ahead of us, driving from the city of Oaxaca, Oax., to the highlands of San Cristobal de las Casas, Chiapas. Normally the trip averages ten hours of driving and our average was not helped at all by our second tire blow out and the necessity to purchase another tire. The fact that nearly all businesses were closed that day because of a National Presidential election did not make the purchase of a tire easy. I might add that my car was equipped with a tire size that was not manufactured in Mexico and it was very difficult to find a tire that would come close to fitting! We lost three hours in looking for a tire in Tehuantepec and Juchitan in the Tehauntepec Isthmus before we could continue on our way. I did manage to take time to stop and collect a few bromeliads, and was especially pleased to pick off a few plants of *Tillandsia Carlsoni* north of Tehauntepec earlier in the day. It was nearly dusk before I stopped at Ocozocoautla, Chiapas, to dig a few bulbs of a *Zephyranthes* that I had collected in the same place the year before. For some strange reason, *Zepyhranthes* seem to become as scarce as hen's teeth in Southern Mexico. Except for a few *Zephyranthes brazoxsensis* that are to be found around the city of Oaxaca, I have not found any members of this group until reaching this point in Chiapas. Oddly, this Chiapas *Zephyranthes* seems to be identical to *Z. miradorensis* found much further north and west in the state of Veracruz. Why it suddenly turns up again here is one of those enigmas that makes plant collecting interesting!

We reached Tuxtla Guterrez that evening, but chose not to stop, but rather proceeded onward and upward to the mountain city of San Cristobal de las Casas where we would spend the night. The distance is only about 50 miles, but it is a steady climb all the way. This beautiful country has all the charm of Guatemala. Native amerindians still cling to their regional costumes, the climate is invigorating and it is a paradise for plant collectors, particularly those seeking bromeliads. I decided that we would return from Guatemala through this town and made arrangements to leave all of my plants with a Hotel attendant, picking them up on my return. I would thus not risk losing them in crossing the frontier and customs inspections with which I was unfamiliar. I had originally intended leaving my plants in the city of Oaxaca and I was later to regret not doing this instead. I have never found much in the way of bulbs in the San Cristobal area, though it seems like it would be ideal for them. I will admit that I was amazed to see amerindian women carrying boquets of cut flowers to market

that included scapes of *Brunsvegia rosea* . . . and this in early July! The country is high and cool, and gets much summer rains and I did not expect to find Brunsvegias growing happily under such conditions.

We left San Cristobal, and drove towards the Guatemala border and did no more bulb collecting, though I stopped to admire some beautiful white flowered Calochortus of the "cat's ear" type in bloom. There is little reason to mention here all the details of our problems of crossing into Guatemala, other than to note that it can be costly unless one crosses during the limited time in which the border is officially open. The "extraordinary service charges" can make a dent in the day's budget. The roads leading from the border into the interior are horribly bad and unpaved, and are much worse during the rainy season. Naturally we arrived with the beginning of the rainy season, and I was well indoctrinated about the hazards of driving at this time before I had traveled more than an hour. The country is fantastically beautiful, but I failed to collect any bulbs while there other than a little stoloniferous *Milla* species. These were not in flower, but I later flowered them at home and they proved to be another night flowering species similar to the ones from the state of Puebla, Mexico. These differed in having slender, grassy leaves. We found these near Huehuetenango.

We lost time at Solola, near Lake Atitlan repairing a torn oil pan, and thus we decided to cut our trip short and return to Mexco by another route. This change in plans caused us more border delays and also more miles of driving than we had planned. The experience was a nightmare that I am in no hurry to repeat. At any rate, we finally *did* return to San Cristobal to pick up our plants and then drove northward to pick up our little Kinkajou in Oaxaca . . . sadder, poorer, and much, much wiser! In defense of Guatemala, I will say that the country is gorgeous, the people friendly, and prices more reasonable than we feared. My main complaints are the miserable highways leading into the country, and the hazardous conditions encountered. I am sure that someday this will be corrected. Highways in the interior are excellent. My other complaint is the absurd methods used to fleece tourists out of extra dollars with the many "extraordinary services" by employees of both governments. Tourists accustomed to crossing into Mexico from the United States will be rudely shocked when they try to return into Mexico from Guatemala. My advice is to fly.

The drive down from San Cristobal to Tuxtla Gutierrez proved to be pleasantly eventful and rewarding. We collected a few choice bromeliads and orchids, but I was really excited in finding a beautiful blue flowered irid, *Orthosanthus chimboracensis,* in flower in the mountains. The plant has the appearance of a *Sisyrinchium,* with the fan-like foliage of narrow grassy leaves. The showy sky blue *Aristea*-like flowers of this species are an asset to any garden. It has fibrous roots. The plant proved difficult to keep and none of my collection survived. A few more miles down the road, at a slightly lower altitude I found an amazing giant yellow-flowered *Sisyrinchium* with tuberous roots that proved to be the finest of all. The huge lemon yellow flowers were as

large as a half dollar and the large Iris-like plants produced stems several feet tall, making them a worthwhile addition to any garden. Growing with them was a bulbous irid of the tigridioid clan, but since they were not yet in flower I could not determine what they might be. Not wishing to pass up any good bets, I collected some of these as well.

Later that afternoon, as I neared the Oaxaca state line in a scenic mountain area that overlooks the Pacific ocean I stopped to recollect bulbs of *Eustylis purpurea,* another attractive tigridioid that grows from Costa Rica to Louisiana. This one has attractive violet purple flowers. Growing with it was a species of *Hypoxis* with long carrot-like tubers. The leaves of this *Hypoxis* were conspicuously plicate and it was very difficult to distinguish between *Hypoxis* and *Eustylis* without first digging them. Also growing in this general area was *Cipura paludosa,* another pretty white bulbous irid, with icy white flowers opening early in the morning. This *Cipura* species is another very widespread bulb that is apt to be encountered over very large areas on both coast lines of Mexico.

Arriving in Oaxaca City, we went to the market to get a crate for our kinkajou and then we picked him up. Chris was really tickled with the antics of our new passenger, but it quickly became evident that "Sam's" energy was overwhelming and it was necessary to keep him in his crate lest he cause us to have an accident. At any rate, Sam was a welcome relief to the boredom of so many miles of driving and we really did not mind his playful bites (and resulting teethmarks) too much. Sam loved fruit and feeding him was no problem since cafe owners were glad to give him a free handout just to watch him eat. Kinkajous are related to, and as amusing as, a raccoon, and they can be just as mischievous.

We did no more collecting until we reached the Oaxaca-Puebla state line, where to my knowledge grew several interesting bulbous plants. including an unusual *Sprekelia* species that I had first collected in 1962. This tiny little *Sprekelia* was the most unusual and most distinctive of any that I have seen, and the first time I saw it, I was sure that it must be a *Habranthus* and continued to regard it as such until it flowered and revealed its identity in the spring of 1964. The narrow silvery green foliage is deeply channeled and the 10″ scape has dainty little red flowers of a very spidery appearance with segs less than ½″ wide. I had thought that this country would be too dry to support Sprekelias, since it seemed better suited for cactus, such as the giant Tetetzo that grew here. We stopped to dig some bulbs of this little *Sprekelia,* when much to my surprise, I found a second *Sprekelia* species growing along with these dwarfs! This second *Sprekelia* was a larger, more conventional kind with long, bright green foliage and much larger bulbs. I looked, but could find no evidence of intermediate hybrids so I assumed that indeed we had two distinct species. We also found a small white *Anthericum* species with reflexed cyclamen-like white afternoon blooming flowers and dug a few of these for our collection.

Nearing Izucar de Matamoros, Puebla, I stopped at K 210, by a hillside to dig bulbs of *Zephyranthes nelsonii* at the same spot that I had first dug them in 1962. These grew on a rocky ledge above the highway along with both *Milla biflora* and the night blooming *Milla* species. *Hymenocallis glauca* is abundant in this area, and I had first collected them here in 1954. Under cultivation, *Z. nelsonii* has proved to be one of the prettiest species, as the flowers are well formed and blessed with an unusually sweet fragrance for a Zephyranthes. The flowers are usually white, but occasionally they may have a touch of pink, and the texture is remarkable in that there is an "icy" sparkle overlaying the segs. We did no more collecting until we reached Mexico City as I had pretty well checked over the country on three previous trips. We stopped at University City to collect a few more bulbs of the large white *Habranthus* species that grows so abundantly in volcanic soil in the lava beds surrounding the University. I first collected this species in 1957 and have since made other collections from time to time. The bulbs can get huge . . . as large as hybrid *Amaryllis*, and the robust glaucous foliage can be easily mistaken for that of a *Sprekelia*. There are both large and small flowered forms of this species growing in this area, but except for the size of the flowers they seem to be identical. Under cultivation they seem to be unpredictable, sometimes growing vigorously, and sometimes refusing to grow at all. One can never be sure how they will perform from one year to the next.

We drove right on through Mexico City and headed homeward. For the first time during our trip, Chris got sick. This came as no surprise to me, since nearly every traveler visiting Mexico for the first time is apt to get it. What surprised me is that it took him two weeks to finally acquire the "Curse of Montezuma". We had almost decided that he would not get it. I had long since developed an immunity after my first trip in 1953. I made but one more collection after that, in the state of Queretaro, to collect a few *Milla biflora*, a pink *Zephyranthes*, and some yellow Anthericums. Crossing the border was uneventful. There was the usual inspection and fumigation of our plants and the three hour trip home from Laredo. All in all it was a very successful trip, and there is always the possibility that perhaps a few plants may prove to be new to science and welcome additions to cultivation.

EDITOR'S MAIL BAG

The editor received a visit from Mr. and Mrs. W. W. Walton, 5318 Rivino Road, Riverside, Calif., on May 27, 1964.

Mr. W. Quinn Buck of the Los Angeles Arboretum, Arcadia, Calif., and Mr. Jack S. Romine, 6893 Charing Cross Road, Berkeley, Calif. 94705, visited with your editor. They were particularly interested in the tetraploid daylilies.

Dr. C. G. Rueppel, Casilla 370, Mendoza, Argentina, offers to exchange seeds of *Amaryllis*, and seeds of other unusual amaryllids, with members of the Society. Those interested should write directly to Dr. Rueppel.

The editor received a visit from Mrs. Frank McCown, Holtville, Calif., on Aug. 18, 1964. Mrs. McCown is interested in idids and amaryllids.

Mrs. M. S. Anthes, 123 Grandview St., Encinitas, Calif., who has imported some interesting new amaryllids, particularly from Argentina, visited the editor's garden on several occasions.

In August 1964, the editor enjoyed a visit from Mr. & Mrs. Clifford C. Smith, 5511 W. 116th St., Los Angeles, Calif. 90045, who brought a potted plant of *Zephyranthes grandiflora* Lindl., native to Mexico, (triploid sterile form) for identification. Mr. Smith had collected the original bulb in the wilderness area (Marble Mts.) of Northern California 12 years ago, but had not been able to have it identified, This plant had apparently been grown by some early settler in Northern California.

The members will be saddened to hear that Mr. C. Lloyd Burlingham, of Punta Gorda, Fla., a long standing member of the Society, died on Aug. 31, 1964, after a short illness.

Mr. & Mrs. E. R. Middelmann, of Honingklip Nurseries, "Barosma", Barmbeck Av., Newlands, Cape Town, South Africa, traveled in the United States from Nov. 1964 to Febr. 1965, showing their unusual and beautiful color slides which accompanied their lecture, "Proteas and Ericas, unusual flowering shrubs from the Cape of Good Hope."

Dr. Roujansky, Director, Etablissment Horticole, O. R. Du Grand-Tampon, B. P.: 31 Tampon, Isle de la Reunion, Ocean Indien, writes of his interest in *Amaryllis* and other amaryllids under date of November 1, 1964.

We have just learned (Nov. 16, 1964) that due to a heart attack, Mr. E. L. Brasol, and his family, have moved from their wonderful jungle farm into town. His many friends will be pleased to hear that he is now in good health. His address is: P. O. Box 1774, Daytona Beach, Fla. 32015.

The Ofuna Botanical Garden, No. 1018, Okamoto, Kamakura, Shi, Kanagawa-Ken, Japan, Dr. Motoo Shimizu, Director, has sent to the Editor pamphlets on the Garden, and the export of flowering plants from Kanagawa Prefecture. The plants listed do not include *Lycoris,* and these should be added. Hybrid *Amaryllis* are included.

Mr. C. W. Lander, 26 Cleveland Av., Milton Park, Salisbury, Rhodesia, writes under date of Nov. 11, 1964, that he is joining the ranks of *Amaryllis* breeders. We welcome him.

Mr. V. Roger Fesmire, 1170 South Xavier St., Denver, Colorado, the noted breeder of *Amaryllis,* visited with your Editor on December 7, 1964.

PLANT LIFE LIBRARY—continued from page 4.

THE PLANT KINGDOM, 2nd Edition, by H. C. Bold. Prentice-Hall, Englewood Cliffs, N. J. 1964. Pp. 118. Illus. Paper, $1.75; cloth, $3.95. Teachers and students will welcome this second edition of an outstanding text as part of a beginning course in biology. The subject matter is grouped under the headings—the unity and diversity of plants; the algae; bacteria; slime molds and fungi; mosses and liverworts; structure of vascular plants; seedless vascular plants—ferns; seed plants—gymnosperms, angiosperms; and summary. Highly recommended.

THIS VIEW OF LIFE—THE WORLD OF AN EVOLUTIONIST, by G. G. Simpson. Harcourt, Brace & World, Inc., 757 3rd Av., New York 17, N. Y. Pp. 308. $5.95. On the basis of a sound grounding in evolutionary biology, Professor Simpson has produced a brilliant exposition of his views on life. The subject is developed under the headings—approaches to evolution; evolution among the sciences; the problem of purpose; and evolution in the universe. This stimulating book is required reading for all biologists. Highly recommended.

WATER METABOLISM IN PLANTS, by Theodore Kozlowski. Harper & Row, 49 E. 33rd St., New York 16, N. Y. 1964. Pp. 227. Illus. $4.25. This stimulating new monograph on important aspects of water metabolism in plants at the cellular and whole-plant levels, by an outstanding authority, will be welcomed by teacher and student. The subject is developed under the headings—xerophytism and plant water balance; water relations of plant cells and tissues; absorption of water; water transport; loss of water; and effects of water deficits on plants. Highly recommended.

ERASMUS DARWIN—GRANDFATHER OF CHARLES DARWIN, by Desmond King-Hele. Chas. Scribner's Sons, 597 5th Av., New York 17, N. Y. 1963. Pp. 183. Illus. $3.95. This evaluation of the place of Erasmus Darwin (1731-1802) in literature and science is long overdue. Erasmus was among the most respected medical doctors of his time, a best-selling poet, and prolific inventor who also proposed scientific theories, including a theory of bioevolution. The author develops the evaluation under the headings—18th century medicine; life story; animal and vegetable; the theory of evolution; "The Botanic Garden"; "The Temple of Nature"; influence of the poems; inventions; and conclusions. Highly recommended.

GUIDE TO THE LITERATURE OF BOTANY, by B. D. Jackson. Facsimile of the 1881 Edition. Hafner Publ. Co., 31 E. 10th St., New York 3, N. Y. Publ. 1964. Pp. 626. $12.50. This facsimile reprint of a standard botanical reference book includes nearly 6,000 titles not given in Pritzel's "Thesaurus" (2nd ed. 1872-7). Following the historical introduction, the literature of botany is classified under bibliography; history; biography; indexes; encyclopedias; keys to other books; nomenclators; systems; pre-Linnean botany; introductory works; physiological and morphological works; descriptive botany; paleobotany; economic botany; emblematic works; practical botany; local works; local floras; botanical gardens; and serial publications. This is an indispensable reference work for all interested in phytology.

HENDERSON'S—A DICTIONARY OF BIOLOGICAL TERMS, 8th Edition, by J. H. Kenneth. D. Van Nostrand Co., 120 Alexander St., Princeton, N. J. 1963. Pp. 640. $12.50. This 8th edition of a standard reference book will be welcomed by all biologists. The work has been extensively revised, and new material has been added, so that over 16,000 biological terms are included. The pronunciation, derivation and definitions of terms is indicated. An attempt has been made to include terms used in American texts. There is a table of equivalents—weights, measures, etc., a list of abbreviations used, and a list of sound-symbols used in pronunciation. There are apparently few omissions, such as the lack of cross references between "corona" and "paracrolla". This reference work is indispensable to all biologists and is highly recommended.

PLANT LIFE LIBRARY—continued on page 118.

1. REGIONAL ACTIVITY AND EXHIBITIONS

1964 AMARYLLIS SHOWS

The Official Amaryllis Shows for the year 1964 began on April 4—5, and ended on May 2—3.

The Men's Amaryllis Club of New Orleans Show was held April 4—5. This was followed by the Coastal Bend Amaryllis Society Show on April 11—12, the Garden Circles Amaryllis Club of New Orleans 15th Show on April 11—12; and the Greater Houston Amaryllis Club Show also on April 12. The Valdosta Amaryllis Show was held on April 18—19; the Houston Amaryllis Society Amaryllis Show was held on April 19; the 12th Greater Gulf Amaryllis Show of the Amaryllis Society of Mobile was staged on April 25—26, and The Hattiesburg (Miss.) Amaryllis Society Show on May 2—3.

OFFICIAL MEN'S AMARYLLIS CLUB OF NEW ORLEANS AMARYLLIS SHOW, 1964

WALTER R. LATAPIE, *Show Standards Chairman,*
3737 Elysian Fields Av., New Orleans, La. 70122

The Men's Amaryllis Club of New Orleans held their 7th Annual Show on April 4th and 5th, 1964. Continuing the tradition of their six previous shows, the Club again scored a huge success. Registered attendance exceeded 500.

Fig. 3. Trophy table Men's Amaryllis Club Show, New Orleans, 1964.

Again, a number of out of town visitors also enjoyed the exhibits. From the cities within Louisiana we had guests from Baton Rouge, Prairieville, Hansville, Luling, Thibodaux, Raceland, Belle Chase, Bastrop, Shreveport, Covington, Destrehan, and Port Sulphur. From out of the state, amaryllis enthusiasts came from Mobile, Ala., Lothan, Ala., Gautier, Miss., and Biloxi, Miss.

Awards in the horticulture section were received by: N. J. Clements, tricolor winner in Dutch Hybrid class (Jessee Nursery award); Stephen P. Gasperecz, tricolor winner in American hybrid class (Newsham-Becnel award); Rodney F. Broussard, sweepstakes winner in Dutch hybrid class (Reuter Seed Co.); Rodney F. Broussard, president's trophy for most blue ribbons won by a member of the Men's Amaryllis Club (Men's Amaryllis Club award); Stephen P. Gasperecz, outstanding specimen of an American Seedling (Men's Amaryllis Club award); W. J. Perrin was silver cup award winner for runner-up for tricolor in Dutch hybrid class (Swetman challenge cup); Rodney F. Broussard, silver tray award winner for most blue ribbons in Dutch hybrid class (Swetman Amaryllis Garden trophy).

Awards of merit of the American Plant Life Society went to: E. M. Beckman, for Golden Triumphator; Mrs. A. J. Esteves, for Wyndham Hayward; W. J. Perrin, for Daintiness.

Preliminary Commendations were given to: E. F. Authement; Rodney F. Broussard; W. J. Perrin.

Mr. Frederic Schmitz, Assistant Professor of Horticulture, Plaquemines Parish Experimental Station, Diamond, La., (L.S.U. A and M College) again showed his colored slides and held discussions on *Amaryllis* during the afternoon of Sunday, April 5th.

James Mahan was Chairman of the Show, with Walter R. Latapie acting as Co-Chairman.

OFFICIAL COASTAL BEND AMARYLLIS SOCIETY AMARYLLIS SHOW, 1964

Mrs. Carl C. Henny, *Vice-President*
Corpus Christi, Texas

The Coastal Bend Amaryllis Society conducted its annual show in conjunction with the Lola Forrester Flower Show held in the Exposition Hall, April 11th and 12th, 1964.

Mr. Henry E. Lemoine received the Ludwig Challenge Trophy for winning the greatest number of blue and red ribbons in the registered pot grown Leopoldii and Reginae Type amaryllis.

Mr. Lemoine's Bouquet *Amaryllis* scored the highest in his collection. He also won a silver trophy for the highest scoring registered *Amaryllis,* potted plant, exhibited in the Amaryllis section of the show, scoring 97 points.

Mr. Harvey Vogt received a silver trophy for his entry, Maria Goretti, a Ludwig variety cut scape which scored highest in the registered Cut Scape section, scoring 97 points.

The highest Award of Merit for Bulbs and a blue ribbon for his entry of Ludwig's Apple Blossom cut scape were won by Mr. Richard A. Blucher, a non-member, scoring 98 points.

The Awards of Merit, issued by the American Plant Life Society, were awarded to Mr. R. A. Blucher, Mr. H. E. Lemoine, Mrs. William Lorenzen, Mrs. Cecil Redford, Mr. Harvey Vogt and Mrs. Charles E. Weeks, each scoring 96 points.

The Awards of Preliminary Commendation were issued to: Mrs. L. A. Buckner, Mr. Ted Herring, Mrs. C. E. Horton, Mrs. R. A. Hornberger, Mrs. W. S. Liles and Mr. Dennis Flinn, for outstanding entries within the Amaryllis Exhibit, all—95 points.

Members of the Coastal Bend Amaryllis Society received 22 Blue Ribbons, 15 Red Ribbons and 7 Gold Ribbons for their entries, making a total of 44 ribbons received.

Fig. 4. Coastal Bend Amaryllis Society Show, Corpus Christi, Tex., 1964. *Left,* Mr. H. E. Lemoine, winner Ludwig Trophy with 'Bouquet' (Lud.). *Right,* Mr. Harry Vogt, winner Silver Trophy, with 'Marie Goretti'; best cut scape in Show.

Among the Ludwig registered and names *Amaryllis* entered were 'Happy Memory', 'Masterpiece', 'Picotee', 'Square Dance', 'Beautiful Lady', 'Candy Cane', 'Streaking Stripes', 'Goliath', 'Ludwig's It', 'Cardinal', 'Rockett', 'Home Decorator', 'Dutch Belle', 'Champion's Reward', 'Bouquet' and 'Apple Blossom'.

A total of 96 entries were made in the show, with 90 awards being given. Accredited American Amaryllis Society Judges for the show were Mrs. Jesse Haver, Mrs. R. H. Schmuck and Mrs. R. L. Morgan, all from Houston, Texas.

Despite the lack of much needed rain and cold and cloudy weather this year, our society display was considered one of the most interesting in the flower show.

15th OFFICIAL AMARYLLIS SHOW, NEW ORLEANS, 1964

Mrs. John Klein, Jr., *Show Chairman,*
2504 Mistletoe St., New Orleans, La. 70118

The 15th Official Amaryllis Show in New Orleans, was sponsored by the Garden Circle Amaryllis Club. Affiliated with the American Amaryllis Society; The Federated Council of New Orleans Garden Clubs; Jefferson Council of Garden Clubs and the Louisiana State and National Federation of Garden Clubs, was held on Sat. April 11th and Sunday April 12th, 1964 at the Eleanor McMain Junior High School, 5712 So. Claiborne Avenue. 60 Garden Clubs participating in the Artistic Arrangements and Corsage Division.

Mrs. John Klein Jr. was Show Chairman; Vice Chairmen Mrs. A. R. Oddo and Mrs. A. J. Haydel.

The Horticulture exhibit was opened to the public. The Arrangements were judged by six accredited judges and the horticulture exhibit by nine Official Amaryllis Judges.

Award of Distinction and Silver Tray was given to Mrs. Oscar Paysee Jr. of the Pine Village Garden Club for her outstanding arrangement, titled Exotic. In the Corsage Division, Mrs. Robert Keller won the Blue Ribbon for her Formal Corsage for Odd and Fanciful, and Mrs. W. Prudhomme for the Informal Corsage "Precice an Trim".

The following awards were given: Mrs. W. J. Perrin won the Ludwig Challenge Cup for the best Ludwig Specimen 'Apple Blossom'. She also won the Reuter Seed Trophy, a beautiful Silver Tray for the outstanding Dutch Specimen in the Show 'Apple Blossom'. The Klein Award for the most Blue Ribbons in Dutch Horticulture was given to Mr. Milo C. Virgin. Sweepstake Ribbons for the most Blue Ribbons in American Horticulture to Mrs. Frank Ramos and Mrs. Harry St. John who tied.

Best Two Floret to Mrs. A. J. Haydel was a Silver Tray.

Best Three Floret to Mr. Rodney Broussard a Silver Tray. The New Orleans Public School Award to McDonogh No. 7 School for the Third Consecutive Year. Mrs. J. C. Zwicke Award of Merit Ribbon for the best Cut American Specimen. Award for the best single floret for Garden Circle Amaryllis Club Member only was given to Mrs. M. G. Authement.

The awards of merit from the American Amaryllis Society went to Mrs. A. J. Haydel, Mrs. W. J. Perrin, Mrs. M. G. Authement, Mr. Milo C. Virgin, and Mrs. John Klein Jr.

P. C. Awards were given to Mrs. John Klein Jr., Best Seedling (Dutch); Mr. Milo C. Virgin, American Seedling; Mrs. F. L. Ramos, American; Mrs. J. C. Zwiche, American; Mrs. A. Guizirix, American; Mrs. A. Autry, American.

Blue Ribbon winners in Horticulture were Mrs. A. J. Haydel, Mrs. John Klein Jr., Mrs. W. J. Perrin, Mrs. M. G. Authement, Mrs. William Morgan, Mr. Milo C. Virgin, Mr. Rodney Broussard, Mrs. J. C. Zwiche,

Mrs. A. P. Guizerix, Mrs. F. L. Ramos, Mrs. Ed. Landry, Mrs. A. Autry and Mrs. Harry St. John.

There were Six Invitational Arrangements Displayed on Pedestals by non-competitive Guest Artist.

There were 196 entries in Horticulture and over 500 people attended the Show including a number of visitors from out of State such as Alabama, Mississippi and Texas.

The 15th Official Amaryllis Show was displayed by division 1 to 9 as per Revised Show Schedule for Official Amaryllis Show in 1961 Amaryllis Year Book.

OFFICIAL GREATER HOUSTON AMARYLLIS CLUB SHOW, 1964

Mrs. Sally Fox

Breathtaking, beautifully colored amaryllis blossoms greeted an overflow crowd Sunday, April 12, 1964, at the Garden Center when the Greater Houston Amaryllis Club proudly presented their annual flower show with the theme "Amaryllis Around The World". Mrs. Walter D. Wells, Sr. was general chairman, capably assisted by all members to stage an outstanding show.

Arrangements to represent many countries where amaryllis are native were shown by the members. The staging committee carried out the theme of the show with a mammoth ten foot "world", which drew favorable attention.

Competition was keen for the beautiful trophies. The highest award, along with an official merit of award from the American Amaryllis Society, was won by Mrs. Walter D. Wells, Sr. for Little Diamond, a blend of pink and white. This well-known grower also was awarded the Ludwig Challenge Cup for a miniature type Firefly, as well as a trophy for the best Dutch collection. Other winners were: For second high in named and registered Dutch specimen, and an official award of merit from the American Amaryllis Society, Mrs. W. S. Wheeler. For best named and registered Dutch cut specimen, Mrs. R. A. Fawcett. For best American Hybrid specimen, Mrs. R. A. Fawcett. For highest commended Dutch seedling, Mrs. C. R. Frampton. For best new introduction of Dutch Hybrids, Mrs. Charles H. Pease. Mr. W. S. Wheeler was awarded a silver tray for the best blossom in the invitional class.

A highlight of the show was the educational booth which was most unusual and truly educational since it showed the various stages of breeding a native (or wild) *Amaryllis* grown in its original natural state in the foreign countries with various pollen parents to develop the good growing habits in both, thereby producing a variety that would be appealing.

Guests were asked to vote for their favorite blossom in the show and a dark red blossom "Queen Superiora", was the selection by a

Fig. 5. Greater Houston Amaryllis Club Show, 1964. Part of the exhibits.

great margin. Next was "Floriade", a blend of pink and white and "Golden Triumphator", a salmon blend, third.

A refreshment table where the visitors could enjoy a cup of punch and cookies was added to the 1964 Show. This brought a lot of favorable comment.

OFFICIAL VALDOSTA AMARYLLIS SHOW, 1964

Guy Rice

The Official Valdosta Amaryllis Show was held April 18—19, 1964, at the Garden Center Auditorium. It was sponsored by the Valdosta Men's Garden Club and the American Amaryllis Society.

Mrs. Hyta Mederer was sweepstakes winner; and Mrs. C. H. Mock had the most outstanding entry in Horticulture with 'Floriade'. Top honors were awarded to Mr. Hulyn Smith for a potted plant of 'Rembrandt'; to Mr. James Wheeler, for a cut scape of 'Apple Blossom'; to Mr. Guy Rice for seedlings in hybridizers class.

OFFICIAL HOUSTON AMARYLLIS SOCIETY SHOW, 1964

Mrs. A. C. Pickard, *Official Show Standards Chairman,*
Mrs. Joe E. Craft, *Flower Show Chairman*

"Amaryllis, our promise of Spring" was the theme of the Houston Amaryllis Society's Official Show, held in the Houston Garden Center, April 19, 1964.

To a flower lover, gardener and flower arranger the Society's show has grown to be the most popular event of the Spring season.

The classification of entries included the named and unnamed species from Division 1 through Division 8 with exception of Division 2, long trumpet. Unclassified (non registered) were grouped by countries of origin.

Exhibits in possession less than one year were classified in a separate section from exhibits grown more than one year. However, the two separate sections were competitive, as it requires less effort to bring into bloom the newly purchased bulb.

Potted plants were placed in classes by number of scapes per plant. Collections, minimum 5 specimens, named and registered Dutch (all one color), Dutch named and registered, all different, all garden grown added another point of interest.

Under the Amaryllid section the Clivias were proudly displayed with their lovely umbels of salmon flowers with yellow throats.

The educational section showing methods of vegetative and asexual propagation always seems to appeal to the public.

Most interesting additions to the show were the two six foot tables of Dutch A. seedlings from the Pickard's Amaryllis Gardens, hybridized by Mrs. A. C. Pickard. All were Leopoldii type in colors from dark red through all shades of pink. Another six foot table held many

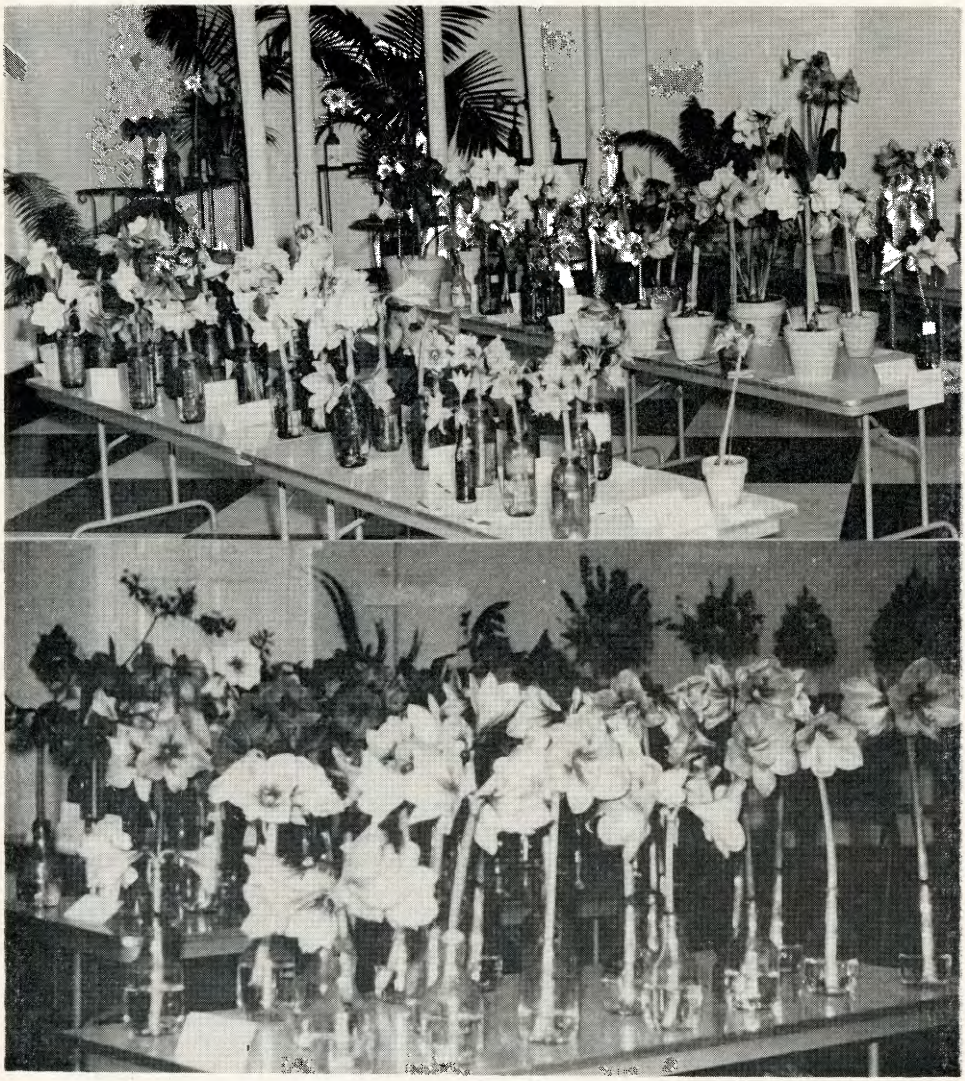

Fig. 6. Houston Amaryllis Society Show, 1964. Part of the exhibits.

outstanding seedlings grown by other members of the H.A.S. It was difficult to select favorites from so many new arrivals.

The horticulture section would not be complete without mention of high praise for the "Junior Amaryllis Society" exhibits of cut and potted Dutch specimens, including their educational table demonstration of seed planting to seedling, and named clone.

Invitational classes in horticulture and artistic sections displayed the growing interest in the Amaryllis world.

The Artistic section was executed with perfection, featuring Amaryllis in various arrangements.

A sponsored art exhibit by one of Houston's most popular masters of art was acclaimed for its outstanding beauty.

The H.A.S. show was a standard competitive official show. Horticulture was judged by official Amaryllis judges. There were 7 classes in artistic arrangements including the invitational class for Jr. judges and a class for national flower show judges. Mrs. W. L. Offenbacher won the tri-color in the Artistic section.

In the Horticulture section the following received the highest A.M. and H.A.S. Trophies; 'Boquet' (Lud.) A.M. & H.A.S. Trophy—Mrs. Carey Z. Brown; 'Golden Triumphator' (Warm.) A.M. & H.A.S. Trophy—Mrs. Joe E. Craft; 'Home Decorator' (Lud.) A.M. & Ludwig Cup—Mrs. M. E. Shelton; 'Pamela' (Lud.) A.M. & H.A.S. Trophy—Mrs. E. O. Griener; Breeders class: 'Dutch Seedling' P.C. & H.A.S. Trophy—Mrs. A. C. Pickard; 'Dutch Collection' H.A.S. Trophy—Mrs. A. C. Pickard; 'Apple Blossom' (Lud.) Houston Junior A.S. Founders Trophy—Robert Guenther.

The Houston Amaryllis Society is a working group and we renew our acquaintance each Spring with old favorites with the same joyous expectations that we greet the new arrivals.

12th OFFICIAL GREATER GULF AMARYLLIS SHOW, 1964

Miss Mildred Laughlin, *Secretary*
701 Dauphin Isle Parkway, Mobile, Alabama

The Amaryllis Society of Mobile staged its 12th Annual Greater Gulf Amaryllis Show, April 25 and 26, 1964, in Mobile, Alabama at the Murphy High School Cafeteria. Colonel Robert Pollack was Show Chairman and W. A. McCollum, Russell Ludlow and J. C. McRae acted as his Co-Chairmen.

Theme of the Show was AMARYLLIS UNDER FIVE FLAGS, with the theme being developed in the General Show decorations and the Artistic Arrangements.

The focal point of interest upon entering the Show was a large flagstaff containing the five flags side by side. Centered and in front of the flags was a small cannon. The display being enclosed with a small white picket fence which was flanked by *Amaryllis.*

Eighteen accredited judges from Hattiesburg, Mississippi, Pensacola, Florida and Biloxi, Mississippi judged the show. Award winners were:

Col. Robert Pollock, Sterling Silver Paul Revere Bowl for winning the most blue ribbons in show, including Horticultural and Artistic Arrangement Division; Silver Chased Tray with handles as winner of the most blue ribbons in horticultural division; Large Silver Tray with handles awarded for winner of the most blue ribbons in the combined Dutch Hybrid Potted and Cut Amaryllis Divisions; Silver Tray with handles as winner of the Most Blue Ribbons in the Dutch Hybrid Potted Amaryllis Division; Sterling Silver Cup for the Most Blue Ribbons in Dutch Named Varieties; Silver Cup for the Most Outstanding Hobby Collection of Amaryllis; Silver Bowl for the Most Blue Ribbons in unnamed Potted Seedlings; and Silver Bowl for the Most Blue Ribbons in the Single Bloom Named Division.

Mrs. J. C. McRae, Sterling Silver Vase for the Most Blue Ribbons in Artistic Arrangement Division; and The Inez Scheurmann Invitation Trophy with the entry for the Rose Club in the Invitational Class for Garden Clubs.

Miss Darby Hickson, Silver Trophy for Best Painting of Amaryllis (in Junior Division), and Silver Trophy for the Junior with the most blue ribbons.

C. E. Tagert, Sr., Silver trophy for Most Outstanding Horticultural Cut Specimen of Dutch Amaryllis in Show; Silver tray with handles for the Most Blue Ribbons in Dutch Hybrid Cut Amaryllis.

Wilmer Smith, Silver Bowl for the Most Blue Ribbons in the unnamed Cut Seedlings; Silver Bowl for the Most Blue Ribbons in the Single Bloom unnamed Division.

Mrs. Robert Waterhouse, Sterling Silver Sandwich Tray awarded for the Most Outstanding Horticultural Potted Bulb Specimen of Dutch Amaryllis in Show.

Mrs. R. E. Chason, Silver Trophy for the Most Outstanding Horticultural Potted Bulb Specimen of Amarvican Hybrid Amaryllis in Show.

Mrs. T. W. Antoine, Silver Trophy for the Most Outstanding Artistic Arrangement of Amaryllis in Show.

Miss Virginia Sherwood, Silver Trophy for the Best Painting of Amaryllis.

Mr. Jeff Brown, Silver Trophy for the Most Outstanding Horticultural Cut Specimen of American Hybrid Amaryllis in Show.

Mr. W. A. McCollum was given a Special Award Ribbon on his Hobby Display.

Col. Robert Pollack acted as Master of Ceremonies for the occasion. The Awards and Trophies were given by Mrs. A. B. Palmer, Chairman of that Committee, with the assistance of the President, Mr. Wilmer R. Smith.

4th OFFICIAL HATTIESBURG AMARYLLIS SOCIETY SHOW, 1964

Mrs. Sam Forbert, *1910 Evergreen Lane, Hattiesburg, Miss.*

The 4th Official Hattiesburg Amaryllis Society Show was held May 2—3, 1964 at the Garden Center. Several hundred enthusiastic Amaryllis fanciers came to view the outstanding array of blooms. The Show theme "Creating Beauty" was inspirational and tended to guide creative minds and hands in action. Friendly rivalry existed among members in both Horticulture and Artistic Design divisions of the Show. This resulted in the best Show up to the present.

This is to be expected because for the past seven years members have been growing Amaryllis from seeds, and these crosses of Dutch and American clones, are now coming to maturity and the flowers are coming into the Show. Wonderful new colors and forms are being produced and in due time when proved meritorious, will be registered and named. Hundreds of named clones are being planted each year, both in pots and outdoors.

Mrs. Charlie Bell's 'Heaven Sent' (Ludwig) was voted the most beautiful clone in the Show by an overwhelming majority vote of the visitors to the Show. 'Cardinal', 'Beautiful Lady', 'Streaking Stripes' and 'Happy Memory' each received a large vote also.

The Official Amaryllis Judges for the Horticultural Division were: Mr. and Mrs. J. A. Brown, Mr. W. C. Strain, Mr. W. R. Smith, Mr. W. A. McCollum and Mrs. A. B. Palmer, all of Mobile, Ala. The Artistic Design Judges were: Mrs. R. E. Goodwin, Mrs. S. D. Case, and Mrs. John B. Guenther, nationally accredited Flower Show Judges of Jackson, Miss. They judged thirty designs in six classes including both Free-Form-Interpretive and Geometric. There are fifteen nationally accredited Flower Show Judges in our Society which perhaps accounts for the expert workmanship in the designs displayed.

