PLANT LIFE

AMARYLLIS
YEAR BOOK

1969

Amaryllis aulica stenopetala

THE AMERICAN PLANT LIFE SOCIETY

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EDITED BY
HAMILTON P. TRAUB
HAROLD N. MOLDENKE

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The cover design by Prof. Penrith B. Goff is based on *Amaryllis aulica stenopetala* as grown and photographed by Mr. Sam Caldwell at Nashville, Tenn., from bulbs imported by Mr. Robt. D. Goedert from South America.

PLANT LIFE, VOLUME 25, NO. 1, 1969—AMARYLLIS YEAR BOOK
GENERAL AMARYLLID EDITION

4. AMARYLLID CULTURE

PLANT LIFE, VOLUME 25, NOS. 2—4, INCL., 1969
GENERAL EDITION

ILLUSTRATIONS

CORRIGENDA

PLANT LIFE, Vol. 23, 1967

Page 61, 18th line, change "E. L. Brasol, near Daytona Beach, Florida" to "a collector in eastern peninsular Florida".

Page 67, center of page, *Narcissus tazetta* subsp. *chinensis* var. *"plenifloris"*, 4th line, change "11-16-50" to "1-16-50 a+b+c".

SUPPLEMENT—REVIEW OF THE GENUS NERINE (see also corrigenda PLANT LIFE Vol. 24. 1968 p. vi.)

Page 3, 12th line from bottom of text, change "Winsome F. Baker" to "Winsome F. Barker".

Page 10, change "7. *rydleyi*" to "7. *ridleyi*".

Page 16, 12th line from bottom, change "1805" to "1905".

Page 19, 3rd line from top, change "*rydleyi*" to "*ridleyi*".

11th line from bottom, change "rose pink" to "mauve pink".

Page 21, under "11. *Nerine alta* (err. *alata*).

8th line from bottom, change "(Hogsbeck)" to "(Hogsback)".

14 to 15th line from bottom, change "Hogsbeck" to "Hogsback".

Page 23, 13th line from top, change "Prof. T. Baron" to "Prof. T. T. Barnard".

Page 24, under 16. *Nerine brachystemon,* 1st line, change "Bulb unknown" to "Bulb ovoid, rather small."

PLANT LIFE, Vol. 24, 1968

Page 50, Fig. 14, 2nd and 3rd lines, change "Sultinate" to "Sultanate".

Page 127, 14th line from bottom, change "(1841)" to "(1823-31)".

Page 130, 18th line from top, change "holonomenifer" to "lectonomenifer".

Page 134, in the key, under 19a, 3rd line, change "14. *michoacanense*" to "14. *michoacanum*".

Page 136, under 2. *Allium scaposum,* 10th line, change "tepals 6 cm. long" to "tepals 6 mm. long."

Page 139, under 11. *Allium ownbeyi*; Range.—, change "about 30 mi. north of Monterrey" to "within western edge of City of Monterrey." See also Plant Life 25:56. 1969. Under 13. *Allium elmendorfii,* 2nd line, change "Allium elmandorfii" to "Allium elmendorfii".

Page 141, under 19. *Allium glandulosum,* 2nd line, change "1841" to "1828-31".

Page 154, 19th line from bottom, change "Feinbrun (1965)" to "Feinbrun (1954)".

Page 159, from bottom of text, 2nd line up, change *"erotophyllum"* to *"eurotophilum"*.

Page 162, 6th line from bottom, change "Feinbrun, N. Palest, J. Bot. Jerusalem 5:13. 1950" to "Feinbrun, N. Caryologia, Vol. suppl. 1954, pp. 1036-1041."

LINEAGICS, BY HAMILTON P. TRAUB

Published Aug. 6, 1964

CORRIGENDA

(See also Corrigenda PLANT LIFE Vol. 21, 1965, pp. vi.—vii.)

Page 18, 12th line from top, for "Mauterpuis" read "Maupertuis".
16th line from top, for "Mauterpuis" read "Maupertuis".

Page 26, 12th line from top, change "cretaceans" to "cetaceans".

Page 35, 23rd line from bottom, change "Mauterpuis" to "Maupertuis".

Page 36, 3rd line from bottom, change "Mauterpuis" to "Maupertuis".
7th line from bottom, change "Mauterpuis" to "Maupertuis".

Page 37, 10th line from top, change "Mauterpuis" to "Maupertuis".
7th line from bottom, change "Mauterpuis" to "Maupertuis".

Page 36, 1st paragraph, 1st line, change "Mauterpuis" to "Maupertuis".
2nd paragraph, 6th line, change "Mauterpuis" to "Maupertuis".

Page 48, 18th line from top, change "Wilheim" to "Wilhelm".

Page 58, 1st line, change, "Mauterpuis" to "Maupertuis".

Page 62, Fig. 2, 4th line, change "mathematices" to "mathematics".

Page 64, 13th line, change "basic" to "basis".
17th line from top, change "fall" into "falls".

Page 97, 4th line from bottom, insert "to" after "closely".

Page 107, 1st paragraph, 7th line, change "are" to "is".

Page 112, 1st line, change "Methanabacae" to "Methanobacae".

Page 141, Table 27, 1st line, change "Superphylum" to "Superkingdom".

Page 145, 10th line from top, change "EUMACOTAE" to "EUMYCOTAE".

Page 155, 26th line from top, place "Lectures, 1961-62" at the end of the line beginning "Lees, H. etc."

Page 162, 20th line from top, change "Mauterpuis" to "Maupertuis"

PLANT LIFE, VOL. 25, NO. 1, January, 1969

AMARYLLIS
YEAR BOOK
1969

Year Book of
The American Amaryllis Society
36th Issue

GENERAL AMARYLLID EDITION

EDITED BY
HAMILTON P. TRAUB
HAROLD N. MOLDENKE

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

THE AMERICAN PLANT LIFE SOCIETY

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[THE AMERICAN AMARYLLIS SOCIETY—continued on page 168.]