Winners of the Silver Awards were Mrs. Charlie Bell, Sweepstakes, with sixteen blue ribbons, captured the Swetman Traveling Trophy (Swetman Amaryllis Nursery, Gautier, Miss.).

Mrs. Charlie Bell, Best unnamed seedling, an outstanding red from Ludwig. Mrs. O. F. Coursey, Award of Merit for 'Zenith'. Mrs. John D. Askew, for a cut scape of 'Apple Blossom'. Mrs. Sam Forbert won in both cut scape and potted American hybrids. Miss Lucile Parker, exhibited the best painting of an Amaryllis in the Show.

Mrs. Paul Bailey received the tri-color award for a crescent design. Mrs. B. M. Lewis, received an Award of Distinction for a Free-Form Interpretive design. Mr. Robert D. Goedert, Amaryllis Bulb Dealer, of Jacksonville, Florida, donated the bulbs for the prizes.

Official American Amaryllis Society Awards of Merit were given to: Mrs. Charlie Bell, for 'Invincible', 'Cardinal', 'Streaking Stripes' and a Ludwig seedling; Mrs. O. F. Conway, for 'Zenith'; and Mrs. J. W. Snowden for 'Beautiful Lady'.

Preliminary Commendations from the American Amaryllis Society were awarded to Mrs. Sam Forbert for a cut scape of a seedling (Dutch-American cross), cut specimen (American seedling), a potted American seedling; Mrs. Charlie Bell, for a seedling raised from 'Apple Blossom'; Mrs. Jhnonie Jackson, for an American seedling; and Mrs. Charlie Bell, for a seedling grown from Ludwig stock.

GREATER HOUSTON AMARYLLIS JUDGES COUNCIL

The fast growing Gulf Coast area, where plant life enjoys abundaut growth and where weather conditions are favorable for growing amaryllids, which have become more and more popular, has been lagging in sufficient accredited amaryllis judges to assist at the many shows each Spring. Realizing this, two well known Houston growers, who are accredited judges, conducted classes for members of The Greater Houston Amaryllis Club: Mrs. Walter D. Wells, Sr. in Horticulture and Mrs. W. S. Wheeler in flower arranging. The classes and examination were held in the home of Mrs. Wells at no cost to the members. As a result the area now has six additional accredited amaryllis judges, all members of The Greater Houston Amaryllis Judges Council, which was organized in January, 1964.

The Greater Houston Amaryllis Judges Council held monthly meetings during the blossoming period of the amaryllids, which will be their future policy. This Council has limited its membership to authorized amaryllis judges who must be active growers of varied types of amaryllids, with emphasis on each member growing some species.

The purpose of the Council is primarily to keep up with new rules on judging, as well as new trends in amaryllis and results of experiments of the various hybridizers.

The present officers are: Mrs. W. S. Wheeler, President, Mrs. Walter D. Wells, Sr., Vice President, and Mrs. Sally Fox, Secretary-Treasurer.

THE SOUTHERN CALIFORNIA HEMEROCALLIS AND AMARYLLIS SOCIETY FOUNDED

This Society was founded in 1964 and will hold its first Amaryllis Show on April 24—25, 1965. Those interested in joining and/or exhibiting at the show should write to Mrs. Dorothy Rose, Secretary, 10300 Rosewood Av., South Gate, Calif.

AMARYLLIS JUDGES CERTIFICATES

Since the last report in the 1964 Amaryllis Year Book (page 31), the following named Amaryllis Judges Certificates have been issued by the American Amaryllis Society:

134. Mrs. Earle W. Purser, 1523 Milford, Houston, Tex. 77006 (Horticulture only).
135. Mrs. K. C. Poulsen, P. O. Box 337, Lake Jackson, Tex. 77566 (Horticulture only).
136. Mrs. Esther Cash, 1101 E. Cedar, Angleton, Tex. (Horticulture only).
137. Mrs. L. E. Morgan, 1220 Chevy Chase Drive, Angleton, Tex. (Horticulture only).
138. Mrs. Thomas S. Behr, 5345 Windswept Lane, Houston, Tex. 77027 (Horticulture only).
139. Mrs. E. E. Koon, 1147 Panama, Houston, Tex. (Horticulture only).
140. Mrs. George Harris, 316 E. Bernard St., Clute, Tex. (Horticulture only).
141. Mr. Carey F. Brown, 9328 Leto Road, Houston 55, Tex. (Horticulture only).
142. Mrs. Lucy D. Wilkinson, 1008 Morningside Dr., Angleton, Tex. (Horticulture only).
143. Mr. Santo N. Cuchinotto, 2338 Independence St., New Orleans, La. 70117 (Horticulture only).
144. Mr. Barry W. Clark, 2735 Lavender St., New Orleans, La. (Horticulture only).
145. Mr. James E. Mahan, 3028 Palmyra St., New Orleans, La. (Horticulture only).
146. Mrs. Tracy T. Word, 3219 Fairhope St., Houston, Tex. 77025 (Horticulture only).
147. Mrs. A. F. Segatske, 2611 Oaks Drive, Pasadena, Tex. 77502 (Horticulture only).
148. Mrs. V. V. Hubby, 716 Heron Lane, Pasadena, Tex. 77502 (Horticulture only).
149. Mr. Tracy T. Word, 3219 Fairhope St., Houston, Tex. 77025 (Horticulture only).

AMARYLLIS REGISTRATION—continued from page 100

Registered by G. C. Van Waveren & Sons, Heemstede, Holland:

Reg. No. A-827, 'Berenice', very dark velvet red.
Reg. No. A-828, 'Daphne', brick red.
Reg. No. A-829, 'Durango', clear orange.
Reg. No. A-830, 'Fortuna', salmon with dark throat.
Reg. No. A-831, 'Hecuba', orange.
Reg. No. A-832, 'Odin', salmon pink.
Reg. No. A-833, 'Orion,' rose with white.

CONTROLLING MEALYBUGS—continued from page 152.

and meanwhile, the mealybugs are gone. It is my understanding that this material has both a systemic and contact effect in controlling insects.

The folder accompanying my bottle of Cygon 2E did not list any amaryllids at all, but for "Poinsettias and Outdoor Plants" it recommended a spray of 2 teaspoonfuls of Cygon 2E to the gallon of water, for control of mealybugs, Mites, white flies and aphids. I have simply used that strength, both as a spray and for immersing entire pots of growing bulbs. If there is any damage to the plants, I haven't noticed it.

This sounds like a patent medicine commercial or testimonial. I have no interest whatever in the manufacture or sale of this material, but am so grateful for it's killing the mealybugs on my plants that I'm glad to spread the news.

CONTROL OF AMARYLLIS LEAF TROUBLE IN AUSTRALIA

C. A. Campbell, *New South Wales*

In the past I have had trouble with black and reddish-brown spots on *Amaryllis* leaves. [This is apparently the red leaf spot of *Amaryllis*. —Editor] I tried many kinds of sprays for fungi and insects obtainable on the market over the years, but without success. Recently I tried the commercial product, "Phenyle" on the plants with the spotting, using it at the rate of 2½ tablespoons of the product to one gallon of water. Before application, I cut away all of the affected leaves; "Phenyle" was sprayed on the plants two times a week. At the end of two weeks, the young leaves appeared normal without any spotting. On the basis of this experience, I spray all of my *Amaryllis* once each week with "Phenyle", and the leaves are now a beautiful green color. It may be that others having similar trouble would like to try this method of control for spotting of *Amaryllis* leaves.

59 Gannons Road,
Caringbah, New South Wales.

(Editorial note: It is hoped that Mr. Campbell will publish a note about the composition of "Phenyle" so that we may obtain an idea of what the active substance is which is effective in controlling red leaf spot in *Amaryllis*.)

2. LINEAGICS

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

FOUR NEW BOLIVIAN **AMARYLLIS** SPECIES

MARTIN CARDENAS

Amaryllis umabisana Cardenas, **sp. nov.**

(Macropodastrum) Bulbus ovoideus, tegumentum nigriscentibus obtectus, 6-7 cm long. 6 cm crassus. Foliis erectis, 30-35 cm long., 1.5-2 cm latis glaucus. Scapo plusminusve 30 cm long., 1 cm crasso, parce compplanato, herba viridis. Umbella 2-3 flora. Bracteis spathaceis 7 cm long. albidis apice bruneis. Pedicellis 2-3 cm long., 5 mm crassis. Floribus 17 cm long. niveo albis, fragrantibus. Ovario diluto viride, 12 mm long. 5 mm crasso. Tubo 3.5 cm long, 5 mm crasso. Setepalsegmentis 10 cm long. 3 cm latis, lanceolatis, mucronatis, albis a basim viridiscentibus. Petepalsegmentis lanceolatis 10 cm long., 2.5 cm latis, margo undulatis, niveo albis, a basim viridibus. Staminibus 5-6 cm long. Filamentibus albis a basim viridibus. Antheris 6 mm long. flavis. Stylo 6 cm long. albo a basim viridis. Stigma trifida alba. Lobis stigmaticis 5 mm long. Paraperigonium diluto viridis.

Patria: Bolivia. Provincia Bilbao. Departamento Potosi, prope Umabisa 2,000 m.

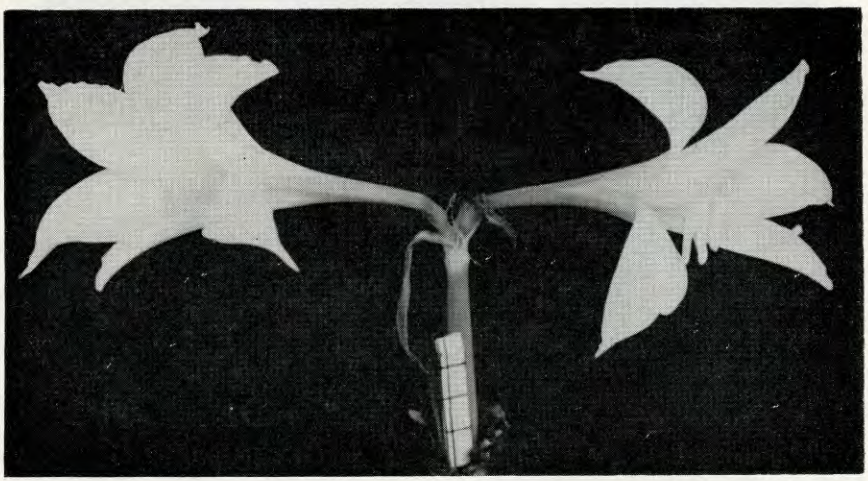

Fig. 7 *Amaryllis umabisana* Cardenas, *sp. nov.*

Bulb ovoid covered by almost black skin, 6-7 cm long, 6 cm thick. Leaves erect 30-35 cm long, 1.5-2 cm wide, gray green. Scape about 30 cm long 1 cm thick, fresh green somewhat flattened. Spathe valves 7 cm long whitish, brown tipped. Umbel 2-3 flowered. Pedicels 2-3 cm long, 5 mm thick. Flowers 17 cm long. 8 cm limb scented. Ovary 12 mm long, 5 mm thick light green. Tube 3.5 cm long, 5 mm thick above ovary, greenish white. Setepalsegs lanceolate 10 cm long 3 cm wide pure white, mucronate, greenish at the base. Petepalsegs lanceolate 10 cm long, 2.5

cm wide, curled at edges, snow white, deflexed, greenish at base. Stamens 5-6 cm long; filaments white, greenish at base; anthers 6 mm long, yellow. Style 6 cm long surpassing stamens, white, greenish at base. Stigma trifid with 5 mm long lobes. Paraperigone light green bearing few hairs.

Fig. 8. *Amaryllis incachacana* Cardenas, *sp. nov.* (upper) flowering scape, and capsules; (lower) ovary, tepaltube, and tepalseg; also stamens and pistil (natural size).

Bolivia. Province Bilboa. Department of Cochabamba, near Umabisa, 2,000 m. On rocky cliffs among xerophytic bushes, November 1960, M. Cárdenas No. 6,100 (Holotype) in Herbarium Cardenasianum.

Obs.—This species recalls *A. chionedyantha* Cárd. by its long tube, and fragrant pure white flowers. Differs however by its very erect habit, its shorter flower parts and its xerophytic habitat which is unusual for *Amaryllis*. Another physiological character of this rare *Amaryllis* is that it does not flower even in Cochabamba at an elevation of only 2,500 m. and with similar dry air conditions.

Amaryllis incachacana Cardenas, **sp. nov.**

Bulbo globoso 7 cm long. Foliis loratis 40 cm long. 3 cm latis herba viridis a basim purpureis. Scapo 50 cm long. cylindrico, parce compplanato superne glauco, inferne purpureo, 2,5 cm a basim crasso. Umbella 7-8 flora. Bracteis spathaceis 5-6 cm long lanceolatis bruneis. Pedicellis 3.5-5 cm long 3 mm crassis atro viridis. Floribus 7-8 cm long roseo lilacinus. Ovario 8-12 mm long. 6 mm crasso, trigono, atro viridis. Tubo 7 mm long. atro viridis. Setepalsegmentis lanceolato spathulatis 6-7 cm long. 2-2.5 cm latis, diluto roseis, linea media alba 3 mm lata instructis. Petepalsegmentis lanceolatis roseo lilacinis, linea media alba ostentis. Staminibus 4-5 cm long. Filamentibus albidis. Antheris 3 mm long. flavis. Stylo 6-7 cm long. Stigma trifida atro purpurea. Capsula triloculata 1-1.5 cm alta, 2.5-3 lata, atro-viridis.

Patria: Bolivia. Provincia Chapare. Departamento Cochabamba, prope Incachaca, 2,000 m.

Bulb globose about 7 cm in diameter covered by several brown tunic sheets. Leaves lorate 40 cm long, 3 cm wide, fresh green, purple at the base and unusually thick. Scape 50 cm long cylindric to slightly flattened at the base, glaucous above purplish below. Umbel 7-8 flowered. Spathe valves 5-6 cm long lanceolate, brownish. Pedicels 3.5-5 cm long at anthesis, dark green. Flowers 7-8 cm long, light purple to pink lilac. Ovary 8-12 mm long, trigone, 6 mm thick dark green. Tube 7 mm long dark green. Setepalsegments lanceolate to spathulate 7 cm long, 2.5 cm wide, light pink with a central white 3 mm wide line outside and red streaks inside. Petepalsegments lanceolate of same size and colour as setepalsegments. Stamens 4-5 cm long; filaments whitish; anthers only 3 mm long, yellow. Style 6-7 cm long. A very conspicous nectar cavity at the bottom of tube. Stigma trifid dark purple. Capsules similar to those of *A. belladonna*, L. 1-1.5 cm high, 2.5-3 cm broad, dark green with darker colour at the septal lines.

Bolivia. Province of Chapare. Department of Cochamba, near Incahaca, 2,000 m. No. 6102 (Holotype) in Herbarium Cardenasianum.

Obs.—This rare species of *Amaryllis* was obtained for study from a lady living at Cochabamba who said she obtained it from Incachaca. We have not collected it although we have visited Incachaca several times. It is like *A. mollevillquensis* Cárd. in the size and number of flowers. It is characterized by its thick leaves and the white middle line on the tepalsegs.

Amaryllis Pseudopardina Cardenas, **sp. nov.**

Bulbus globosus 5-6 cm long. Foliis loratis 30-35 cm long., 2.5 cm latis, herba viridis. Scapo 10-16 cm long. parce compplanato, viridis. Umbella 2 flora. Braceteis spathaceis lanceolatis 7 cm long. flavidulis vel purpureis. Pedicellis 2-3 cm long., 3 mm crassis, viridis. Floribus actinomorphis, 11 cm long. Ovario trigono, 1 cm long. 5 mm crasso atro viride. Tubo brevis, 4 mm long. extus atro viridis. Setepalsegmentis 10 cm long. 2.5 cm latis, lanceolatis, mucronatis, exteriora cremea viridis, interiora alba viridiscente a marginem, sanguinea rubra a zonam media. Petepalsegmentis lanceolatis, 9.5 cm long., 3 cm latis, exteriora cremea viridis, interiora sanguinea rubra, cremea marginata. Paraperigonium viridiscentibus. Staminibus 7-9 cm long. inferne diluto viridibus, superne albis. Antheris 3-5 mm long. flavis. Stylo stamina superans 9-10.5 cm long. inferne temperato viridis, superne atro-purpureo. Stigma parva trilobata, purpurea lila marginata. Capsula trilocularis, 3 cm. long., 3 cm. crassa atro viridis. Semina membranacei alata atro brunea 18 mm. long.

Patria: Bolivia. Provincia Chapare. Departamento Cochabamba. Yungas de Corani, 1,500 m.

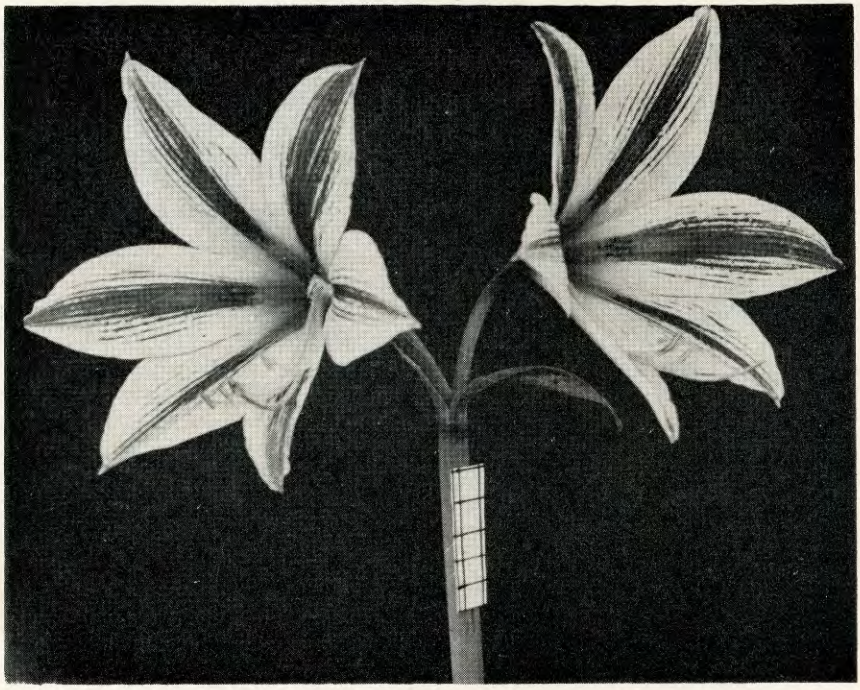

Fig. 9. *Amaryllis pseudopardina* Cardenas, *sp. nov.;* flower scape.

Bulb globose 5-6 cm long. Leaves lorate 30-35 cm long, 2.5 cm wide, fresh green. Scape 10-16 cm long slightly flattened, 8-11 mm thick, dark green, purple flushed. Umbel quite always 2 flowered. Spathe bracts lanceolate 7 cm long, yellowish purple. Pedicels 2-3 cm long, 3 mm thick, fresh green. Flowers regularly actinomorphic,, 11 cm long, 10 cm across limb, not completely opened. Ovary 3 ribbed, 1 cm long 5-6 mm thick, dark green. Tube very short, 3-4 mm long, dark green, Setepalsegments lanceolate acute to mucronate 10 cm long, 2.5 to 3 cm wide, cream greenish outside, white greenish with a solid blood red central band inside. Petepalsegments lanceolate. mucronate, 9.5 cm long, 3 cm wide of the same colour as are the setepalsegments. The lower petepalsegments narrower, only 2.5 wide. Paraperigone light green with 5 mm long hairs closing entirely the tubular throat. Stamens 7-9 cm long light green below, whitish above; anthers 3-5 mm long, yellow. Style longer than the stamens 9-10.5 cm long, light green below, dark purple above and again white greenish at the very base of stigma. Stigma slightly trilobate, purple bearing a lilac bordering line around the lobes.

Capsule triocular, 3 cm. long, 3 cm. in diam., dark green with darker or blackish borders. Seeds flat, D-shaped, membranaceus, dark brown 18 mm. long.

Bolivia. Province of Chapare. Department of Cochabamba. Yungas of Corani, 1,500 m. February 1959. M. Cárdenas, No. 6,094 (Holotype) in Herbarium Cardenasianum.

Obs.—This handsome species is reminescent of *A. pardina* Hook f. in the color of the tepalsegs but differs by its not deflexed flower segments and the wide rare solid blood red band at the middle of tepalsegs which is continued by red streaks towards its borders. The short scape is always 2-flowered.

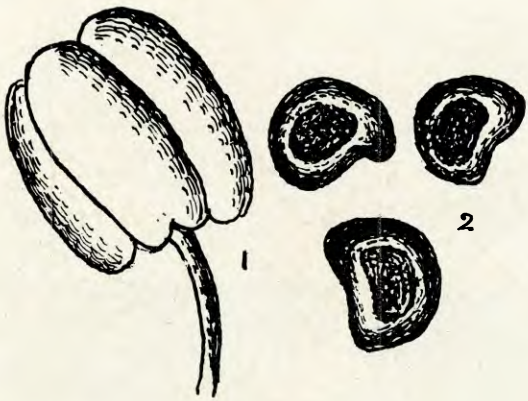

Fig. 10. *Amaryllis pseudopardina* Cardenas, *sp. nov.;* 1. capsule and 2. seeds (natural size).

Amaryllis yungacensis Cardenas et Nelson, **sp. nov.**

Bulbus globosus 5—7 cm. long. Foliis loratis 30—50 cm. long. 2—3.5 cm latis a basim angustatis, viride glaucescentis. Scapo 25—35 cm long. 12 mm a basim crasso, viridis. Umbella 2 flora. Bracteis spathaceis atro purpureis 5—6 cm long. Pedicellis 2—3 cm long. 5 mm crassis, dilute viridis. Floribus fere actinomorphis, 11 cm long. Ovario 1 cm long, 8 mm crasso atro viridis. Tubus brevis 4 mm long. atro viridibus. Setepalsegmentis late lanceolatis 10 cm long. 3—4 cm latis, mucronatis, inferne diluto viridis, superne atro vinoso rubis. Petepalsegmentis lanceolatis 9.5 cm long. 2.5—3 cm latis, inferne viridibus, superne atro vinoso vel lilacino rubis. Paraperigonium temperato viridis 2 mm altis, pectinatis. Staminibus 8—9 cm long. sursum curvatis; filamentis diluto viridis; antheris 7 mm long. flavis. Stylo stamina superans 11.5 cm long. inferne diluto viridis, superne albis. Stigma 2 mm crasso, trilobata, magenta.

Patria: Bolivia. Provincia Sud Yungas. Departamento La Paz, prope Rio Solacama, 1,800 m.

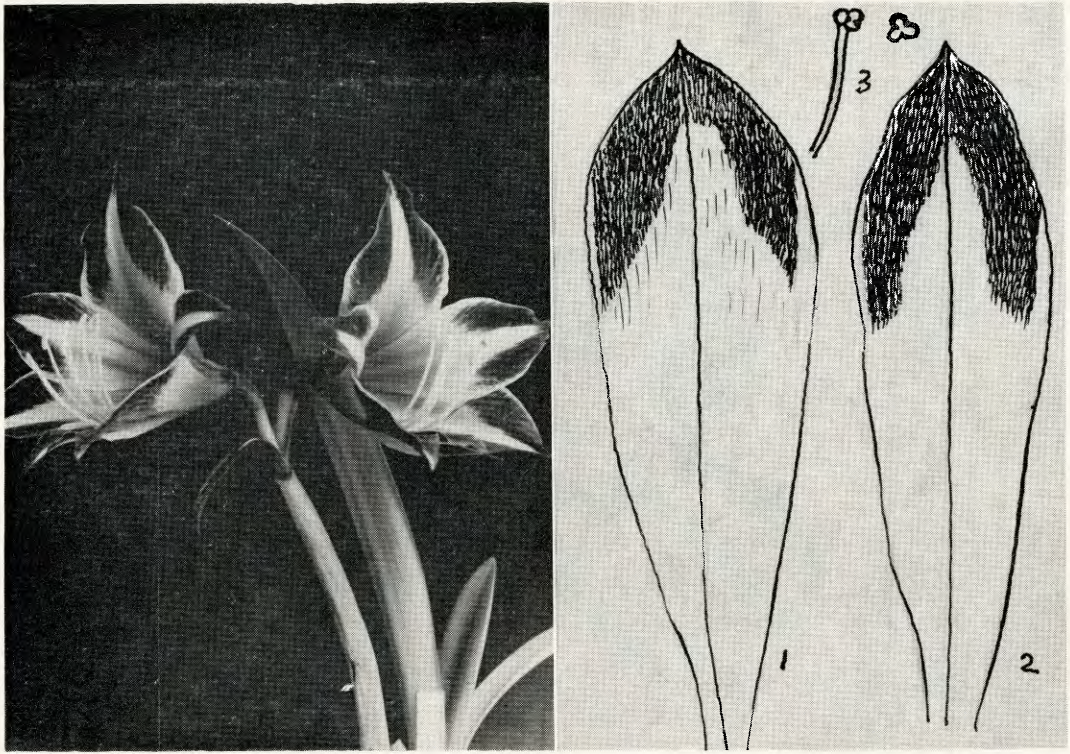

Fig. 11. *Amaryllis yungacensis* Cardenas & Nelson, *sp. nov.* (left), flowering scape and leaves; (right) 1. setepalseg, 2. petepalseg, and 3. stigma (natural size).

Bulb globose 5-7 cm long. Neck of bulb 3.5 cm long. Leaves lorate, 30-35 cm long, 2-3.5 cm wide, narrow at base, grayish green (moderate yellow green—Nickerson Color Fan 5GY 5/6). Scape 25-55 cm long, 12 mm thick at base, green with a purple flush at the base. Umbel 2-flowered. Spathe valves purplish red and remain fresh for 2 to 3 days after anthesis, 5-8 cm long, 1.5 cm wide. Pedicels 2-5.9 cm long, light green, 5 mm thick. Open flowers quite regularly actinomorphic about 11 cm long and 13 cm wide. Ovary 1.5 cm above, 8 mm below, 7-8 mm thick, olive green tinged with red. Tepaltube short 4 mm (1.7 above, 1.3 below) same color as ovary. Top setepal broadly lanceolate 10-12 cm long, 3-4.4 wide mucronate. Lower sepals 10-11.9 cm long, 3.9-4.-1 wide mucronate. Setepalsegs with basic ground color of yellow green (brilliant yellow green—Nickerson Color Fan 2.5GY 8/9) fading to almost white on segment margins. Upper 1/3 of segments dark red (moderate red—Nickerson Color Fan 2.5R 4/10) with deeper red venation (dark red—Nickerson Color Fan 2.5R 3/7). Wide yellow green keel extends from base to tip of segments on inner surface only. Bottom petepalseg 9.5-11.2 cm long, 2-2.75 cm wide, lanceolate, colored same as setepalsegs. Keel on inner surface does not extend to tip of segment. Upper petepalsegs 9.5-11.7 cm long, 2.5-3.5 cm wide lanceolate. Colored same as bottom petepalseg. The two upper petepalsegs are more reflexed. The lower petepalseg is slightly plicate near the base to support the androecium. Paraperigone light green callus 2 mm thick with incurved white hair-like appendages. Filaments of 2 length groups 8.0-10.3 cm long, ascending, yellow green below fading to white above. Anthers 1.25 cm long before dehiscence, 7 mm long after dehiscence, yellow. Style longer than stamens, 11.5-13.7 cm, yellow green at base fading to white above. Stigma 2 mm thick, strongly trilobed, magenta. Fruit, 3-celled, many seeded, dehiscent capsule about 3.5 cm in diameter. Seed, flattened, D-shaped, very thin and paper like, turning black at maturity, to 1.8 cm long, 1.0 cm wide.

Bolivia, Province of Sud Yungas. Department of La Paz. Banks of River Solacama, Nov. 7, 1958, M. Cardenas and I. S. Nelson, No. 6093 (Holotype) in Herbarium Cardenasianum, No. U.S.L. 1786, Ornamental Horticulture Herbarium, University of Southwestern Louisiana.

Obs. Bulbs of this species were introduced into the United States by both collectors since 1958. In 1960 Cardenas examined the type species of *Hippeastrum Mandonii* Baker at Kew Herbarium and it seemed that our species from Rio Solacama might be *A. mandonii* (Baker) Traub and Uphof. The same year he saw at the Paris Natural History Museum several duplicates of Mandon's collection from Rio Challasuyo, near Sorata, Bolivia, which were not named. After returning to Bolivia Cardenas went to the type locality of *A. mandonii* and collected several bulbs. These bulbs which bloomed in cultivation at Cochabamba, Bolivia, proved to be among the most beautiful *Amaryllis* known from Bolivia if not from anywhere else, but differed from the collection from the banks of the Solacama River. Thus we arrived at the conclusion that the Solacama River plants represent a species

new to science. It has been described above with the following differential characteristics: The flowers are much more regular than those of *A. mandonii,* the red coloration is darker, the flowers are keeled with yellow green on the inner surface of the segments, it is found at nearly 1000 M. lower and in a much warmer and more humid atmosphere.

At a glance the dry herbarium specimens of both taxa seem very similar but a comparison of living materials readily reveals the extent that the more acute flower segments of *A. mandonii* are connivent and all are the color of the Bolivian Flag, that is blood red at the tips, yellow in the center and greenish in the throat. The white margins on the segments of *A. yungacensis* are not present on *A. mandonii.*

A. yungacensis has proved easy to flower in cultivation once it became established. Seed set is readily obtained by using pollen from a different clone from the pod parent. This should prove to be a valuable species for the hybridizer.

It is of interest to point out that with the description of these new species, the number of *Amaryllis* species known from Bolivia numbers over 30, which is a larger number than from any other South American Country.

University of San Simon,
Cochabamba, Bolivia

COMMENTS ON AMARYLLIS PSEUDOPARDINA

With reference to *Amaryllis pseudopardina,* the editor, under date of Aug. 1, 1964, made the following comments in a letter to Dr. Cardenas:

"With reference to *Amaryllis pseudopardina,* this is the closest match with *Amaryllis leopoldii* that has been found up to the present. This species has been lost for almost a century and many have searched for it. The only difference appears to be the color pattern, particularly in the throat. However, such color variations are often found in *Amaryllis* species. Thus, it may be that this plant will later be recognized as *A. leopoldii.* The rediscovery of this species will be hailed as a really important event."

DR. CARDENAS LETTER, AUG. 27, 1964

In reply, under date of Aug. 13, 1964, Dr. Cardenas commented:

"Your comments about *Amaryllis pseudopardina* are very interesting. Really, with the exception of the white bifid bar appearing in the throat of *A. leopoldii,* my new species has all the floral morphology of *leopoldii.* Pearce, as well as the other early collectors of ornamental plants, were obliged by business reasons to avoid the mention of the right places where they found the most valuable plants. According to Pearce, *A. leopoldii* and also *A. pardina,* are from Peru. However, to my knowledge they have not been recollected in that country. On the contrary, at least *A. pardina,* in two varieties, has been found by Prof. Nelson and me as true wild plants in Bolivia. The typical *A. pardina,*

I found in 1959 at Apolo, where Pearce collected. The other variety with stripe-lines instead of dots of blood-red on cream or whitish tepalsegs, was found by Prof. Nelson at Santa Cruz and by me in Yungas of La Paz. In the latter locality, Pearce also collected. But *A. pseudopardina,* comes from Yungas de Corani where according to the itinerary of Pearce, provided for me by Mr. Sandwith from Kew Gardens, Pearce did not enter.

"One striking thing is that years ago while inspecting a large number of commercial *Amaryllis* grown by Mr. Lancaster in Cartago, near San Jose de Costa Rica, I noted that most of the hybrid segregate plants showed flowers of the pattern reminiscent of *A. pseudopardina.*

"Lastly, when I spent a few days at La Paz in June, I saw for the first time flowers of *A. pardina* and *A. vittata tweediana* at the Flower Market. I asked where they came from and I was told that they were gathered from the wild in Yungas of La Paz. The *A. pardina* I saw this time had the appearance of *A. pseudopardina* except for the solid blood-red zone in the middle of the tepalsegs which had instead very dense pencilings of the same colour."

In reply to Dr. Cardenas' letter of August 13, the Editor reported (Sept. 7, 1964) that he wrote to Dr. Sandwith at Kew Gardens for a copy of the Pearce itinerary mentioned by Dr. Cardenas, and received the following reply:

"Replying to your letter of Aug. 20th about a Pearce itinerary reported by Dr. Cardenas, I am afraid that is a slight misunderstanding. There is no such definite itinerary. There are only sheets of foolscap with localities and dates and territories jotted down, as Dr. T. A. Sprague and I found them on herbarium labels, for our private use. These are often used by botanists who visit us, because many of Pearce's localities are so obscure, and it is convenient to look on our little collection to see if any given one is there, and in what country between Ecuador and N. W. Argentina it lies, but our list of course is not complete, is in no sense an "itinerary", and is quite unfit for publication. Believe me, yours sincerely, (signed) Noel Y. Sandwith." Aug. 27, 1964.

The Editor stated further in his letter to Dr. Cardenas (Sept. 7, 1964): "Thus Pearce could have collected in Yungas de Corani. Apparently, he collected only bulbs without flowers and thus there are no herbarium specimens of some of his *Amaryllis* species. We have been looking high and low for anything closely resembling his *Amaryllis leopoldii*, and your *A. pseudopardina* may turn out to be the long missing species."

"From the reported data, *Amaryllis leopoldii* was placed in the subgenus AMARYLLIS by Baker. Thus it will have to be moved to the subgenus AULICA. Baker did not know that it had a pronounced paraperigone."

DR. CARDENAS LETTER, SEPT. 27, 1964

In reply to the editor's letter, Dr. Cardenas wrote under date of Sept. 27, 1964, "the place where this species (*Amaryllis pseudopardina*)

was found by one of my students and where I did travel 10 days ago, is quite out of the regular travel routes. We went by car from Cochabamba to Limbo in the direction of Chapare (124 Km.). From there it was necessary to go by a narrow mule path which was very difficult to negotiate even on foot. I traveled only 10 Km., because the descent was very steep. I sent two students to a place 5 Km. downward. I retraced the 10 Km. back upward to Limbo which took three hours. By evening, the students came back bringing bulbs of *Amaryllis pseudopardina* with flower scapes in bud attached. The next day we returned to Cochabamba. Thus it took three days' journey to collect the precious bulbs. Twenty flowering-sized bulbs were sent by air freight to Prof. Nelson for distribution in the United States."

The bulbs are being distributed by Prof. Claude W. Davis of Baton Rouge, Louisiana. He has notified his customers and long before the members read this note, they will have been exhausted. Thus many will have to wait until seeds are produced which might be sold directly, or they could be planted and sold when the bulblets are large enough. Thus after almost a century, the long lost *Amaryllis leopoldii* has been found.

In an earlier letter (dated Sept. 3, 1964), Dr. Cardenas indicated that the species is located on a quite inaccessible cliff. Thus the members are in debt to Dr. Cardenas for the reintroduction of *Amaryllis leopoldii.*

PLACEMENT OF BULBS

The 22 bulbs sent to the United States by Dr. Cardenas have been placed as follows (Prof. Nelson received two for the collection at the University of Southwestern Louisiana; all others received one bulb):

Prof. Ira S. Nelson, Department of Horticulture, U. S. L., Lafayette, La.
Mrs. H. W. Tucker, 3612 Byron Street, Baton Rouge, La.
Mr. Fred Buchmann, 1766 Avondale Drive, Baton Rouge, La.
Mr. Joseph K. Mertzweiller, North Parkway Drive, Baton Rouge, La.
Prof. Claude W. Davis, 470 Delgado Drive, Baton Rouge 8, La.
Mr. Lewis Lloyd, P. O. Box 19686, New Orleans 19, La.
Mrs. Morris W. Clint, 2005 Palm Blvd., Brownsville, Texas.
Dr. Clair Brown, Dept. of Botany, L.S.U., University Station, Baton Rouge 3, La
Mrs. Camilla B. Truax, Box 246, St. Francisville, La.
Mr. Earl E. Vallot, Grandview Nursery, RFD, Box 54, Youngsville, La.
Mr. Charles Ramelli, 128 Jeff Davis Avenue, Biloxi, Miss.
Mr. Robert D. Goedert, P. O. Box 6534, Jacksonville, Florida 32205.
Mrs. Alton J. Hoffman, 205 Rees Street, Breaux Bridge, La.
Mr. Hugh L. Bush, P. O. Box 1371, Columbia, S. C., 29202.
Mr. Joe L. Stanley, 2203 West 9th Street, Austin, Texas.
Mrs. A. C. Pickard, 1702 North Blvd., Houston, Texas 77006.
Mr. Everett E. Cook, Box 135, Gulfport, Miss.
Mr. W. D. Morton, 3114 State Street Drive, New Orleans 25, La.
Mr. W. J. Perrin, 4753 Press Drive, New Orleans 26, La.
Mr. James E. Mahan, 3228 Palmyra Street, New Orleans 19, La.
Mr. W. R. Latapie, 3737 Elysian Fields Avenue, New Orleans 22, La.

It is not known if this species is self-fertile. In case it should prove to be self-sterile, those listed may be able to exchange pollen and thus make good such a deficiency, if it should exist.

It is also suggested that the members report on their experiences with this species in future issues of the Amaryllis Year Book.

LYCORIS JOSEPHINAE, SP. NOV.

Hamilton P. Traub

In 1945, Miss Josephine Henry obtained a small-leaved form of *Lycoris* in China. When it finally bloomed here at La Jolla, Calif., in 1964, it was noted that it differs from *Lycoris radiata* var. *radiata*, the biological type, and *L. radiata* var. *triploidia* (the triploid form). When grown under the same soil and cultural conditions here at La Jolla, Calif., the leaves are less upright, and it blooms much later (last days of August through September) as contrasted with *L. radiata* var. *radiata* which blooms in July. It also differs in phenontological characters. The scape is much stouter and taller, the flowers are Delft-rose (HCC-020) the widest leaves are slightly wider than in *L. radiata* var. *radiata*, and they are a deeper green, glabrous, with lighter glaucescent stripe in center, and glaucescent on under side with a glabrous green keel in center. Since the blooming seasons are different, it is reproductively isolated from *L. radiata* var. *radiata*, and it is thus entitled to specific rank. It has been named for Miss Josephine Henry of Gladwyne, Penna., who brought it to the United States.

Lycoris josephinae Traub, **sp. nov.**

A L. radiata var. radiata differt scapo valde robustiore longioreque, floribus "Delft"-roseis, characteribus foliorum, et anni tempo florente tardiore (a ultimis diebus Sextili usque ad finem Septembri).

Rootstock bulbous. *Leaves* several per bulb, narrow, linear, up to 8 mm. wide, deep green, glabrous, with lighter glaucescent strips in center, glaucescent on under side with a narrow glabrous green keel in the center. *Scape* solid, stout, up to 37 cm. tall, reddish in lower ¼, dull greenish above, 9x10 mm. diam. (base), 5x6 mm. diam. (apex). *Spathe* 2-valved, lanceolate, acute, up to 4.3 cm. long. *Umbel* 8-flowered, segs, stamens and style Delft rose (HCC-020), tepalsegs ruffled on the margins, upper ½ decidedly recurved; stamens and style much exserted. *Pedicels* 6-7-9-10 mm. long at anthesis. *Ovary* 6 mm. long, 4 mm. in diam. *Tepaltube* 5 mm. long. *Paraperigone* of 6 single minute rose-colored teeth between the segs at the base. *Tepalsegs* 4 cm. long, 5 mm. wide, acute. *Stamens* and *style* much longer than tepalsegs. *Style* subequaling the longest stamens. Anthers 4 mm. long at anthesis, pollen yellow. *Stigma* minute.

HOLOTYPE: Traub #972 (TRA), 8-29-64, cult., La Jolla, Calif.; from bulbs obtained by Miss Josephine Henry, Gladwyne, Penna., in

China, July 1945, from a soldier on mosquito patrol. He got them from a ledge west of the Min River, not very far from the Hsin Ching Base, almost on the Min River, about 30 miles southwest of Cheng-tu.

SPREKELIA CLINTIAE, SP. NOV.

HAMILTON P. TRAUB

In June 1952, Mrs. Morris Clint obtained bulbs (Clint No. 266) from Mrs. Chester Wheelock of Brownsville, Texas, which had been brought in from Guadalajara, Jalisco, Mexico, in the spring by an employee. Mrs. Clint shared the bulbs with the writer. It was noted that the leaves were linear, glaucous. Although they were given good care they consistently failed to bloom until 1964, when one bulb bloomed on June 17. It was at once apparent that it could not be placed with *Sprekelia formosissima,* the only species in the genus recognized up to the present. The new species has been named for Mrs. Clint in recognition of her important work toward the collecting of the amaryllids of Mexico.