PREFACE

The cover design by Prof. Penrith B. Goff, of Wayne State University, Detroit, Michigan, represents *Amaryllis aulica stenopetala* as grown and photographed by Sam Caldwell in Tennessee from bulbs imported by Robert D. Goedert from South America. Prof. Goff is to be congratulated again on another beautiful cover design.

This 36th issue of the AMARYLLIS YEAR BOOK is dedicated to William Quinn Buck who received the WILLIAM HERBERT MEDAL for 1969 in recognition of his outstanding contributions toward the advancement of the amaryllids, particularly pioneer work with tetraploid daylilies (*Hemerocallis washingtonia*), and work with various other amaryllids. Mr. Buck contributes an autobiography and a report on *Hemerocallis* to the present issue.

Dr. Martin Cardenas, the recipient of the 1967 WILLIAM HERBERT MEDAL, has named a new Bolivian *Amaryllis* species, *A. escobaruriae* in honor of the La Paz Burgomaster, General Armando Escobar Uria, who staged the first flower show in La Paz in 1968. The members of the Society congratulate General Escobar Uria and Bolivia on its first flower show.

In the present edition, papers on exploration for amaryllids in South America are contributed by Dr. Ruppel and J. L. Doran.

Articles on *Amaryllis* are contributed by Fred J. Buchmann, Russell H. Manning, V. Roger Fesmire, Joseph K. Mertzweiller, J. T. Schmidt, Mr. and Mrs. Alek Korsakoff and Mrs. Fred Tebben.

Prof. Pedro F. Ravenna reports on new species of *Phaedranassa, Griffinia, Amaryllis* and *Nothoscordum,* including some excellent illustrations.

Dr. Easterly reports on the chromosome number in *Lycoris* "cinnabarina", and hardiness of some *Lycoris* species in Ohio, and Miss Grapes writes about the hardiness of some *Lycoris* species in western Nebraska.

Dr. John M. Cage reports on his *Sprekelia-Habranthus* hybrid, and also on the uses of some systemic pesticides with amaryllids. Mr. Hudson writes about the blooming of the Blue Amaryllis in South Carolina, and Miss Grier reports on the culture of *Narcissus* in southern California.

Mr. Tisch writes about his experiences with amaryllids in California, and on the naturalizing of plants. Prof. Davis details the handling of *Brunsvigia* x *parkeri* in Louisiana. L. S. Hannibal writes about various crinums and *Crinum* hybrids.

We are again indebted to Mr. Goedert for his annual report on the Amaryllis Season.

Mr. Van Woesik writes about his trip through the United States, and on the planting, fertilizing and caring for *Amaryllis* grown outdoors.

Dr. Artyushenko contributes a fine grouping of the *Galanthus* species, and Profs. van der Merwe and Grobler report on an electric drying press for herbarium specimens.

Mr. Russell H. Manning writes about sending live amaryllid flowers by mail.

Our good friend, Alek Korsakoff, the amaryllid enthusiast, contributes a most interesting autobiography that all members will enjoy reading.

There are also reports on the annual Amaryllis shows, and various other items as shown in the table of contents.

Contributors to the 1970 issue of the AMARYLLIS YEAR BOOK are requested to send in their articles by August 1, 1969, in order to insure earlier publication of this edition. Unless articles are received on time, publication will again be delayed to June or July or even later as with some issues in the past. Your cooperation toward earlier publication will be greatly appreciated. Those having color slides or transparencies which they wish to use as the basis of illustrations, are requested to have black-and-white prints made, and to submit these with their articles.

December 15, 1968
5804 Camino de la Costa,
La Jolla, California 92037

Hamilton P. Traub
Harold N. Moldenke

PLANT LIFE LIBRARY—continued from page 167.

DICTIONARY OF ECONOMIC PLANTS, by J. C. Th. Uphof. 2nd Edition. Verlag von Cramer. Sold in the U.S.A. by Stechert-Hafner, 31 E. 10th St., New York, N. Y. 10003. 1968. Pp. 591. This second, revised and enlarged edition of an important reference book on economic plants will be welcomed. In the new edition over 3000 species have been added so that the total number of entries is now 9500. The subject matter, excepting ornamental plants, includes those important in agriculture, forestry, pomology, olericulture, pharmacognosy, and crops producing oils, rubber, spices, essential oils, gums, resins, etc. The entries are arranged alphabetically. The bibliography has been more than doubled. Recommended to all interested in economic plants.

THE MEANING OF EVOLUTION, by George Gaylord Simpson. 2nd Revised Edition. Yale University Press, New Haven, Conn. 1967. Pp. xvii + 368. Illus. cloth, $7.50; paper, $2.45. Subtitled "A Study of the History of Life and of Its Significance for Man", this revised edition of a stimulating book by an outstanding authority, will be welcomed. This easy to read explanation of the evolutionary process is arranged under four sections—prologue, the course of evolution, the interpretation of evolution, and evolution, humanity and ethics. Highly recommended to the specialist, student and the general reader.

READINGS FROM SCIENTIFIC AMERICAN: BIO-ORGANIC CHEMISTRY, with an introduction by Garrett Hardin. W. H. Freeman & Co., 660 Market St., San Francisco, Calif. 94104. 1968. Pp. 317. Illus. $4.95. The 32 articles by various authorities, published in the Scientific American, have been selected on the basis of "chemical emphasis, significance, novelty and the level of presentation" to close the gap between the classically oriented elementary organic textbook and the detailed biochemical treatise. The three sections of the book are (1) macromolecular architecture, (2) Biological Regulators, and (3) chemical biodynamics. This stimulating text is highly recommended to all interested in recent developments in bio-organic chemistry.

PLANT LIFE LIBRARY—continued on page 54.

Dedicated to
William Quinn Buck

HERBERT MEDALIST—WILLIAM QUINN BUCK

WILLIAM QUINN BUCK

AN AUTOBIOGRAPHY

I was born on April 27, 1908, in Chillicothe, Hardeman County, Texas, where my father published a weekly newspaper. My earliest recollections of plants are of the delightful smell of the peach trees that had come up between the printing office and a big frame building which I think was a livery stable. A little old lady living near the blacksmith shop had a garden so full of plants that no more could have been crowded in, and the garden was almost as fascinating as the blacksmiths' work.