Sprekelia clintiae Traub, *sp. nov.*

Herba bulbosa; foliis glaucis linearibus obtuse acutis; scapo 14 cm. longo; spatha parte 1/3 inferiore connata; umbella uniflora; perigonio leviter irregulari S. formosissimam aliquoversum "vino-rubello" -roseo; pedicello 5.2 cm. longo; ovario 1 cm. longo; segmentis sepalorum 7.2—7.6 cm. longis 1.1—1.4 cm. latis lanceolatis acutis; segmentis petalorum 7.4—8.2 cm. longis 7—9 mm. latis linearibus acutis; staminibus styloque fasciculatis declinato-adscendentibus, segmentos longissimos brevioribus; stylo stamina paulo breviore; antheris versatilibus 6 mm. longis; stigmate breviter trifido.

Holotype: Traub No. 975 (TRA), 6-17-64, La Jolla, Calif., from bulbs obtained originally from Guadalajara, Jalisco, Mexico.

Rootstock bulbous. Leaves several, linear, glaucous, 28.5 cm. long, 1.1 cm. wide at the base, 1.2 cm. wide at the middle, bluntly acute, shallowly chanelled in lower ¼; contemporaneous with the flowers. Scape 14 cm. long, 6 x 8 mm. diam. (base), 5 x 6 mm. diam. (apex); flattened, roundish edges; greenish, tinged reddish in lower ¼. Spathe 6.6 cm. long, 7 mm. wide, united for 3 cm. below, free portion above fenstrated slightly near the acute apex. Umbel 1-flowered; flower declinate; perigone slightly irregular in the direction of *Sprekelia formosissima,* color claret rose (HCC-021/1) inside and outside, whitish stripe in lower ¼ to ½ of segs, the whitish stripe wider in the upper seg. Pedicel 5.2 cm. long. 5 x 5 mm. in diam. Ovary declinate, 1 cm. long. 6 x 7 mm. in diam., green, tinged reddish above. Tepaltube very short, 1—2 mm. long. Tepalsegs somewhat irregularly arranged; setsegs 7.2—7.6 cm. long, 1.1—1.4 cm. wide, lanceolate, acute; petsegs 7.4—8.2 cm. long, 7—9 mm. wide, linear acute. Stamens and style fasciculate, declinate-ascending, stamens 6—7.2 cm. long; anthers 6 mm. long at anthesis, versatile; style 8.5 cm. long; stigma shortly trifid.

CRINUM X LAJOLLA CL. 'MARJORIE ANTHES'

HAMILTON P. TRAUB

In the 1963 PLANT LIFE (vol. 19, page 60), a hybrid between *Crinum strictum* var. *traubii* Moldenke ♀ (PLANT LIFE 18: 9-50, 1962) x *Crinum moorei* (tall light pink form) ♂, was named *Crinum* x *lajolla* Traub. The Spanish, "La Jolla" (pronounced "lahoya") means "The Jewel".

The flowers of this hybrid vary from very light pink (almost white) to medium pink, and to a deeper very beautiful Persian rose (HCC-628); and have a delightful fragrance. It is of interest to note that the crossing of a white-flowering with a light pink-flowering plant has given progeny with a much deeper color—Persian rose—not heretofore seen in either species. The plants are of easy culture, evergreen and decorative. It appears worth while to name the best of the Persian-rose-flowering clones so that it may be introduced.

Crinum x **lajolla** cl. 'Majorie Anthes', **new clone**

Similar to the other clones of *Crinum* x *lajolla* Traub, excepting that its flowers are a beautiful Persian rose (HCC-628).

The clone has been named for Mrs. Marjorie Anthes, of Encinitas, Calif., a gardener of outstanding talents.

NATIVE AND INTRODUCED AMARYLLIDS IN ARGENTINA

C. G. RUEPPEL, *Casilla 370, Mendoza, Argentina*

I live in Mendoza Province, which together with San Luis and San Juan Provinces, make up the three "Provinces de Cuyo", a region with similar soil and climatic conditions—the vineyard of my country.

NATIVE AMARYLLIDS

In the wild, the tribe *Zepyhranthes* is generally represented by many interesting species, one of these is the small yellow *Zephyranthes filifolia,* I believe. The tribe *Eustephieae* is represented with a many-flowered, red *Phycella* (?), and 100 kms. northward, in a dry sandy location called, "El Ramblon", grows by the hundreds, *Hieronymiella chlidanthoides* Pax, with its many-flowered scapes of white, scented flowers.

Thus I have plenty of material at home and am preparing notes for future contributions.

INTRODUCED AMARYLLIDS

Recently, 4 medium-sized bulbs labeled "Pancratium" were sent to me from Salta Province, and 2 large bulbs from Jujuy Province, similar to those of subgenus *Ismene* of genus *Hymenocallis.* They were badly injured in digging so that only part of the stems was saved. I placed them in an empty pot in the greenhouse believing that they might rot.

On the way back from Paraguay, where I visited friends in the City of Formosa, the capital of the province of the same name, I obtained some amaryllids. In the wilds of Formosa grow by the hundreds, *Amaryllis elegans* var. (?). There in a friend's garden, I got a very rare bulb—rather large, with opposite, broad, petiolate leaves, dark, shining green. At home, after proper cleaning and disinfection, I rested the bulbs for three months in dry sand in a sheltered room.

In September (early spring here), I placed the "Pancratium" and the "Ismene-type" bulbs in good garden soil with good drainage. In spite of their injury, the latter were in good condition. The petiole-

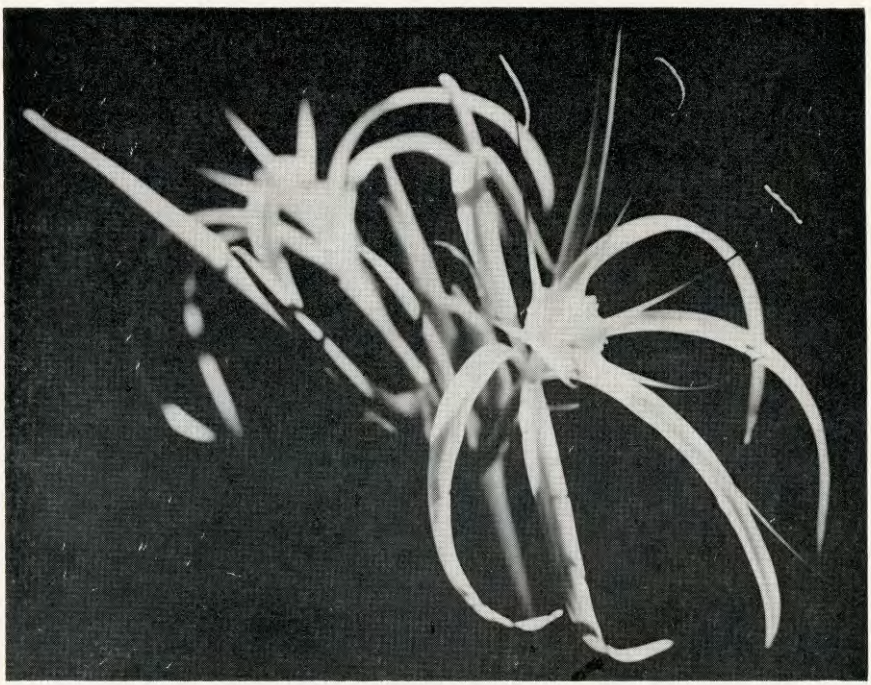

Fig. 12. *Hymenocallis speciosa;* flowering scape as grown by Dr. C. G. Rueppel in Mendoza, Argentina.

leaved amaryllid from Formosa was placed in an 8-inch pot in rich sandy compost, about Oct. 15, 1963. All four pots were placed in partial shade.

The first to bloom was the "Pancratium", on Dec. 1, 1963 (late spring). The scape when fully developed turned out to be *Hymenocallis expansa* which is native to the West Indies. Thus, at last I had an example of subgenus *Hymenocallis,* with broad sessile leaves, 1 foot long. The umbel was many-flowered, the flowers white, scentless.

The Ismene-type bulbs made sturdy plants. From the basal part (wounded stem), many (about 18)young offsets were produced. Then on Dec. 20, 1963, I had two scapes of *Hymenocallis* (subgenus *Ismene*) *narcissiflora.*

With me *Hymenocallis* x *festalis* usually blooms at the beginning of summer, bearing large many-flowered-scapes, with large, white, scented flowers. I was able to identify these from Dr. Traub's Key to the subgenera of the genus *Hymenocallis,* Plant Life 1962, page 68. This is the hybrid of *H. narcissiflora* and *H. longipetala,* and is known as *H.* x *festalis,* with criss-crossing stamens. The parents are native to Peru.

Contemporarily with *Hymenocallis* x *festalis,* the petiolate-leaved amaryllid obtained from Formosa produced a strong scape, with up to 10 flowers in the umbel. The leaves were well developed at anthesis, wedge-shaped at the base, with well-developed thick petioles 10 cm. long, 1.1 cm. wide, blades 25 cm. long, 9 cm. wide. The scape was flattened with sharp edges, 46 cm. long, 1.7 cm. in diam. (base), 1.1 cm. diam. (apex).

The spathe 2-valved, free, 6 cm. long, 3 cm. wide, and many smaller broadish bracteoles. Ovary sessile, many ovules per cell. Tepaltube 6 cm. long, 2.5 mm. in diam., light green; staminal cup white, 3 cm. long, 2 cm. wide. Filaments and style, white in lower ⅓ green above. Style 3 cm. longer than the stamens; anthers filiform, crescent-shaped; pollen dark orange brown; stigma capitate.

The flowers open one by one, are very long lasting, and thus 10 days later I had a wonderful umbel, measuring a foot in diameter by 17 cm. high. It is delightfully scented all day long. It was hand pollinated but I got only one big, green fleshy seed which unfortunately rotted. The bulb has made no offsets.

Fig. 12 shows the scape in flower which was identified as *Hymenocallis speciosa* from the West Indies and Mexico (see Traub's Key, Plant Life 1962).

CHROMOSOME NUMBER AND MORPHOLOGY IN **TULBAGHIA**

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INTRODUCTION

The genus *Tulbaghia* is much in need of taxonomic revision, and the phylogenetic relationships of this genus, with certain of its relatives, are still unclear. The chromosome morphology and number of available *Tulbaghia* taxa have been studied, and the results are reported here for aid to the eventual solution of the problem.

Agapanthus and *Tulbaghia* are petaloid monocotyledons which are indigenous to Africa. Because of a rhizomatous rootstock, an umbellate inflorescence subtended by two or more bracts, and the presence of 6

stamens, there seems to be little doubt that the two genera are closely related. Most taxonomic systems since that of Bentham and Hooker in 1883 have placed them in the same tribe (Table 1). Baker in 1896 included both genera in tribe Allieae, but most other systematists have considered them sufficiently distinct to separate these two genera in the tribe, or at least subtribe, Agapantheae. Traub in 1963 (Table 1), however, again excluded *Tulbaghia* from Agapantheae, replacing it in Tribe Allieae.

Until the researches of Hutchinson in 1934 (2nd edition, 1959), *Agapanthus* and *Tulbaghia* were considered as members of the Liliaceae. Hutchinson's definition of the families Liliaceae and Amaryllidaceae, however, caused them to be moved to the latter family. He considered the tribe Agapantheae to be the most primitive of the Amaryllidaceae since both *Agapanthus* and *Tulbaghia,* which he includes therein, retain a rhizomatous rootstock which is a dominant characteristic of the more primitive family Liliaceae. Such a root system is suggested in but few other genera of the Amaryllidaceae. Thus these two genera exhibit several characters which make their occurrence as a connecting link between the Lilliaceae and the Amaryllidaceae a tempting postulate. The taxonomic history of *Agapanthus* and *Tulbaghia* is summarized in Table 1.

Table 1. Taxonomic History of **Agapanthus** and **Tulbaghia.**

Authority	Family [1]	Tribe	Subtribe	Genera
Bentham & Hooker (1883)	Liliaceae	Allieae	Agapantheae	**Agapanthus** **Tulbaghia**
Thiselton-Dyer (1894)	Liliaceae	Allieae	.....	**Agapanthus** **Tulbaghia** **Allium** **Massonia** **Daubenya**
Engler & Prantl (1930)	Liliaceae [2]	Agapantheae	.....	**Agapanthus** **Tulbaghia**
Hutchinson (1959)	Amaryllidaceae	Agapantheae	.....	**Agapanthus** **Tulbaghia**
Traub (1963)	Amaryllidaceae [3]	Allieae	Allinae	**Allium** **Nectaroscordum** **Caloscordum** **Steinmannia** **Nothoscordum** **Leucocoryne** **Tulbaghia** **Stemmatium** **Tristagma**
		Agapantheae	.....	**Agapanthus**

[1] Bentham & Hooker (1883) and Thiselton-Dyer (1894) used the category name "Order" rather than "Family".
[2] Engler & Prantl (1930) placed the tribe **Agapantheae** in the subfamily **Allioideae.**
[3] Traub (1963) placed the tribes **Allieae** and **Agapantheae** in the subfamily **Allioideae.**

REVIEW OF CYTOLOGICAL LITERATURE

Index Kewensis (1885-1955) lists 15 species of *Agapanthus,* all of which were described from the Cape area of South Africa. However, there is no general agreement in the literature as to the validity of this

number. Riley and Mukerjee (1962) reported the somatic chromosome numbers and chromosome morphology for 5 putative species and 2 unidentified plants. This is the most extensive cytological treatment of this genus published and the descriptions are referred to in this paper in the discussion of the phylogeny of the tribe. Other cytological studies have been carried out by Darlington (1933), Mookerjea (1955), and Sharma and Sharma (1961). Table 2 lists the known chromosome numbers for *Agapanthus* and *Tulbaghia.*

Cytological accounts of *Tulbaghia* are scanty and deal with only 3 of the 30 species listed by *Index Kewensis.* This genus is distributed throughout southern and tropical Africa. Chromosome reports were made by Whitaker and Flory (1955) and they reported a gametic number of 6 for *T. violacea* and a somatic number of 12 for *T. cepacea* and *T. fragrans.* In 1955 Flory reported that the somatic chromosome numbers for 5 additional, unidentified, taxa were being studied, with chromosome numbers determined. Four of these are listed in Table 2, and the fifth (*T. sp.* 3359-1) was found to have 12 somatic chromosomes. Other cytological studies of the genus were carried out by Mookerjea (1955), Sharma (1956), and by Riley and Hoff (1958) who each dealt, also, with one or more of the above mentioned species. Sato earlier (1942) had reported the number for *T. aloides* (Table 2), a taxon not found listed in *Index Kewensis.*

Table 2. Chromosome numbers in **Agapanthus** and **Tulbaghia.**

Species	2n	Authority
Agapanthus		
campanulatus	30	Riley and Mukerjee, 1962
globosus	30	Sharma and Sharma, 1961
inapertus	30	Sharma and Sharma, 1961
	30	Riley and Mukerjee, 1962
minimus	30	Riley and Mukerjee, 1962
orientalis	32	Riley and Mukerjee, 1962
praecox	32	Riley and Mukerjee, 1962
umbellatus	n=15	Darlington, 1933
	30	Sato, 1942
	30	Mookerjea, 1955
sp. 148/55	30	Riley and Mukerjee, 1962
sp. 71/50	29	Riley and Mukerjee, 1962
Tulbaghia		
aloides	12	Sato, 1942
cepacea	12	Whitaker and Flory, 1955
	12	Riley and Hoff, 1958
fragrans	12	Whitaker and Flory, 1955
violacea	n= 6	Whitaker and Flory, 1955
	12	Mookerjea, 1955
	12, (6, 24)	Sharma, 1956
	12	Riley and Hoff, 1958, 1960
sp. 1851	12	Flory, 1955
sp. 5076	12	Flory, 1955
sp. 7249	12	Flory, 1955
sp. 469S	24	Flory, 1955

MATERIALS AND METHODS

The various taxa of *Tulbaghia* used in this study were secured from private collectors and commercial supply houses. Table 4 lists the source of all of the materials along with the chromosome numbers of those species not reported before.

All chromosome counts and drawings were made from metaphase stages of root tip cells pretreated in .25 per cent colchicine for 5 hours. Following pretreatment, the root tips were fixed in acetic; alcohol 1:3 for 12-24 hours. They were then hydrolyzed for 5 minutes in normal HCl and squashed in 2 per cent aceto-orcein solution. Pressure was applied to the cover glass to obtain maximum flattening of the cells. The slides were then heated over an alcohol lamp to spread the chromosomes and intensify their staining (Darlington and LaCour, 1960). Utilization of the Feulgen reaction was attempted using the method of Flagg (1961) but this seemed to result in the clumping of the chromosomes.

Observations were made from temporary preparations of slides sealed with cover glass cement. Care was taken to use only those cells for study whose walls were intact. An American Optical microscope equipped with a 90x, apochromatic, oil immersion objective (N. A. 1.30) together with paired 15x oculars was used and drawings were made with the aid of a Zeiss camera lucida at a magnification of 2000x. In drawing the chromosomes, the stage was moved slightly so that those chromosomes laying on top of another could be observed without hindrance.

OBSERVATIONS

The chromosomes of 8 taxa of *Tulbaghia* were studied. Camera lucida drawings of metaphase plates and idiograms are given in Figures 13-19.

The chromosomes of *Tulbaghia* vary in the position of the centromere and the placement of secondary constrictions within any given taxon. The chromosomes of the genus are comparatively quite long. Swanson (1957) reports that among the higher plants, monocots generally have larger chromosomes than dicots. Warmke (1941) states that the largest chromosomes of *Trillium* are about 30 microns long. After the pretreatment and fixation described above, the chromosomes of *Tulbaghia* varied from 8.5 microns to 24 microns in length. However, there is no marked variation in length of the chromosomes within any given species. In most species with 2n=12, there are 3 pairs which cannot be distinguished with any degree of certainty. In the case of those species with 2n=24, there are 6 pairs which present this same problem. *Tulbaghia* sp. 469S (2n=24) has 11 chromosomes with similar lengths and centromere positions. For that reason, the idiograms with the accompanying figures were constructed by measuring and pairing the chromosomes of 1 cell and the length of the 2 members of each pair were averaged. However, chromosome number and morphology were verified with as many other plates as possible.

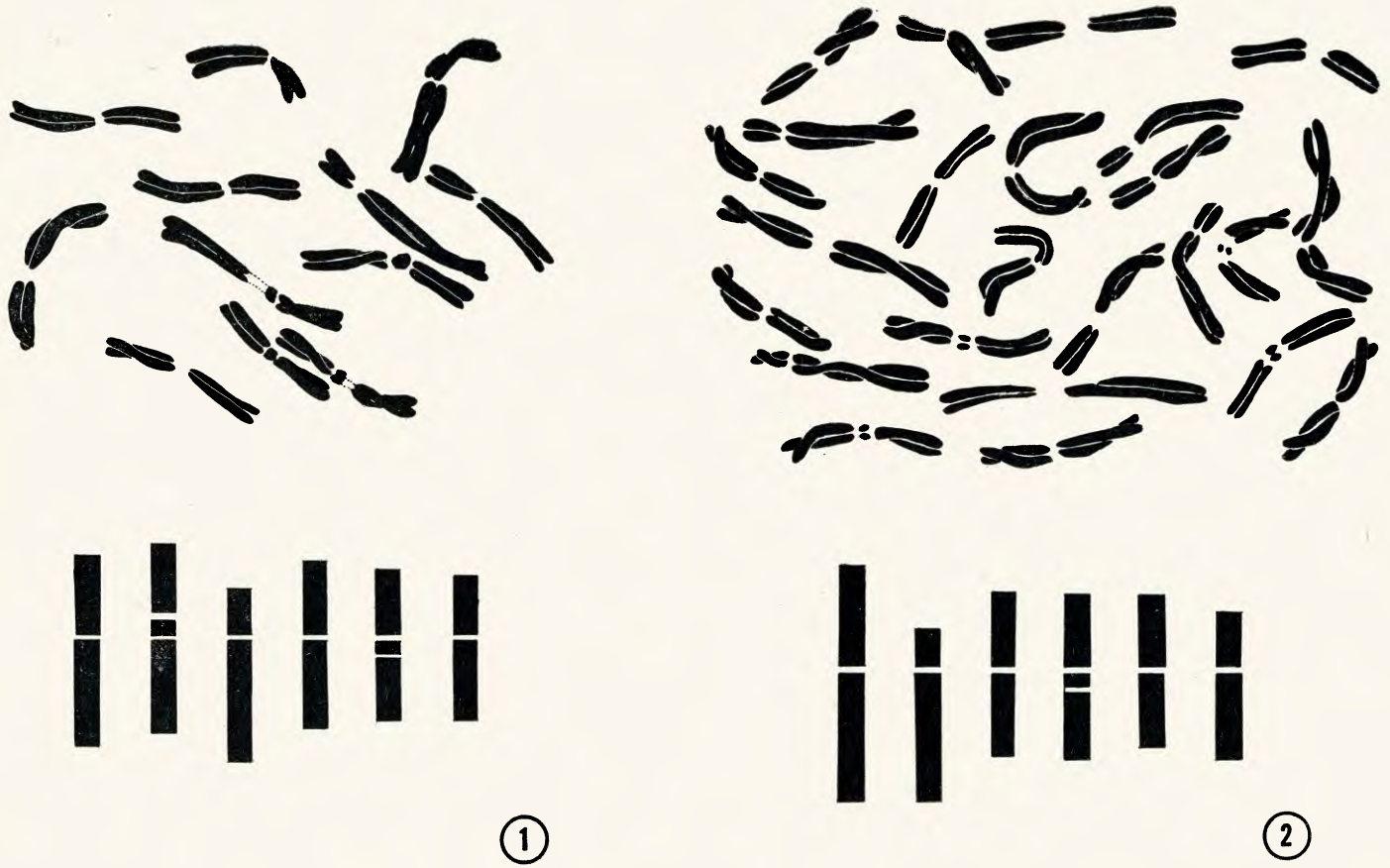

Fig. 13. Chromosomes of *Tulbaghia*: (1) *T. alliacea*, 2n=12; and (2) *T. ludwigiana*, 2n=24 (an allopolyploid form of *T. alliacea*).

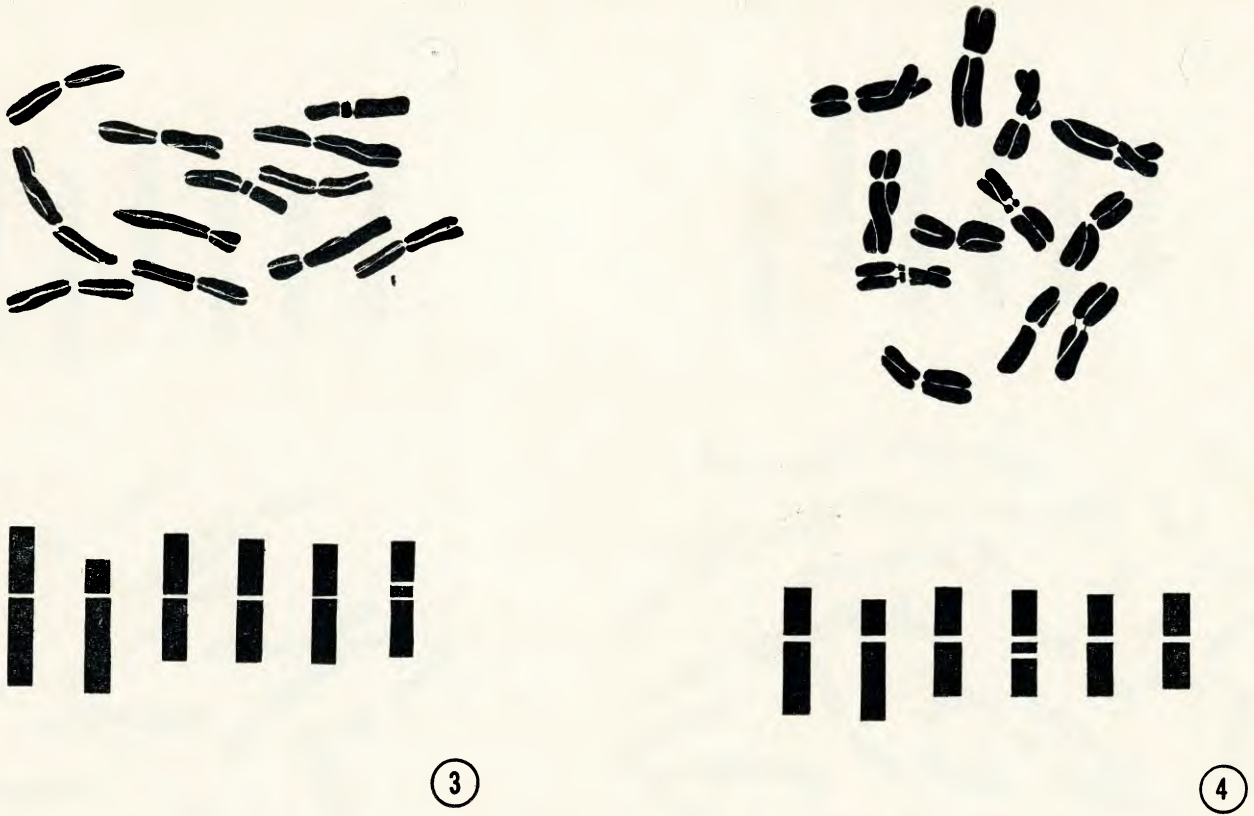

Fig. 14. Chromosomes of *Tulbaghia*: (3) *T. cepacea*, 2n=12; and (4) *T. fragrants*, 2n=12. (The chromosomes of this species are morphologically primitive).

The chromosomes were classified by centromere position and the appropriate abbreviations used in the description are given in Table 3. The formulas in the description are for the entire diploid complement. Table 4 lists the chromosome numbers of *Tulbaghia* reported for the first time.

Table 3. Classification of centromere position.

Ratio of short arm to total length	Centromere position	Abbreviation
.50 - .45	Median	M
.44 - .30	Submedian	Sm
less than .30	Subterminal	St.

T. alliacea Linn. 2n=12. The chromosomes of this species fall into 6 morphological types which may be represented by the formula 6M+4Sm+2St. There are 4 chromosomes which have a secondary constriction. Figure 13 (1).

T. cepacea Linn. fil. 2n=12. There are 6 types with a formula of 6M+4Sm+2St. 2 chromosomes have a secondary constriction. Figure 14 (3).

T. fragrans Verdoorn. 2n=12. There are 6 types represented by the formula 6M+6Sm. There are 2 chromosomes with a secondary constriction. Figure 14 (4).

T. leucantha Baker. 2n=12. There are 7 morphological types represented by this species. The formula is 4M+6Sm+2St. The chromosomes are in 5 identical pairs and there are 2 chromosomes which are not alike. There is 1 chromosome with a secondary constriction. Figure 15 (5).

T. leucantha Baker. 2n=24. There are 6 morphological types here with a formula of 8M+16Sm. Four chromosomes have a secondary constriction. Figure 15 (6).

T. ludwigiana Harv. 2n=24. There are also 6 morphological types in this variety. These are given by the formula 12M+8Sm+4St. There are 4 chromosomes which have a secondary constriction. Figure 13 (2).

T. violacea Harv. 2n=12. There are 6 morphological types here with a formula of 8M+2Sm+2St. There are 2 chromosomes with a secondary constriction. Figure 16 (7).

T. violacea var. "Silverlace." 2n=12. There are 6 types represented by this variety which has a formula of 6M+4Sm+2St. There are 2 chromosomes with a secondary constriction. Figure 16 (8).

T. sp. Dyer no. 2042. 2n=12. There are 6 types in this taxon with a formula of 8M+2Sm+2St. There are 4 chromosomes with a secondary constriction. Figure 17 (9).

T. sp. Dyer no. 1851. 2n=12. There are 6 morphological types in this taxon. They have a formula of 6M+4Sm+2St. There are 4 chromosomes with a secondary constriction. Figure 17 (10).

T. sp. Dyer no. 5076. 2n=12. The chromosomes of this taxon represent an unusual situation. There are 2 different karyotypes, each with 7 morphological types of chromosomes. The first—Figure 18 (11)—has

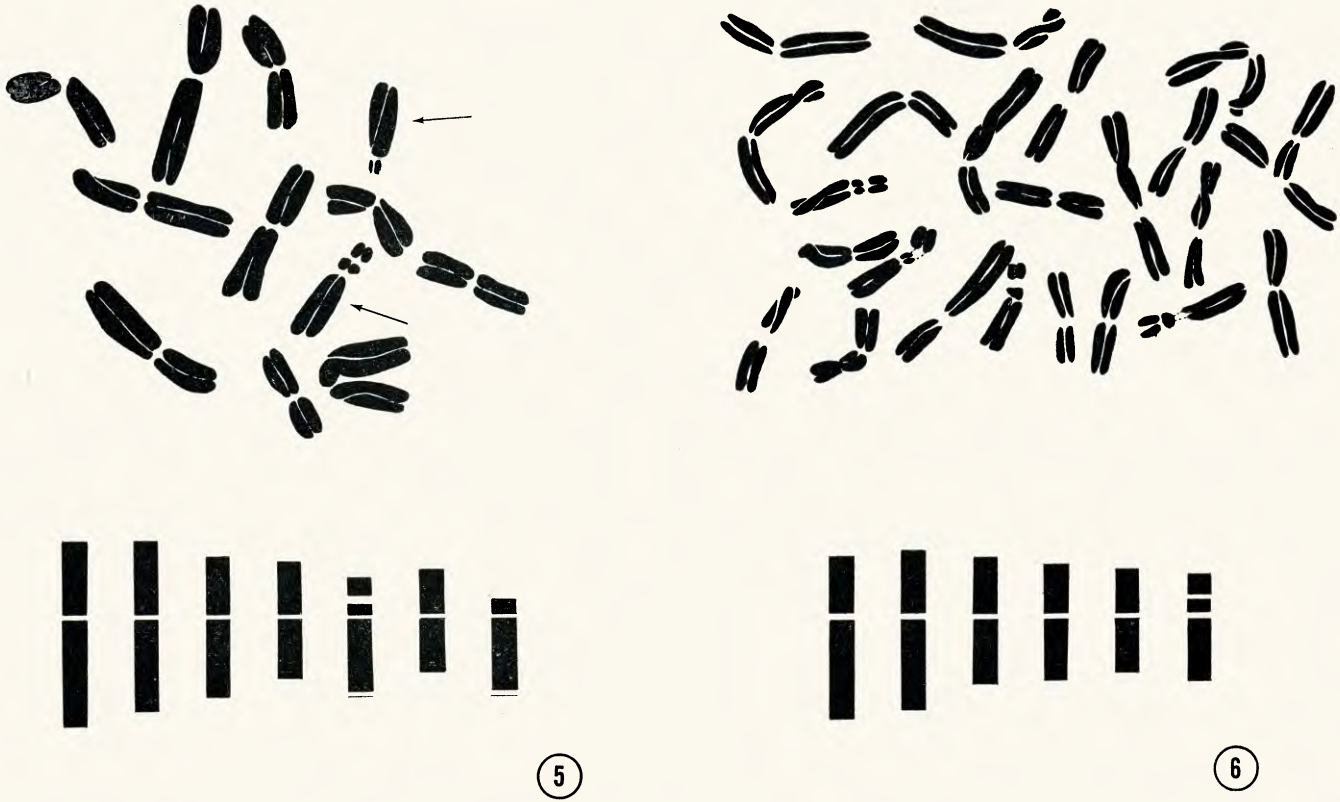

Fig. 15. Chromosomes of *Tulbaghia*: (5) *T. leucantha*, 2n=12; arrows indicate the heteromorphic chromosomes. In the idiogram these chromosomes are underlined.
(6) *T. leucantha*, 2n=24; a suspected autopolyploid form of the 2n=12 taxon. The chromosome with the very short arm in (5) is not represented in this tetraploid form.

a formula of 6M+6Sm. There is 1 chromosome with a secondary constriction and 1 with 2 secondary constrictions. The other taxon (Figure 18—12) has a formula of 7M+5Sm. There are 2 chromesomes which have a secondary constriction.

T. sp. Dyer no. 469S. 2n+24. The chromosomes are of 6 morphological types in this taxon. The formula is 11M+10Sm+3St. No chromosomes with a secondary constriction have been noted. Figure 19 (13).

Table 4. Unreported chromosome numbers of **Tulbaghia.**

Species	Source	2n
T. alliacea	Dr. Walter Lewis South Rhodesia	12
T. ludwigiana	Dr. R. A. Dyer Pretoria, South Africa	24
T. leucantha	Dr. R. A. Dyer Pretoria, South Africa	12
T. leucantha	Dr. Walter Lewis South Rhodesia	24
T. violacea var. "Silverlace"	Oakhurst Gardens Arcadia, California	12

DISCUSSION

Basic numbers in the Agapantheae. The report of Riley and Mukerjee (1962) on the chromosome numbers in *Agapanthus* and the studies of *Tulbaghia* carried out here lead to agreement with Darlington and Wylie's (1955) suggested basic numbers of 15 for *Agapanthus* and 6 for *Tulbaghia.* Of the 12 taxa of *Tulbaghia* studied here, there is none whose 2n number is not ultimately reducible to 6. Riley and Mukerjee (l.c.) studied 7 taxa of *Agapanthus* and of these 4 have diploid numbers which may be derived from a base of 15. (Table 2). Two other taxa have a diploid number of 32 and 1 has a diploid number of 29. Such numbers are not damaging to the idea of a basic number of 15 for the genus. Darlington (1937) has postulated how unequal translocations can lead to the loss or gain of a chromosome, thus changing the number of the basic set. His ideas have been confirmed by the reports of Tobgy (1943) in his studies of the genus *Crepis.* It cannot be categorically stated that such an aneuploid alteration is the case in *Agapanthus* because no meiotic studies of species hybrids have been carried out. However, the assumption is not an improbable one.

Evolution within the tribe. The evidence obtained from chromosome numbers and morphology indicates that *Tulbaghia* is probably not in a euploid series with *Agapanthus.* Since change in chromosome number by ploidy is irreversible, in any euploid series, the most primitive members are those with the lowest chromosome numbers. The morphologically more primitive *Agapanthus* has higher chromosome numbers (2n: 29, 30, 32) than the more morphologically advanced *Tulbaghia* (2n: 12, 24).

Chromosomes of Tulbaghia taxa. The status of *Tulbaghia ludwigiana* Harv. is not clear in the literature. Harvey (1837) described the taxon and gave it specific status but Baker (1896) regarded it as a

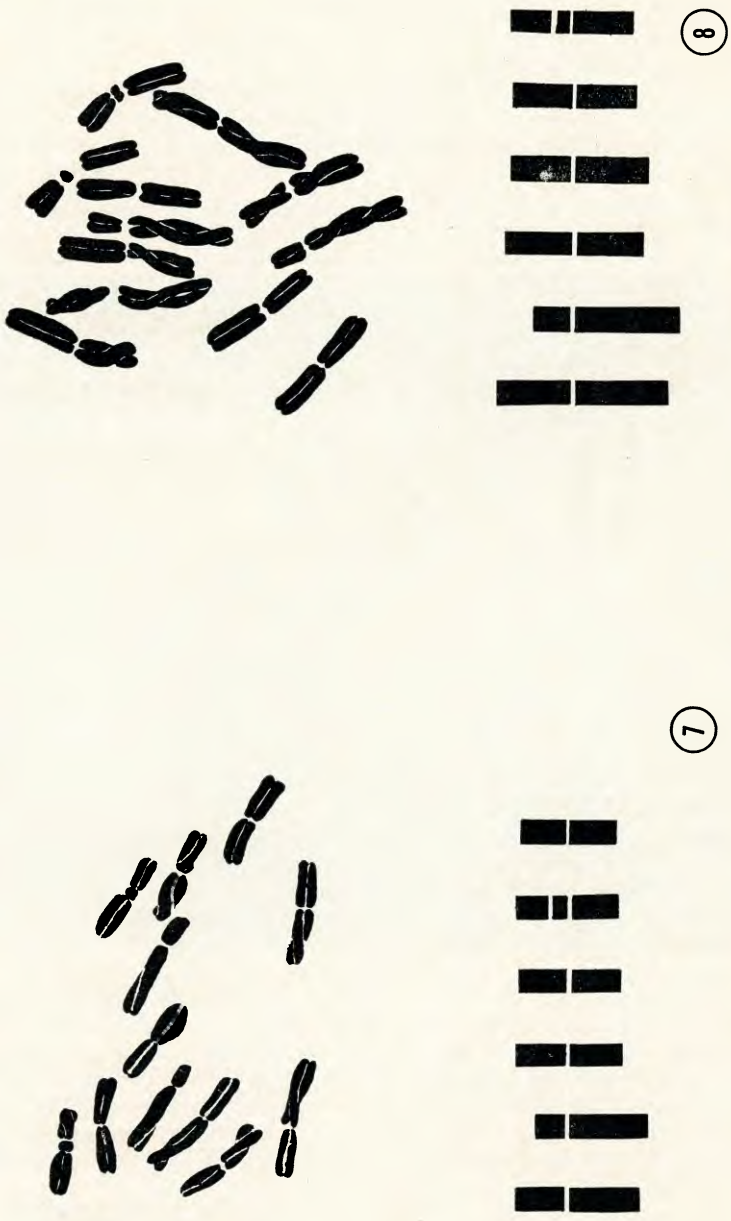

Fig. 16. Chromosomes of *Tulbaghia*: (7) *T. violacea*, 2n=12; and (8) *T. violacea* var. 'Silverlace', 2n=12.

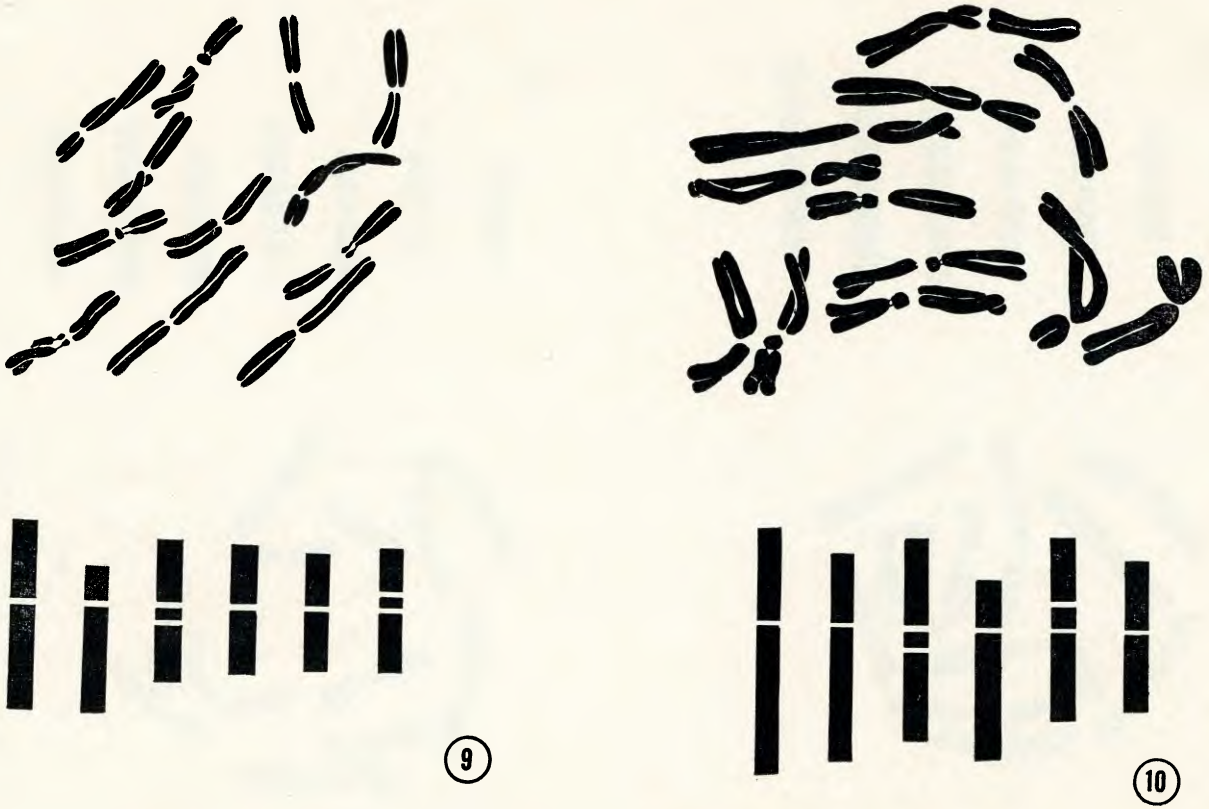

Fig. 17. Chromosomes of *Tulbaghia*: (9) *T.* sp. Dyer no. 2052, 2n=12; and (10) *T.* sp. Dyer no. 1951, 2n=12.