My seventh birthday came while we were visiting my parents' families in Mississippi, and it was there that I got to see the big shrubs from which my grandmother picked the fragrant Cape jasmines that she tried to send by mail each year. The japonica, with its shiny leaves and small red flowers, was so much the center of my interest that severe punishment rewarded my picking the flowers. The green rose was the real marvel of the garden though, and it probably excited my keenest delight.

About the time I was in the third grade we moved to a new home which had a very large garden area, and I immediately began gardening. Learning how to germinate snapdragon seed in spite of the dry West Texas air by shading the seed box with wet sacks, and growing waterlilies for tubs from Burpee seed were among my fondest youthful horticultural accomplishments.

By the time that I went away to Clarendon College in 1925 there was a huge collection of gladiolus corms and dahlia roots that had to be dug, cured, and stored, and of course my mother was the only one to assume the responsibility. Summer gardening thereafter had to be curtailed in many ways.

Study of painting was begun at Clarendon and later continued at Texas Christian University, in Fort Worth, from which I was graduated *summa cum laude* in 1929, with majors in English and art. In the fall of that year I went up to Philadelphia to enter the Pennsylvania Academy of the Fine Arts, oldest art school in the country. In 1930 I was admitted to classes at the Barnes Foundation in Merion, Pa., and I heard the first brief series of horticultural lectures there.

In December of 1929 I got a night job in the proofreading departpartment of The Philadelphia Inquirer. By 1931 classes at the Academy had to be dropped for a year because of a serious illness. About this time myopia became a serious problem. In 1935 I enrolled in the graduate school of the University of Pennsylvania. During these years plant growing had to be limited to a few pots, but seedling

agapanthuses and a clivia were managed somehow. Frequent visits to Horticultural Hall, the Morris Arboretum, and the University of Pennsylvania botanical garden, and the annual flower shows, gave me plants to see, at least.

In 1937 I suddenly began to have tiny hemorrhages on both retinas, and this hemorrhagic choroiditis and a detached retina in the right eye soon forced me to leave the proof reading job and give up painting permanently. A return to growing plants now became logical. It was during these trying years that I first became interested in the *Hemerocallis* and hybridizing, as well as in using colchicine as a polyploidizing agent. My daylilies had to be grown on a hillside near a spring on the land of a friend in Bucks County, and I lived in the old stone farmhouse at the top of the hill the summer that I had braille lessons.

A couple of trips to Florida and Southern Georgia failed to enable me to become located in a warmer climate, as advised by the oculists. After trying south Texas, also, I arrived in California early in 1942. For a year I worked for Cecil Houdyshel, the bulb grower, in La Verne, and then I went to the University of California at Los Angeles, becoming a senior laboratory technician at the greenhouses in the floriculture department. I was able to do a considerable amount of daylily and amaryllid work here. The polyploidizing experiments were resumed, and in 1948 the first of my induced tetraploid daylily clones flowered. Colchicine was used successfully on germinating orchid seed in this period.

In 1950 I became head of the propagation section at the Los Angeles State and County Arboretum in Arcadia, and during the ensuing fifteen years some of the polyploidizing experiments were squeezed in with the propagation of thousands of plants from all parts of the world. A colchicine-induced tetraploid blue daisy, *Felicia amelloides* 'Santa Anita', obtained from 1951 experiments, later was given an A.M. by the California Horticultural Society and was commercially propagated by the thousands for use in the Los Angeles and San Francisco areas. By treating germinating seed from a fine diploid strain a whole series of wonderful *Gerbera* hybrids was obtained. *Lagerstroemia indica*, the Crepe-Myrtle; *Chorisia speciosa, Tabebuia chrysotricha, Ligustrum japonicum, Fatsia japonica* were among the plants treated in extensive colchicine experiments. A fine collection of amaryllids was brought together here, and some wonderful hybrid amaryllis seedlings were grown, including the *Amaryllis calyptrata* hybrids.

Since my retirement in 1965, the work of polyploidizing and breeding daylilies, amaryllises, and orchids at home has been given all my time. My acre lot has long been filled, and good neighbors are letting me grow seedlings on their ground, and my 18′x60′ greenhouse contains enough plants to fill several. 1968 saw unusually good results with the daylilies, and the improvements in polyploidizing techniques worked out will give even more rapid advancement in coming years, we hope.

1968 HEMEROCALLIS REPORT

W. QUINN BUCK, *Chairman, Daylily Committee, American Plant Life Society*

The 1968 season emphasized strongly the importance of having established clumps for breeding daylilies, as well as showing the old problems of regional adaptability. Rather consistently the tetraploid clones from Dr. Traub set seed well on the established clumps and poorly on first-year plants. This year the clones from Dr. Peck bloomed beautifully but again proved poor parents, demonstrating that something still was not to their liking in our soil or climate.

The 1967 introductions from Brother Charles also showed the need for being better established. 'Loyal Subject' was almost an exception to this appraisal, doing best of all of them, and it did so much better in Bakersfield, in number of spikes and in number of pods set, that it raises the strong possibility that low night temperatures here might be to blame. Of the Fay varieties 'Mary Todd' set pods fairly well, and it was a beautiful flower, but it was not sunfast here. 'Golden Surrey' had no fringe on its first flowers, but on the redbloom spike when nights were warmer the fringe was there. Older clumps of Fay tetraploids were good seed parents, with the exception of 'Crestwood Lucy' and 'Crestwood Ann'. Each year 'Crestwood Lucy' will set a few pods here, but 'Crestwood Ann' will set none at all.

'Fair Annet' (Peck) and 'Bonnie Barbara Allen' (Peck) this year were quite beautiful in pink effect in the garden. 'Sir Patrick Spens' (Peck) had the best color of any red tetraploid yet seen, and it seemed almost as sunfast as the old reliable 'Bess Ross' (Claar) in our area. 'Fair Margaret' (Peck) and 'Queen Eleanor' (Peck) were melons of fine form.

Among the newer diploids 'Prairie Moonlight' (Marsh) was particularly outstanding as an established clump, and here it was not rivaled even by the wonderful creamy yellow 'Crystal Sunshine' (Bro. Charles). 'Prairie Melody' (Marsh) again this year was an especially beautiful pink. In the bright lavenders, 'Charlemagne' (Moldovan) had great color appeal, but it may be somewhat lacking in sunfastness in our area. 'Childscraft' (Childs) was most outstanding in both quality and form.

Among the miniature melons 'Little Rainbow', 'Toyland', and 'Cub Scout', all three from Bro. Charles, performed well. 'Little Darling' (Spalding), much branded, and 'Dreamlet' (Childs) were good pink miniatures. 'Little Wart' and 'Wanetta' from Miss Spalding have to stay as favorite lavender-purple miniatures that everybody should grow.

In the Buck garden the results from using treated plants were unusually good, and the clones offering greatest promise included 'Beauty Pageant' (Fay), 'Superfine' (Fay), 'Jewel Case' (Lester), 'Porcelain Dole' (Lester), 'Good Evening' (Wynne), 'Best of Luck' (Wynne), 'Eburnean' (Munson), 'Diamond Anniversary' (Childs), 'Childscraft' (Childs), 'Little Darling' (Spalding), and the beautifully colored

'Raspberry Frills' (Williamson). Many very fine combinations were obtained.

One of the outstanding events of the year was the publication of the *Daylily Handbook* by The American Hemerocallis Society and the American Horticultural Society, as a joint project. This *Handbook* is a most important new working tool for those interested in the *Hemerocallis*.

Fig. 1a. Henry van Woesik, President-Director, Ludwig & Co., in his business office.

TWO MONTHS' AMARYLLIS TRIP IN THE U. S. A.

HENRY VAN WOESIK, *President-Director*
Ludwig & Co., P. O. Box 18, Hillegom, Holland

GROWING AMARYLLIS IN THE OPEN

To study the matter on the spot I decided to visit with all the centers where Amaryllis are grown in the open on a fairly large scale, for which it is obviously too cold in Holland, where these semi-tropical bulbous plants only do well in hothouses equipped with a special heating system, so that even the soil has the ideal temperature.

I started my U. S. Amaryllis trip and lecture tour in Houston, Texas on May 12th 1968, subsequently calling at Corpus Christi, San Antonio, Austin, Beaumont, Baton Rouge, New Orleans, Hattiesburg, Mobile, Chickasaw, Panama City, Tampa, Sarasota, Fort Myers, Miami, Orlando, Jacksonville, Valdosta, Griffin, Greenwood, and Atlanta, after which I went northward, where Amaryllis are grown in much the same way as in Holland. A death in my family prevented me from finding time to see Amaryllis growing in California, Arizona and Oklahoma, which States I intend to visit in 1970.

Of course, I saw no end of Amaryllis grown in yards and gardens, but as some people easily bruise, I may not have been over-anxious to point out the mistakes made.

Let me first mention the positive side of the Amaryllis world in the States I visited:

THE POSITIVE SIDE

(a) The enthusiasm with which Amaryllis-fans grow Amaryllis in the open is overwhelming.

(b) Both men and women have green thumbs, by which I mean that they are ready to work for long hours to get the best results. In my opinion a nurseryman or woman with green thumbs is one that does not balk at working 14 hours a day.

(c) The Amaryllis-groups are found in almost any city and are well organized in Amaryllis Clubs or Garden Clubs and each member is supposed to do his or her share of work to rouse and stimulate interest in Amaryllis.

(d) They organize Amaryllis spring shows, where the most outstanding Amaryllis flowers are a treat to the eyes of the public at large, which cannot but popularize the Queen of Flowers.

(e) Growing methods are conscientiously studied at their monthly meetings, which is bound to improve them in the long run.

(f) At shows there is a fair competition for prizes, though this does not degenerate into prize-hunting, for participating is more important than winning prizes.

(g) They do everything to have people who are experts, speak at their meetings, resulting in lively and highly interesting discussions.

(h) Temperature in all the cities I visited was ideal to grow Amaryllis in the open, but though my fuel-bill is a regular nightmare here in Holland, there are also a good many disadvantages and drawbacks when Amaryllis are grown in the open, which I cannot help mentioning.

THE NEGATIVE SIDE

(a) Amaryllis-lovers are so enthusiastic that they refuse to remove Amaryllis that obviously suffer from Mozaic-virus. I was often impressed that some people did not know what Mozaic-virus was, in which case I explained the term and the phenomena to them, for Mozaic-virus can be detected easily enough by examining the foliage.

The worst of it is that the disease spreads like wild fire; there is a legend that one virus plant infests the other, but as legends are meant for the superstitious, I do not believe them and I am convinced that when an Amaryllis plant has contracted virus, the disease is spread by insects sucking juice from the foliage of a virus infested plant, then flying to another healthy plant, sucking its juice and spreading the disease in this way. Secondly the virus infested plant may contaminate the soil, so that future Amaryllis planted in the same spot may again be infested, for which reason we sterilize the soil in our hothouses every year before planting the bulbs.

Finally the virus will develop to such a degree that the foliage turns yellow with green spots, affecting also the flowers, so that it is not true what a good many Amaryllis-lovers assert that virus infested Amaryllis produce perfect and normal flowers.

(b) Though American Amaryllis-lovers do not grudge work, they should have their soil inspected by the American Plant Inspectors, when the results are not satisfactory.

They spend a good deal on fertilizing, which is no good; if they do not know what is wrong with the soil, any attempt to remedy it, will be a leap in the dark, unless they know the composition of the soil.

I have found in the States I visited, i.e. Texas, Louisiana, Alabama, Mississippi, Florida, Georgia, North and South Carolina, that generally speaking the pH (degree of acidity) of the soil is far too high (from 8 to 12), which should be reduced to somewhere between 6 and 7.

The alkalinity of the water in these States is also of great consequence, but if watering is done after 4 PM, the damage will be less than when one waters during the hottest part of the day, i.e. between 10 AM and 4 PM.