Fig. 18. Chromosomes of *Tulbaghia*: (11 and 12) *T.* sp. Dyer no. 5076, 2n=12. Heteromorphic chromosomes are indicated by arrows and underlined in the idiogram. Possibly 2 chromosome races are present here.

variety of *T. alliacea*. The diploid number in *T. ludwigiana* is 24 and there are 6 morphological types of chromosomes, each represented 4 times in the karyotype (Figure 13—2). *T. alliacea* (Figure 13-1) has only 12 chromosomes in the diploid complement but there are proportionately the same number of medianly, submedianly and subterminally constricted chromosomes in both the diploid and the tetraploid. The geographical distribution of the two taxa coincide and it is therefore possible that *T. ludwigiana* has been derived from *T. alliacea*. If that is the case. there is a discrepancy in the number of chromosomes with secondary constrictions in *T. ludwigiana*.

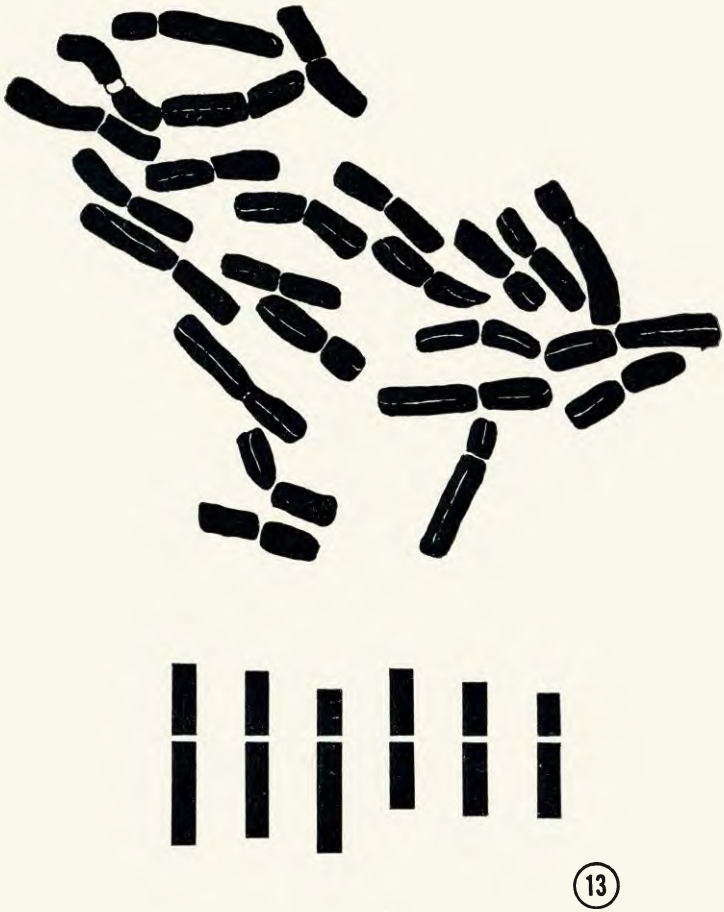

Fig. 19. Chromosomes of *Tulbaghia*: (13) *T.* sp. Dyer no. 4695, 2n=24. The chromosomes have no secondary constrictions and few subterminal centromeres.

However, there is evidence that the number of satellite chromosomes is a most unreliable indication of ploidy (Stebbins, 1950). The possibility

that *T. ludwigiana* might have been derived from some other taxa and is an allopolyploid cannot be ruled out since the chromosome morphology of the other taxa of *Tulbaghia* studied here is quite similar. The fact that there are distinct morphological differences between *T. alliacea* and *T. ludwigiana,* as well as cytological differences, indicates that the latter might be deserving of specific status.

There are two levels of ploidy represented by *T. leucantha* (Figs. 5 and 6). Members of this taxa from South Africa have a 2n number of 12 and those from South Rhodesia have a 2n number of 24. There do not seem to be any significant morphological differences between the two taxa and the fact that they have different chromosome numbers does not seem to warrant their separation into different species at the present time.

The chromosomes of *Tulbaghia* sp. 5076 (Figs. 17-10 & 18-11) are quite distinct. Unfortunately, the material from which these drawings were made is no longer available and morphological data was not taken. If the plants are of the same species, there are 2 distinct chromosome races present and meiotic studies of crosses between the 2 races would provide valuable information as to their origin.

Sharma (1956) reports variation nuclei in *Tulbaghia violacea* with numbers of 6 and 24. He postulates that such aberrant forms may eventually give rise to new species in plants which are vegetatively propagated. These observations were not confirmed in this study.

An unusual feature of the chromosome morphology of the tribe is concerned with secondary constrictions. Sato (1942) reports that 2 chromosomes in the diploid complement of *Agapanthus umbellatus* have secondary constrictions. Mookerjea (1955) reports 10 chromosomes with secondary constrictions in the same species. The 1962 work of Riley and Mukerjee in *Aganpanthus* records no chromosomes with secondary constrictions as having been observed either in *A. umbellatus* or any other taxon of the genus. By referring to Figures 13-19, it may be seen that in every species of *Tulbaghia* investigated here (with the exception of *T.* sp. 469S) there are chromosomes with secondary constrictions.

Stebbins (1950) reports that very little is known about the evolutionary changes in satellites, but that they may be either lost or gained during evolution. Since the chromosomes of *Agapanthus* have few or no secondary constrictions, while the morphologically closely related *Tulbaghia* has secondarily constricted chromosomes in almost every species, this general problem seems deserving of still further investigation.

SUMMARY

Previously unreported chromosome numbers are presented for 5 taxa of *Tulbaghia,* including two species not heretofore studied cytologically.

Detailed chromosome drawings and idiograms are included here for *Tulbaghia* species: *alliacea, cepacea, fragrans, leucantha* (both 2n and

4n forms), *ludwigiana* and *violacea*, as well as for a variegated form of the latter. In addition drawings and idiograms are presented for the chromosomes of 4 as yet unidentified taxa of *Tulbaghia*. Chromosomes are characterized by being long and often distinctive. One or two pairs of chromosomes with distinctive secondary constrictions are features of the complements of all but one of the taxa studied.

The data are considered in relationship to the phylogenetic position of *Tulbaghia*, and its relationship to *Agapanthus*, with the need for still further study of this general problem being pointed out.

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ON THE KARYOLOGY AND PHYLOGENY OF SOME GENERA OF THE AMARYLLIDACEAE

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Quite a number of authors, e.g. Taylor (1925), Sato (1942), Gouws (1949), Mookerjea (1955), Sharma and Ball (1956), Ising (1962) and Wilsenach (1963), have investigated members of the family *Amaryllidaceae* cytologically. At least some species of most of the genera have already been studied, and of the South African representatives only *Hessea, Strumaria, Gethyllis, Klingia* and *Apodolirion* are still cytologically unknown. In the present study one species of each genus is investigated cytologically and idiograms are compared. This information is correlated with morphological data and some suggestions are made about phylogeny of the genera concerned.

MATERIAL AND METHODS

The species were collected in their natural habitat and transplanted into a sandy loam in 4 inch pots. The root tips of *Hessea* and *Strumaria* were fixed in Craf (Randolph, 1935) for 24 hours and embedded in wax. Sections were cut 16—18 microns thick, and were stained in crystal violet, using the method of Smith (1934). The root tips of the other three genera were fixed in 3 alcohol: 1 acetic acid for about 30 minutes and were then macerated in a mixture of equal volumes of concentrated hydrochloric acid and 95% alcohol. The cells were subsequently hardened in a 6:3:1 solution of acetic acid, alcohol and chloroform, and the squashes were stained in acetocarmine, making them semi-permanent by sealing the edges of the coverslips with nail varnish.

When the idiograms are compared, it must be remembered that chromosomes after acetic-alcohol fixation are about 25% longer than after Craf fixation (see Wilsenach, 1963). The rather great difference in chromosome length between *Hessea* and *Strumaria* chromosomes on the one hand, and those of *Gethyllis, Klingia* and *Apodolirion* on the other hand, is partly due to the differences in the methods of fixation.

RESULTS

The chromosomes are described as V-, L- and f-shaped depending on the position of the primary constriction: V for a median constriction or one nearly so, L for submedian and f for a subterminal constriction, i.e. where the proximal arm is less than a third of the length of the distal arm. Although the primary constrictions were very clear, especially after acetic-alcohol fixation, the secondary constrictions could not be seen in any of the material investigated. The chromosomes are arbitrarily divided into long (l), medium (m) and short (b, brevis). This system was also used by Gouws (1949), and Wilsenach (1963), and is used here to facilitate comparison with these results.

At least three metaphase plates of each species were investigated in order to determine chromosome number and to compute the idiograms (see Figs. 20 and 21).

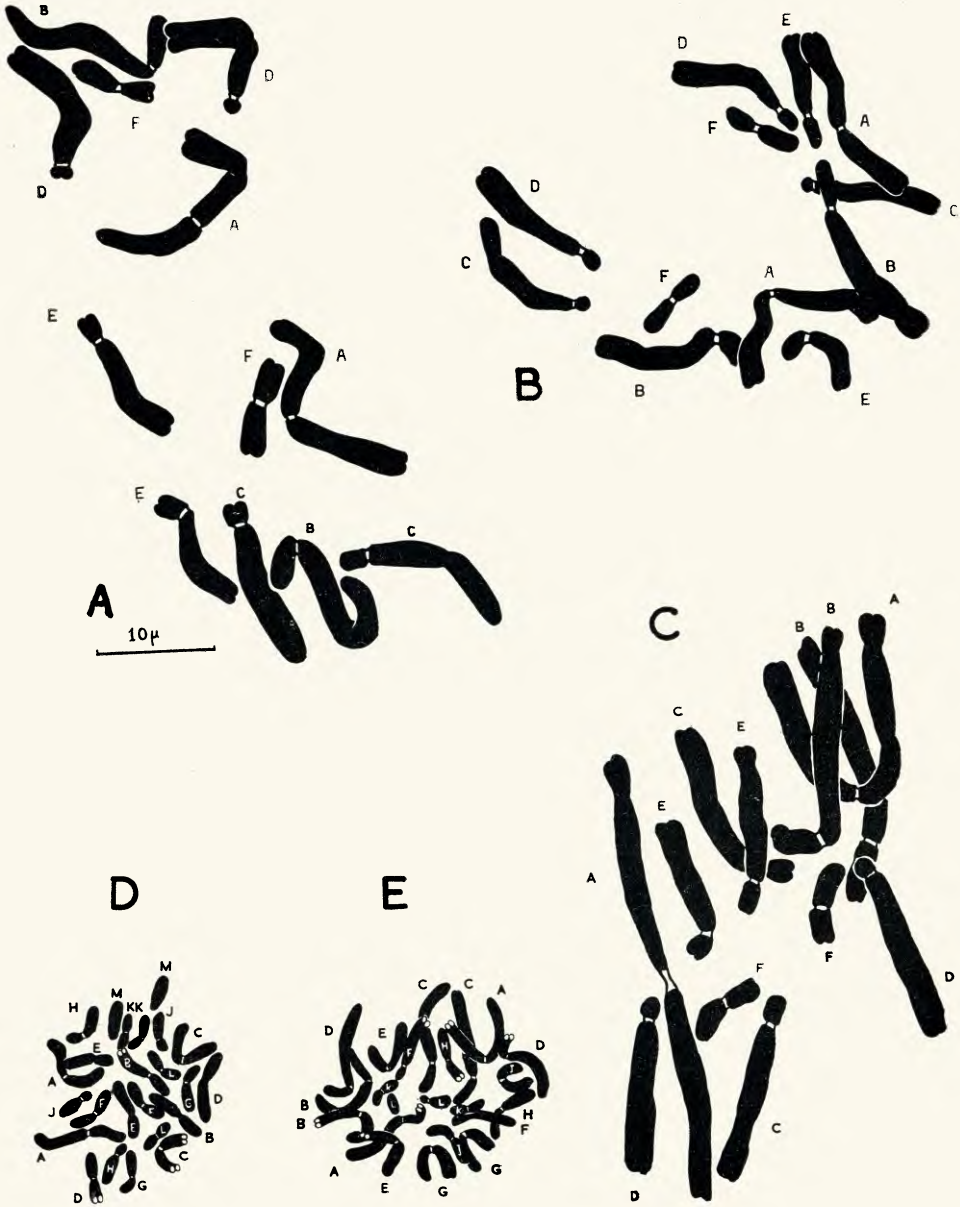

Fig. 20. Chromosome morphology in the species *Gethyllis afra* (A), *Klingia namaquensis* (B), *Apodolirion buchananii* (C), *Hessea zeyheri* (D), and *Strumaria truncata* (E).

A. *Gethyllis afra* Linn. *2n=12.*
Genome formula:— 1 (one) l V; 1 (one) l f; 2 mf;
1 (one) mL; 1 (one) b V.
The longest chromosome is 21 microns long, the shortest 7.5 microns.

B. *Klingia namaquensis* Schoenl. *2n=12.*
Genome formula:— 1 (one) l V; 1 (one) l f; 3 mf;
1 (one) b V.
Chromosome A is 23 microns long, the shortest chromosome has a length of 7.5 microns.

C. *Apodolirion buchanani* Baker *2n=12*
Genome formula:— 1 (one) l V; 1 (one) l f; 3 mf;
1 (one) b V.
Chromosome A: 31 microns; Chromosome F: 7 microns.

D. *Hessea zeyheri* Baker *2n=24*
Genome formula:— 1 (one) l V; 1 (one) l L; 2 mV; 3 mL;
2 b L; 2 b V; 1 (one) bf.
Longest chromosome 9 microns long, shortest one plus or minus 3 microns.

E. *Strumaria truncata* Jacq. *2n=22*
Genome formula:— 1 (one) l L; 4 mL; 1 (one) mf; 2 mV;
1 (one) bL; 1 (one) b V; 1 (one) bf.
The longest chromosome is 12 microns long, the shortest has a length of less than 5 microns.

DISCUSSION

Most authorities agree that the family *Amaryllidaceae* is derived from the *Liliaceae*. In the *Liliaceae* many chromosome numbers have been reported, but 2n=24 is a common one (e.g. *Fritillaria, Lilium, Notholirion* and *Tulipa*). Very few have 2n=12 (e.g. *Kniphofia* and *Ornithogalum*), but it is possible to consider 2n=12 as the original basic number, and to consider 2n=24 as the result of polyploidy.

Tulbaghia has an umbellate inflorescence but superior ovary and can be considered as a link between the two families. It is characterised by 12 somatic chromosomes (Whitaker and Flory, 1955).

It is interesting to note that *Gethyllis, Klingia* and *Apodolirion* also have 12 somatic chromosomes and it is suggested here that this represent the original basic chromosome number for the *Amaryllidaceae. Zephyranthes,* too, has been reported as having 6 as the haploid number, but in this genus polyploid species also occur (Sato, 1938; Sharma & Ghosh, 1954). It is interesting to note that Hutchinson (1959) has grouped *Gethyllis and Apodolirion* and *Zephyranthes* in one tribe, the *Zephyrantheae*, and this classification is supported here by cytological data. Unfortunately Hutchinson (1959) separated these genera from *Klingia,* which he put into a completely different tribe. If the idiograms of *Gethyllis, Apodolirion* and *Klingia* are compared one notices that they are so similar that it seems unreasonable to separate these genera into different tribes. It is suggested here that Hutchinson's scheme is unnatural in this aspect, and that *Klingia* also should be included in the *Zephyrantheae*. This tribe is by no means primitive, but it is considered here as having retained the original basic number (6) of the family.

Hutchinson (1959) as well as Pax & Hoffman (1930) group the genera *Hessea* and *Strumaria* in the *Haemantheae* (or *Haemanthinae*),

which separates them completely from the genus *Nerine*. That the genus *Hessea* is closely related to the genus *Nerine* can be demonstrated as follows: The karyotype of *Hessea zeyheri* is remarkably similar to that of *Nerine filifolia* (for karyotype of latter see Gouws, 1949). Not only does this indicate the affinity of the two genera, but *N. rehmannii* has long been regarded as a plant belonging to the genus *Hessea*, until Bolus (1930) demonstrated that in this plant the anthers are basifixed. Another distinguishing character is that the stamens in *Hessea* are spread, but this is not unknown amongst the *Nerines*. It is therefore suggested that *Hessea* be included with *Nerine* in the same tribe and not the *Haemantheae* (or *Haemanthinae*) as proposed by Hutchinson. A study of the karyotype of *Strumaria* likewise suggests that this genus also should be here included. Morphologically and karyologically *Strumaria* and *Hessea* appear to be closely related. Obermeyer (1963) expressed doubt as to whether they should be considered as two distinct genera.

Basing his ideas on karyological and morphological data, Gouws (1949) included the following genera in the one tribe: *Boöphone* (2n=22). *Nerine* (2n=24, 22,), *Brunsvigia* (2n=22). Amaryllis (2n=22), *Crinum* (2n=22), *Ammocharis* (2n=22), and *Cybistetes* (2n=22). If *Hessea* and *Strumaria* are added to this tribe (Amaryllideae) the following picture emerges: The primitive genera having free perianth segments or a short perianth tube have 22 or 24 chromosomes, and the members which are more advanced (with a distinct perianth tube) have 22 chromosomes.

In the earlier discussion 2n=24 was explained in terms of polyploidy from a 2n=12 ancestor. If this interpretation is accepted the origin of the tribe Amaryllideae involved polyploidy from 2n=12 stock, while the species and genera with 22 somatic chromosomes arose by loss of a pair of chromosomes.

Pax and Hoffman (1930), when discussing the anatomy of the peduncle of the Amaryllidaceae, pointed out that two types occur: In some the ground tissue is wholly composed of parenchyma, in others a definite ring of sclerenchyma tissue occurs. They noticed that some genera were characterized by the sclerenchyma ring even though the flowers were small or few, and in other genera many big flowers were borne on an axis without sclerenchyma. They came to the conclusion that the presence of the sclerenchyma could not be explained on the basis of mechanical function, and suggested that it may be a character of some phylogenetic importance. All the amaryllid genera were not available to Pax and Hoffman for peduncle studies, and when the peduncles of the South African representatives were investigated by the present author, it was very interesting to note that all the genera which had sclerenchymatous peduncles are grouped together in the tribe Amaryllideae as suggested above.

The genera lacking sclerenchyma are *Haemanthus*, *Clivia*, *Cryptostephanus* and *Cyrtanthus* (including the genera *Anoiganthus* and *Vallota*). The possibility that these genera belong to one tribe, the

Haemantheae, can also be supported on cytological grounds, but their relationships are not discussed in this paper.

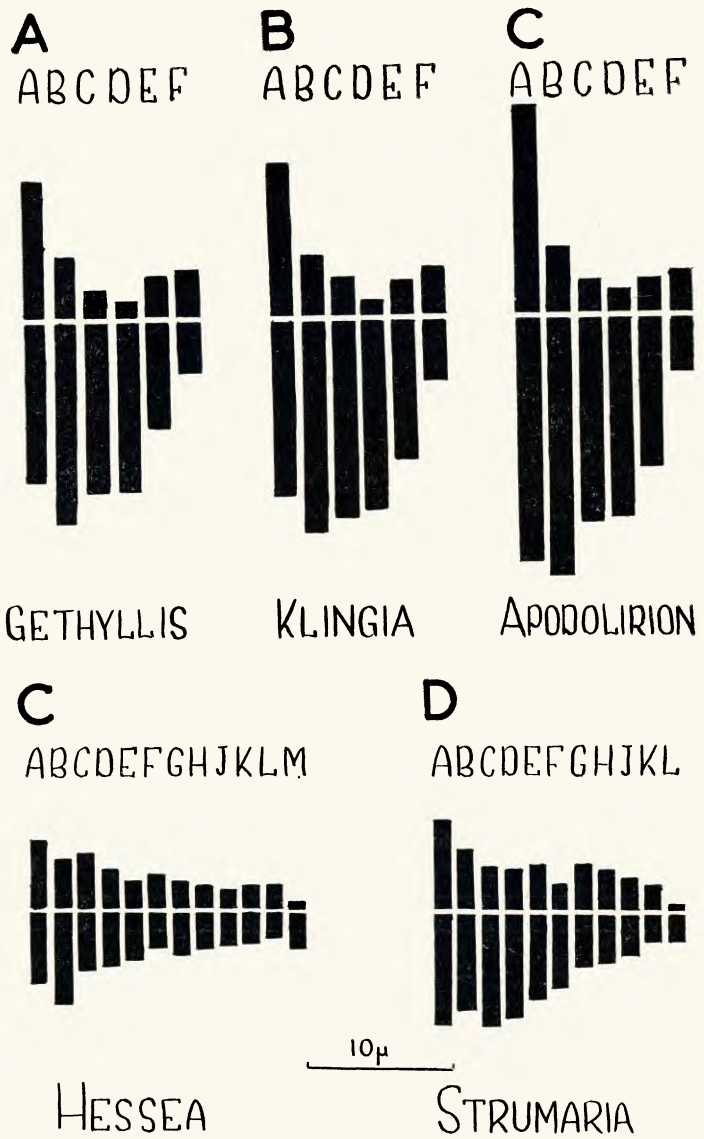

Fig. 21. Idiograms for the species (upper) *Gethyllis afra* (A), *Klingia namaquensis* (B), *Apodolirion buchananii* (C), and (lower) *Hessea zeyneri* (C), and *Strumaria truncata* (D).

A NEW CONCEPT FOR THE GENUS GETHYLLIS (SEE FIG. 21.)

Different *Gethyllis* species show great variation as regards their stamens (the number varies from six to many and the anthers per stamen vary from two to five). *Klingia* is considered as being distinct from *Gethyllis* because three filaments in *Klingia* widen out to form a staminal cup. *Apodolirion* is maintained as a separate genus because the stamens occur in two series whereas they occur in only one series in *Gethyllis*. It almost seems anomalous to maintain three genera on the basis of stamen characters and to accept at the same time that the stamens of one of the genera are quite variable.

It is interesting to compare the above differences with variation which has been demonstrated to occur within another amaryllid genus, *Cyrtanthus*. *Cyrtanthus herrei* was formerly considered as belonging to the genus *Cryptostephanus* on the basis of a staminal cup which is formed by fused filaments. Dyer (1959) combined this species with *Cyrtanthus* (in which no staminal cup is normally present) and suggested that such variation could occur within one genus. His decision was supported by subsequent karyological data (Wilsenach, 1963). The difference on which *Klingia* and *Gethyllis* are separated has therefore been demonstrated to occur *within* another amaryllid genus.

In *Cyrtanthus* species occur in which the stamens are in one series, other species have stamens in two series, and it is not disputed that they belong to one genus. It is inconsistent to separate two other genera (*Gethyllis* and *Apodolirion*) on this basis only.

When the idiograms of *Klingia*, *Gethyllis* and *Apodolirion* are compared one notices remarkable similarity: In all three chromosome A is V-shaped; chromosome B has the longest distal arm; chromosomes C and D have distal arms of the same length; chromosome D has the shortest proximal arm and the shortest chromosome is V-shaped; chromosome E is the only one showing a little variation, in that the centromere is a little further away from the one end in *Gethyllis* than in the other two genera. These idiograms show much less variation than is commonly seen within a genus in the *Amaryllidaceae* (see e.g. Wilsenach, 1963).

From the above it should be clear that *Gethyllis*, *Apodolirion* and *Klingia* are maintained as separate genera for very debatable reasons. The great karyological similarity of these three genera is a strong indication that they belong to one genus, and it is suggested here that they should be merged into one genus, namely *Gethyllis*, which was described first. All that is involved is to describe the androecium of the genus as follows:

Stamens from six to many, usually occurring in one series, rarely in two series; filaments may widen to form a staminal cup: two to five anthers per stamen, anthers basified, linear and often twisted or curved.

SUMMARY

The Karyotypes were studied and the following chromosome numbers were reported: *Gethyllis afra*, 2n=12; *Klingia namaquensis*, 2n=12; *Apodolirion buchanani*, 2n=12; *Hessea zeyheri*, 2n=24; *Stru-*

maria truncata, 2n=22. It was suggested that *Klingia* and *Apodolirion* are congeneric with *Gethyllis*, and that this genus should be included in the tribe Zephyrantheae. The genera *Hessea* and *Strumaria* are closely related to *Nerine* and it was proposed that they should be included in the tribe *Amaryllideae*. The origin of this tribe was considered to involve polyploidy from a 2n=12 ancestor. The diploid number of 12 (or x=6) was suggested as the original chromosome number of the *Amaryllidaceae*, and this number has been retained in the tribe *Zephyrantheae*.

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EDITORIAL NOTE.—Prof. Wilsenach did not have access to the publication, "The Genera of Amaryllidaceae" (1963) by Hamilton P. Traub. Thus in his discussions he refers only to treatments of the *Amaryllidaceae* published before 1963. Prof. Wilsenach will publish a follow-up article in the 1966 PLANT LIFE in which he will discuss his present and any additional results in relation to "The Genera of Amaryllidaceae" (Traub, 1963), and the addenda note by Hamilton P. Traub in the 1965 PLANT LIFE (pages 88-89).—*Hamilton P. Traub.*

ADDENDA TO TRAUB'S "THE GENERA OF AMARYLLIDACEAE" (1963)

Hamilton P. Traub

When the text of "The Genera of Amaryllidaceae" (Traub, 1963) was prepared the chromosome numbers of the Amaryllid genera of the

Trans-Saharan African Region (East- and West-Central, and South Africa) were minimally known, excepting for the genera *Choananthus, Gethyllis, Apodolirion, Klingia, Hessea, Carpolyza, Strumaria and Chapmanolirion.* Wilsenach (1965) in the present issue of PLANT LIFE has given a minimal report on the chromosomes of most of these genera—*Gethyllis, Apodolirion, Klingia, Hessea and Strumaria.* On the basis of this report, the following dispositions can be made:

(1) The tribe *Strumarieae,* including *Hessea, Carpolyza,* and *Strumaria,* can be merged with the tribe *Crineae* (see Table 1.).

(2) Chromosome evidence has to be used in conjunction with morphological and other data. It is not known if Wilsenach (1965) has seen the fruit of *Klingia,* and thus this information may be missing. However, the genus *Klingia* can be placed in the tribe *Gethylleae,* along with *Gethyllis* and *Apodorlion,* tentatively (see Table 1) awaiting verification of the fruit character.

1a. Filaments free, fruit an elongated berry ..... **Gethyllis** (incl. **Apodolirion)**
1b. Filaments united below into a staminal cup, fruit unknown ..... **Klingia**

This leaves only the genera *Choananthus* and *Chapmanolirion* to be accounted for on the basis of chromosome number and morphology. The type of *Chapmanolirion* may be *Pancratium trianthum* (see Traub, 1963). If this can be verified, then it will become a synonym of *Pancratium.*

Table 1, incorporating the data reported by Wilsenach (1965) is furnished for the information of the members of the Society. Thus the missing parts of the amaryllid chromosome atlas are gradually being fiilled in.

Table 1. Chromosome numbers in **tribes** of the Amaryllidaceae containing genera native to the Trans-Saharan African Legion (East- & West-Central and South Africa.)

Tribe ALLIEAE, x=5, 6, 7, 8, 9, 10, 13?
Subtribe 1. ALLINAE, x=6, 7, 8, 9, 10
Allium 2n=14, 16, 18, 24, 28, 32, 40; (cosmopolitan in No. Hemisphere to Mexico and No. Afr.)
Nectaroscordum 2n=16 (E. Asia)
Caloscordum 2n=16 (E. Asia)
Steinmannia 2n=? (So. Amer.)
Nothoscordum 2n=16, 18, 24 (No. Amer. and So. Amer.)
Leucocoryne 2n=18 (So. Amer.)
Tulbaghia 2n=12, 24 (So. Afr.)
Stemmatium 2n=? (So. Amer.)
Tristagma 2n=12 (So. Amer.)
Subtribe 2. BRODAEINAE, x=5, 6, 7, 8, 9 (No. Amer.)
Subtribe 3. MILLINAE, x=13? (No. Amer.)
Tribe AGAPANTHEAE, x=15 **(So. Afr.)**
Tribe CRINEAE, x=6, 11 (including tribe Strumarieae)
Ammocharis 2n=22 (So. Afr.)
Crinum 2n=22, 22+2B, c.72 (cosmopolitan No. & So. tropical and adjacent temperate zones)
X Crinodonna 2n=? (bigeneric hybrid)
Nerine 2n=22, 24 (So. Afr.)
Hessea 2n=24 (So. Afr.)
Strumaria 2n=22 (So. Afr.) (including **Carpolyza)**
X Brunserine 2n=? (bigeneric hybrid)
Boophone 2n=22 (So. Afr.)
Cybistetes 2n=22 (So. Afr.)
Brunsvigia 2n=22 (So. Afr.)
Tribe GETHYLLEAE, x=6
Gethyllis 2n=12 (incl. **Apodolirion)** (So. Afr.)
Klingia 2n=12 (So. Afr.)
Tribe HAEMANTHEAE x=8, 9
Haemanthus 2n=16, 18 (E. Cent. So. Afr.)
Choananthus 2n=? (E. Cent. Afr.)
Tribe CLIVIEAE, x=6, 11
Clivia 2n=22 (So. Afr.)
Cryptostephanus 2n=24 (So. Afr.)
Tribe CYRTANTHEAE, x=8, 11
Anoiganthus 2n=16 (So. Afr.)
Cyrtanthus 2n=16, 22 (incl. Vallota) (So. Afr.)
Tribe PANCRATIEAE x=11
Vagaria 2n=? (Asia Minor)
Pancratium 2n=22, 44 (Canary Is., Medit. Region to India and So. Afr.)
Chapmanolirion 2n=? (So. Afr.)

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Wilsenach, R. On the karyology and phylogeny of some genera of the Amaryllidaceae. Plant Life 21: 82-88. 1965

NOTHOSCORDUM—THE UBIQUITOUS AMERICAN

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The Bible teaches us that the meek shall inherit the earth, but surely the genus *Nothscordum* was not meant to be included in this statement, for there is really nothing meek or shy about a few notable members of this interesting genus. Both *N. bivalve* and its cousin *N. inodorum* are well equipped to inherit the earth, given the opportunity to do so, with practically no encouragement. If one judges flowers by only their impressive colors and dimensions, then *Nothoscordum* is a meek little mouse indeed, but like the mouse, it is persistent, rugged, adaptable, and quietly aggressive. This is not meant to convey to the reader that I have any lack of love for these tough little gamins, for in truth I do admire it and am rather fond of its sometime virtues. Presently at least 17 species are recognized, which are widely distributed from Ohio and Virginia Southward to the Gulf states and Westward to Texas and down into Mexico and South America. It is in South America where they are best represented, with some fifteen or so species recognized. It is hoped that the others from South America are less inclined to run rampant. None, excepting *N. inordorum* are known to be in general cultivation in the countries above the equator at this time, though no doubt a few of them would be choice garden material. Apparently Nothoscordums replace Alliums in South America, as no Alliums occur south of Central Mexico. Unlike Alliums, Nothoscordums in their vegetative parts lack the characteristic onion or garlic odor and are relatively odorless and tasteless. Indeed the word *Nothoscordum*, translated, literally means "not a garlic". As a group, most species are monotonously colored white, or whitish, with occasional markings of violet, yellow, or green, but there are several species said to have bright golden yellow flowers, and one species is said to be lilac colored. In general they have umbels of 2 or more flowers per scape, and some are dwarf while some are tall and wiry.

Nothoscordum bivalve is undoubtedly the best known member of the genus and also the most widely distributed. It grows in roughly 25% of the United States, North to Ohio and West to W. Texas. I know of no other native bulbous plant that has adapted itself to such a widely varying environment. It thrives at mile high elevations as easily as it does at sea level. Neither high humidity nor semi-arid conditions bother it. It will adapt itself to tropical conditions and will survive subzero temperatures with equal disdain. A rampant seeder, it offsets freely too, so that a single bulb can quickly become an established colony where conditions permit. In its defense, it must be stated that it is no worse than some other equally rampant spreaders such as *Orinthogalum umbellatum, Muscari* species, and many *Alliums,* to name a few of our garden favorites. What then, are its virtues, if any? True, it is pretty enough, in an unimposing way. The loosely arranged umbels of starry cream-white flowers are not at all unattractive when seen at their best.

Often they are keeled with a stripe of green, brown, or purple on their backside which adds a bit of color to the individual flowers. These little stars are each about ¾″ across the face, and the anthers, filaments, ovary, and base of each segment are tinged greenish-yellow, and are each carried on a pedicle from 1-2″ from the center of the umbel. The umbels may rise on stems from ten inches to two feet above the leaves. A single bulb may send forth scape, after scape, continuously from February until June, with no letup. After a brief summer of dormancy, they will flower again in the fall, until winter really sets in. Under cultivation, a few will refuse to go dormant and flower throughout the summer. Thus it is quite possible for them to flower 9-10 months of the year where climate and conditions permit. And that is not all! They are very sweetly fragrant, with perfume suggesting *Heliotrope.*

A group of *Nothoscordum bivalve* swaying on wiry stems above shiny green grassy leaves on a warm sunny afternoon in spring or fall can be a pleasant experience to the olfactory senses as their perfume is wafted through the air. I can recall pleasing moments as a child-home-from-school, sitting out in the lawn among the entrenched *Nothoscordum bivalve* colony and enjoying the pervading fragrance. What cared I if these "wild onions" did not belong there and were uninvited residents? The smell of them in the early evening air was delicious. I would pick handfuls of them and stick my nose into the masses of yellowish white blooms to drink deeply of the scent. The yellow pollen dusted my nose and face! Such are the joys of children. Later, as I began to acquire an interest in bulbous things, these were the first bulbs to go into my garden. I recall digging them from the lawn and leaving ugly blemishes in my wake. Mother, though patiently tolerant, was unimpressed. Thereupon I would gather a bunch of the stems for her to smell. She was agreeably surprised, but still not convinced. But even to this day, she has never been too impressed with most of my "little bulbs" that I grow, so it was really no reflection on my beloved Nothoscordums. Even now, when I find a person cautious to praise this plant's unpretentious qualities, I still gather a bunch of them and let them smell. It never fails. Who can fail to be charmed or delighted by a fragrant flower. To be so jaded is to miss some of life's real pleasures. The generous blooming habits, with an autumn reprise, its delicious fragrance, its modest prettiness, its zeal for living, these are its endearing qualities. Like the dog, it joyfully seems to be wagging its tail, licking our boots, and asking for nothing in return, save a pat of appreciation. Surely we can offer it a sunny nook somewhere where it can be left to colonize at the expense of no one. It should be a charter member in any garden set aside for wildings. If set deeply, to a depth of six or more inches, it need never be divided, as increased depths inhibit offsetting. Fastidious gardeners who don't allow any plants to set seed voluntarily can even plant it in a choice position. *Nothoscordum bivalve* grows everywhere in Mexico, and is said to grow into Guatemala.

Nothoscordum inodorum (syn.—*N. fragrans*) is a taller cousin of *N. bivalve,* of more robust growth habits, and even more sweetly scented

flowers, if that can be. Though slightly less hardy, and less able to withstand dry conditions than its tough cousin, it is even more rampant a spreader, and this must be very carefully watched lest it become an unwelcome guest. Unlike *N. bivalve* which has narrow grassy leaves that are never untidy, the foliage of this larger *Nothoscordum* is much broader and longer, of a dull bluish green color, and apt to sprawl. It is for this reason that one must choose a place for it with care, so that it does not smother other smaller things, as well as choke them out with its numerous seedling offspring. If one chooses to cultivate it, all flower stems should be removed as quickly as they fade, so that it will not set seed. Its quaintly charming umbels of whitish flowers with their intense fragrance are simply not enough to offset or compensate for its numberless seedling offspring that insist on taking over every inch of adjacent garden space. It is a plant only for wild gardens. Much as I would like to do so, I cannot eulogize this plant. If *N. bivalve* is like a friendly dog, then *N. inodorum* is a dog that bites the hand that feeds it. Look out! "Pretty is as pretty does."

There is not much point in discussing all of the South American Nothoscordums, as they are not in cultivation, nor are they available here. No doubt there are some that are choice within the group, and fairly adaptable to our culture. It is likely that those from higher altitudes should prove fairly hardy. Uruguay seems to be the center of the *Nothoscordum* clan, with most species being found there. Others are found in Chile, Paraguay, Peru, Bolivia, and Argentina. Any discussion of these exotics should begin with those that seem most appealing as garden plants, and the yellow flowered species would be my first choice. *N. gramineum,* has many flowered umbels of yellow flowers on stems 3-6 inches tall. This one should prove easy, as it is said to grow from Argentina to Mexico. That is a lot of territory! *N. minarum* has taller stems 6-12 inches tall, but few flowered umbels of yellow flowers. It is one of the many species from Uruguay. *N. bonariense,* another yellow Uruguayan species, has slender stems with only one or two flowers, or more rarely three or four flowers, less than a foot tall. Sometimes the flowers are said to be white with brown veins.

The light lilac flowers of *N. andicola* top dainty 3-6″ stems and are a refreshing departure from the many white kinds. This Andean species seems to be wide spread in the countries of the Andean region. The white flowers of *N. gaudichadianum* with their violet veins in 3-6 flowered umbels on stems under a foot in height whet the imagination of the enthusiast collector. It too is from Uruguay. Two *Nothoscordum* species have such short stems as to be practically stemless. Both the white *N. fictile* and *N. sessile,* with their one flowered scapes must appear like starry crocuses squatting on the ground. They surely are a departure from a family which mimics the onion family. These are but a few of the species within the genus, but it will at least point out the fact that there are still many interesting plants yet to be had. Let us hope that some day these will be made available to us. We might further hope that they will not violate their welcome in the fashion of *N. inodorum.*

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RECORD KEEPING BY PLANT COLLECTORS

HAMILTON P. TRAUB

Such experienced plant collectors as Mrs. Morris Clint, and Dr. T. M. Howard, keep adequate records of their plant finds, and this note is not meant for such veteran collectors. It is aimed at those who have recently entered the field and as yet do not keep adequate records. The writer has received seeds and bulbs without any definite record of the place and time of collection, or any other notations. This is most unfortunate because the scientific record is forever inadequate.

Most collectors obtain handy smaller bound memorandum books which they can carry into the field. The various lots are numbered consecutively from No. 1 upward, using one number for each lot taken in a different habitat, even if it is the same species. In this way confusion is avoided because each number will appear only once for any one collector.

After each number, he enters the date of collection, sometimes even the time of day, the name of the plant, if known, or probable (?) identity, or the space is left blank as to species, if unknown. He also enters the altitude, if known, the geographical location, the ecological conditions, soil, rainfall, etc., and notes on plant characters obtainable at the time.

When any part of the lot is sent to another person, the collection number is given with it. In this way all who work with the material can refer back to the original collection number for further details. For instance, Mrs. Clint sent the writer stock of a glaucous-leaved amaryllid, probably a *Sprekelia* (?), Clint No. 266, in 1952. When flowers were finally obtained 12 years later in 1964, it was easy to write to Mrs. Clint for more information about this lot so that the plant could be published as the new species, *Sprekelia clintiae,* in the present issue.

Fig. 22. *Hymenocallis fragrans* as grown at the Los Angeles State and County Arboretum, Arcadia, Calif. The petioled leaves had begun to decline but are still attached to the bulb. Photo by Wilfred M. Noble.

HYMENOCALLIS FRAGRANS FROM SEED

W. Quinn Buck
Los Angeles State & County Arboretum
Arcadia, California

In May of 1960 seeds were received under the name "*Hymenocallis expansa*" from the Hortus Botanicus, Groningen, Holland.

These seeds were planted at the Arboretum, and one seedling made slow progress through the years until June 1964, when it produced the magnificent flower scape pictured. Dr. Hamilton P. Traub has identified this wonderful species as *Hymenocallis fragrans* (Salisb.) Salisb., in Trans. Hort. Soc. 1: 340. 1812, excel. Trew, Sel. pl. 28, using photographs furnished by us for the identification (see Fig. 22).

Besides the outstanding beautiful flowers with their strong fragrance, the most outstanding characteristic of this rare species is the foliage, which is distinctly petioled and in that way quite different from any of the species which are commonly grown.

According to Dr. Traub, this beautiful species is native to the West Indies, where it grows commonly among hills near the coast on the Island of Barbados. It differs from *Hymenocallis speciosa* (Salisb.) Salisb., in Trans. Hort. soc. 1: 340. 1812, excel. Redouté, Lil. pl. 156, mainly due to its shorter, narrower, leaf blades.

AMARYLLID NOTES, 1965

Hamilton P. Traub

X Sydneya morrisii hybr. nov.