(c) The Amaryllis and Garden Clubs should bring home to their members that selfcrosses or "selves" lead inevitably to inbreeding, which is against nature, causing degeneration in the long run. Never cross one bulb of a variety with the pollen of another (or of the same bulb for that matter) bulb of the same variety.

(d) Amaryllis flowers for shows are always grown best in greenhouses, where watering is under control and where insects can easily be killed by spraying the plants with some disinfectant, which will prevent them from catching all kinds of diseases.

In principle I should be in favor of killing off as many insects as possible also in the open. Of course, if one's neighbor does not spray, it is of little avail, but nowadays everybody is struggling with insects, so why not do a thorough job, starting in the yard or garden?

(e) With the aid of several American Amaryllis growers who know their job I have drawn up planting and fertilizing directions. These are given in detail in another section of the present AMARYLLIS YEAR BOOK.

(f) Amaryllis shows are meant to popularize Amaryllis with the public at large; keen, but fair competition is all right, but prize-hunting

with unfair means will kill the enthusiasm in the local Amaryllis and Garden Clubs.

(g) Temperature in the open cannot be controlled, but the preparation of the beds could be done in accordance with the Planting and Fertilizing Directions.

Some people in Houston, Corpus Christi, San Antonio and many other cities have managed to grow one and the same bulb successfully for more than 15 years. Of course, fertilizing is necessary in this case, for when the bulb has done flowering, it feels like a sponge and should be restored to normal size, but if the soil of the bed is nutritious and has the correct pH, half the work is already done.

(h) Many Dutch bulbs start sweating in transit, due to a sudden change in temperature; they sometimes lose their roots and show reddish and brownish spots, called Red Neck disease or technically Stagonosphora.

Delay in delivery from the American port of entry to destination seems to be inevitable in some cases, though I am sure that such delays could be avoided when shipping agents were somewhat more conscientious, but the disease can easily be cured; on arrival the bulbs should be thoroughly cleaned, or rubbed clean with sand; and then applying Dura Dust (50% D D T) and putting them aside in a cool place for about 48 hours and letting them dry before planting. One New Orleans customer told me that bulbs suffering from Red Neck disease had been thoroughly cleaned by him, after which he put them under the water tap, washing away what little rot was left, drying them thoroughly before planting them, and his success was enormous.

I was glad to find that a good many people grew Amaryllis successfully, as they had found out most of these things themselves. I have admired beautiful lots of Amaryllis, entirely virus-free all over the States I visited, and I was really thrilled to find a married couple in Valdosta, Georgia, having thrown more than 4,000 Amaryllis on the scrapheap, turning over a new leaf, when they noticed that the bulbs were infested with Mozaic-virus; of course, they should have selected the lot a few years earlier, in which case they might have saved a fair percentage of the bulbs, but then it takes courage to admit a mistake and to take the necessary measures to correct it, especially if such measures cause a substantial loss of precious Amaryllis.

(i) When visiting Florida, I was welcomed by a hurricane (''Abbie''), and one day there was 15″ rain, which spelled ruin to a good many plants and bulbs including Amaryllis.

Heavy showers and torrents are nothing out of the common in areas where Amaryllis can be grown in the open; drainage is generally very poor. Why not plant the Amaryllis in beds, the tops of which are brought 4″ above the surrounding garden areas, so that there is sufficient drainage?

(j) I happened to spot aphis or aphids (plantlice or greenfly) in the yard of a well-known Florida Amaryllis grower, who was evidently

not much impressed when I drew his attention to this danger. I may point out to you here that aphis is very stubborn, once it has spread. Any insecticide will kill aphids, but then they have generally already laid eggs, which are not destroyed by spraying, so that the treatment should be repeated at least three times with a week's interval. As soon as you discover a wooly stuff on the foliage or between the leaves, you may be sure there are aphids, so start spraying, for aphids multiply more rapidly than rabbits.

Prevention is better than cure; five weeks after planting our Amaryllis we start spraying them for the first time with Parathion to kill all insects, including aphids, and we repeat the treatment four or five times with a fortnight's interval.

I know that in some areas in the U. S. A. you may not use Parathion *which is indeed very poisonous,* but then your dealer will know of an adequate substitute for Parathion.

Considering everything I am fairly optimistic as to successful Amaryllis growing in the open in the U. S. A. Mistakes are made, wherever work is done (and U. S. A. Amaryllis growers do a lot of work), whereas the average American Amaryllis-lover is eager to learn, so that his constant endeavors are bound to be attended with success.

A friend of mine in Corpus Christi expressed himself as follows: "I hope to hear you say in three to five years that your Amaryllis shipments to the States have doubled. This I know can be done, for the surface has hardly been scratched so far". Let us continue scratching the surface, for beauty, though a rare thing, can be created in your yard and garden with some effort and will give you much joy and satisfaction.

ALEK KORSAKOFF

An Autobiography

Our venerable Editor, Dr. Hamilton P. Traub, asked me to write something that would "do justice to (my) eventful and useful life." "Eventful" can be accepted, but "useful" is debatable.

My Odyssey (or would it be better to call it a Saga?—There may be a drop or two of Viking blood in my veins), if indulged in to the limit, would fill much more than one issue of the Yearbook.

CHILDHOOD, 1894—1910

As recorded officially, I was born twice—Febr. 17, 1894 (Julian Calendar), and March 1, 1894 (Gregorian Calendar). I inhaled the then almost unpolluted air in Porohovaia Sloboda, a suburb of the City of Kazan, on the Volga River. There I spent all my time until 1913. My native town is located several miles from Kazan, and included then the military post guarding the Porohovoi Zavod (Gunpowder Plant)

and housing facilities for thousands of employees, including my father. Primeaval forests surrounded it and the Powder Works.

In 1903, at the age of 9, I entered grammar school; finishing it in 1906. I then attended the City School, somewhat equivalent to Junior High School. My father had passed away, and mother was not able to enforce my taking French and German (languages being elective). In 1910, I graduated, second in the class minus languages. "The elbow is very close but try and bite it."

CALM BEFORE THE STORM, 1910—1915

I was first employed as a messenger boy in the Powder Plant and shortly after moved to the Plant Chemical Laboratory. When my eyes started bothering me, the doctor advised me to quit the Laboratory. With the recommendations of the Plant officials, I entered the provincial branch of the Church Synod with the first rank of a Civil Service Officer. I did not like the gloomy office and church squabbles and decided to be a Medical Doctor (M. D.) Having insufficient education to enter University, from the "front", I laid plans to storm it from the "rear". Obtaining tutoring in Latin, I passed the examinations, and was ready for a pharmaceutical ladder to doctorship.

The time came when I must leave my forest and floodlands of the Volga—flower gathering in spring time for the market; gathering mushrooms in summer for mother's lay-a-way; nutting in the fall (the best nuts being stolen from the squirrels); fishing in the Volga for sterlet and carp in forest lakes; catching birds in winter. . . .

I can never forget my first and only flight so far. Carefully placed crow's eggs in my pocket, I started down from the nest and went faster than planned—there I was hanging by what was left of my pants, about 12 feet from the ground on a stub of a broken limb. I have had no recollection of the passage of about 30 feet between the nest and the saving stub, then or have now. However, I came down whole excepting for the pants. Don't ask about the eggs.

No more winter skiing over the woods and fields, tracking foxes, snaring hares, meeting moose; no more bringing home in early spring wild roses, Mountain Ash, Weeping Birch to plant alongside Mother's lilacs, raspberries, gooseberries, etc. No more expecting another winter when sparrows, flying from under eaves, would fall frozen; or one with a warm spell that would gloss everything during rain around Christmas time.

In 1913, I found myself in northern Caucasus on the shores of the Kuban River as an apprentice pharmacist in a drug store. The vegetation was different; fishing was different. All else was different—peach and apricot orchards acre after acre; miles upon miles of sunflower fields harboring wolves; grapes and wine, and no woods at all.

Two years passed, I was back in Kazan to enter the University with courses leading to assistant pharmacist's grade on the "ladder".

Fig. 2. Aleksey Stepanovich Sosipatrov-Kuznetzov (later John Karl Johnson and Alek Korsakoff) in the field uniform of the Russian Imperial Army before 1917.

THE STORM, 1915—1920

Mobilization! September 8, 1915, in the Army! By September 12th in Samara in the 102nd Reserve Infantry. March of 1916 found me in the Military School, the same one that allowed my Sokal Athletic Club the use of its gymnasium. June 15, 1916, I was commissioned an Ensign in the Russian Imperial Army. I was left in the school as assistant instructor for the next class. In October, I was ordered to the Noncom School of the 164th Reserve Infantry. Back in my woods again! There the Revolution caught up with me. The day the regiment mutinied every single officer fled the Regiment environs except myself. I was trapped in the barracks of the school.

Before the actual revolt in my regiment, all live ammunition was brought to the school. The fact being that no one likes noncoms, my charges were as badly off as myself. We decided to stay put and let it be known that any one appearing in the open space around our barracks would be shot on sight. We posted sentries at every door and window, and waited to see what would happen next. Night came bright, the snow was white, and there was no attempt to set our barracks on fire.

Morning came, everything was quiet. About noon, every one who did not desert elsewhere got hungry. The quartermaster in the City refused to issue anything without requisitions signed by a commissioned officer. There was a meeting with the result that I was a Regimental Commander for two whole days!

By September 1917, I was in the trenches at the front in Poland, a member of the 30th Siberian Sharpshooters Regiment. To break the trench monotony in October, I volunteered for the Strike Battalion of Death of the 8th Siberian Sharpshooters Division. Once I was slightly gassed, once I had a bullet make a hole in my hat; another time one passed through my coat. Many "pinged" around my head but the only scratch I acquired was when I fell head first, one dark night, in a trench.

Attaining by that time the rank of Staff Captain, I and my orderly, I in disguise, deserted December 2nd, 1917. He went home, I planned by some chance to get to France and the Russian forces still fighting there. On the 10th of December, my sister being dead, I bid my mother Good Bye . . . for the last time.

In Siberia, I got in a scrap with the train commissar. He stopped the train, a kangaroo court was set to try me—the proposed punishment, putting me under the train, was about to be accepted when my orderly, a real "dyed in the wool" Sibiriak (Siberian) started talking. A new commissar was chosen and the train chugged on. My orderly begged me to go to his father's farm. Time came for him to change trains, we parted. . . .

On the 31st of December, I was in Harbin, Manchuria, and at the U. S. Consulate was refused crossing America on the way to France. There was no work to be found, and I had plenty of time to visit all

parks, cemeteries, and City nursery, which were well provided with vegetation, all new to me. When my money was dangerously low, I had only three or four decent meals in a week. Fortune smiled on me on April 17, 1918. I was employed as a Laborant in the Pharmaceutical Department of the Chinese Eastern Railway's hospital. Fall found me as a YMCA Physical Director in one of the High Schools. My first contact with America.

Fig. 3. John Karl Johnson (born Aleksey Stepanovich Sosipatrov-Kuznetzov) in the U. S. Army, 1920-1921, Manila, Philippine Islands.

In March 1919, Kolchak arrived, and I was in the Army again. When the Allies came to Siberia, I was assigned as a liaison officer to an American detachment guarding a stretch of the Far Eastern Railroad. When on patrols, I paid more attention to vegetation than anything else, although one time crossing a creek, the lieutenant in charge, and myself found gold flakes in the sand.

FROM MANILA TO AMERICA, 1920—1922

On February 15, 1920, Co. E. 31st Infantry, packed me in the hull of the S. S. Great Northern, and on the 24th I arrived in Manila.

In a few days, the F. B. I. was scouring town for a Russian; on March 18th, a native son from the "Windy City", named John Karl Johnson, became Pvt. of Co. E. 31st Infantry, U.S.A., and there was no Russian "any more."

Everywhere were tropical trees, shrubs, vines, flowers; and sugar cane, and tomatoes. All the fruits. Days, weeks, two years roaming the environs of Manila in the bamboo forests watching iguanas, in 10 to 12 feet deep cool and moist gullies full of Java sparrows and some of the tiniest birds flitting around. The king of all fruits, the Mango by the bushel.