In the 1963 Plant Life, pp. 73-74; 34, Mrs. Morris Clint, of Brownsville, Texas, reported briefly on a new bi-generic hybrid between *Habranthus immaculatus* (seed parent) and *Zephyranthes bifolia* (pollen parent). In November 1964, Mrs. Clint sent a pressed specimen to the writer, and the description is based on this Holotype; and information reported by Mrs. Clint:

Leaves strap-shaped, up to 34 cm. long, 1.2 cm. wide, apex bluntly-acute; scape 31 cm. long; umbel 1-flowered, pedicel 5.6 cm. long, ovary 8 mm. long, 4 mm. in diam.; tepaltube 1.1 cm. long, tepalsegs 6.5 cm. long, narrowly oblanceolate, up to 1.5 cm. wide; flowers resembling *Habranthus immaculatus* in size and shape, color carmine rose (HCC-621) to Neyron rose (HCC-623), white center, and a small green throat; stamens and style shorter than the tepalsegs; stamens shorter than the style, of 2 sets of lengths; stigma trifid, with lobes markedly recurved.

Herba bulbosa; foliis loriformibus usque ad 34 cm. longis, 1.2 cm. latis, apice obtuse acutis; spatha in tubam infra connata, parte libera fenestrata vel bifida; flos illam Habranthi immaculati magnitudine figuraque consimilis carmineo-roseus (HCC-621) usque ad "Neyron"-roseus (HCC-623), loco medio albo, et gula parva viridi; staminibus styloque segmentis tepalorum brevioribus; staminibus stylo brevioribus,

in ordinibus longitudinis duobus dispositis, stigmate profunde, trifido, lobis valde recurvatis.

Holotype: No. 974 (TRA), taken Nov. 23, 1963, by Mrs. Clint, Brownsville, Texas; from bulbs obtained from Mexico.

Hymenocallis morrisonii (Vargas) Traub, **comb. nov.**

Syn.—*Stenomesson morrisonii* Vargas, in Nat. Hort. Mag., p. 132, pl. 3, Oct. 1943; *Pseudostenomesson morrisonii* (Vargas) Velarde, Rev. Cienc. li: 51. 1949.

Hymenocallis vargasii (Velarde) Traub, **comb. nov.**

Syn.—*Pseudostenomesson vargasii* Velarde, Rev. Cienc. li: 48. 1949.

Urceolina robledoana (Vargas) Traub, **comb. nov.**

Syn.—*Pseudourceolina robledoana Vargas,* in Bol. Fac. Sc. Univ. Cuzco 1: 7—8. 1960.

Pseudostenomesson (Velarde) Traub, **subg. nov.** (genus Hymenocallis L.; Amaryllidac).

Traub, Genera of Amaryllidac. 1963, p. 76. syn.—Genus *Pseudostenomesson* Velarde, Rev. Cienc. li: 47. 1949.

Elisena (Herb.) Traub, **subg. nov.** (genus Hymenocallis Salisb., Amaryllidac).

Traub, Genera of Amaryllidac. 1963, p. 76. syn.—Genus *Elisena* Herb. Amaryll. 201. 1837.

Ismene (Salisb.) Bak. ex Traub, **subg. nov.** (genus Hemenocallis Salisb., Amaryllidac.)

Traub, Genera of Amaryllidac. 1963, p. 76. syn.—*Ismene* Salisb., Trans. Hort. Soc. i: 342. 1812; Bak., Amaryll. 121. 1888.

Crinum amabile Don; var. cuperfolium (Traub) Traub, **comb. nov.**

Syn.—*Crinum asiaticum* var. *cuprefolium* Traub, in Plant Life 16: 93—94. 1960.

Crinum luteolum H. P. Traub et L. S. Hannibal, **sp. nov.**

A Crinum flaccido praecipue differt verni florens (sic in conjugio solivagum) et floribus parvioribus luteolis possidens.

HOLOTYPE: No. 985 (TRA), La Jolla, Calif., from bulb collected at Pichi-Richi Pass, Flinders Range, near Port Augusta, South Australia.

REGISTRATION OF NEW AMARYLLID CLONES

Mr. W. D. Morton, Jr., Registrar,
Mr. Edward Authement, and Mrs. Emma D. Menninger,
Assistant Registrars

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 CULTIVARIS, 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. W. D. Morton, Jr., Registrar, 3114 State Street Drive, New Orleans 25, Louisiana. The registration fee is $2.00 for each clone to be registered. Make checks payable to AMERICAN PLANT LIFE SOCIETY.

AMARYLLIS CLONES

EDWARD AUTHEMENT, *Assistant Registrar*

NEW AMARYLLIS BREEDERS, 1964

Abbrev.

Cuch.—Mr. Santo N. Cuchinotto, 2338 Independence St., New Orleans 17, La.

Fesm.—Mr. V. Roger Fesmire, 1170 So. Xavier St., Denver, Colo.

Lander.—Mr. C. W. Lander, 26 Cleveland Av., Milton Park, Salisbury, Rhodesia.

Moody—Mrs. James E. Moody, Box 35, Barney, Georgia.

Prudh.—Mr. Edward C. Prudhomme, 221 Rosa Av., Metairie, La.

Virg.—Mr. Milo C. Virgin, Columbia Road, Covington, La.

AMARYLLIS CLONES REGISTERED IN 1964

Registered by M. Van Waveren & Sons, N. V., Hillegom, Holland:

'Alfred Nobel' (VW. 1964), R; A-784, D-5A; U-4fld; 16″h; fls. 8″ diam; neyron rose (HCC-623) with green to white throat, whitish midribs; spr.

'Annie Hermes' (VW. 1964), R; A-785, D-5A; U-4fld; 18″h; fls. 8″ diam; rose madder (HCC-23); spr.

'Christine Spierenburg' (VW. 1964), R; A-787, D-4B; U-4fld; 24″h; fls. 9″ diam; rose bengal (HCC-25); spr.

'Deanne Durbin' (VW. 1964), R; A-788, D-5A; U-4fld; 22″h; fls. 7½″ diam; turkey red (HCC-721); spr.

'Dr. Ir. Louwes' (VW. 1964), R; A-789, D-5A; U-4fld; 12″h; fls. 7″ diam; indian lake red (HCC-826); spr.

'Elisabeth Andersen' (VW. 1964), R; A-790, D-5A; U-4fld; 22″h; fls. 8″ diam; rose red (HCC-724/3); spr.

'Garry Cooper' (VW. 1964), R; A-791; D-5A; U-4fld; 12″h; fls. 6″ diam; blood red (HCC-820); spr.

'Godesberg' (VW. 1964), R; A-792, D-5A; U-3fld; 19″h; fls. 7″ diam; geranium lake (HCC*-20); spr.

'Maria Callas' (VW. 1964), R; A-793, D-5A; U-4fld; 22″h; fls. 8″ diam; french rose (HCC-520), 3 upper segs whitish midribs with reddish stripes halfway up segs; spr.

'Maria Zamora' (VW. 1964), R; A-794, D-5A; U-4fld; 16″h; fls. 8″ diam; geranium lake (HCC-20); spr.

'Prof. Keesoom' (VW. 1964), R; A-796, D-15A; U-3fld; 15″h; fls. 8″ diam; claret rose (HCC-o21) with purplish cast; spr.

'Recherche' (VW. 1964), R; A-797, D-8; U-4fld; 12″h; fls. 4½″ diam; signal red (HCC-719); spr.

'Red Prince' (VW. 1964), R; A-798, D-5A; U-4fld; 21″h; fls. 8″ diam; blood red (HCC-820); spr.

'Red Trophy' (VW. 1964), R; A-799, D-5A; U-3fld; 14″h; fls. 6″ diam; signal red (HCC-719); spr.

'Scarlet Perfection' (VW. 1964), R; A-801, D-5A; U-4-5fld; 14″h; fls. 7″ diam; blood red (HCC-820) with faint white midrib; spr.

Description of 3 Van Waveren clones registered 1963:

'Joy' (VW. 1963), R; A-770, D-5A; U-4fld; 14″h; fls. 8″ diam; scarlet (HCC-19-19/1) with white midribs halfway up segs; spr.

'Leo Gestel' (VW. 1963), R; A-771, D-4A; U-4-6fld; 16″h; fls. 7″ diam; neyron rose (HHC-623); spr.

'Red Shank' (VW. 1963), R; A-772, D-5A; U-4fld; 14″h; fls. 6½″ diam; turkey red (HCC-721) with glossy turkey red throat; spr.

Registered by Milo C. Virgin, Columbia Rd., Covington, La.:

'Zeus' (Vir. 1964), R; A-802, D-5A; U-4fld; 24″h; fls. 8″ diam; scarlet (HCC-19); spr.

Registered by W. J. Perrin, 4753 Press Drive, New Orleans, La.:

'Grand Red' (Perr. 1964), R; A-803, D-5A; U-3-4fld; 16-18″h; fls. 7″ diam; cardinal red (HCC-822), with glossy cardinal red throat; spr.

Registered by Santo N. Cuchinotto, 2338 Independence St., New Orleans, La.:

'Orleans Beauty' (Cuch. 1964), R; A-804, D-5B; U-4fld; 18″h; fls. 6″ diam; white base with tyrian rose (HCC-24) stripes each side of white midrib to end of segs; spr.

Registered by Edward C. Prudhomme, 221 Rosa Ave., Metairie, La.:

'Delphi' (Prud. 1964), R; A-805, D-4B; U-4fld; 16″h; fls. 6½″ diam; fushine pink (HCC-627), greenish midribs ¾ length of segs, heavily veined; semi-ev, spr, fr.

'Dotty' (Prud. 1964), R; A-806, D-5B; U-4fld; 18″h; fls. 8″ diam; dutch vermilion (HCC-717/1), cherry red spots in throat; spr.

'Mardi-Gras' (Prud. 1964), R; A-807, D-8; U-2fld; 12″h; fls. 4½ to 5″ diam; orient red and blood red, minute red spots intermingled with white, blotchy appearance; semi-ev, spr.

'Neopolitan' (Prud. 1964), R; A-808, D-5A; U-4fld; 14″h; fls. 7″ diam; jasper red (HCC-o18) on white base each side of white midrib almost to edge of segs in upper 3 segs and upper half of 2 lower segs, pale green throat; semi-ev, spr.

'Crown' (Prud. 1964), R; A-809, D-5A; U-4fld; 18″h; fls. 7″ diam; jasper red (HCC-o18) with white edge around all segs; semi-ev, spr.

'Twist' (Prud. 1964), R; A-810, D-9; U-4fld; 18″h; fls. 5″ diam; cardinal red (HCC-822), very light whitish markings in throat; semi-ev, spr.

Registered by Mrs. Mildred P. Moody, Box 35, Barney, Georgia:

'Lou Anne' (Moody-1964), R; A-811, D-5A; U-6fld; 24″h; fls 8″ diam; upper 3 segs red veins on white, upper half of 2 lower setsegs veined red, lower petseg pure white; de, fr, spr.

'Zenora' (Moody-1964), R; A-812, D-5A; U-6fld; 24″h; fls. 8″ diam; bright red, velvet sheen, greenish white midrib shaded to deep red in throat; fr, de, spr.

Registered by Mrs. A. C. Pickard, 1702 N. Blvd., Houston 6, Texas:

'Fashion Show' (Pick. 1964), R; A-813, D-5A; U-4fld; 26″h; fls. 9½″ diam; carmine rose (HCC-21), shade lighter on lower segs; spr.

'Holiday' (Pick. 1964), R; A-814, D-5A; U-4fld; 24″h; fls. 9″ diam; currant red (HCC-822/2), darker throat; spr.

'Princess' (Pick. 1964), R; A-815, D-5A; U-4fld. 30″h; fls. 9″ diam; dawn pink (HCC-523); spr.

'Spring Beauty' (Pick 1964), R; A-816, D-5A; U-4fld; 28″h; fls. 9″ diam; porcelain rose (HCC-620); spr.

Registered by Ludwig & Co., Hillegom, Holland:

'Early White' (Lud. 1964), re-introduction. R; A-105, D-5A; U-4fld; 24″h; fls. 8-9″ diam; pure white, greenish-white throat; de, win or spr.

'Fiesta' (Lud. 1964), R; A-817, D-5A; U-4fld; 26-28″h; fls. 7-8″ diam; oriental red (HCC-819), darker veined towards the throat; win or spr.

'Mandarino' (Lud. 1964), R: A-818, D-5A; U-4fld; 26-28″h; fls. 8-9″ diam; intense capsicum red (HCC-715), blood red in throat; semi-ev, win or spr.

'Red Coral' (Lud. 1964), R; A-819, D-5A; U-4fld; 27-29″h; fls. 8-9″ diam; blood red (HCC-820) with darker, glossy throat; de, win or spr.

'Petticoat' (Lud. 1964), R; A-820; U-4fld; 26-28″h; fls. 6-7″ diam; pure white, red edged—ideal picotee; ev, win or spr.

'Constant Comment' (Lud. 1964), R; A-821, D-8; U-4-5fld; 22-24″h; fls. 4-5″ diam; dark winered Gracilis; ev, win or spr.

'Melody Lane' (Lud. 1964), R; A-822, D-8; U-4-5fld; 16-18″h; fls. 4-5″ diam; salmon orange, lighter color in throat; ev, win or spr.

AMARYLLIS REGISTRATION—continued on page 51.

CORRIGENDA

PLANT LIFE, VOL. 20. 1964—
CATALOG OF HYBRID AMARYLLIS CULTIVARS, 1799 TO DEC. 31, 1963

Page 13, 1st. line, for 'Ambiguum' read 'Ambigua'.
Page 13, line 17, for 'A-555' read 'A-565'.
Page 14, line 29, delete 'NR'.
Page 14, line 32, delete '(VM. 1963)'. End with 'for a Dutch breeder'.
Page 16, line 31, read 'Cavalier' R; A-774, D-5A; U-3-4fld; 12″h; fls. 7″ diam; scarlet (HCC-19); spr.; I.—Goed. 1962 for a Dutch breeder.
Page 21, line 5 from bottom, for 'Floral Queen' read 'Flora Queen'
Page 22, line 21, read 'R; A-143'.
Page 25, line 2 from bottom, read 'Joy' (VW. 1963), R; A-770, D-5A; U-4fld; 14″h; fls. 8″ diam; scarlet (HCC-19) with white midribs halfway up segs.
Page 27, line 11, read 'Leo Gestel' (VW. 1963), R; A-771, D-4A; U-4fld; 16″h; fls. 7″ diam; neyron rose (HCC-623).
Page 34, line 14, for 'A-163' read 'A-613'.
Page 35, Line 17, read 'Red Shank' (VW. 1963), R; A-772, D-5A; U-4fld; 14″h; fls. 6½″ diam; turkey red (HCC-721) with glossy turkey red throat.

NERINE CLONES

The following are additions (not registered) to the "Catalog of Nerine Cultivars."

'Mary Fenwick', a *N. bowdenii gigantea* variant; differs in number of chromosomes, relatively larger flowers. See Gard. Chron. March 23, 1963, p. 205. See 'Fenwick' Plant Life 19: 68. 1963.

'Mary Knight', a *N. bowdenii gigantea* variant, very pale pink. See Gard. Chron. March 23, 1963, p. 205.

'Mary Sealy', a *N. bowdenii gigantea* variant, darker pink. See Gard. Chron. March 23, 1963, p. 205.

'Quinton Wells', a *N. bowdenii gigantea* variant, with smaller flowers, segs markedly waved, first to flower. See Gard. Chron. March 23, 1963, p. 205.

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.]

Milula spicata Prain, Ann. Roy. Bot. Garden, Calcutta 5(2): 165, plate 200. 1895-(1896).—Herbs; bulb elongate, the lower half covered with fibrous scales which are the remains of old leaves; roots numerous; leaves linear-lanceolate, equaling or surpassing the fistulose scape which, in turn, is twice as long as the bulb; spike cylindric, included by a basal, spathaceous, ovate-acuminate bract; flowers becoming green-reddish, small, very many, campanulate, the perianth-segments equal, their margins undulate-fimbriate; stamens in two series, the exterior three alternate with the carpels and with the lower half of the filaments expanded and petaloid, the lower 3 opposite the carpels, slightly shorter, filiform upwards; anthers versatile, all perfect; ovary subglobose; ovules attached at the inner angle of the cell somewhat above the base; capsule globose, with always one ovule (seed) in each cell, sometimes both (two?) aborted; seeds black. In the eastern Himalayas, at Chumbi, collected by Do-tho, King's hired collector.

Phaedranassa megistophylla Kraenzl., Engl. Bot. Jahrb. 54 (Beiblatt #117); 2—3. 1916.—Bulbs subglobose, somewhat depressed, 8—9 cm. in diameter, copiously covered with brown tunics, 1- or 2-leaved; leaves subsessile or shortly and broadly petiolate, very broadly oblong, obtuse, (Pale?)—margined, rather thick, fleshy, canaliculate, the largest seen by me 37 cm. long (including the short petiole), about 11—12 cm. wide, usually more or less shorter and broader; scape without inflorescence 75—105 cm. tall, thick, terete, glaucous as are also the leaves and flowers, pruinous; spathe of the inflorescence quickly perishing in linear fragments; flowers more than 20, successive; pedicels during the anthesis of the flowers 6—8 cm. long, those of the buds much shorter, the entire inflorescence resembling that of Brunsvigia; ovary during anthesis oblong, later triquetrous, incrassate; leaves of the perigonium merely connate, later noticeably dilated and divergent, forming and narrow scarcely open little funnel, all equally long, 4 cm. long, to 7 mm. wide toward the apex, glacous, pruinous on the outer surface; stamens fertile during anthesis, equaling the perigonium, the anthers soon becoming effete and deciduous; filaments slightly compressed; style considerably surpassing the perigonium, to 6 cm. long; stigma slightly declinate, somewhat 3-parted.

Urceolina microcrater Kraenzl., Engl. Bot. Jahrb. 54. (Beiblatt #117): 3—4. 1916.—bulbs globose, about 4 cm. in diameter, with numerous roots, narrowed into a short neck 2 cm. in length; leaves absent during anthesis; scape slender, fine, 45 cm. tall to the inflorescence; spathe divided into 2 or 3 linear segments 3—4 cm. long; flowers 5, arranged in a raceme; pedicles during anthesis variable in length, 2—8 cm. long, slender; ovary ovoid, deeply 3-sulcate, 5 mm. long and thick;

tube of the perigonium narrowed from the slightly wider base, to 6 mm. long, green, abruptly dilated, campanulate, not truly urceolate above, the lobes 6, equal, lanceolate, free almost to the base, 2 cm. long, 6 mm. wide, yellow later green, white-margined toward the apex, the entire flower at anthesis 3.5 cm. long and 2 cm. in diameter; stamens about equaling or somewhat surpassing the perigonium; style linear, somewhat longer; stigma clavate, incrassate, manifestly papillose.

Brunsvigia rautanenii Bak., Bull. Herb. Boiss. Ser. II. Vol. 3, p. 667. 1902.—Bulb unknown; leaves unknown; peduncle 2.5—3.2 cm. in diameter at the apex; umbel 20—30-flowered; pedicels strict, ascending, 22.9—25.4 cm. long, strongly angled at the apex; perianth red, the tube cylindric, 1.3 cm. long, the segments of the limb unguiculate, 1.7—1.9 cm. long; filaments red, longer than the limb; ovary obconic, acutely trigonous, 1.1—1.3 cm. in diameter. Conspicuously different from all the other known species.

AMARYLLIS CYBISTER FLOWERED IN CALIFORNIA

W. Quinn Buck,
Los Angeles State & County Arboretum,
Arcadia, California

In March of 1963 a bulb of *Amaryllis cybister* came as a gift from Prof. Ira S. Nelson of the University of Southwestern Louisiana at Lafayette, La. A flower spike had started to emerge from the small bulb, which was well established in a four-inch pot.

The spike developed slowly as we waited impatiently to see the flowers. When finally the buds did open we had a happy surprise in that the color was not what we had expected from the descriptions of this orchid-flowered *Amaryllis* from Bolivia and Brazil. The five flowers opened all together and formed an elegantly compact group, each flower having creamy green segments with a crimson base that gave the flower a scintillating red throat. Everyone who got to see this species was delighted with it.

After making good growth for a year, the bulb bloomed in 1964 with an even finer spike, which was larger and taller than in 1963 but still smaller than the type described. Again some flowers were selfed, and part were pollenated with pollen from hybrids and other species. No pods formed on either spike. When crossed on *Amaryllis striata fulgida* by Mrs. Bert Williams, she was able to get pods to set, and she and her friends are looking forward to the flowering of these vigorous seedlings.

This thoroughly charming species should be more widely grown as it can become available. The green form suggests interesting breeding possibilities. See Cover Design of the present issue, and Fig. 23, for unique form of this species.

Fig. 23. Drawings of *Amaryllis cybister* made by Prof. Penrith Goff as an alternate cover design.

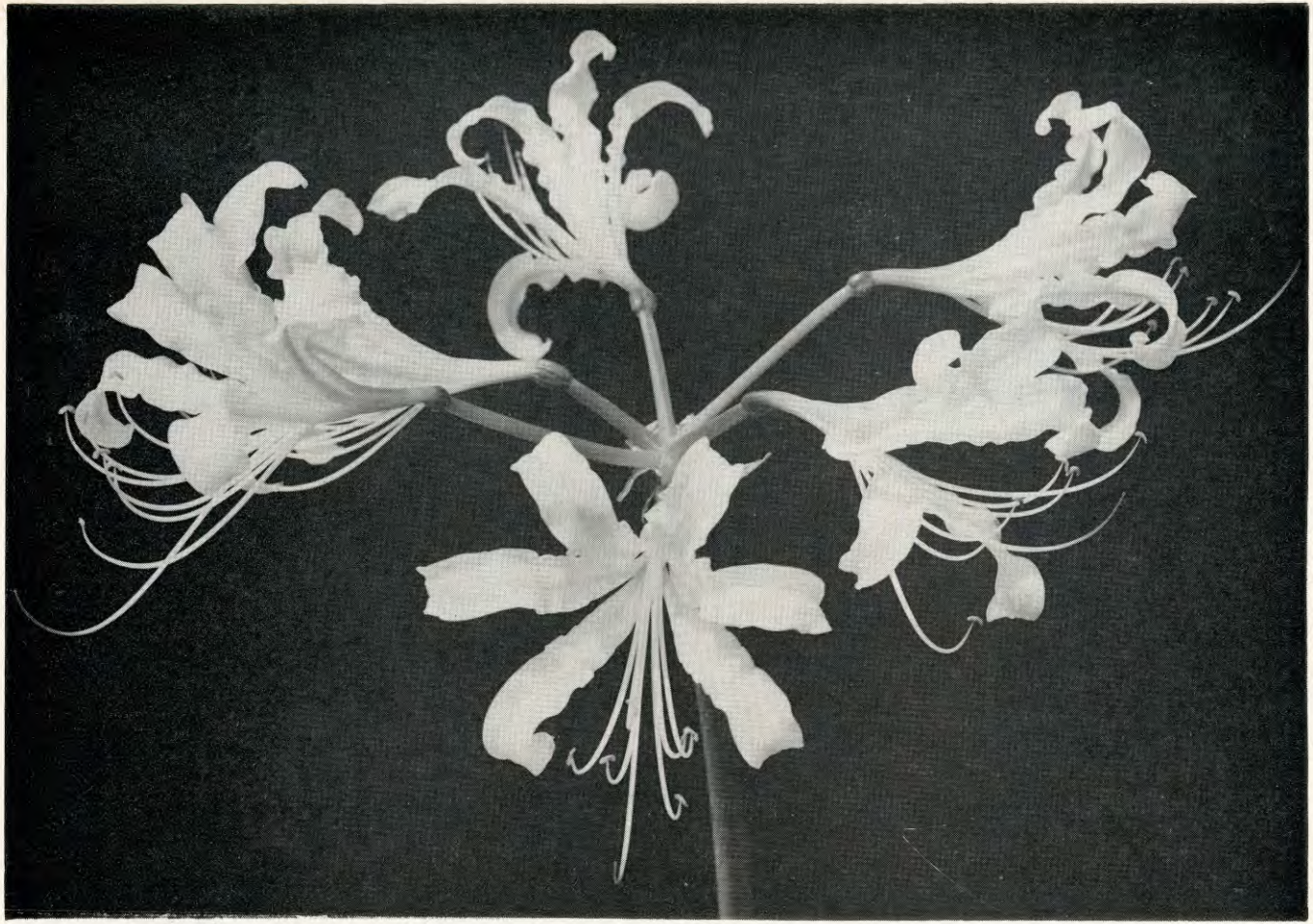

Fig. 24. Hybrid *Lycoris* (*L. haywardii x L.* "Sperryi"), as grown near Nashville, Tenn., Aug. 18, 1964. Color white with faint pinkish lines along outside of segs. Photo by Sam Caldwell.

3. GENETICS AND BREEDING

1964 LYCORIS REPORT

Sam Caldwell, *Nashville, Tennessee 37211*

The year 1964 was the best ever for lycorises in my plantings. Everything bloomed that reasonably could have been expected to flower, and most exciting was the opening of four new hybrids.

In my area (middle Tennessee) the winter preceding a lycoris season strongly affects the amount of bloom we get. Following a mild winter, bloom is usually good; a very cold one damages foliage on a number of species and thus inhibits flower production.

For buyers of fuel to heat homes, our 1963-'64 winter brought record cold but for plants it was relatively mild. The seeming contradiction is explained by the fact that there were many more days than usual of temperatures in the teens and twenties, requiring the consumption of much fuel, but there were never any extremely bitter spells. Five above zero was the lowest temperature experienced—far from the 13- and 15-below-zero marks of the previous winter, which had completely stopped bloom on most of my lycorises that make foliage in fall. Apparently those species maintaining live green leaves over the winter can tolerate extended periods of Freezing weather but begin to suffer when temperatures drop near zero.

THE SPECIES, IN ORDER OF BLOOM

First to appear was a scape of the orange colored *L. kiushiana,* on July 10.

July 13 brought a scape of the hardy yellow *L. chinensis* into prime condition. Most notable observation is that since my one bulb, planted in 1958, started blooming in 1961, it has bloomed regularly for four years straight. There seems to be little increase, though judging from foliage of the past spring, there are now two bulbs.

All through the second half of July there were blooms of *L. sanguinea* in numerous locations. Its orange color is much better in shade than in the sunny places but somehow does not appeal to me.

One small scape of *L.* "cinnabarina" was open on July 20. It will take further observation but I still think this may turn out to be really *L. kiushiana.*

From July 20 to 30 there were excellent blooms of *L. haywardii.* It thrives in the shady spots and the blooms look best and last longest there.

Also from July 20 through two or three weeks of generous flower production we enjoyed *L. squamigera* in all locations where I have established bulbs.

Reaching peak on July 26 and lasting another week were two good scapes on the large hardy yellow lycoris which we call *L.* "sperryi." Actually, I have about eight large bulbs of this now, so the percentage

of bloom was not good. Miss Aileen Bishop, who has the original clumps of this species here in Nashville, had nine scapes. It is similar to *L. chinensis* but has taller scapes and comes consistently about two weeks later than *chinensis*.

During the first half of August there were three wonderful scapes of white *L. houdyshelii* on a clump shaded by a dogwood tree. I have bulbs in two other locations that did not flower.

L. incarnata was late starting this year but by mid-August was showing dozens of scapes.

Also the middle of August brought the first of *L. sprengeri,* with additional blooms coming to stretch the season for more than two weeks.

Through the same period there developed exactly 15 very fine scapes on *L. caldwellii.* Definitely the best display I've seen on this species was due, apparently, to the cool, cloudy and wet weather occurring at the time. All my bulbs of this are in shady locations now. Flowers were unusually large, on two- to three-foot scapes, and the pale yellow color held up well without the usual fast bleaching.

All of the latter half of August the fertile *radiatas* bloomed in quantity. The strain sent me by B. Y. Morrison always starts a little later than the other fertile form I have. My common *radiatas* (the triploid, sterile form), which normally flower around mid-September, gave very scant bloom this year. They are never as floriferous here as the fertile ones; in the severe 1962-'63 winter they appeared to be hurt more than any others, and their bulbs may not be fully recovered as yet.

Beginning around the end of August and lasting through most of September were dozens and dozens of scapes on *L. elsiae* and the various other delicately pastel tinted spiderlily forms which dealers sell as "Albiflora," "Albiflora carnea," "White" lycoris and the like (all grown here in coldframes, covered in winter). This "near white" group was covered in my report of last year, so I'll not repeat details given there. Ample rainfall and unseasonably cool nights that we experience through their blooming this year enhanced the richness of their usually pale coloring. Yellow, pink and salmon tints in various blooms were strong and beautiful.

Because many factors cause color variation in these flowers—age of bloom, light, temperature, soil and moisture—one runs into difficulty when attempting to segregate bulbs that are producing identical blooms. There is a "family resemblance" in all of them but certainly there are numerous variants—some meriting separate propagation. Strangely, in spite of the "albiflora" (white-flowered) name, I have never seen a pure white individual among them. Has anyone? I mean white all the way, of course—not just fading white from original cream, yellow, salmon or pinkish tints.

The variation among these flowers tends to support the Japanese theory that *L. albiflora* is a natural hybrid between *L. aurea* and *L. radiata radiata;* at least, in my own crosses of the fertile *radiata* with *L. sprengeri* there is variation among seedlings quite like that occurring in the "albiflora" group.

Fig. 25. Hybrid *Lycoris* (*L. haywardii x L. sanguinea*), as grown near Nashville, Tenn., Aug. 4, 1964. Color orange pink, bluish tints at the tips of the segs with age. Photo by Sam Caldwell.

HYBRIDS

Beginning August 7 and running through August 25 there were 48 scapes on various lots of the *sprengeri-radiata* hybrids that I started in 1954 and '55 and that began to bloom first in 1961. Dr. Traub has named these *L.* x *jacksoniana*, replacing the convenience label, "Sprenrad Hybrids," formerly used. Variations in the numerous flowering scapes brought daily thrills. I marked a few that seemed outstanding; I rather prefer those with widest segments and the deep rose and purple-red shades. However, some of the lighter ones, mainly pink but with blue-tipped segments, are beautiful.

When three scapes began to push up on *L. haywardii* X *L. sanguinea* seedlings in July I was excited, not only because this was to be their first bloom but also because the seedlings were just five years old. I had never previously had a lycoris seedling to bloom in less than six years. Eventually two more scapes came up on another lot of the same cross (these were six years old), and two weeks later there were two scapes on a group of reciprocal cross (*L. sanguinea* X *L. haywardii*) seedlings. These hybrids turned out to be highly predictable in appearance; their parents are similar in flower form and so the "children" are the same, with plain, smooth-edged segments. (See Fig 25.) The color is a salmon or orange-pink shade with a suggestion of *L. haywardii's* blue segment tips showing as the flowers age. Scapes averaged about 15 inches tall, with three to five flowers per umbel and the umbels measured some seven inches across. The variation so evident in *sprengeri-radiata* hybrids is not present in this cross—flowers on all of the seven scapes were practically identical. Those with *L. sanguinea* as seed parent did come two weeks later than the others and had flowers just a little larger and with slightly wider segments. These are points to be checked in future years, because they could be due to differences in growing conditions.

These "Haysan Hybrids" (temporarily, for convenience) are interesting and probably worth having but to my way of thinking will not create much of a stir in the lycoris world.

Back in 1958 when I first saw the golden *L.* "sperryi" flowers here in Miss Bishop's garden, I brought home pollen and used it on a bloom of my *L. haywardii.* Six large seeds resulted and eventually two bulbs. When I saw a big bud pushing out of the ground in August from one of these I began mentally to visualize what might result from a blending of lavender-pinkish *L. haywardii,* with its severely plain form, and the golden-orange frilliness of spiderlily flowers on *L.* "sperryi."

A sturdy 23-inch scape grew up with six light greenish buds marked with pink longitudinal lines. They opened on August 18, slightly greenish-yellow for a few hours but then becoming white. (See Fig. 24). For all practical purposes it is a large (more than 10 inches across) loose umbel of white flowers with crinkled and reflexed segments in typical spiderlily pattern. Very faint pink lines remain along the midribs of segments on the outside and greenish-yellow lines radiate from flower centers within, but the overall effect is white. While individual flowers

are pretty and "different," they are held on relatively long pedicels—up to 2⅝ inches—and the umbel is less attractive to me than a more compact type. I have a few more bulbs of this to flower (from repetitions of the cross in 1959) and expect to see considerable variation in the seedlings. Actually, something good should come of this.

Of special interest in my lycoris "nursery" frame was the fact that two scapes of the previously mentioned "Haysan Hybrids" were still in good condition and were just about a foot away from the big white "Haysper" bloom. It was hard to realize that both had the same seed parent (see accompanying photographs).

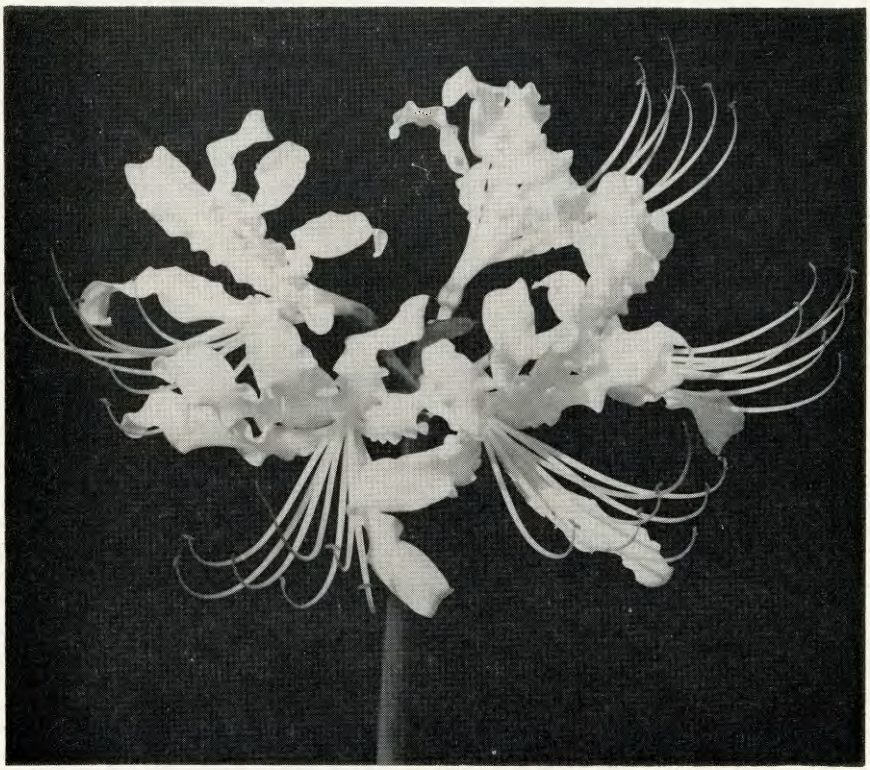

Fig. 26. *Lycoris* x *washingtonia* (*L. radiata* x *L. chinensis*), originated by Dr. John Creech. Flowered near Nashville, Tenn., Aug. 20, 1954. Color soft buttery yellow self.

The next hybrid I saw was not of my own but was the *L. radiata*—*L. chinensis* cross made in Washington, D. C. in 1950 by Dr. John L. Creech. Dr. Traub sent me a bulb of this in July, 1962, and it bloomed August 20 this year. It is an altogether delightful modest-sized spider-lily type yellow lycoris. See Fig. 26.) Some years ago I received a report that flowers of this cross were "yellow with longitudinal reddish

stripes,'' but mine turned out to be a soft buttery yellow self—no red markings at all. Probably different seedlings vary, though Dr. Traub reports no marked difference in several he has made to bloom. Mine had a 15-inch scape with five flowers in a beautifully compact but not crowded umbel about 6 inches across. Segments are a little broader than in *L. radiata;* otherwise it reminds one of a yellow *radiata.* I believe it will be extremely popular when stocks can be increased.

Closing the season for me in late September were two nice scapes on *L.* x *lajolla.* Dr. Traub sent me seeds when he made this cross of *L. aurea* and *L. traubii* back in 1957. Thus these seedlings bloomed in seven years, under pot culture all the way, as both parents are too tender for outdoor planting here. I had lifted and repotted these bulbs in August, just a couple of weeks before the scapes started, so doubt that these first blooms, from the recently disturbed bulbs were typical size. Nevertheless, this seems to be a relatively large-flowered lycoris of rich golden color. Flowers in the umbels (nine had five each) have a pleasing upward tilt and broad segments. A tentative judgment is that besides being a very beautiful lycoris it is going to be one well adapted for container culture. The potted bulbs have grown clean, healthy and strong from the beginning.

LOOSE END

My lycoris report last year told of a ''New Import—Hardy Golden Spiderlily,'' which had been marketed in this country in 1962. I have over 500 of these bulbs and distributed a number to friends for trial in different localities. Thus far I have had no bloom nor has any been reported to me, although the bulbs make foliage growth early each spring. I reported last year the resemblance of their foliage to the leaves of the rare *L. chinensis* and *L.* ''sperryi''—hardy yellow species that I have. But with another year these ''New Import'' bulbs have grown larger and their leaves broader; to me they look exactly like *L. squamigera* foliage. I will not be greatly surprised if the ''Hardy Golden Spiderlily'' label proves to be a hoax and the bulbs really *are L. squamigera.*

Meanwhile, now in the fall of 1964 our local Woolworth stores are selling bulbs with once again the same color plate of a yellow lycoris and the same ''New Import—Hardy Golden Spiderlily'' label of two years ago. So I'm still hoping the label may be true.

STEPS TOWARD THE LARGE-FLOWERED YELLOW AMARYLLIS HYBRIDS

Hamilton P. Traub

In 1952, Dr. Castellanos sent seeds of the very light yellow-flowered *Amaryllis* species, *A. aglaiae.* When these seeds germinated and bulblets had been formed, these were widely distributed so that progress could be made toward the large-flowered yellow *Amaryllis* hybrids. Some of the results have been reported in past issues of the Amaryllis Year Book.

A few years ago, plants of *Amaryllis aglaiae,* maintained in plastic pots, bloomed for the writer, but it was not possible to set seeds on these either by selfing, or crossing of sibling seedlings, or by crossing with the large-flowered white hybrid *Amaryllis.* The plants made lush growth in pot culture and this may have had something to do with the lack of results.

In the spring of 1964, one of the plants set out in the open under ordinary garden conditions produced a scape, and this time seeds were obtained by selfing, and by crossing with a large-flowered white with yellowish throat. This latter cross is the first step toward a large-flowered yellow *Amaryllis.* Seeds were sent to Mr. Quinn Buck, and a few others, so that rapid progress can be made.

When the hybrid seedlings flower, an attempt will be made to intensify the yellow by selfing; back crossing on *A. aglaiae,* and also by crossing with the very light yellow form of *Amaryllis evansiae,* and the yellow form of *Amaryllis pardina,* if the last named can be obtained in the meantime. Possibly, the greenish-yellow form of *Amaryllis calyptrata* might also be useful in such a breeding project. It is hoped that others will report on their progress toward the large-flowered yellow *Amaryllis* hybrids in the future issues of the Amaryllis Year Book.

DAYLILIES IN 1964

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

During the 1964 daylily flowering season the most outstanding event for the writer was the opportunity to visit the garden of Dr. Hamilton P. Traub in La Jolla, California, for the first time in several years. This mid-June visit was an especial pleasure because of all the new things that Dr. Traub had to exhibit.

While waiting for the heavy morning overcast to clear away and permit the day's new flowers to open, we talked about the new work at length. This discussion was interrupted by Dr. Traub's bringing out incredibly beautiful and fresh flowers from the day before which had kept perfectly in the refrigerator. With the exception of a couple of fine diploids selected for release, all were tetraploid seedlings derived from a polyploidized form of 'Artemis' (Norton), which Dr. Traub had admired in its diploid form for its complete sunfastness and "butterfly" shape; both of these characteristics have been established in Dr. Traub's lines, so that now he has huge flowers with wonderful shape, substance, and sunfastness, in a wide range of yellows and golds. (See Fig. 27). One of the most outstanding was a light cream flower of medium size, and with superb substance and shape. There were also several reds of unbelievable color quality.