At the end of 1920, John Karl Johnson decided that he had picked up enough English to be able to stand on his own two hind "laigs", and after a trip to Peking, China, to enjoy the swallow nests, and best ever glazed sweet potatoes, he left his Co. E friends. On January 20, 1921, he became a pharmacist in the Sternberg General Hospital dispensary in Manila, but just for a few days. Soon he found himself in the hospital medical supply room, where the Sarge in charge in a few months left the inventory in almost his sole hands.

THE HAVEN OR "HOME" AT LAST—1922 TO PRESENT TIME

In March 1922, the "native son" left the oleanders, and Night-blooming Jasmine, *Cestrum nocturnum,* in full bloom and started "back" to the good old U. S. A. and Chicago. Hawaii passed by, and by April 3, John K. was on the Angel Island in San Francisco Bay surrounded by giant Eucalyptus trees, and the most virulent poison ivy, gazing on beautiful Alcatraz. After April 29, my home, sweet home was Camp Lewis for the rest of my army life. There, as a Room Orderly, I had the most enjoyable days roaming the surrounding woods, berrying in time, appling in time in abandoned orchards; flushing pheasants. . . .

I was discharged on March 16, 1923, naturalized on the 26th. The judge, after hearing my name, Aleksey Stepanovich Sosipatrov-Kuznetzov, said: "Sayitagain." I did. Said he, "with a name like that, you will have no chance at all." "Think of something simple and short," he continued. Said I, "Aleksey Stepanovich Korsakoff, the last name of my uncle." Well, the musician, all right; but let's drop the "Stepanovich" and cut off "sey" from "Aleksey", was his come-back. So Alek Korsakoff was born; but not smart Alec, but Alek. This is the fifth and final name that I have been masquerading under since leaving my childhood home in Russia.

First I worked for construction and lumber companies, and then in October joined the American Legion, and entered the College of Forestry, University of Washington in Seattle on probation due to no papers of previous schooling. However, at the end of the second quarter, it was

agreed that seven years in Russian schools was sufficient, and I became a regular student.

Then followed work in the Forest Service, in the Rainier National Forest in summer, and afterwards Malmo Nurseries in Seattle. About this time the marital troubles of my aunt's adopted daughter, Elena Korsakova, and my childhood playmate, came to a climax. She was divorced. My mother was dead, and she was the only link with the childhood days. "Want to marry me? This is the only way I can bring you to America." "I will" was the reply. No more college for me.

Fig. 4. Alek Korsakoff (born Aleksey Stepanovich Sosipatrov-Kuznetzov), the amaryllid enthusiast, among some of his favorites in Florida.

Closer to the Atlantic. In October of 1925 I worked for the Carolina Flower Store, Charleston, S. C., then Washington, D. C., and passport, visas and New York in December. Bronx and the New York Botanical Garden, Central Park and the Zoo.

On January 20, 1926, I was married and had a fine four-year son in the bargain. Barely enough money for the honeymoon—Germany, Holland, France, Spain, Cuba.

On June 7, we were in Miami. In a few days my wife started working as a dishwasher in a restuarant on June 14, temporarily until we got settled; on June 14th I was employed in the City Nursery. In July 1927, I was practically in full charge of the Miami City Cemetery as a caretaker. The Cemetery Sexton was in charge of the Bayfront Park, and spent his time there. Later, I became the Sexton and stayed there until retirement in 1962.

During my time the 10 acres of Cemetery grounds became a Botanical attraction, second in Miami only to Chapman Field, the Government Plant Introduction Station. Botanists visited the Cemetery, the College of Forestry, University of Miami, used it for field studies. Dr. Small's (N. Y. Botanical Garden) seed of *Platanus orientalis,* collected in Manhattan, grew well, and Dr. Small never missed a visit when in the vicinity. Dr. Fairchild and I exchanged visits, he to the Cemetery, and I to the Campong, his home. Then the Fairchild Tropical Garden was founded, and the Cemetery was forgotten.

During the late twenties and early thirties, a group known among themselves as Floragoofs often met and had discussions and arguments. Participating were Dr. Swingle, Sr., Dr. Buswell, Dr. Alexander; sometimes they were joined by Dr. Gifford and Mr. Johnny Lynch. The botanists had the interest and the knowledge, I had interest also, ten acres to plant in, unabated desire to watch development and always ready to report. As time passed and many of the Floragoofs passed on to better hunting grounds, my interest in trees, shrubs and vines diminished. The Cemetery was full of maturing and even aging plants, but in the yard there was ample room under the two Avocados, a Rose Apple tree, an Egg Fruit tree, a Sugar Apple and the Sour Sap. By and by my interest turned to smaller things—succulents and a few cacti, then Bromeliads, and Lo! *Amaryllids.*

In 1956, Mrs. Clint sent me a dozen or so species of *Zephyranthes* collected in Texas and Mexico. Since then I am a Rain Lily Goof, or rather, a Zephfan. In addition to a few *Amaryllis* species and other amaryllids, there are also miniature Gingers and a few things in other families. I enjoy 24 accessions in *Habranthus,* species and hybrids; two *Pyrolirions,* two *Sydneyas,* 159 *Zephyranthes,* species and hybrids. These include at present more than 50 of my own crosses. God is good! Praise be to Him!

After naturalization, my wife "Ellen" died in 1962. After 36 happy years, I was left alone. Her boy, my adopted son, is married and lives in New Jersey. Now I had only my plants to worry about, I retired. Later, through correspondence dealing with Amaryllids, I got acquainted with my present wife, Mrs. Meta M. Samples and we were married in 1964. I am afraid she is more a Floragoof than I. Her present interests are *Amaryllis* species and hybrids, Amaryllids and Orchid Cacti. So we have our squabbles. Our 18′x60′ greenhouse is divided. I rule one half, she the other. The other smaller one is wholly hers. She rules the yard with beds of *Amaryllis, Lycoris,* Rhodophialas and what not. God is good! Praise be to Him.