By late morning the high fog had cleared sufficiently to allow the morning's flowers to open quickly, and in the garden we again were impressed by the array of seedlings in bloom. All kinds of fine yellows were interspersed with reds of greatest depth and smoothness; there

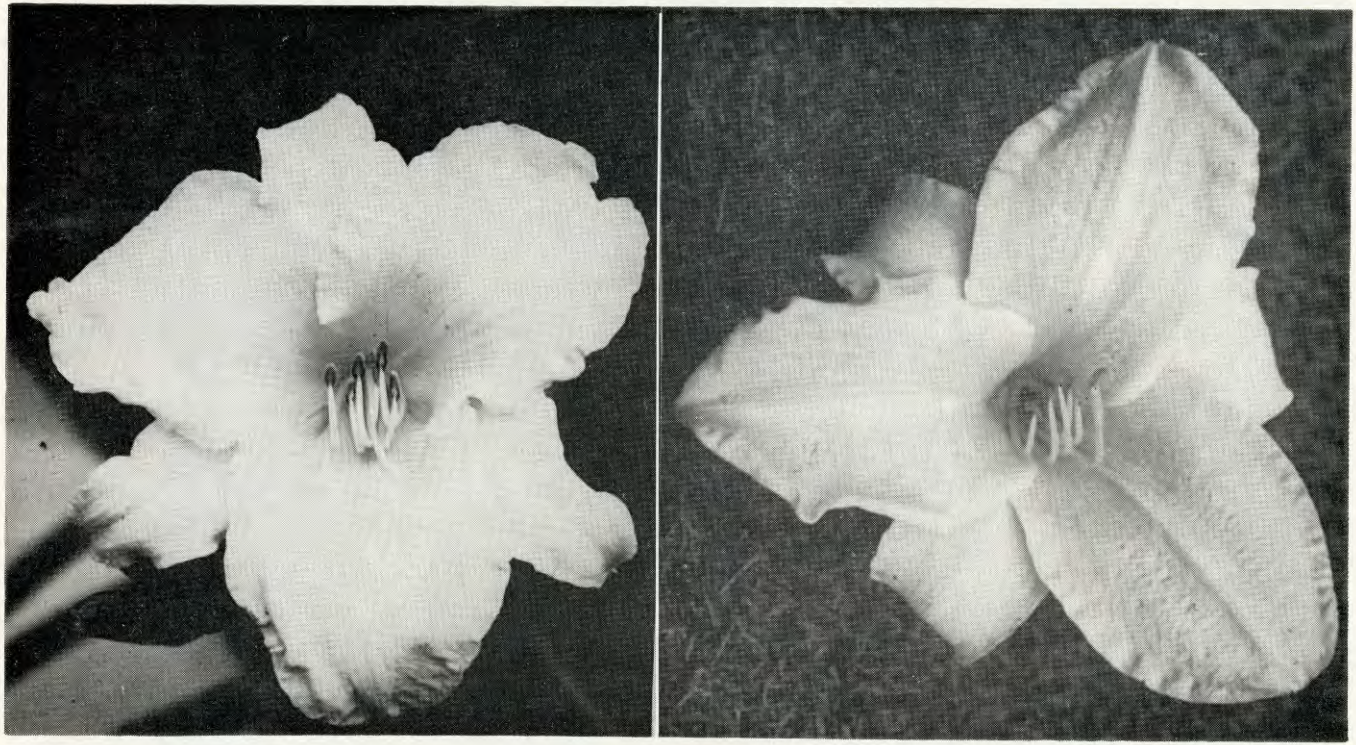

Fig. 27. *Hemerocallis washingtonia.* Butterfly strain tetraploids raised by Hamilton P. Traub, La Jolla, Calif. (Left) light yellow; (right) golden yellow. Photo by Jack Romine, 1964.

was also one red with very good branching, and it is to be used with all the others. Dr. Traub's pride was a huge reddish lavender-purple, (See Fig. 28), from which he hopes to obtain a whole new line of purples and lavenders. The writer regrets not being able to give names or numbers for some of these fine seedlings.

Fig. 28. *Hemerocallis washingtonia.* Mulberry purple tetraploid raised by Hamilton P. Traub, La Jolla, Calif. Photo by Jack Romine, 1964.

In the Buck garden in Arcadia, California, the season was quite late because of the cool spring, but there were many interesting seedlings, such as several huge, bold tetraploid bicolors derived from 'Sue Booth' (Buck). There were some large bright reds with 'Tetra Painted Lady' in their ancestry, besides some handsome dark reds of rich quality. An unusual kind of mahogany red was exhibited by a group of seedlings derived from 'Tetra Redrock Canyon'; this group, unfor-

tunately, lacked sunfastness. In the Buck garden there was a really great range in the yellow-to-orange group in height, size, and shape. See Fig. 29 for the clone 'Arcadia Pink'.

Fig. 29. *Hemerocallis washingtonia.* Tetraploid 'Arcadia Pink', raised by W. Quinn Buck, Arcadia, Calif. Photo by Jack Romine, 1964.

The Fay-Griesbach tetraploids in Illinois can be reported on only from information given by visitors, as well as from the excellent slides of Robert Baker Wynne, and from information and slides furnished by Mr. Orville W. Fay himself. During 1964, Mr. Fay and Dr. Robert A. Griesbach flowered about 4,000 new tetraploid seedlings, including some 400 bright reds; all colors yet obtained in daylilies were represented, as well as several entirely new colors. Mr. Fay reports that the number of visitors this year was so great as to make it impossible

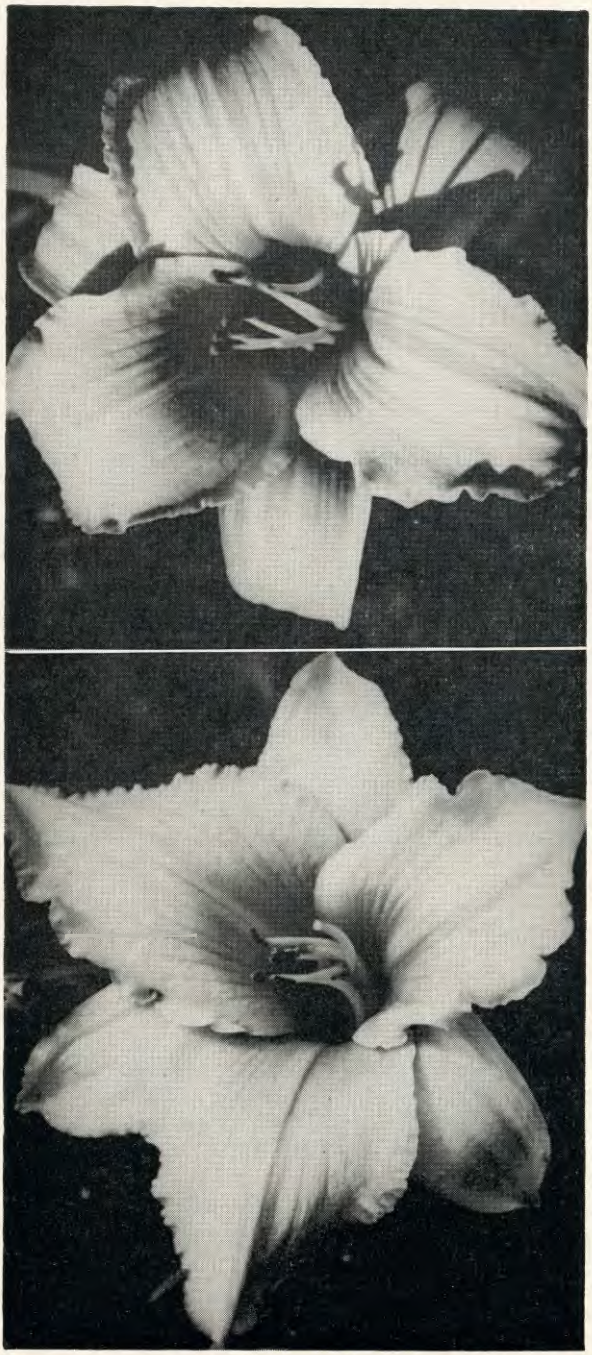

Fig. 30. *Hemerocallis washingtonia.* Fay tetraploids (left) Fay 62-51; (right) Fay T63-24.

for them to study and number the 1964 crop of seedlings, which will have to be held over for another year.

In 1963 Mr. Fay flowered around a thousand tetraploid seedlings, the majority involving 'Crestwood Ann'. The 1964 season afforded opportunities for further observation of the selected seedlings. T62-51 (see Fig. 30) is a particular favorite with Mr. Fay because of its shape, its color—nearly white—and its tremendous substance. This is an induced tetraploid of a cross of Frances Fay X 58-22. This same cross also gave T61-17, which Mr. Fay considers one of his best. Melon T63-24 (see Fig. 30) and T63-5, which is not a melon but a very light color, are among the best of the 1963 selections, because of fine flowers, excellent stems, and good plant characteristics.

Mrs. W. T. Hardy, in Alabama, flowered a number of fine tetraploid seedlings, some of the most beautiful coming from crosses of 'Mildred O'Neal' (Kraus). R. W. Munson, Jr., in Florida, reported flowering a few superior yellow tetraploids. Dr. Virginia Peck, in Tennessee, treated some 7,000 germinating seed in 1964, and she undoubtedly flowered additional fine induced seedlings. In 1963 Dr. Peck had a number of fine tetraploids of which we got to see slides.

Among the newer diploid daylilies the most outstanding in the writer's collection in 1964 were 'Louise Simon' (MacMillan), a huge melon of great quality; 'Sholom' (MacMillan), of particularly fine flat shape and light color, more yellow than melon, but very beautiful; 'Blue Jay' (Spalding), the best "blue" the writer has obtained anywhere; 'Prairie Beauty' (Marsh) and 'Prairie Champ' (Marsh), both large and good; 'Frankly Fabulous' (Childs), a gold-edged melon that can be most incredibly beautiful; 'Symphonette' (Childs), another wonderful melon with a golden glow throughout the color; 'Laurel Anne' (Fischer), very lovely in spite of its resentment of our cool nights; and 'Monica Ann' (Fay), which showed the most wonderful branching for a first-year plant.—*Los Angeles State & County Arboretum, Arcadia, California.*

HYBRID AMARYLLIS FOR DESERT REGIONS

Mrs. Frank McCown, *P. O. Box 176, Holtsville, California*

Summer is long and hot in this region of the Colorado Desert, near the border of the Mexican State of Baja California, starting in early June and remaining warm until late October. That a plant as seemingly fragile as the hybrid *Amaryllis* could thrive and bloom in this climate, with occasional highs of 115° and 118°F. during July and August, seems a miracle.

The hybrid *Amaryllis* clone 'Holtsville' was originally given as a gift to one resident in the town. She planted it in a favorable location on the east side of her home in sandy loam where it received morning sun and protection from the fierce noon sun of summer and strong west

winds of spring and frost of December and January. This one bulb rapidly multiplied and over the years found its way in many other gardens in Holtsville, in Imperial County.

My own interest was sparked when a friend asked me if I had seen the "Red Lily" blooming in a neighbor's yard. This was in August. The fact that anything that could answer the description of a red lily that was blooming in August made me investigate. And there, as my friend said, was a scape with two very thrifty red blossoms, an *Amaryllis*. Bulbs soon found their way in my garden and bloomed the following April (Fig. 31) along with the Dutch Hybrids and again an occasional spike would surprise me during the summer and fall months.

Fig. 31. Hybrid *Amaryllis,* clone 'Holtsville' as grown by Mrs. Frank McCown, Holtsville, Calif., is resistant to high temperature and drought. Photo by Mrs. McCown, 1964.

This vigorous *Amaryllis* Hybrid undoubtedly has quite a bit of *A. aulica* in its background. The flowers, usually two to a scape, are vivid red with a six pointed white star in the throat. Dark maroon shading accents the white star. The broad, rich green, strap shaped leaves sometime reach three and four feet in height and are evergreen. Offsets are rapidly produced.

In the spring of 1962 I made crosses between this clone and the half dozen Dutch Hybrids that grow very well under a Pecan Tree where they receive summer shade and good drainage. In April of 1964 one seedling although quite small bloomed. Very like its 'Holtville' parent in coloring and of only medium size, the only good quality noted was its ability to bloom so young. By the summer of 1965 I anticipate

bloom on a good many of the seedlings and in the following year any ability to make offsets and repeat bloom should begin to show up. These two characteristics if they could be combined with the beauty of the Dutch Hybrids, could point the way to a new type of hybrid that would do well in desert regions.

CYRTANTHUS PURPUREUS

Cyrtanthus purpureus (Ait.) Traub (syn.—*Vallota purpurea* (Ait.) Herb. = *V. speciosa* (L. f.) Dur. & Schinz) is an excellent horticultural subject but unfortunately has been much neglected.

Mr. Roy Hansberry, of Modesto, Calif. (Plant Life 18: 145. 1962) has reported on its culture under the title, "West Coast Vallota Culture". Since this was published, the genus *Vallota* Herb. has been united with the genus *Cyrtanthus* on biological grounds as indicated in Traub—"The Genera of Amaryllidaceae" (1963), page 66.

Since *Cyrtanthus purpureus* (under the synonym *Vallota*) is offered by a number of American dealers, and by Ludwig & Co., Hillegom, Holland, the members should obtain bulbs and report in the Year Book on their experiences with this delightful plant subject.—*Hamilton P. Traub.*

PLANT LIFE LIBRARY—continued from page 38.

PHILOSOPHY OF SCIENCE. THE DELAWARE SEMINAR. Bernard Baumrin, Editor. Interscience Publ., a division of John Wiley & Sons, 605 3rd Av., New York, N. Y. 10016. Vol. 1. 1963. Pp. 370. $9.75; Vol. 2. 1963. Pp. 551. $14.50.

The long range purpose of this series is to bridge the growing chasm between the two intellectual cultures of our time—the scientific and humanistic communities.

In Volume 1, the scope of the philosophy of science is presented by sixteen authorities; two basic distinctions; scientific explanation and prediction; philosophical aspects of foundation mathematics, biology, social science, and of physics. In volume 2, nineteen authorities discuss in detail current philosophical developments pertaining to the physical sciences. These volumes are highly recommended.

The volumes to follow on the biological, and social and behaviorial sciences; and the formal disciplines of logic and mathematics, will be eagerly awaited by scientists generally.

THE GEOGRAPHY OF THE FLOWERING PLANTS, by Ronald Good. John Wiley & Sons, 605 3rd Av., New York, N. Y. 10016. 1964. Pp. 518. Illus. $13.00. This third revised edition of an outstanding text is necessitated by the rapid progress made in our understanding of the geographical distribution of flowering plants. After an introduction indicating the importance of plant geography, Part 1 is concerned mainly with the division of the world into floristic regions with special reference to the bioevolutionary background; the distribution of plant families, genera, and species. Part 2 is devoted to the factors involved in plant distribution —climatic, edaphic, and geographical changes; and to the theory of tolerance. The illustrations are outstanding. This volume is highly recommended.

4. AMARYLLID CULTURE

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

THE 1963-1964 AMARYLLIS SEASON

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Another *Amaryllis* season has passed. Generally almost all amaryllis flowered late this season. The Dutch Growers experienced some difficulty in setting buds and as a result the bulbs arrived in the United States nearly a month late. Normally the hybrid amaryllis bulbs imported from Holland flower nearly 100% but this season there were more complaints than normal that bulbs did not flower at all. This always results in some indignation on the part of the customer and is one of the factors that plague the amaryllis dealer. There was a marked increase in late flowers this season and now, May 15, spikes are still appearing.

The hybrid amaryllis from South Africa are becoming more popular each season. Many fanciers like to have a few early flowers and the amaryllis from South Africa, being shipped from the southern hemisphere, arrives in early October and can be flowered during November the first season. The South African growers, like the Dutch, maintain a high standard of quality. Most bulbs can be expected to make two or more spikes. These amaryllis show more characteristics of the Warmenhoven Strain which they have used extensively in breeding. The Warmenhoven Strain is generally considered the largest flower strain of the Dutch growers. The Indian and Japanese growers on the other hand use the Ludwig Strain in their hybridizing.

The true Dutch strain hybrid amaryllis can be obtained from India. Almost all are seedlings of the Ludwig Strain. While the quality of the flowers is very good, the growers experience difficulty in obtaining bulb size and the percentage of flower spikes obtained from the Indian bulbs the first year is very low, often not over 20%. Most bulb dealers are discontinuing buying these bulbs for these reasons.

Amaryllis belladonna L. (syn. *A. equestris* Ait.) from India is nice small amaryllis and will naturalize well among pine trees in the south where winter temperatures do not fall much below freezing. It also makes a nice pot plant when planted several to a pot. A market for this small amaryllis has failed to develop and few are being imported. *Amaryllis belladonna* L. will set seed and can be used in hybridizing for small flowering sorts if one is interested in this type of amaryllis. The amaryllis "Gracilis" from India is both cheap and of good quality but a market for these has also failed to develop. These also make a wonderful pot plant when planted several to a pot. It is hoped that more interest will be shown in the small amaryllis as they merit our attention.

The growing of amaryllis commercially in the United States has decreased while it has increased in other countries. One firm in the Bahamas is now growing an improved strain called the Calypso Strain. The quality of these bulbs is very high both in flower and condition of bulb. These amaryllis are apparently grown under the most ideal conditions and the bulbs are very clean in appearance and they make vigorous growth. The firm at first had much difficulty in getting bulb size and a high percentage of bud set but changes in culture this past season indicate this difficulty is being overcome. They are confident that their bulbs will be as reliable as the Dutch and South Africa bulbs. The amaryllis from the Bahamas being raised in a warm climate under ideal conditions will eliminate any trouble from red blotch often experienced with other bulbs. By harvesting early and pre-treating experiments this season indicate that they can have amaryllis on the market to flower easily by Christmas, as the African and the treated Dutch bulbs do. The bulbs from the Bahamas I have flowered are exceptionally easy to force. The hybrids now offered are mostly red or mixed colors. The firm in the future plans to produce almost all of their bulbs by cuttage; first to be sold by color and later as named varieties. Here as with the amaryllis from the African growers the hybridizer favors the Warmenhoven Strain.

One grower in Hawaii is producing commercial quantities of amaryllis. This past season a number of different kinds were tested. The percentage of flower spikes were exceptionally high. Many bulbs made three spikes and some four. Flower size was not as large as desired; however, many of these hybrids had extra nice color and many new shades of color. Of particular interest were the Dutch and Australian hybrids. This series of hybrids had some extremely beautiful rose shades among them. The Dutch and Australian crosses also appear to be the most vigorous and have the best flowers. It is believed that this firm will devote most of its attention to the Dutch and Australian crosses and develop its hybrid from these seedlings, as an Australian strain.

The amaryllis fan still prefers to buy the named clones. It is believed, however, that with the improvement in quality of the unnamed hybrids on the market more interest will be shown in growing amaryllis. The so-called "Dime Store" or cheap amaryllis are disappearing from the market and the medium priced better hybrids will eventually eliminate the inferior ones. Over production of the better hybrids will occur before this market is developed. This is one of the greatest problems of the grower. It creates a flooded market and prices fall below production costs and the good hybridizers give up the ghost. Over production is one of the greatest enemies of the amaryllis grower.

The trend in amaryllis breeding appears to be changing. While the solid colors are still popular more of the two tones and blends and distinctly marked varieties are appearing on the market. This is a welcome trend as it gives character to each clone not obtained with the solid colors. The shades in the colors are also being expanded. This all tends to make these flowers more interesting. I think the hybridizers

have neglected type of flower generally and this is especially true with the Dutch. However there is some indication that they are giving this a little more consideration. The new picotee types and the striped varieties show this trend. There are many interesting types of flowers that can be developed particularly with the medium size flowering kinds that should make good cut flowers and worthy arrangement material. Amaryllis are used to some extent in Europe as cut flowers now. We in this country have neglected this use of amaryllis. *I would like to see all members of the Amaryllis Society grow a few flowers each year for this purpose.* Winning a blue ribbon in an amaryllis show is fine but let us make the amaryllis something more than a show flower. It could become more popular than a rose and everyone should either have one in a pot or in the yard. Many people are not interested in shows but I feel each of us can get our neighbor interested in growing amaryllis, at least one, for their own enjoyment. They are a wonderful plant especially as a winter pot plant in the north even if they can not be enjoyed as border subjects.

Getting back to trends in amaryllis. It appears that the hybridizers are recognizing color-types and are breeding to duplicate or improve on a clone that has proven popular. I feel 'Margaret Rose' and 'Sweet Seventeen' are good examples of this. They are very similar—one can argue which is best. These two clones have both been popular. Now Van Meeuwen has a similar clone in 'Loveliness' and another firm has also a similar clone named 'Day Dream'. Other competition is also being developed. Ludwig's 'Love's Desire' is a very beautiful and popular color. Van Meeuwen's new clones. 'Rose Marie' and 'Pygmalion', are very similar. Another firm has introduced 'Rosy Dawn'.

'Apple Blossom' is an exception to this trend. It appears that it has been accepted as a standard and almost all are raising it under its registered name. It is a very nice color shade and a vigorous grower, a fine amaryllis and will be around a long time. Other clones I am sure, will be recognized as standards and will be grown universally.

The new clones on the market this past season were not numerous. Possibly the most noteworthy was Van Meeuwen's 'Siren of Paradise' and 'Pygmalion'. 'Siren of Paradise' is an extremely tall flowering white with just a pencil stripe of red in it. It is also rather large and a most impressive amaryllis. It will compete with 'Marion' and 'Peppermint' both of the same type. 'Siren of Paradise' will make a wonderful show clone. I understand it is very difficult to propagate so it may be discontinued. Those who are fortunate enough to get it will find it a wonderful clone.

'Pygmalion' is similar to 'Love's Desire' and also possibly the best substitute for 'Little Diamond'. It is pink and white, very beautiful and a most free flowering and vigorous growing clone.

Ludwig's new, 'Beautiful Lady' and 'Heaven Sent' caused quite a bit of comment. 'Beautiful Lady' is a new salmon, said to be an improved 'Bouquet'. It has to be good. 'Bouquet' has proved to be an

excellent clone. 'Beautiful Lady' and 'Rilona' are outstanding new salmon clones.

Ludwig's 'Heaven Sent' was well received and caused a lot of comment. It is a beautiful new light shade of rose pink. Many rave about this one.

Though the season was marked by late flowers, generally the quality of flowers was good. I watered my potted plants much too early in the season which caused more leaf growth and reduced flower sizes but generally I got a good percentage of flowers.

The following is my observance of the past flowering season. If I do not mention your favorite clone please remember this is an informal discussion, and I can not cover all of them and could just forget to comment on the one you like best or I may have neglected to observe it.

WHITE HYBRIDS

The white amaryllis are always popular particularly with the beginner. While Warmenhoven's 'Oasis' is considered tops by many that have it, Van Meeuwen's 'White Christmas' has much greater distribution and nearly always is liked. I have had many say it was absolutely tops in performance. It gets rather large, is very free flowering and I have had claims from several sources saying it will flower several times a year. One lady, I believe, said she had six spikes on her bulb during the past year! 'White Christmas' is exceptionally free flowering and a wonderful clone. It is easily forced and can be classed as one of the better amaryllis regardless of color. Van Meeuwen's new white, "Mont Blanc" (will have to be renamed as Warmenhoven already has a clone with this name), is larger than 'White Christmas'. It is considered mainly a show flower and appears to be becoming very popular.

Ludwig's 'Christmas Gift' and 'Winter Carnival' are both fine whites and continue to be popular. The older Ludwig white, 'Marie Goretti' and 'White Giant', are still going strong. 'White Giant' will make a nice size flower from a small size bulb which should be of interest to the florist. 'Nivalis', although a poor commercial variety, (it rots easily in shipping) does very well in the border in the south. It is a good standard white and one of the best for outside planting.

'Overture' appears to be a white of merit. It grows tall and makes a flower similar to 'Ludwig's Dazzler'. It is fairly vigorous and many will favor it. 'Joan of Arc' and 'Leading Lady' are free flowering whites. Warmenhoven's 'Mt. Blanc', a very old clone, is very reliable and can be maintained in flower for many years. It is a good white. Many consider it at or near the top.

'Flying Cloud' is a good standard white. It is becoming more popular each year and will eventually be considered one of the better standard whites due to its free flowering and vigorous growing habits.

NEAR WHITES

The near whites or whites penciled red are becoming popular. 'Siren of Paradise' was added to this list the past season. It is a very tall large flowering clone and a fine show flower. It will give 'Marion' and 'Peppermint' strong competition. 'Marion' may flower larger than 'Siren

of Paradise' but it grows much shorter and is less spectacular when placed beside a 'Siren of Paradise' on a 30″ to 36″ spike that looks down at you. 'Siren of Paradise' *also has a delicate fragrance.*

RED WITH WHITE STRIPES

The red and white striped clones have never been very popular but with each improvement they are gaining favor. 'Streaking Stripes' is no doubt the most outstanding (in my opinion). It has beautiful form, *is fragrant,* and has a lot of green in it which really adds beauty to this amaryllis. Green in amaryllis has in the past been regarded as undesirable but one look at 'Streaking Stripes' will, I am sure, change your mind. 'Zenith' is still popular in a number of areas and Warmenhoven's 'King of Stripes' and older smaller flowering clones are finding favor with many who are turning to the medium-sized flowers as they are more dependable bloomers. Ludwig has several new striped clones. Their value will soon be determined. I feel a striped clone has to be different or very outstanding to be a success. Ludwig must consider the two tones or stripes are going to become more popular by the number he is introducing.

BI-TONE—RED AND WHITE

The bi-tone, red and white, series may be weak growers. 'Five Star General' was a most outstanding flower but propagation difficulties has just about eliminated it and one seldom sees a good flower of it. Its bright red is sparkling. In most similar clones the color is not as intense and is generally dull looking. 'Aphrodite' is a new red and white that is reasonably good—not as fine a color as 'Five Star General' but nice. 'Piquant' has nice coloring, much the same pattern as 'Candy Cane', but of a medium red and white rather than the orange-red and white. It has been seen by only a few people. It is, however, a worthy clone and deserves more attention. Ludwig's 'Happy Memory' is a nice new red and white. Named in honor of the late Mr. & Mrs. C. J. van Til, General Manager, and his wife, director and principal shareholder, of Ludwig & Co., who lost their lives in an automobile accident in 1961. See also page 25, PLANT LIFE, 1963, for brief In Memoriam notice. We will have to be happy with these until someone develops a new 'Five Star General' that will grow vigorously.

WHITE, FLUSHED PINK

The white flushed pink clones are becoming very popular as in this coloring we have our nearest true pink color. The solid colored clones are more rose pink. 'Apple Blossom' is the most popular white flushed pink clone and is being grown by many growers. In my opinion it is not as refined a color as desired, it is surely a vigorous grower and the coloring appeals to almost all people. It will be a leading commercial clone for an indefinite period.

PINK

'Little Diamond' is the nearest to a solid pink—a pin striped pink and white that appears pink. It is very flat and has perfect round form and is relatively large. Without a doubt it is considered to be the nearest pink and a leader in this particular color. It really has class. Being high priced and scarce it is considered a collector's item and few have seen it.

'Pygmalion' approaches the coloring of 'Little Diamond' but has more white in the throat. When raised in the shade it is a delicate pink and white color. It flowers easily and I predict that it will become extremely popular as it has all the makings of an excellent clone. 'Love's Desire' is a good white and pink clone with more pink than 'Apple Blossom'. Two new clones, 'Rose Marie' and 'Rosy Dawn', are very similar. All are good and time will tell which is best. This is a color that is becoming extremely popular and will possibly become more popular than the solid rose pinks. The Hadeco African clone, 'Pink Blush', is about half way between 'Apple Blossom' and 'Love's Desire'. Some may call it an improvement over 'Apple Blossom' as its color is more refined. It is large, grows vigorously and is a very beautiful clone. It ships poorly so may never become popular. 'Rosaline' is brick rose and white. The color is a little odd and it did not flower as well as usual this past season. It normally flowers easily and is distinctly different in color. I should not forget 'Pink Beauty' as it is a beautiful rose red and white that is extremely popular.

'Beacon' still reigns supreme in the salmon pink and white bitones. It has no equal.

BLENDS

In the blends 'Floriade', white flushed pink, is one of the most popular. Its companion, 'Golden Triumphator', is a golden bronze shade. It is also large and beautiful. 'Golden Triumphator' has taken on more color the past several seasons and often flowers near solid golden bronze with little white in it. 'Golden Triumphator' is still considered one of the most beautiful amaryllis by many and is good in hybridizing as its seedlings make robust plants as a rule. 'Pinksterflower', a blend of azalea pink (salmon orange) and white is a strong grower and a fine clone. 'My Fair Lady', a new color in red and white blends, is a most beautiful and different flower. Almost everyone who sees this amaryllis falls in love with it. In the lighter shades 'Margaret Rose', 'Sweet Seventeen' and the two new ones in this color, 'Loveliness' and 'Day Dream', compete for first place. In my opinion 'Day Dream' may be the best. It has wider tepalsegs and is a very fine amaryllis. Of course it has not withstood the test of time as have 'Margaret Rose' and 'Sweet Seventeen'. 'Cupido' is a new one that is a little different in color. It is more old rose and white. It grows tall and vigorous and has a rather interesting color combination.

SALMON

There are few amaryllis of merit but this color has some of the most outstanding amaryllis in it. 'Bouquet' has been among the best for a number of years. Van Meeuwen's new 'Rilona', a light salmon or salmon buff, is a most vigorous clone. It is lightly bearded which makes the flower very beautiful with a delicate ruffling effect. Ludwig's 'Home Decorator' has had a most unique color in the salmon shade being a bronze salmon. This is a new color in amaryllis which is a popular color at the present. 'Beautiful Lady', considered an improved 'Bouquet', is a most beautiful and worthy addition to this color. I do not see 'Beautiful Lady' competing with 'Bouquet' since 'Beautiful Lady' is solid colored while 'Bouquet' has a purple or violet midrib which, in my opinion, makes it distinctive. 'Queen's Page' is still popular among salmons. Generally the Warmenhoven bulbs are higher priced and do not have as wide a distribution as the Van Meeuwen and Ludwig clones. The bulk of Warmenhovens trade is still in unnamed clones. The other growers have named almost all of theirs.

ROSE PINK

In the solid rose pink clones, Ludwig & Co. until recent years were the only contenders. However, almost all Dutch growers produce clones of this color now. Of all of these I have grown I liked 'American Fashion' best. This is very reliable and beautiful. Unfortunately this clone was difficult to propagate and Ludwig & Co., discontinued it.

If I were to name the one I thought was the next best I believe I would have to say 'La Forest Morton'. There has been lots of discussion of the merits of 'La Forest Morton' but if its performance is anything consistent with that of the past season I have great faith in it. It is large, has delicate ruffled edges and is a very pleasing lavender rose pink. Van Meeuwen's 'Queen of Sheba', is fine. It has only one fault. The tepalsegs are so wide they tend to cup and do not allow the flower segs to reflex properly, a very fine clone otherwise. Ludwig's 'Flora Queen', is excellent. It, however, is very scarce. It is a light lavender rose pink and possibly the lightest color in this group. The new clones, 'Dutch Belle' and 'Heaven Sent', are worthy additions in this color. 'Catherine Valenti', 'Bellini', 'Dawning' and 'Fanny', are all nice clones, but being higher priced have not been evaluated to an extent. 'Fanny' is a new color in lilac pink and is very beautiful. Its color is much like 'Daintiness' except the color shade is different. It has a green heart as in 'Daintiness'. All who have seen it have commented on its beauty and different color.

ROSE RED

In the medium rose red shades the leader is possibly 'Bella Vista', a fine free-flowering medium rose red. 'Doris Lillian' is still popular. It is, however, being replaced by such clones as 'Queen of the Pinks' which is similar but larger flowering. 'Symphony' is still very popular. The new 'Trixie', has excellent color and is finding many friends.

In the dark rose reds Warmenhoven's are still the only ones available and all three are fine amaryllis. 'Bordeaux' is the darkest, 'Moreno' and 'Mysterie' being lighter but of different form.

ORANGE

There are not many amaryllis that approach the true orange color. 'Delilah' is the nearest to orange in my opinion. It is a fine amaryllis and possibly in a color class all its own. The new amaryllis 'Orange Orchid' is beautiful and outstanding. It has coloring similar to 'Orange Wonder' which has been very popular the past several years even though high priced. Anyone who likes orange amaryllis will like 'Orange Orchid'. 'Prince of Orange' is another fine tall orange amaryllis. The small Hadeco African amaryllis, 'Tangerine', is an excellent medium sized flowering amaryllis. It still is a grand performer. 'Terra Cotta' and 'Orangedale' perform well also.

BRIGHT RED

There are but few bright red amaryllis. This is a color I like but even I neglect. 'Red Emperor' and 'Red Star' are the only ones I can think of in this particular color at the moment. I do have several unnamed clones in this color that perform beautifully each year. I do not know why this particular color shade has been neglected but we should pay more attention to it.

MEDIUM RED

I think the medium reds as a whole are not a strong lot. Possibly the best one to date is 'Flambouyant'. This amaryllis has just about perfect classic round flat Dutch form. It is an eye catcher. 'Red Champion' is larger and a very fine amaryllis. These two possibly lead the pack. W. S. Warmenhoven's 'Scarlet Triumph' is large and leathery and fine. 'Ludwig's Scarlet' is large and fine, but its popularity seems to be on the wane. 'Ludwig's Goliath' is popular as it is huge. It has been scarce so has not been properly evaluated.

DARK RED

Everyone wants a good dark red but I find no one fully satisfied with those available. Possibly we would like for them to be darker. 'Mars' seems to be the new one that is most popular. Some however report it hard to flower while others report excellent results and huge flowers six to a spike. The best results seem to be obtained in California. I do not know why. My results in Florida have not been the best. 'Mars' can be spectacular. Warmenhoven's clone, 'Rotterdam', is making friends and is a very nice amaryllis. 'Ludwig's It' and 'Franklin Roosevelt' have many friends. 'Ludwig's It' at times flowers in the orange shade but this last year was a beautiful dark red.

WINE RED

There are several that belong in the wine red group. 'Red Master' has led this pack for years. While it is still popular it has not flowered as well the past few seasons. 'Alcyone' and 'Tristan' are good and still popular. 'Purple Queen' is considered by many as the best in this color.

ORANGE RED

I note in my discussion that I have left out the orange reds. If I were to pick a leader in this color it would be 'Rembrandt'. This one grows tall and flowers easily. The bloom is large and flat. At this moment I believe I would class this as one in my list of ten best amaryllis. 'Agatha', 'Apollo', 'Madame Curie' and 'Orange Nassau' are all beautiful and outstanding. Few are available and they remain collectors items. Anyone who has one of these in his collection is very proud of it. 'Cavalier' is a very large new orange red that deserves attention.

PICOTEES

No amaryllis fancier should be without a few of the Picotee type amaryllis. They are very artistic, of airy form, and very beautiful. Ludwig has had two named clones, 'Dutch Doll' and 'Square Dance'. Both were white with a very narrow red edge on each tepalseg. 'Square Dance' was light and airy with an informal form. Tepalsegs were not extremely wide. 'Dutch Doll' on the other hand has fairly wide tepalsegs. 'Square Dance' proved to be a poor shipper so it is being discontinued and replaced by the new 'Petticoat'. The unnamed clones sold as Picotee show quite a bit of variation in form and color some are being almost white while others are speckled and flushed red. All are beautiful and worth your consideration.

HADECO HYBRID AMARYLLIS

In evaluating the amaryllis I tend to forget the Hadeco African clones. These are raised from offsets so that one can expect them to multiply once they are planted in the border. To date the color range in these is not as wide as desired but each year some 10 new clones are evaluated so that eventually a complete color range will be available.

The first Hadecos named clones introduced were orange red. 'Orangedale', 'Terra Cotta' and 'Tangerine' in this group are all nice standard clones. There are now a number of good reds available—Clone 65, 'Firebrand', 'Red Rover', 'Redstone', Red Wing', and 'Ruby Glow'. All are of different color shading and some are of a particular shade of red not obtainable elsewhere. Not all of these are registered but it is planned that they will be by flowering season. Clone 236 and 'Rosedale' are very beautiful rose red clones, a little different shade than found in the Dutch strain. For early flowers the first year the hybrid amaryllis from South Africa are most worthy.

AMARYLLIS SPECIES

So much for the named clones, I have been interested in the species for some time and have a considerable investment in them. My interest in them is their evaluation in view of developing new forms, colors, sizes and growing habits. It appears when the flowering season draws near each year I am the busiest and fail to take proper notes on those I have and have completely neglected to take pictures. Fortunately Mr. Sam Caldwell has a number of species I have collected and he has taken pictures of some of the species as *A. auclca stenopetala* and *A. aulica*

playtypetala as published in the 1964 Year Book. Many people have obtained bulbs of the different species I have collected and I am quite sure your Editor would appreciate any pictures you might have of these when they flower. Send a copy of any of these you may have to your Editor.

Of the 40 to 50 different wild species lots I have collected a few have failed in culture, and have been lost. Many others will reach maturity this coming year and I do hope to find time to record the results.

This past season some flowered that had not flowered before. The one that most impressed me was a spike on species recorded as SA-5-60.

Fig. 34. *Amaryllis striata* Lam.; SA62-5, Rio de Janeiro, Cordeiro, Brazil, in the wild, flowering in September (southern hemisphere), alt. 830 m.; average temperature, during growing season, 25° C. (=77° F.), in half shade; subsurface drainage. Collected for Mr. Robert D. Goedert by paid collector. Photo by Sam Caldwell of plant growing at Nashville, Tenn., without leaves at flowering time.

This bulb, about 1″ in diameter had a spike about 10 inches tall with two flowers about 2½ to 3″ in diameter. The flower was orange red with a yellow star in the throat and a very dark solid purple deep in the throat. The color was very clear with little or no striping. I had a notation on this bulb that it appeared different from the others in the lot so it may be a single odd bulb. The remarkable part of it was that the yellow in it was *a true yellow* very clear and the purple was vivid purple and no trace of any other color. The purple looked like someone had poured indelible ink deep in the center and made a blotch about ½ inch in diameter. As usual I was very busy at the time and did not get a picture.

I had several in the striata group. Possibly the most outstanding was SA62-3. This is a beautiful pastel pink blending to yellow with green deep in the throat. It is of airy form, possibly *A. striata crocata.* This species grows easily and should be useful in hybridizing for pastel shades. This species was gathered in Espirita Santo, Brazil and grows on rocks in full sun. Also in the striata group, SA62-5 flowered. This is a very tall reddish orange with a yellow green to white striated flower (see Fig. 34). This is a fairly regular form and is possibly *A. striata* var. *striata.* Another species, SA63-22 from Santa Catarina Island, Brazil, produced a small solid orange-red striated flower. This has a typical striata leaf and bulb growth and is very similar to the striata Mr. Hana found naturalized in Hawaii but is smaller and darker in color. It is believed to be *A. striata* var. *striata.*

One species that flowered this year for the first time was sent in as *A. blumenavia.* This is species No. 12/62. One flowered this spring—a relatively large flower over 5″ in diam., of crimson veined more deeply. The flower was compressed laterally. It appears to be the species *A. correinsis* var. *compressa.* This flower has amazing ability to catch the moon light and literally glows in the dark. I would assume it is pollinated by some night flying moth. It grows poorly for me, appears to belong to the aulica group wanting cool weather to grow but appears to want this coolness during the summer months as it apparently goes dormant much above 70° or below 60° F.

Species LM63-1 from San Martin, Peru is a worthy species being bright medium red with whitish-green throat. It resembles *A. belladonna* but is more trumpet shaped. It is a clear red with little or no yellow in it. In this group of bulbs there are some that are similar but the color is pink. As this species has little or no yellow in its coloring, I feel it may lead to a new series of hybrids of pure pink color as well as hybrids of bright red. This amaryllis surely deserves the attention of the hybridizers.

Another species that flowered was SA62-1, from Esperito Santo, Brazil. It was a very regular flat formed amaryllis in rose pink with white heart and appears to belong in the belladonna group. SA62-2 from the same area is very similar. The foliage on these appears very similar, however SA62-2 rots easily during warm wet spells whereas SA62-1 seems to like this condition.

Next season I should have a number of new species to flower. Many of these do well in North Florida and should prove good in hybridizing. May I suggest in your hybridizing that you use *A. aulica platypetala* as a seed parent. This past seasan I flowered several crosses between 'Floriade' and *A. aulica playtypetala.* These hybrids appear to be robust growing. They are late flowering—a month later than most hybrids. They produce very large flowers. The flowers were striped, very interesting and beautiful. This particular cross produced salmon, orange red and rose shades. This is a very interesting and worthwhile cross that anyone might try if he wants some amaryllis that are different from those of his neighbors.

VEGETATIVE PROPAGATION OF AMARYLLIS FOR AMATEUR GARDENERS

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Elsewhere in this issue is an article in which I have endeavoured comprehensively to describe a particular method of vegetative propagation of *Amaryllis* by specially designed incubators. It is not only a cumbersome operation, but also a method involving the outlay of money for the building of equipment which would normally be entertained only by the commercial grower, since the installation of such units could not be justified other than for reproduction of established and proven clones intended for large-scale distribution. This naturally, is not the function of the home gardener who, moreover, would much more wisely spend money on the acquisition of one or a limited number of ramets in a larger range of popular and attractive new clones.

There are many home gardeners whose pride it is to exhibit blooms at their local Amaryllis shows—and quite rightly so. And then it often happens that a keen enthusiast is unable to enter his choice clones, for the reason that the single ramets of many of them have flowered too early, whilst the blooms of others are not yet properly developed for exhibition. Such a predicament could, more often than not, be overcome by having a few ramets of each clone with staggered blooming cycles. This applies particularly to those who have a greenhouse or bedding facilities to accommodate a few of each clone, with room to spare for the addition of attractive or newer ones which may catch the eye.

It will be found that many of the exhibition clones are slow in natural increase and it often takes a number of years before offsets are produced. Then there is a further period of waiting for these offsets to advance to the stage where they may safely be detached for transplanting. This slow process of natural increase can be easily and speedily stimulated by human aid with a method that calls for nothing more than a bit of skilful handling. Not only is the operation a very simple one but, furthermore, it does not entail any special apparatus and can be applied on a small scale by any one, even with restricted space.

Let me disclose at this stage that the method of vegetative propagation, which I shall attempt to describe as fully as possible in the following paragraphs, is by no means anything new or revolutionary. Whilst I may perhaps introduce a few innovations as far as accepted procedure is concerned, it is a practice which has been in vogue for such a long time that I cannot correctly remember when I first learned about it (see Traub, "The Amaryllis Manual, 1958"). It was definitely very many years before I ever heard of the cuttage method. In addition, it has been written about extensively in horticultural journals and, for all I know, articles on the subject may have been published in back numbers of the Year Book.

TIME OF PREPARATION

The best time for the operation, as in the case of cuttage referred to in the concluding paragraph of the other article which follows, is when the bulbs have reached the peak of dormancy and just prior to the commencement of new seasonal growth.

CHOICE OF BULBS

One would, naturally, select for propagation a bulb of a clone which one wishes to increase. That goes without saying. However, do not use a young bulb that has not yet reached a full state of maturity. The best results are obtained from fully matured large bulbs with well developed basal plates. Vigour of growth is a determining factor and, therefore, the weaker bulbs with smaller chances of survival against laceration, mutilation and further rough handling had better not be subjected to the treatment involved in the process of preparation.

TOOLS, EQUIPMENT, ETC

The first requirement is a large-sized flower pot to provide sufficient space around the bulb so as to allow for growth and development of young bulblets. With this will go drainage material, regular potting medium and sharp coarse and well washed river sand.

A sharp thin-bladed knife is required with a length of blade somewhat exceeding the diameter of the bulb.

The most suitable instrument for scooping out the hole in the basal plate of the bulb is an ordinary metal teaspoon. Here I would advise the use of an old spoon which may be discarded without any sense of great loss. Sharpen the edge of the teaspoon all round with a fine file or on an emery wheel so that it will cut cleanly into the bulb.

Thin wooden wedges are required to act as spacers for insertion into the cuts in the bulb. The ideal wedge is cut from a wooden spatula such as a doctor uses for pressing down the tongue when examining one's throat. Wedges about ¾" wide are cut to a suitable length, depending on the diameter of the bulb.

A basin containing a medium strength solution of permanganate of potash should be kept handy.

Lastly, provide a fungicide in powder form and for this I would recommend copper sulphate.

TREATMENT AND PREPARATION OF BULB

The bulb is lifted in the normal way with care to avoid unnecessary bruising. The roots are cut off flush with the base, decaying matter usually attached to the basal plate of freshly lifted bulbs is removed by gentle scraping and all soil and extraneous matter are removed by thorough washing and rinsing. The bulb is then emersed in the permanganate solution to ensure proper disinfection. By these means, the hands will also become disinfected. Subject the knife, the spoon and spatula wedges to similar treatment.

Now remove leaf growth, if any, by cutting off the top of the "neck" of the bulb. The next step is to level off the bottom end of the basal

plate with the knife. Be careful not to remove too much, but only sufficient so as to provide a flat face which will enable you to start scooping out the basal plate from its centre, i.e. at equal distances from the outer rim of the basal plate. The sharp-edged spoon is used for this operation. The hole, which is eventually dome-shaped, must be neither too wide or too narrow. It should have a surrounding wall of basal plate of about ⅜″ thick. The depth of the hole depends on the depth of the basal plate, but this does not vary much with mature bulbs. Nevertheless, scoop out to a depth of about 1½″ beyond the basal plate right into the pulpy matter of the bulb.

The bulb is now stood on its neck with the basal hole upward and the knife edge placed across the centre of the hole. Then cut to a depth extending about one third of the bulb. The second cut is made similarly, but at right angles across the first. These four sections are all likewise halved and the operation is once more repeated so that ultimately there are 16 cuts, all to the same depth. Care should be taken to cut straight vertically.

It will now be found that all the cuts have closed up automatically and this is where the use of the wedges comes in. If necessary, sharpen the points of the wedges—not like a pencil, but in the fashion of a chisel. Dip the wedges in the fungicide and insert them in the cleavages at the point where the outer scales attach to the basal plate. This operation is sometimes tricky on account of the closed up cuts. But by exerting pressure from inside the hole with the fingers, the cuts are forced open and the wedges more easily inserted. By experiment, I have found that unless the cuts are wedged open, the wounds appear to knit and development of offshoot bulblets is negligible. After wedging, semi-loose scale segments, which soon start decaying in the ground, are removed and the bulb is then dusted with copper sulphate powder to minimize the danger of fungus infection. The bulb is now ready for planting.

PLANTING

Even more so than in the case of ordinary bulbs, the need for effective drainage cannot be over-emphasized. The pot must be provided with a drainage hole at the bottom. First place a layer of drainage rubble at the bottom of the pot and just cover this with coarse sand. Now fill up with regular potting medium to a depth at which the basal plate would normally be placed in ordinary potting. A mound of damp clean sharp river sand is placed in the centre of the pot on top of the potting medium. Fill the hole in the bulb with damp sand and place it on the mound of sand in the pot, pressing in slightly, but not so much as to press the basal plate through the sand into the bottom potting medium. Heap some more of this sand around the bulb up to the terminals of the cuts. The pot is then filled up with potting medium to the normal height. I usually fill it up to the shoulder of the bulb with the entire neck above the soil. The pot is then given a normal watering.

AFTER CARE OF BULB

To induce rapid growth, the potted bulb should be placed in a warm sheltered location with plenty of sunlight. Direct sun rays during the heat of day should be avoided, although early morning and late afternoon sun is beneficial. Having regard to the fact that all roots have been removed, the bulb cannot "drink" water in a normal manner and, as in the case of incubator segments, the medium should be kept moist regularly, but not wet as in the case of a growing bulb. Overwatering during the period prior to development of young offsets will almost certainly cause complete rot. This development is a lengthy process and will try your patience. Bulbs also vary greatly in nature so that some may produce their young ones long before such signs are evident with others. Root growth develops simultaneously with the forming of new bulblets and this will be an indication when watering should progressively be increased. At a later stage, when there is no more doubt about the development of root growth on the young bulblets, periodical liquid fertilizing is recommended.

An experienced eye will readily determine when it is time for the removal and transplanting of the offsets. This stage is normally accompanied by signs of overcrowding, especially in bulbs with a tendency to multiply rapidly.

REMOVAL AND TRANSPLANTATION OF BULBLETS

Eventually the bulb will be ready for lifting and the detachment of its "chicks". Here again it will be found that the use of the knife is called for. Further mutilation of the bulb will be inevitable and care should be taken, wherever possible, to perform the dissection in such a manner as to ensure the attachment of a section of the mother basal plate to each bulblet, except in cases of obvious advanced weaning. It will be necessary to operate very delicately and not to damage any of the tender root growth. It is advisable to treat all freshly cut surfaces with fungicide.

PLANTING AND AFTER CARE OF BULBLETS

The young bulblets must be planted immediately after removal and should, in the process, be protected against wind and sun. If they are left lying about carelessly, the root system will be damaged and further natural growth seriously retarded. It will, therefore, be necessary to have the new pots or beds in readiness immediately to receive the bulblets after detachment. For further information on the planting medium and after care of bulblets, please refer to the following article on the Buller incubators.

GENERAL REMARKS

It is only natural that one would be very chary in attempting these serious operations on precious clones of which one has no duplicates, although, in fact, this article is actually intended for that very purpose. However, the method of propagation described herein may first be tried out and put to the test with inferior bulbs, the loss of which would not

entail any serious hardship. This will also provide the operator with sufficient experience and confidence later to apply the method to more worthy clones. After all, it will only be a question of waiting for one more season before taking bolder steps.

Be assured, though, that I have not yet lost one single bulb that I have subjected to this treatment, in spite of the fact that some clones gave me only very few offsets compared with others which were prolific. Likewise, some bulbs are by nature inclined to develop their young ones earlier and more rapidly than others. I have had as many as 37 offsets from one bulb and as few as 4 from the most stubborn.

The insertion of 16 wedges calls for patient and dexterous manipulation of the bulb, entailing appreciable expansion of wall around the hole, i.e. the surrounding slit shell of basal plate and scales. Should this procedure be found too cumbersome, I would suggest that, after quartering, the four sections be further divided into only three sections each, giving a total of 12 cuts.

After scooping and cutting, the possibility that a bulb will produce a bloom is exceedingly remote. Should, however, this miracle occur, it would have a most devitalizing effect on the bulb and the flower bud must be removed immediately after emergence. Most likely this warning is superfluous, because I have never yet seen a bud on even the most robust bulb after having been subjected to such severe mutilation.

In conclusion I take this opportunity of extending my best wishes for a successful season to all my readers and my warm regards to the many friends whose kindness during my last visit to your great country is always remembered.

VEGETATIVE PROPAGATION OF AMARYLLIS WITH BULLER INCUBATORS

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INTRODUCTION

The principle of the particular method of vegetative propagation applied by me during the past fourteen years is not one which I have invented or evolved. It was the outcome of research and experimentation by the late A. C. Buller who, at the time when I met him in the late forties, was under the impression that he was the only person in the world who practised such propagation with equipment scientifically designed for the purpose. No doubt, the units designed by him were unique and, even at the present moment, their construction and method of operation are most probably unknown to many.

In a previous article, I referred to these units which Mr. Buller called "Incubators" and I propose to continue the application of this term. At the time when Mr. Buller intimated to me his intention of giving up the breeding of *Amaryllis* and requested me to continue from the stage where he retired, he not only made available to me the cream of his collection which he and I jointly and severally selected, but he

also let me into his jealously guarded details of vegetative propagation.

I read in the 1963 Year Book that after his death, the residue of Mr. Buller's collection was acquired by some horticulturists in the Cape. It is only reasonable to assume that those horticulturists for whom this privilege is claimed also acquired Mr. Buller's incubators or, at least, the knowledge of the method of their construction and operation. Besides, vegetative propagation of *Amaryllis* has been practised all over the world for very many years—since the 1930's (see Traub, "The Amaryllis Manual", 1958, for a summary).

Although I am a commercial breeder and grower of *Amaryllis,* I am not prompted by fear of competition to keep any specialised knowledge to myself. In fact, I welcome competition since not only I but the whole of South Africa and my overseas friends know what I have, what I have done during the past sixteen years and what I am still doing in the continuous improvement of South African strains and their public introduction.

Apart from the foregoing, it is my sincere conviction that any person with specialised knowledge who lays claim to being a true horticulturist, should not adopt the "dog in the manger" attitude, but should share his knowledge with his fellows. If everybody had selfishly guarded his knowledge, the establishment of an organisation such as the American Amaryllis Society would have been ineffective and the publication of the Year Book a fruitless effort. Hence this contribution!

THE INCUBATOR UNIT

The incubator was designed at a time when there were no rural electricity reticulation schemes in operation in South Africa and it was, therefore, a fuel burning unit heated with a kerosene burning lamp. Such was the nature of the incubator to which I was introduced and, apart from various improvements, including thermostatic heat control, I have not attempted to redesign it for electrical operation. Moreover, I have eight units in operation and they are so successful in their present operation that I have no intention of installing electric elements.

The complete unit, which stands on a simply constructed table of any suitable design—Fig. 36 (V)—comprises three major component parts, viz:

BOX—Fig. 35 (I); WATER PAN—Fig. 35 (II)—and MEDIUM PAN—Fig. 36 (III). In addition to these three components, reference will further be made to various accessories which will be separately described.

THE BOX—Fig. 35 (I). The box itself is an open-topped shell enveloping the vital components (water and medium pans) and it provides cavities at the bottom and on all sides of the two pans for the insertion of insulating material. It is 17″ deep, 48″ long and 28″ wide. Its construction is of 24 gge. galvanised flat sheet and, for the purpose of rigidity, the upper rim is rolled round a 6 gge. wire bent in a rectangle of the same inner dimensions as the box.

On the 28″ side, which is the front of the box, there are two circular holes of 2½″ diameter to accommodate the open ends of the heater

flue pipe of the water pan, i.e. the heat intake end and the waste gas escape end. The holes, measuring from their outer rims, are 3″ above the bottom of the box, 7½″ from the corners of the box and are spaced 8″ apart.

Since the bottom of the box has to be covered with insulating material which would be squashed flat by the burden of the water and medium pans, it is necessary to lay two parallel pieces of timber, 3″ wide x 2″ thick, along the length of the bottom of the box in line with the holes. These supports are, in any case, necessary so as to ensure that the flue ends of the water pan are held on a proper level to pass through the holes in the box.

THE WATER PAN—Fig. 35 (II). The open-topped water pan which is 7″ deep, 44″ long and 23″ wide, is constructed of 22 gge. galvanized flat sheet. On the 23″ side, i.e. the front end of the pan and 1″ from its bottom, two similar circular holes of 2½″ diameter spaced 8″ apart are provided through which the two ends of the flue are to pass. The flue, in the shape of a U, is also made of 22 gge. galvanised flat sheet just like a rainwater downpipe. The outer curve of the U passes about 5″ from the back wall of the pan whilst the open ends protrude 2¼″ in front, permitting an external protrusion of ¼″ through the holes in the box when the pan is placed in position.

The water pan must, of course, be soldered water-tight at all seams and joints, including those around the flue where it passes through the holes at the front of the pan. The bend of the flue need not be half circular but may be rectangular in construction and should be supported by soldering a stay or bracket from its underside to the bottom of the pan at the back end.

When correctly filled, the pan will have 1″ water below the flue pipe and the level of the water should also be 1″ above the flue. This means that the pan is filled to a depth of 4½″ and should constantly be kept at that level, with a space of 2½″ between the water level and the rim of the pan. For the purpose of checking and regulating the water level, a metal dip stick 21″ long with a notch 4½″ from the bottom must be provided, since there are no other means of determinnig the water level when once the unit is assembled and in operation. I did not find it necessary to show a diagram of the dip stick which can be made of ⅜″ round steel.

THE MEDIUM PAN—Fig. 36 (III). This pan which is 9″ deep, 45″ long and 24″ wide is also made of 22 gge. galvanised flat sheet. It is open at top and bottom and the latter is provided with a metal screen on which the medium rests. At the bottom end, on the inside of the pan, it is fitted with an exact fitting rectangular steel frame constructed of 1″ x 1″ x ⅛″ or 3/16″ thickness equal angle iron, to provide a protruding 1″ flange on all sides around the inside of the pan and 1″ from its bottom end. Along the bottom 1″ of the pan the other side of the angle iron, i.e. the vertical side, is secured by riveting or spot-welding to the sides of the pan.

When fitted on top of the water pan which is 1″ smaller overall, the bottom end of the medium pan will overhang by 1″ on all four sides around the water pan. The one side of the angle iron frame (vertical side) will form a loose-fitting collar around the brim of the water pan, whilst the other side (horizontal side) is the flange which rests on the rim of the water pan and holds the medium pan firmly in position on

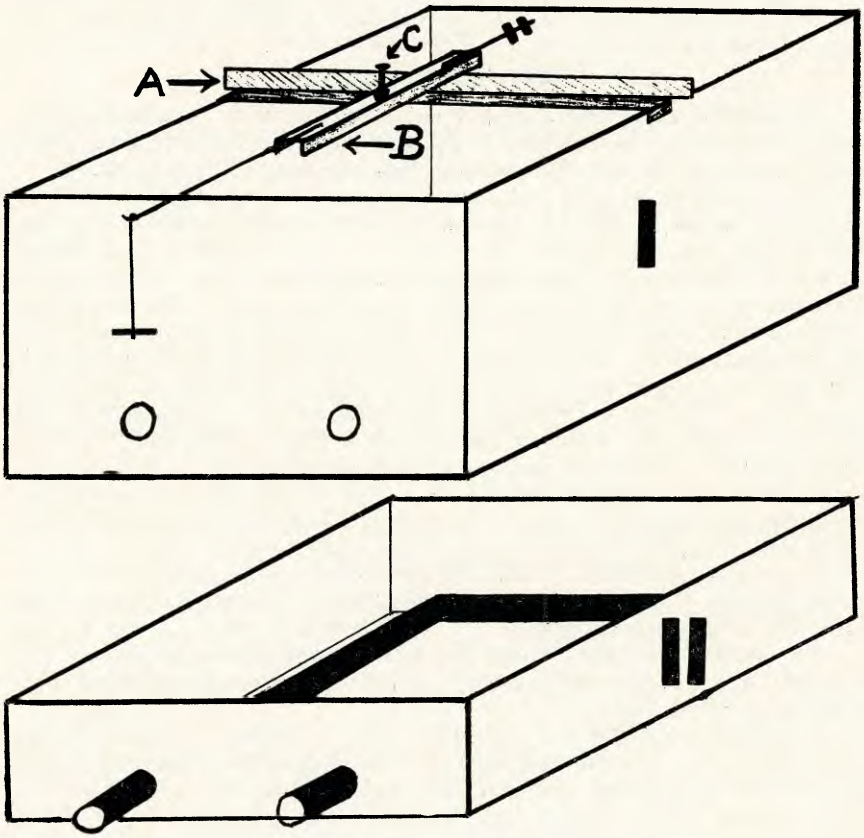

Fig. 35. Incubator unit: Box (I), and Water Pan (II). See text descriptions.

top of the water pan. This flange also serves to hold the metal screen of ¼″ mesh which forms the bottom or floor of the medium pan. The screen should be of galvanised wire of a gauge not less than 10 s.w.g., since it must be sufficiently sturdy to carry the burden of the medium in which the bulb segments are inserted. The screen is cut to size and laid on top of the flange formed by the angle iron inner frame to which it is then welded.

In one corner of the screen a hole is made for a ½″ pipe. This pipe, 9″ long, passes through the hole to a length of 1″ at its bottom end, where it is welded into the corner of the angle iron frame. At the top end, where it is level with the top of the pan, it is held firmly in its vertical position by a welded metal corner brace. This piece of piping which is not shown in any of the diagrams, is most essential because it is through this that the dip stick passes to determine the water level, and through which water is also poured with a funnel to maintain the proper level.

OTHER ACCESSORIES

THERMOSTAT—Fig. 36 (IV). The thermostat is also a home-made contraption. It is placed at the bottom of the medium pan, about in the centre at the same level as the bases of the bulb segments.

It comprises a gas-filled thin metal wafer or diaphragm encased in a metal container to which is fitted a length of copper tube. The wafers that I use, I see, are made in the U. S. A. and are used in fuel heated chicken incubators. It contracts and expands according to changes in temperature to which it is extremely sensitive. The metal container, which must be sealed air-tight, is to protect the wafer against moisture and relieve it of any pressure other than that of the push rod which operates the damper lever. For a metal container, I use an ordinary boot polish tin of the correct size to hold the wafer. A hole is made in the centre of the lid of the tin into which a 6½″ length of ¼″ copper tube is soldered, so that at its bottom end only a fraction of an inch protrudes inside the tin above the hollow on top of the wafer on which the one end of the push rod rests. The push rod is a 7½″ length of 12 gge. galvanised wire, sharpened at both ends and it moves freely up and down in the copper tube. It rests in the hollow on top of the wafer and extends about 1″ above the copper tube, where it makes contact with the thermostat control screw.

The metal container, which for months remains embedded in the wet medium, should be given several layers of a corrosion resistant coating to prevent rusting.

KNIFE-EDGE CROSS ANGLE—Fig. 35 (I-A). Please refer to Fig. 35 (I) since I could best illustrate it in that diagram. The cross angle is a 3″ wide x 32″ long strip of 24 gge. galvanised sheet bent to a 2″ x 1″ angle. This is snipped in the bend for a distance of 2″ on either end and the 2″ horizontal ends bent downward at right angles. The cross angle, with the 1″ side upward, is then placed about centre on top of the box across its width and the two bent ends clamped tightly over the sides of the box. Although tightly clamped, it can still be moved backward and forward so that the control screw may be brought exactly over the push rod. The two ends of the 1″ vertical side of the angle may be snipped off so that there is just enough left over to rest firmly on the rim of the box.

DAMPER LEVER—Fig. 35 (I-B). Here again this is best illustrated in Fig. 35 (I). The damper lever comprises a channel section, two pieces of 6 gge. galvanised wire, a couple of large steel nuts to serve

as balance control weights and a thermostat control screw. The channel section is a 2″ wide x 9″ long strip of 24 gge. galvanised sheet bent to a 1″ wide x ½″ deep channel. To the two ends of the channel, on the outside of its 1″ side and along the centre for about 2″ from the ends, are soldered the ends of the two pieces of 6 gge. wire—the one to extend 22″ beyond the channel to hold the damper and the other to extend 15″ to hold the balance control weights. The latter are large steel nuts with pieces of cork inside them, through which suitable holes are made so that the nuts do not slip too loosely over the wire.

The thermostat control screw—Fig. 35 (I-C)—which is very much enlarged in diagram Fig. 36 (V). is a ¼″x2″ galvanised verandah bolt with its nut. A ⅜″ hole is drilled in the centre of the channel section, somewhat off the middle toward the damper end, and the nut is soldered over the hole, so that the bolt when screwed into the nut may pass through the channel section. In the end of the bolt, which may first be filed flat, a shallow hollow is drilled into which the upper sharp end of the push rod fits, so that it does not easily slip off the control screw.

LAMP STAND—Fig. 36 (V-A). This is a simple little table of no particular design which can be knocked up with any odd pieces of scrap planking.

LAMP—Fig. 36 (V-B). This is just a regular kerosene burning chicken incubator lamp, fitted with the usual chimney with a mica covered peep hole to watch the flame.

TEE PIECE HEATER FLUE—Fig. 36 (V-C). This T piece, which like the water pan flue is made of 22 gge. galvanised sheet, takes the heat from the lamp through the water pan. Its cross piece, which is a tiny fraction smaller than the water pan flue, fits into the ¼″ protruding end of the water pan flue. Its bottom end fits over the lamp chimney, whilst the top end is opened and closed by the damper. In order to conserve heat, I do not leave the T piece exposed, but have encased it entirely in a covering of asbestos cement to within 1″ off the end of the cross piece where it fits into the water pan flue.

DAMPER—Fig. 36 (V-D). This is a 3½″ diameter metal disc suspended by a piece of thin wire through its centre, from the end of the damper lever. This damper I also give a top covering of asbestos cement. After fixing the one end of the wire through the centre of the damper disc, the other end should not be cut until the entire unit has been erected and the damper lever sensitively balanced on the knife-edge cross angle. The damper is now brought in position to close the heater flue at the top and the suspension wire bent at the end, at the correct distance from the damper, into a hook which rests on the end portion of the damper lever. The wire can now be cut beyond the hook.

When balancing the damper lever, see that the damper is correctly over the heater flue and the thermostat control screw is immediately over the push rod. Two tiny sharp notches are then made in the edges of the channel section where they rest on the knife-edge of the cross angle. This will help to keep the damper lever in the correct position and prevent shifting. The damper lever is sensitively balanced by shifting the

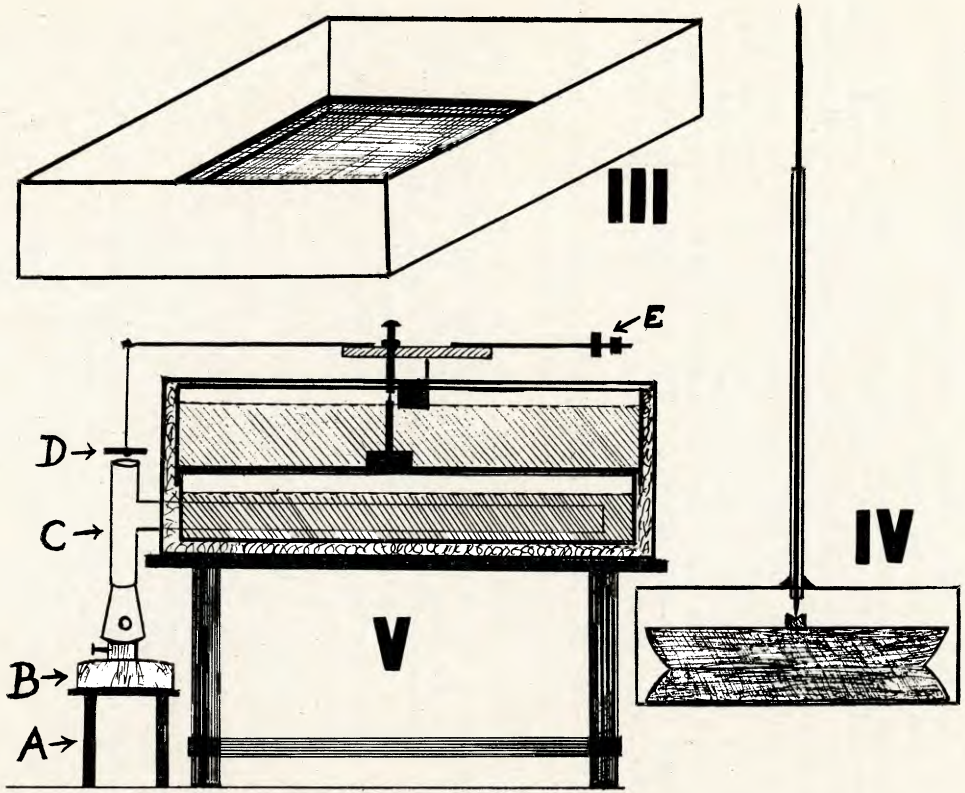

Fig. 36 Incubator unit: Medium Plan (III), thermostat (IV), and comeplete assembly (V). See text descriptions.

control weights—Fig. 36 (V-E)—until they almost lift the damper from the heater flue. There will then be practically no pressure on the thermostat wafer and the slightest expansion will cause the push rod to lift the damper lever and thus raise the damper off the flue. These adjustments, of course, are not made until the whole unit is in operation.

THERMOMETER. Although it is not shown in any of the diagrams, it is of such importance that any attempt to operate the incubator would be completely futile without the thermometer. I have found a dairy thermometer to be the only suitable one. It is sufficiently long and appropriately graded for the mercury to be visible above the medium from 80 degrees F. upward and readings easily taken. Proper heat control is thereby assured.

THE PROPAGATION MEDIUM

The medium in which the bulb segments are placed should be inert and free of organic matter which might cause the segments to rot. It should also have moisture retentive properties. I successfully use 2 parts cleanly washed coarse river sand, 1 part charcoal screened ⅛″ to ¼″ and 1 part exfoliated vermiculite similarly screened. Both the charcoal and vermiculite must be definitely free of dust. These ingredients should be thoroughly mixed.

ASSEMBLY AND PREPARATION

The unit is assembled as shown in Fig. 36 (B). The box is placed on its stand. Two lengths of 2″ x 3″ timber are laid on the bottom opposite the holes and the whole of the bottom covered between and around the timber with insulating material such as vermiculite, glass wool or dry sawdust.

The water pan is next placed in position with the ends of the flue fitting through the holes in the box and water poured into the pan to a depth of 4½″.

The medium pan undergoes prior preparation before being placed on the water pan. First a layer of teased coconut fibre, or coir as we know it, is placed on the screen at the bottom of the pan and firmly pushed down by hand to a thickness of about 1″. Make sure that the entire screen bottom is well covered with the coir which is then thoroughly soaked with water. On top of this, place a ½″ layer of well damped medium. Although thoroughly damp, the medium should never be soaking wet. The medium pan is now ready to be placed over the water pan in the box. The bulb segments with the base downward can then be placed on this prepared bed and covered with wet medium. Here again, the medium should not be soaking wet because that will cause rot. The thermometer is also placed on this bed in an upright position close to the thermostat and with its mercury bulb at the level of the base of the segments. The thermometer, naturally, is placed in position only when filling up with medium reaches towards the middle of the pan.

The medium pan is of a size which will accommodate 15 rows of segments, allowing 3″ for each row as it is packed in, starting from the back of the pan and working forward. I actually use galvanised flat

sheet partitions of 4″ x 23½″ long which I place between the rows of segments and these remain in place until I remove the bulblets. The partitions are equally spaced and kept in position by resting against tiny lugs spot-welded to the sides of the pan. The rows of segments are thus progressively filled up and covered with medium as they are placed on the prepared bed of the pan. Partitioning also prevents the different varieties of bulblets from mixing when taken out. A covering of medium to ½″ over the tops of the segments is enough.

The cavities between the pans and the walls of the box are now carefully filled, from the bottom upward to the rim, with insulating material such as was placed on the bottom of the box under the water pan.

Next, the control screw is adjusted so as not to touch the push rod, the damper is seen in position on top of the flue, the damper lever is sensitively balanced as already described, the lamp is filled and lit and placed in position under the flue. The height of the lamp stand is such that the top of the lamp chimney can almost touch the bottom end of the heater flue. The lamp is then lifted so that its chimney fits into the flue and a couple of old magazines or a piece of plank inserted under the lamp to keep it in position. This padding can readily be retrieved when the lamp is to be removed for filling, lighting or wick dressing.

Carefully keep an eye on the thermometer and as soon as the temperature rises to 80 degrees F., the control screw is finely adjusted so that the damper will start lifting with any increase in temperature beyond 82 degrees F. and close again with any drop in the heat. The optimum temperature is 82 to 83 degrees F. and temperatures from 85 degrees upward are harmful to the segments, whilst temperatures below 80 degrees retard development. The operator will by practice soon learn how to adjust the control screw and to lower or raise the flame of the lamp with the heat of warm days or the cold of chilly nights.

Except during hot dry spells, it will not be necessary often to wet the medium from the top. Should this, however, become necessary, apply water through a fine rose and do so sparingly to avoid soaking. Normal evaporation from the heated water pan is sufficient to maintain constant moisture in the medium in the region of the segment bases.

After a period of about 4 months, the little bulblets should be sufficiently advanced for removal from the incubator and can then, without detachment from remaining parts of their original segments, be planted in a growing medium such as is normally prepared for young seedlings. For some time, however, until they are properly established, they require a little pampering and should be protected against the heat of a severe sun and also against cold.

So much has already been written in previous Year Books on the preparation of bulbs before cutting—and the manner in which the segments are cut, that I have not thought it necessary to touch upon that aspect in this contribution. As regards the time of year for incubation I must, however, stress that the incubators are put into operation and the bulbs cut at the very height of dormancy and immediately before the advent of the new growing season.

MY EXPERIENCES WITH HAEMANTHUS KATHERINAE

ARTHUR HOERL

When I obtained my first bulb of *Haemanthus katherinae* it was an extremely rare plant. That was, as I recall it, nearly twenty years ago. Today this hardy plant, stately even without its exotically-beautiful bloom, is still quite rare; yet I can say out of my own experience it is getting around. I would wish that everyone who has a love for plants and flowers had at least one specimen to enjoy. Perhaps such a hope may yet come to pass.

I should say, first, that I am merely an amateur in floriculture, indulging in it for the pleasure it brings, for the beauty which derives to replace many hours that might just be prosaic. Fun there is too. Through it I have found friends at the far corners of the Earth: in Warwickshire in England, in Western Australia, Argentina, the Canal Zone, the Transvaal in South Africa, in India and Israel. It may be I shall never meet them, but by their friendly letters I know them, and through seeds and plants that we exchange we share each a part of our leisure lives. Except for this pleasant bypath I would not now be nurturing a *Fuschia* tree or an Elephantwood tree, raising wilding amaryllids native to the mountain slopes of Brazil and Paraguay, clivias that have been brought to perfection through years of breeding, liliums that have never been seen here. Pots and pans and borders hold exotic plants from many distant, romantic lands.

That is a unique kind of fun.

The common bond between all these far away friends has somehow always been forged by *Haemanthus katherinae.*

That first bulb of mine has flourished into many thousands of fruits, seedlings, flowering plants. *Haemanthus katherinae* (which may be abbreviated as H. k.) is a quite hardy plant and will flower in a pot or in the garden. In my area, the San Fernando Valley in Southern California, the temperature drops on occasion as low as 26 degrees at night. H. k. seems to thrive on it right out in the garden soil. In various experiments I have made in conjunction with a research program now in progress I have held young bulbs in the freezing compartment of the refrigerator for 2, 3, and 4 weeks. Then they were all planted out; almost all the bulbs survived and continued their growth. There were other specimens placed in a closet, shutting light out completely for a month or more in testing growth against photo period. The plants grew normally without light—all growth *stark white* of course. When the specimens were brought into the light they were green within 72 hours and went on to flower. So the plant seems to adapt itself to the environment, within limits.

A most extensive research on H. k. in many biological phases is now in progress and will go on for a lengthy period at the Department of Biological Sciences, Dartmouth College, New Hampshire, under the direction of Professor William T. Jackson. It was my privilege to be able to

furnish some hundreds of bulbs to assist in starting this research and I am still sending weekly specimens for dissection. This research has spread now into other fields including, I am advised, the medical. Facilities at such institutions as Brown University, the University of Florida, Texas State Teachers College, and North Carolina State are at work. I learn through correspondence that the University of Oregon is at the outset of its own research on *Haemanthus katherinae.*

It may be anticipated that papers on these research projects may be available in the not-too-distant future.

So, as I remarked, H. k. is getting around.

It may be of interest to other amateur growers to detail my method of propagation. The plant blooms for me starting in late June and through July. (Incidentally one of the avenues of the current research is the developing of the procedure to bring about all-year blooming). In order to bring it to fruit requires hand-pollination. Each bloom has up to a hundred florets in a nearly circular head often from 6 to 8 inches in diameter. Florets are pollinated individually. As high as 50 per cent fruiting can be obtained.

The fruit ripens to a deep red in late October and November. I extract the seed at once and plant in pans. When I have 1000 seeds or more to plant I often use flats, 1000 seeds to a flat. The planting mixture I use is 50/50 vermiculite and milled sphagnum, well moistened, a sterile mix. The seeds are pushed halfway into the mix. The seed is pearly and the green embryo is visible. Germination, usually 100 per cent, is from 10 days to 3 weeks, in the form of a radicle. Usually it seeks the mix; when it doesn't I prod it in gently. The bulb and roots form at the end of the radicle. Within another month the first true leaf comes out, the seed shrivels up and falls away.

I keep the seedlings for a year in the mix. (I have even kept them for 2 and 3 years and they continued to grow). From the mix they are potted individually in 4″ pots, graduating up each year. Blooms usually come the fifth year although I have had plants bloom in four years. Adult plants I have in 10″ pots, and even 12″. Some of the seedlings are also planted directly out in the soil. There may be a question about this procedure where there is extensive freeze and snow, although I have it from a friend who sent some of the plants to Colorado where they were planted out and survived and went on growing and flowering. But perhaps that would be a gamble because the habitat of the H. k. is Natal and Rhodesia where it probably does not get quite that cold.

Out in the garden is where H. k. grow most luxuriantly. I have had leafing past two feet and flower stalks of more than 36″. In Southern California the plants are practically evergreen, the new year's growth bursting out of the center of the leaf stalk while the leaves are still green. (I then cut off the previous growth to let all the strength go to the new growth). If the old growth does die off the new growth comes right up in February and March. H. k. may be considered dormant only in January in my climate. Another avenue of the present research projects is a study being made to induce enforced dormancy.

A few words about light reaction with H. k. may be of interest to those adventurous gardeners who might wish to experiment with this plant. All the specimens I have in pots and pans are kept out-of-doors (in fact, I never bring them into the house except to enjoy a bloom or in making some experiment) in a patio which is covered to permit filtered sunlight. Out in the borders the H. k. are located to be in partial shade, usually to allow them morning sunlight. Some are even in positions where they do not receive sunlight and only reflected light. As a test some specimens are planted in direct sunlight. In all positions they thrive, although those in direct sunlight show a slight fading of leaf color and are not quite as robust as those in semi-shade. In a shady spot the foliage is a charming shade of green, somewhat lighter than, say, *Eucharis and Clivia.* From my experience it would be suggested that the plant thrives best in partial shade or even in full shade with good reflected light. Also in such a situation the flowers will have no inclination to fade, the florets being a deep coral pink with anthers a deeper shade of coral, and pollen yellow. Truly a really beautiful picture.

As for fertilizing: perhaps that might make the plants even more robust. As an actual fact I have never fertilized any of my hundreds of plants aside from that contained in the potting medium. This is merely an idiosyncrasy of mine. I keep my soil always heavily mulched and let the plants struggle for their own existence. It is merely my opinion that roots will go deeper in search of their own food and become sturdier and more disease- and pest-resistant. For example, I never spray my garden at all. If lady bugs and mantis are around let them get fat. This year I had hardly even an aphid. For potting, too, I have a formula, never using any loam soil: mixing shredded redwood bark, oak leaf mold, humus, milled bean straw, a bit of steer manure, vermiculite, and some bone meal.

I said I think it's fun. It really is.

4321 Vantage Avenue,
North Hollywood, California

CRINUM CULTURE IN MARYLAND

WILLIAM W. ZORBACH, *Maryland*

For a preliminary report, including directions for the preparation of a satisfactory soil mixture, attention of the reader is invited to Plant Life, *19,* 101-105 (1963).

Of special interest, at this writing, is a continued success in the wintering over of crinums. The original bulbs of *C.* 'Cecil Houdyshel', C. 'Ellen Bosanquet' and C. *powellii album*, planted along the south wall in the fall of 1959, are now handsome clumps and this summer (1964), the longer leaves of 'Cecil Houdyshel' attained a length of 6′. This year, the original lath shade was removed to prepare the area for a small conservatory, and the three subject crinums were exposed to a full and very hot sun. Under these conditions the three specimens appeared

to thrive and the writer was rewarded by twelve scapes on C. *powellii album* which were produced over the period June 15 to July 15.

The habit of these three beautiful crinums is distinctly different as handled in this area. Although 'Cecil Houdyshel' produced only 5 scapes this year, the first of these preceded by one week *C. powellii album* while the last finished blooming in late August. The outer covering of the stalks of two offsets of 'Cecil Houdyshel' are splitting at ground level at this writing, and because this phenomenon invariably precedes the appearance of a new scape on the main bulb, it is considered that the two offsets, by now having attained blooming size, are ready to produce scapes for the first time.

C. 'Ellen Bosanquet', in spite of the number of offsets and the clump it has produced, yielded only three scapes. This, however, may have been the result of "freak" weather late in March which had some severe consequences in the writer's garden. As noted previously, this *Crinum* is the most tender of the three and is the slowest starter in spring. This year we had a somewhat warmer March and by the 20th of the month, early items were springing up all over the place. *Tulipa praestans* and *Azalea mucronulatum* were beginning to flower, and *C.* 'Cecil Houdyshel' and *C. powellii album* were already 8-10 inches above ground. 'Ellen Bosanquet' was just pushing up and on March 25, when the air temperature reached 72°, everyone agreed that spring was here to stay. That night an arctic air mass pushed through the Washington area, dropping the temperature some 35-40°, and on the following night, the temperature fell to 20°. The cold weather persisted for three more days with the result that the new leaf growth on the crinums was killed back to the ground. This very likely weakened 'Ellen Bosanquet' to a point where its bloom this year was hampered. Needless to say, *T. praestans* and *A. mucronulatum,* which were in full bloom at the time, were a complete disaster. After twelve years now of observing Washington weather, the writer is forced to agree with an oft-repeated cliché: "If you don't like the weather in Washington, wait a minute!"

To add to such difficulties is the singular lack of rain this summer. Although there was adequate precipitation during the spring, little rain has fallen since May 1 and, at this time, we must be 10-12 inches in arrears. The drought conditions this year are worse even than in 1962. It is true that in isolated areas more rain has appeared than in others, yet such sporadic falls have miraculously avoided the writer's yard. Nevertheless, without any special care in watering, the crinums have performed well and, in view of their extensive root systems, they have proved to be very efficient plants.

New plantings were made along the east wall in the spring of 1963, and include *C. powellii album, C.* 'Ellen Bosanquet', *C. bulbispermum, C. asiaticum* and *Crinnodonna corsii* (syn.- *Amarcrinum howardii*). The soil along this wall was originally of a poor quality, being light clay, but was improved by the addition of a little sphagnum peat and much coarse sand. Although far from being rich, the soil has excellent drainage properties especially since the bed is raised 4″ with respect to the

yard. During the summer of 1963, the newly-planted crinums did virtually nothing at all, spending such time in becoming established. Early this summer a single bulb of *C. scabrum* was planted in the bed, and shows the same behavior. At this writing (September) it has made only 12 inches of leaf growth.

In contrast, the plantings made originally in the fall of 1959 apparently became established in dormancy during the winter, and when spring arrived, they began growth without delay, reaching maturity in about two months. It is recommended, therefore, that crinums to be grown as hardy bulbs in this area be secured in the fall and planted deeply before the cold weather arrives. In this manner, they will be ready for spring growth.

Crinum asiaticum, which was planted 10″ deep as measured from the base of bulb (deeper than recommended), appeared to suffer the most from its reluctance to establish, primarily due to the character of the bulb. During the summer following planting, there was considerable withering and rotting of the outer layers, and when fall came, the diameter of live bulb was sharply reduced. The decision to winter over this species was a calculated risk, and after a hard frost killed back the little leaf growth which had been made, the bulb was covered lightly with wood ashes and leaves. Miraculously enough, this *Crinum* survived in this location and has been making slow but steady growth during the present summer. Also, the bulb has thickened considerably and it is the writer's prediction that blooms will be obtained later in the fall. All the other crinums planted in this location easily survived the winter, and this summer the newly acquired *C. powellii album* and *Crinnodonna corsii* have bloomed.

Perhaps it would be well at this point to further qualify growing conditions for crinums in the writer's yard. Both the south *and* the east are protected locations in the Washington area. East winds are rare and south winds in winter are quite warm. Cold air, on the other hand, comes either from the northeast or west; therefore, plants grown along the south and east walls are protected from freezing winds. Because the writer's home is of split-level construction having basement-type rooms in the east half of the house, both the south and east wall are heated to a depth of 5′ below soil level by warm air in the rooms. There is little doubt that some heat transfer through the walls to the soil outside is continuously taking place during the cold weather, and evidence for this is taken from the observation that offsets of the main bulbs form more readily in the direction of the wall. The implication to be drawn from this heating effect from the inside is not that this condition is necessary for wintering over crinums but, rather, that it must certainly offer a decided advantage over less auspicious locations. Without this added advantage, *C. asiaticum* most likely would have perished; indeed, this may have been a factor also in the wintering over of hybrid gerberas, which are planted alternately with the crinums. This has proved to be a desirable combination inasmuch as the former serve to provide color continuously during the summer and fall, long after the latter have finished blooming.

In closing, the writer cannot adequately extol the qualities of these fine plants. Of the various amaryllids grown here, the crinums are by far the most outstanding, and to describe them as magnificent is something of an understatement. Because of the warm weather and long growing season in this area, leaf growth is luxuriant and as landscape bulbs, they are peerless. Desirable also is the fact that they appear to be disease-free and not subject to attack by the usual garden pests. With a minimum of care and protection in the winter, they flower faithfully, becoming stronger each year.

Long live the genus *Crinum*!

September 8, 1964,
3602 Dupont Ave.,
Kensington, Maryland

GROWING WORSLEYA RAYNERI **FROM SEEDS**

[In 1962 and again in 1964, Mr. Robert D. Goedert, of Jacksonville, Florida, paid a collector to gather seeds of the Blue Amaryllis, *Worsleya rayneri*, from a mountain top in Brasil. These seeds were made available to his customers. It will be most interesting and helpful to record the successes and failures of those who have experimented with these rare seeds. Two reports were included in the 1964 Plant Life, and two additional reports are included in the present issue. It is hoped that others will send in reports of their experiments for publication in later issues without any special request from the editor.—*Editor*]

3. SECOND REPORT FROM MR. BURR CLOUETTE (CALIFORNIA)

My own single seedling of *Worsleya rayneri* has tripled in size. It is now quite thrifty; is evergreen, and seems to grow slowly most of the time. The first year it usually had only three leaves at any one time, and a rather weak root system. Of late it has had five leaves most of the time, and a few roots showing when the plant with ball of soil is lefted free from the 4-inch pot. I have watered it regularly, and feed it about every three weeks with fish emulsion. It is growing in a south window where it gets strong light all of the time, and about half of the day's sun.

Of six other seedlings given to me by Dr. Traub to raise, two died, but the other four are now growing well under "Gro Lux" lamps where they receive about 16 hours of light.

All five Blue Amaryllis seedlings are planted in "Black Magic" planter mix.—*P. O. Box 483, Rosamond, Calif. 93560*

4. REPORT FROM SAN ANTONIO, TEXAS, by Mrs. Robert E. Herold

Mrs. Paul A. Kane passed on to me in 1964, *Worsleya rayneri* seeds that had been sent to her from Mr. Robert D. Goedert of Florida. I was so pleased to get them. She remarked to me that they seemed to be very dry. I prepared a 3# ham can as my flat with a layer of charcoal from the barbecue pit, then a layer of sandy, humusy soil (begonia

mix) to within an inch of the top. In the meantime, I made a weak starter solution (Ferti-lome liquid root stimulator) in warm water and treated my seeds as I do sweet peas. I let them soak for about two hours. As I poured this water off the seeds—it moistened the flat. I counted the seeds as I planted and set each one on its side. I had 62 seeds in all. When all were set, I finely covered them with Michigan peat and then covered the can loosely with a strip of Saran Wrap. This was placed on the middle shelf of a Canada Dry display stand which make ideal pot stands on the north side of the garage. They were planted Aug. 31 and on Sunday, Sept. 13, I discovered 3 seeds up. Since that date, each day has been a revelation of new growth. I removed the Saran Wrap after three weeks. At the present time (Oct. 9, 1964), I have 54 distinct bulbils with tiny foliage almost 2″ tall.

ANDROSTEPHIUM CAERULEUM—BLUE WESTERN STAR

T. M. Howard, *Texas*

A member of the Allieae tribe in the Amaryllis family, *Androstephium caeruleum* is a very small genus that is most nearly related to *Brodiaea* and *Bessera* within the family, and like these cousins, it grows from a corm. This little corm has a loosely reticulated skin from which arise the 4-6 narrow grey-green leaves and the stout little 5″ scape topped by 2-6 fragrant upright facing bells of surprisingly hyacinth-like form and size. The fragrance reminds one of a freshly opened box of candy, and is very pleasing. The color of this little jewel is apt to be almost any shade of blue, of a frosty translucent quality, ranging from nearly white with just a hint of blue, to amethyst, French blue, and deeper violet tones, verging on purple. Indeed, *Androstephium caeruleum* provides those rich "true blue" shades that are so hard to come by in bulb collections. A colony of them flowering along roadsides in the wild is a joy to behold and a delight to jaded eyes, often bored by the commonplace fare repetitiously offered to dulled appetites year after year by commercial sources. Discovering these little "Blue Western Stars" for the first time is like sharing a secret that few others are privileged to know.

How strange it is that one of our most attractive native amaryllids is so nearly completely unknown among bulb growing hobbiests in this day and time. But the fact is that one may search for *Androstephium caeruleum* in books and commercial lists devoted to unusual bulbs, and it is seldom mentioned, and even more rarely offered. It may as well be non-existent! One can only wonder how or why it has apparently escaped the attentions of the commercial bulb specialists, as it has so many fine qualities that would appeal to gardeners, and it is no more difficult to grow than many popular bulbs. Perhaps it has been passed by because it has never been blessed with a fitting popular name. "Wild Hyacinth" is certainly descriptive enough, but other bulbs belonging to *Scilla, Camassia,* and *Muscari* genera also go by this loose term. It

has also been called "Funnel Lily", "Blue Star-of-Bethlehem", and "Blue Bethlehem", but none of these names seem to stick. The name, "Blue Western Star" has been suggested, and is adopted here.

Casually one might want to lump it with the *Brodiaea* clan, since its habits are rather similar, but close inspection of the indivdual flowers of *Androstephium* reveal that they have a character of their own that sets them apart. Imagine, if you will, the floret of a Dutch Hyacinth

Fig. 37. *Androstephium caeruleum,* Blue Western Star, flowering in its native habitat in southwestern Texas. Photos by Dr. T. M. Howard.

(*Hyacinthus orientalis*) to which has been added a tiny Daffodil-like crown in its center, which is however a stamenial-cup as in *Hymenocallis,* and you have a fair idea of the appearance of *Androstephium.* This little crown is formed by the union of the protruding filaments and this gives it its Greek name, *Androstephium.*

Androstephium caeruleum is a native of blackland prairies, said to be found from Kansas (and the Dakotas?) southward to Oklahoma and central Texas. It was collected by the botanist with the Mexican Boundary Commission in the 1850's. Up to the present, I have collected it only as far south as the Northern part of Bexar County, Texas. Thus it is a rather widespread little plant, but is never really common anywhere, and few people know it. In Texas it flowers fairly early in March

and April, after which it quickly becomes dormant and disappears for another year. A truly hardy plant, owing to its northerly range limits and its ability to withstand droughts, it should prove adaptable to many climates. Under cultivation it seems best satisfied in a sunny well drained alkaline soil, where it will not be watered while dormant, and it is for this reason that it is best suited for the wild garden. If in doubt, it should be dug when it begins to become dormant and stored in a dry place until fall, when it can be replanted.

Another species, *Androstephium breviflorum* Wats., is is said to be a similar, but more Western counterpart, and is said to range Westward from Colorado into Utah, Arizona, and south-eastern California. I have never seen this species and do not know what differences, if any, exist, but surely it too must be as charming as its prairie cousin.

SEVENTH GRADE SCIENCE PROJECT

Mr. Hayward called the Editor's attention to the project carried out by Mr. Frank A. Turner, and he was asked to give an informal report on his work. The following letter was received:—

507 Bon Aire Avenue,
Temple Terrace, Florida,
April 23, 1964

Dr. Hamilton P. Traub
5804 Camino de la Costa
La Jolla, California

Dear Dr. Traub:

As a seventh grade Science Fair project at the new Greco Junior High School in Temple Terrace, I chose Propagation of Plants—Without Seeds.

After referring to our Taylor's Encyclopedia, I wrote to Mr. Wyndham Hayward who sent me a copy of the Amaryllis Year Book with a good article on bulb splitting.

On October 29, 1963 I split one bulb of my Mom's dark red *Amaryllis* into four equal parts, being very careful that each part had a portion of the yellow stem. These were then planted in a mixture of sawdust and soil and kept well watered outdoors.

By the middle of February these four parts of the one bulb had each formed a tiny new green bulb from the stem and the old leaf was still crisp and green.

I had split a second bulb to show how this is done and it had been kept in a clear plastic wrap. This bulb by now had not started new bulbs but was blood red.

These were all displayed at our Science Fair on February 25, 1964, with about 700 entries, and I won the blue ribbon for first place in botany, for which there were 50 entries, with seventh, eighth and ninth grades competing together.

I am proud of the blue ribbon and this was interesting fun so I think I would like to find out now what else is true of *Amaryllis* bulbs.

Thank you for asking me to write you about my project. Mr. Hayward's help was encouraging.

Sincerely yours,
Frank A. Turner
Age—thirteen years

POPPED SEEDS, A DISEASE IN HEMEROCALLIS

Hamilton P. Traub

Most breeders of hybrid *Hemerocallis* have perhaps noted the condition which is indicated here as "popped seeds". This condition is characterized by seeds which have literally "popped" as in the case of popped maize (corn) : the endosperm is partly turned inside out. In many cases the germ is loosened from the endosperm and is easily separated. Such seeds are usually a total loss.

It is possible that this conditon may be brought on by excessive moisture, but the writer has noted chiefly another kind in which susceptibility to seed popping is inherited. He noted that in such clones as 'Ann Rutledge', a pastel pink, at least part of the seeds, sometimes all of them, are popped no matter what the cultural conditions. It has also been noted that offspring from such clones also exhibit the abnormality to a greater or lesser degree.

Thus, the best method of control in case of the heritable type of "popped seeds" is to weed out the clones which exhibit this abnormality.

It will be interesting to hear reports from others who have had trouble with this disease in *Hemerocallis*.

CONTROLLING MEALYBUGS ON AMARYLLIDS

Sam Caldwell, *Tennessee*

Mealybugs have been a bane of my existence for many years. They get down between the leaf blades of clivias, amaryllis, nerines, sprekelias and other amaryllids, causing distortion of the foliage and, I have suspected, spread of the amaryllis mosaic virus. I've managed to keep the mealybug population down somewhat by using a mild oil spray, but have never been able to clean them out entirely.

Now, with the relatively new insecticide, dimethoate, I seem to be well on the way toward eradicating this pest. I use the formulation sold commercially as Cygon 2E. A simple spray application is effective, but experimentally I've tried dipping bulbs and submerging entire pots of growing bulbs—soil, foliage and all—in deep jars of the spray solution. If there has been any injury it is too little for me to observe,

CONTROLLING MEALYBUGS—continued on page 52.

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EDITED BY

HAMILTON P. TRAUB

HAROLD N. MOLDENKE

THE AMERICAN PLANT LIFE SOCIETY

Box 150, La Jolla, California

BOWLING GREEN STATE UNIVERSITY PLANTARIUM

WILLIAM EASTERLY

This year our campus is being transformed into an attractive display of trees, shrubs and herbaceous perennials. We owe this achievement to the interest of our new president, Dr. William Travers Jerome. He recognizes the need of our University to provide an atmosphere of beauty as well as an atmosphere of scholarly activity. The plantings will be cared for by a full time horticulturist, Mr. Colen Wyatt. At the present time the campus can be divided into three distinct areas as far as the plantings are concerned; (1) general landscaping of the academic area and living quarters for the students, (2) landscaping of the athletic facility which includes a golf course, tennis courts and baseball field, and (3) an area devoted to seedling plants of a great variety of trees, shrubs and herbaceous perennials. The latter area is of special interest to our botany program and will eventually serve as a point of interest to the general public using our golf course.

Laminated plastic labels have been used to name the specimens. The letters are white on a red background. After a few years when the specimens have all been labelled, we plan to prepare a booklet describing our plantarium to campus visitors and friends.

It would be premature to compile a list of our plantings but we have favored maples, oaks, tulip tree, ginkgo, and moraine locust on the inner campus. The athletic facility includes a mixture of spruce, pine, fir, beech, linden, willow, oak, crabapple, viburnum, ash, honey locust, euonymus and a variety of flowering shrubs, and herbaceous perennials. Of special interest in the third area might be *Alnus incana, Amelanchier canadensis,* many species of *Cornus, Chionanthus virginicus, Callicarpa dichotoma, Aralia spinosa, Acer ginnala, Hippophae rhammoides, Larix decidua, Pinus aristata, Photinia villosa, Phellodendron amurense, Ptelea trifoliata, Rhamnus frangula, Rhodotypos tetrapetala, Rhus aromatica, Rhus trilobata,* several species of *Sorbus, Taxodium distichum,* and various species of *Paeonia, Hemerocallis, Lycoris, Ungernia, Narcissus, Sternbergia, Galanthus, Leucojum, Allium,* and other hardy bulbous, fibrous—or tuberous-rooted hardy herbaceous perennials.

NOTE TO AMARYLLID COLLECTORS

The following amaryllids are growing in my greenhouse in Bowling Green, Ohio. My goal is to obtain seeds from as many as possible. The seeds will then be sown and the plants raised to maturity. I would like to exchange bulbs or seeds with other collectors. My address is William Easterly, 506 Harvest Lane, Bowling Green, Ohio 43402.

The listing is as follows: *Amaryllis* species, LM63-1, from Peru; Iquitos, Peru; *Amaryllis moreliana,* from Brasil; *Zephyranthes* sp. (received as "*Cooperia* inolii"), grown in Texas; *Zephyranthes jonesii*

D. Don (syn.—*Cooperia pedunculata* Herb.), grown in Texas; *Zephyranthes brazosensis* (syn.—*Cooperia drummondii* Herb.), grown in Texas; *Eucharis grandiflora; Habranthus robustus* (two lots, one from Brasil, the other received as "Zephyranthes robusta" from India); *Habranthus texanus; Hymenocallis speciosa,* received from Peru; *Rhodophiala bifida; Zephyranthes clintiae,* rose #154; and *Zephyranthes longifolia.*

TWO NEW BOMAREA SPECIES FROM PERU

César Vargas C., *Universidad Nacional de Cuzco, Perú*

My studies of the flora of Peru have led me to believe that certain species of the genus *Bomarea,* (Alstroemeriaceae), have not been previously described. I therefore undertake their descriptions as follows:

Bomarea tacnaensae (Fig. 38)

Erecta usque ad 60 cm. alta, caulis robustus apice recurvato, glabro, laeviter angulatus, altrovirens. *Folio*:—Linear-lanceolata, sessilia, 3.5-4 cm. longa, 6 mm. lata, atroviridis, subtus laeviter pilosa et ad caulem adpressa. *Inflorescentia*:—Umbela simplex, 7-11 radiata, bracteae lanceolatae, persistentes, 30-32 mm longae, 6-7 mm latae, albae, subtus pilosulae; radia 34-36 mm longa, bracteolae lanceolatae, 22-23 mm longae, 3-4 mm latae, subtus pauce pilosae, nutantes. *Perianthium*:—Segmenta 30-31 mm longa, suaequalia. Sepala linearia, acuta, atrorubra, viride punctata, subtus alba, laeviter rosea, 7 mm lata. Petala spathulata, in apicem 12 mm, in basim 3 mm lata, flava et viridia, purpureo punctata. *Androceum*:—Stamina perianthi paulum longiora, antherae 3 mm longae, 2 mm latae. *Gynaeceum*:—Ovarium inferioris, purpureum, campanulatum, glabrum. Stylus staminibus brevior, tenuis, stigma styli non crassius.

This new species is an erect herb, up to 60 cm. high, the stem stout, strongly recurved at the apex, glabrous, slightly angular, especially at the recurved part, dark green. *Leaves,* linear lanceolate, sessile, 3.5-4 cm. long, 6 mm. wide, appressed to the stem, dark green, slightly pilose beneath. *Inflorescence,* umbel rays simple, 7-11, the bracts lanceolate, persistent, 30-32 mm long, 6-7 mm wide, minute, white pilose beneath. The rays of the inflorescence 34-36 mm long and the bractlets lanceolate noding at the base, 22-23 mm long, 3-4 mm wide, also slightly pilose beneath. Perianth segments 30-31 mm long, subequal. The sepals linear acute at apex, dark red with green tips, white and slightly pink beneath, 7 mm wide. The petals, spatulate, light yellow and green with dark purple tips, 3 mm wide at the base and almost 12 mm wide at the apex. *Androecium,* the stamen slightly larger than the perianth segments, 3 mm long and 2 mm wide, the anthers *Gynoecium,* Ovary inferior, dark purple, campanulate, glabrous. Style slender and shorter than the stamens; stigma as wide as the style. This species is close to *Bomarea praeustua,* but differs in its simple umbel rays, size and color of the perianth.

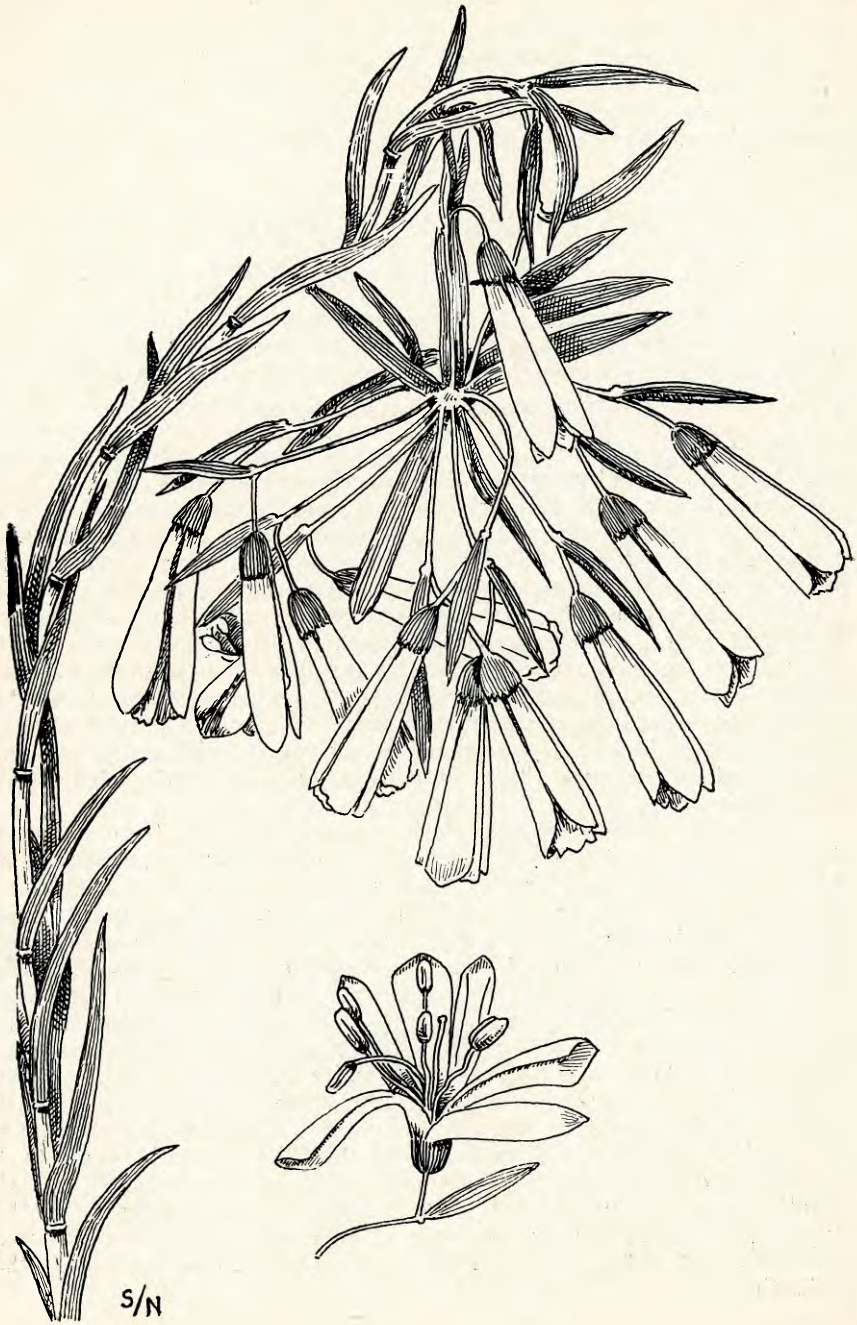

Fig. 38. *Bomarea tacnaensae* Vargas, *sp. nov.*

Fig. 39. *Bomarea longistyla* Vargas, *sp. nov.*

Type locality: Collected in Department of Tacna, Provincia, Tarata, between the pass of Livini and Tarta, at 3800 m alti. Habitat: on shrubby and rocky slopes. Type specimen: CVC., 13025, Nov. 1959; deposited at CUZ.

Bomarea longistyla (Fig. 39)

Suberecta, 70-80 cm. alta, caulis robustus dense pilosus, flavus et fuscus basi praecipue, apice albidus. *Folia*:—Plurima secunda, membranacea, glabra, subtus laeviter pilosa, ex parte centrali 6-8 cm. longa, 18-20 mm. lata. *Inflorescentia*:—Umbela 5-6 radiata, simplex, bracteae foliorum superiorum non longiora, radia 4-4.5 cm. longa, subangulata, pilis brevibus et glandulis obsita. *Perianthium*:—Florum bracteae longitudine et latitudine foliorum bene evolutis, aequalia. Flores 5-5.2 cm. longi, sepala atropurpurea ad apicem viridia 12 cm lata, petalis paululum breviora. *Androceum*:—Stamina 15 mm longa, exserta, antherae 5 mm longae et 2 mm latae. *Gynaeceum*:—Ovarium semi-inferioris, atropurpureum, glabrum, campanulatum. Stylus 22 mm longus exsertus; stigma foliaceum.

This new species is a suberect herb, 70-80 cm. high, the stem stout, terete thick, pilosule, yellow and brown, especially at the base, and whitish near the apex. *Leaves* numerous and secund, membranaceous, glabrous, except beneath, which is slightly piliferous. The middle ones are 6-8 cm. long and 18-20 mm. wide. *Inflorescence,* umbel with 5-6 flower rays; the bracts of the inflorescence, as large as the upper leaves; the flower rays 4-4.5 cm long, minute pilose, glandular, slightly angular. *Perianth,* the bracts of the flower as long and as wide as the normal leaves; the flowers 5-5.2 cm long; the sepals dark pink 12 mm wide, slightly shorter than the petals. *Androecium,* the stamens are exserted almost 15 mm long; anthers 5 mm long and 2 mm wide. *Gynoecium,* Ovary half inferior, dark purple, glabrous, campanulate; the style long exserted 22 mm; stigma slightly foliaceous.

Type locality:—Collected in the Department of Ancash, Provincia Bolognesi, Mangas, Cerro San Cristóbal, between rocks, May 1962, by Dr. Emma Cerrate, #4123, Typus, at CUZ; Isotypus, Lima USM.

Cuzco, Perú,
October 31, 1963.

PLANT LIFE LIBRARY

EXTRACHROMOSOMAL INHERITANCE, by Dr. John L. Jinks. Prentice-Hall, Inc., Englewood Cliffs, New Jersey. 1964. pp. 177. $4.95. This book is one of the short volumes in Prentice-Hall's Foundation of Modern Genetics Series. Dr. Jinks, the author, is Principal Scientific Officer of the Agricultural Research Council's Unit of Biometrical Genetics at Birmingham. He is well-equipped by experience and training to discuss extrachromosomal inheritance. His work with cytoplasmic inheritance in fungi, particularly with *Aspergillus,* has contributed much to this facet of genetics.

Sigmund R. Suskind and Philip E. Hartman of the McCollum-Pratt Institute, the Johns Hopkins University, are Editors of this series of books. According to the Editors the books are designed to "make possible a stimulating, selective treatment of the various aspects of genetics at the intermediate level". The author has conscientiously adhered to the limitations imposed by the editors; the book is clearly not a college text nor a reference work for graduate students and investigators.

Until about the 1940's there was little interest and not much was known about extrachromosomal inheritance except in higher plants where the classical work of Bauer, Correns, Renner, Rhoades and others, mostly with maternal inheritance of plastids, stood as lonely beacons surrounded by a sea of knowledge concerned with Mendelian chromosomal inheritance.

During the past two decades the picture has changed; investigators working with microorganisms such as yeast, *Neurospora, Aspergillus, Paramecium, Amoeba,* etc. have discovered many new, novel and important examples of extrachromosomal inheritance. At the same time, *Oenothera* workers have made fundamental discoveries in the field of extrachromosomal inheritance. Likewise, the thorough and brilliant work of Michaelis on cytoplasmic inheritance using *Epilobium* as experimental material is just commencing to be appreciated.

Dr. Jinks is concerned first with establishing a physical basis for the continuity of extrachromosomal constituents that might serve as bearers of hereditary determinants. There are two classes of extrachromosomal bodies that could conceivably qualify: (1) fiber-producers such as centrioles and basal granules, and (2) metabolic controllers such as mitochondria and plastids.

In the next few chapters Dr. Jinks has set-up rules for identifying extrachromosomal inheritance. Then follow chapters on the nature of the extrachromosomal system, relations between chromosomal and extrachromososal systems, and lastly the extrachromosomal role in development, variation and evolution.

The book is well written, and with few exceptions is free of the troublesome typographical errors that almost inevitably crop up in any book. The black and white diagrams are neat and informative and there is an excellent index. Surprisingly, the specific name of the Four O'clock, *Mirabilis jalapa* (*M. jalopa* in the book), is consistently misspelled, and unhappily, the black and white photographs from which the Frontispiece was composed did not reproduce well. For those geneticists and cell biologists who feel the need to up-grade their understanding of extrachromosomal inheritance, this stimulating book is highly recommended.—*Thomas W. Whitaker*

ECOLOGICAL GENETICS, by E. B. Ford. John Wiley & Sons, Inc., 605 Third Avenue, New York, N. Y. 10016. 1964. Pp. 335, Ill. $7.75. This book is a product of thirty years of research by a group in the Department of Zoology, Oxford University, under the leadership of Professor E. B. Ford, along with his close colleagues, Professor P. M. Sheppard and Dr. H. B. D. Kettlewell. The work was stimulated and encouraged by Sir Ronald Fisher until his death (the book is dedicated to him). Sir Julian Huxley has likewise maintained an interest in the experiments, contributing his customary critical comments and suggestions. From research spawned under these prestigious auspices one is tempted to anticipate an outstanding intellectual feast. The discerning reader with the patience to cope wtih the rather small print and 304 pages of text will not be disappointed.

Nearly all of the experimental work is concerned with animals, mostly invertebrates. The book actually amounts to a monograph of the ecological genetics of certain Leptodoptera, chiefly the butterflies, *Melitaea aurinia, Maniola justina* and *Papilio dardanus;* and the Scarlet Tiger moth, *Panaxia dominula.* Professor Ford naturally stresses his own research, but he has chosen *Drosophila* as an example of chromosome polymorphism, and snails to illustrate polymorphism and the development of the "supergene" (his term). The heterostyle-homostyle situation in primrose is the only extended discussion of plant material in the book, but this is only logical according to Ford since little is known about the ecological genetics of plants.

The limitations of space forbid a critical examination of the many excellent chapters in this book, but there are two concepts that form a continuous theme throughout the discussion. (1) "Unexpectedly great selective forces are normally operating to maintain or adjust the adaptations of organisms in natural conditions." It was originally thought that selective advantages of up to about 1 percent in wild populations was about normal. The present work on ecological genetics has shown that values of 20 to 30 percent are commonplace. This means that a population can rapidly readjust itself to changed conditions. Ford goes on to say, "the fact that such powerful selection is normally operating reduces to negligible limits the effects of random drift upon the changes in the frequency of widespread genetic qualities".

(2) Ford is skeptical of the importance of mutation in the evolutionary process. He sums up his position as follows. "Similarly, if ever it could have been thought that mutation is important in the control of evolution, it is impossible to think so now; for not only do we observe it to be so rare that it cannot compete with the forces of selection but we know that this must inevitably be so. One of the triumphs of Mendelism is the demonstration that there exists a system which promotes both great heritable variability and great heritable stability; for extremely permanent genes can be recombined in an infinite variety of ways and there are mechanisms, such as inversion and other devices for evolving close linkage, by which new combinations of value to the organism can be preserved." Ford admits that mutation is originally responsible for the diversity of the genetic units, but he goes on to say, "living organisms are the product of evolution *controlled* not by mutation but by powerful selection."

The above remarks are indeed a gross over-simplification of Professor Ford's elegant experimental studies of wild populations and his cogent analysis and interpretation of the results, but they do indicate the general trend of his conclusions.

The chapters on Mimicry, *Popilio dardanus* and the Evolution of Mimicry, and Transient Polymorphism and Industrial Melanism are among the best to be found anywhere. There are sixteen black and white plates of superior quality, a bibliography of slightly over 300 titles and an index—*Thomas W. Whitaker.*

PLANT PATENTS, WITH COMMON NAMES, 1963 SUPPLEMENT, 2208 THROUGH 2336. Published by the Amer. Assoc. of Nurserymen, 835 Southern Bldg., Washington, D. C. 20005. 1963. Pp. 7. $0.50. This is a supplement to the complete listing of plant patents, nos. 1 through 2207. 1931—1962. In the supplement, the subject matter is arranged under three parts: I. Numerical listings; II. alphabetical listings under common names; and III. alphabetical listings of names and addresses of originators or discoverers and assignees.

GENTIANS FOR YOUR GARDEN, by Doretta Klaber. M. Barrows & Co., 425 Park Av. S., New York, N. Y. 10016. 1964. Pp. 141. Illus. $4.50. Illustrated by the author, this pioneering book describes nearly one hundred gentian species and hybrids in the first part of the book. The second part is devoted to cultural directions for gentian culture, including also the available rare or difficult ones from the Himalayas, Japan, New Zealand, Europe and America. Highly recommended.

GARDENS OF ITALY, by Frances M. McGuire. M. Barrows & Co., 425 Park Av. S., New York, N. Y. 10016. 1964. Pp. 223. Illus. $4.95. This is an informal account of visits to some of the finest gardens of Italy, including the pertinent historical background. The subjects discussed include papal gardens, royal gardens, Roman gardens, water gardens, castle gardens, villa gardens, a Venetian garden, an island garden, lakeside gardens, and a botanical garden.

A HANDBOOK OF DRIED ARRANGEMENTS AND DECORATIONS, by Mabel Squires. M. Barrows & Co., 425 Park Av. S., New York, N. Y. 10016. 1964. Pp. 95. Illus. $3.25. This is an illustrated handbook for the beginner which presents an introduction to the drying of the vegetative parts of plants and the flowers, and their arrangement for decorative purposes. It explores containers, possibilities with decorative wood, treasures from the sea, natural forms, corn, dried materials for ornamental work, and household articles.

THE FLOWER ARRANGEMENT CALENDAR, 1965, by Helen Van Pelt Wilson. M. Barrows & Co., 425 Park Av. S., New York, N. Y. 10016. 1964. Paper with plastic ring binding. Illus. $1.50. The publisher sponsors an annual flower arrangement calendar contest. In this little book, the 19th edition, some of the outstanding photographs of floral arrangements accepted by the publisher are reproduced in calendar form for 1965. This calendar will interest those engaged in flower arranging.

CHEMOTAXONOMIE DER PFLANZEN. Band 2. Monocotyledonae (German), by R. Hegnauer. Birkhaeuser Verlag, Basel 10, Switzerland. 1963. Pp. 540. Illus. $ sFr. 98. This is a pioneering attempt to bring together the available information on the chemical composition of the monocotyledonous plants, and to correlate this data with relationships among the 48 families which are arranged alphabetically from *Agavaceae* to *Zingiberaceae*. It is not possible in a brief review to go into detail for the various families, and thus the *Amaryllidaceae* as arranged by Traub (1963) will be singled out as an example to show how the chemical data may be applied.

It is to be noted that typical alkaloids are characteristic of subfam. 4. *Amarylloideae*, and these substances are not reported for the other three subfamilies. In subfam. 1. *Alloideae*, the typical compounds are steroidsapogenins. In subfam. 2. *Hemerocalloideae*, only *Hosta* has been superficially investigated, and on that basis sapogenin has been reported. This is in harmony with the conclusions reached by Traub (1953) on morphological grounds that *Hosta* belongs with the *Agavaceae*. Thus only the genus *Hemerocallis* remains in Subfamily 2, *Hemerocalloideae*.. Subfam. 3. *Ixiolirioideae* has not been investigated on a chemical basis, excepting for a brief reference to polyphenols in *Gagea lutea*. This is insufficient for any conclusions.

First, it has to be emphasized that chemical composition has to be considered in conjunction with data from other disciplines—embryology, anatomy, morphology, etc.—and thus conclusions from chemical data should be used with caution. However, on the basis of the evidence, it can be stated that there is a relatively great gap between subfamilies 1. *Alloideae* and subfam. 4. *Amarylloideae*. Thus both could have originated from a common ancestral stock, but subfam. 4. has subsequently specialized in the type of alkaloids revealed at the present which are not present in Subfam. 1.

The chemical data reported, however incomplete, in the text are thus valuable to the worker in lineagics (the grouping of lineages; see Traub, 1964), and the book by Dr. Hegnauer should be in the library of every worker in that field.—*Hamilton P. Traub*

LITERATURE CITED

Traub, Hamilton P. The Tribes and Genera of the Agavaceae. Plant Life 9: 134—137. 1953.

Traub, Hamilton P. The Genera of Amaryllidaceae. 1963.

Traub, Hamilton P. Lineagics. 1964.

SEASIDE PLANTS OF THE WORLD, by Edwin A. Menninger. Hearthside Press, 118 E. 28th St., New York, N. Y. 10016. 1964. Pp. 303. Illus. $9.95. This profusely illustrated encyclopedic guide to the planning, planting and maintaining of salt-resistant gardens, by an outstanding authority, will be welcomed by all who live by the sea. After a general statement about the problems presented to the seaside gardener, chapters are devoted to enemies, soil, windbreaks, planting, eroding hills and reclaiming marsh land, ground covers, vines, grass and lily-like plants, herbs, and sub-shrubs, shrubs, trees and palms, annuals, vegetables, lawns, and field crops. The appendix covers the subjects of salt tonerance in soils, sources of plant materials, and classification of salt-resistant plants to cold and the sea. Highly recommended.

THE PICTURE BOOK OF PERENNIALS, by Arno and Irene Nehrling. Hearthside Press, 118 E. 28th St., New York, N. Y. 10016. 1964. Pp. 286. Illus. $5.95. Two outstanding horticulturists, a husband and wife team, have collaborated on this charming book. It is profusely illustrated, including some color plates. After explaining why perennials are their favorites, the perennials included are briefly described in an alphabetical arrangement. Next the planning and planting of the garden is explained, and finally, a calendar of operations, and lists of perennials for special purposes, are presented. Highly recommended.

THE CAMELLIA TREASURY, by Mrs. Paul Kincaid. Hearthside Press, 118 E. 28th St., New York, N. Y. 10016. 1964. Pp. 224. Illus. $9.95. This profusely illustrated book by an outstanding authority will be welcomed by camellia growers. The subjects covered include camellias in the past, present and projections into the future, their use in the landscape, choosing varieties, planting and care, pest problems, greenhouse culture, Bonasi and other container growing, propagation, exhibiting at shows ,and use in arrangements. Highly recommended.

AN EASY GUIDE TO ARTIFICIAL LIGHT-GARDENING FOR PLEASURE AND PROFIT, by Vernon Johnston and Winifred Carriere. Hearthside Press, 118 E. 28th St., New York, N. Y. 10016. 1964. Pp. 192. Illus. $4.50. Two authorities on the subject have collaborated to produce this book. After briefly describing the pleasure of light-gardening, the subject is developed in two parts: (1) the effect of light and darkness on plant growth; lamps and equipment; construction of the light-garden; designing the light-garden; care, and feeding of plants; propagation; profit from light-gardening; and (2) compatible light-garden plants. Recommended to amateurs interested in light-gardening.

MODERN ABSTRACT FLOWER ARRANGEMENTS, by Emma H. Cyphers. Hearthside Press, 118 E. 28th St., New York. N. Y. 10016. 1964. Pp. 128. Illus. $4.95. The author, who is an authority, explores new possibilities in the field of abstract flower arrangements, explaining how to identify, evaluate and design such arrangements. The illustrations are excellent. Highly recommended to all interested in flower arrangements.

HOME AND GARDEN CALENDAR, 1965. Hearthside Press, 118 E. 28th St., New York, N. Y. 10016. 1964. Paper, plastic ring binding. The publishers sponsor an annual Home and Garden Arrangements Calendar. In this little book, some of the outstanding photographs of such arrangements accepted by the publishers are reproduced in calendar form. It will appeal to those interested in home decoration.

FLOWERS AND FESTIVALS OF THE JEWISH YEAR, by Lillian S. Freehof, and Lottie C. Bandman. Hearthside Press, 118 E. 28th St., New York, N. Y. 10016. 1964. Pp. 192. Illus. $5.95. This book fills the need of those who observe the festivals of the Jewish Year. It provides information on flower arrangements and table decorations for home, hotel, and synagogue or temple. The background of the festival days is detailed. The text is provided with excellent illustrations.

THE AFRICAN VIOLET CALENDAR, INCLUDING GLOXINIAS AND OTHER GESNERIADS, 1965. Hearthside Press, 118 E. 28th St., New York, N. Y. 10016. 1964. Paper, plastic ring binding. The publishers sponsor an annual African Violet arrangement Calendar Contest. In this little book, some of the outstanding photographs of such arrangements accepted by the publishers, are reproduced in calendar form. This calendar will appeal to those interested in African violets and related plants.

ADVANCES IN AGRONOMY, VOL. 16, edited by A. G. Norman. Academic Press, 111 5th Av., New York, N. Y. 10003. 1964. Pp. 414. Illus. This 16th volume of the series, including contributions from 18 outstanding authorities, represents a rich harvest with reviews on field plant physiology; crop response to "available" phosphorus; corn improvement; salinity in relation to irrigation; response of plants to soil compaction; nitrate accumulation in crops and nitrate poisoning in animals; soil oxygen conditions; population variability in relation to plant breeding; and amorphous inorganic materials in soils. Highly recommended.

PLANT LIFE LIBRARY—continued on page [ix].

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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[AMERICAN AMARYLLIS SOCIETY, continued from page 2.]

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III. PUBLICATIONS OF THE AMERICAN PLANT LIFE SOCIETY

BOOKS

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. Manila covers, 163 pages, incl. 8 illus. $5.00, postpaid.

PERIODICALS

(**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 should note that this may be the last opportunity for complete sets.

COMPLETE SETS **OF HERBERTIA:**

Vols. 1-5 (1934-1938), $20.00, postpaid.
6-10 (1939-1943), $20.00, postpaid.
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