HERBERT MEDAL PRESENTATION TO DR. ROBERT P. KAHN

In a ceremony at the annual dinner of the Potomac Branch of the American Phytopathological Society, Dr. Wilbur D. McClellan, Assistant Director of the Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture, presented the 1968 WILLIAM HERBERT MEDAL to Dr. Robert P. Kahn, March 27, 1968, on behalf of the American Plant Life Society (Fig. 6.).

Fig. 6. Dr. Robert P. Kahn (left), virologist of the Plant Quarantine Division, A. R. S., U. S. D. A., receiving the 1968 William Herbert Medal from Dr. Wilbur D. McClellan, Assistant Director of the Crops Research Division, A. R. S., U. S. D. A., on behalf of The American Plant Life Society.

EDITOR'S MAIL BAG

Mrs. Marei Splinter (Mrs. A. C. Splinter), Zelgliweg, Maniken, Zurich, Switzerland, writes under date of June 23, 1968, that her husband, A. C. Splinter passed away a year ago, and that he kept up his interest in the amaryllids to the end. His many friends in the United States will greatly miss him.

EDITOR'S MAIL BAG—continued on page 32.

1. REGIONAL ACTIVITY AND EXHIBITIONS

THE 1968 OFFICIAL AMARYLLIS SHOWS

The Amaryllis shows began on April 6—7 with the Official Men's Amaryllis Club of New Orleans Show with horticulture exhibits; including arrangements exhibits sponsored by the Garden Circle Amaryllis Club of New Orleans. Then followed the Official Houston Amaryllis Society Show, on April 20; the First Official Amaryllis Show sponsored by the Amaryllis Society of Baton Rouge, Louisiana, on April 21; the Official Coastal Bend Amaryllis Society Show, on April 27—28; the Official Amaryllis Show sponsored by the Amaryllis and Hemerocallis Society of Southern California, also on April 27—28; and the Official Greater Houston Amaryllis Show, on April 28.

The Official Hattiesburg (Miss.) Amaryllis Society Show had to be canceled due to inclement weather. The Hattiesburg members and the American Amaryllis Society mourn the death of Mrs. William H. Sparrow, who died on April 25, 1968. Mrs. Sparrow had been active in staging the local shows. No report has been received of any show at Mobile in 1968.

1968 OFFICIAL AMARYLLIS SHOW OF NEW ORLEANS

JAMES E. MAHAN, *3028 Palmyra Street, New Orleans, La. 70119*

The Official Amaryllis Show of New Orleans was held on April 6 and 7, 1968 at the Edward Hynes School on Harrison Avenue and represented the combined efforts of the Men's Amaryllis Club of New Orleans, Inc. and the Garden Circle Amaryllis Club. The horticulture section was sponsored by the Men's Club and the artistic arrangements by the Garden Circle Club. This was the first time that these two clubs had joined forces to stage a very well received show.

In the artistic design division the Tri-color was won by Mrs. W. H. Lake, and in the creativity division Mrs. John A. Hennessey took the honors. Both presented very striking arrangements.

The horticulture section attracted many entries with the following trophies being awarded: Mrs. F. J. Cuquet, Sr., the W. R. Latapie trophy for the best registered, named specimen and also the Ludwig challenge cup; Mr. Lester L. Laine the Norman Clements trophy for the best un-named and unregistered specimen; and Mr. Milo C. Virgin the Reuter Seed Co. trophy, the James Mahan trophy, and the Swetman Amaryllis Garden trophy, all sweepstakes awards. American Plant Life Society Awards of Merit went to Mrs. E. J. Cuquet, Sr. and Mr. W. J. Perrin; Preliminary Commendation Awards to Messrs. Milo C. Virgin, Lester L. Laine and W. A. McCollum.

Good weather contributed toward a fine turnout in the way of show entrants as well as visitors, not only from New Orleans but from the

surrounding areas as well. The numerous compliments from the visitors were very heart-warming and made all feel determined to put forth an even greater effort for the following year's show.

OFFICIAL HOUSTON AMARYLLIS SOCIETY SHOW, 1968

Mrs. A. C. Pickard, *Show Standards Chairman, 1702 North Blvd., Houston, Texas 77006*

The Houston Amaryllis Society Official Show staged under the standards of the American Amaryllis Society at the Garden Center in Houston, Texas, April 20, 1968 was a perfect fulfillment of the theme "Amaryllis, Queen of the Spring".

The consensus of the overflowing crowd was that an excellent Amaryllis show of garden grown specimens can be beautiful in spite of the abnormality of a cool spring.

One of the main attractions of the show was the Artistic Section in which the theme of the show was appropriately carried out.

The educational Exhibit on methods of propagation of Amaryllis included all stages of growth from seeds to the mature clone.

A special table on Conservation with informative information was well received.

The Junior Section received the Junior Achievement Award in the Educational Division as well as blue ribbons and trophies for cut Amaryllis specimens.

The Society has enjoyed a long span of productive years and its basic functions have remained constant. The ingredients which went into its foundation account for much of its accomplishments.

In the Horticulture Section the following received the highest A. M. and H. A. S. Trophies:

'Apple Blossom' (Lud.) cut Specimen, R.A.422 D.5.A.—A.M. Mrs. L. E. Morgan.

'Prince of Orange' (Warm.) cut Specimen R.A.506 D.5.A.—A.M. Mrs. Tracy T. Word.

'Bellina' (Lud.) pot plant R.A.856 D.5.A.—A.M. & Ludwig Challenge Cup. Mrs. L. E. Morgan.

Miniature (Lud.) 'Fire Fly' R.A.469 D.8.A.M.—Mrs. John Baird.

Breeders Class-Dutch Seedling P.C.—Dr. E. M. Yeats.

Breeders Class-American Seedling—P.C. Dr. E. M. Yeats.

Non-Competitive 'Doris Lilian' (Lud.) R.A.431 D.5.2.—Mrs. Leon Cox.

Non-Competitive - American Hybrid - non-registered D.9.—Mrs. Richard June.

Sweepstakes-awarded to H. A. S. Member—Mrs. Tracy T. Word.

AMARYLLIS SOCIETY OF BATON ROUGE OFFICIAL SHOW, 1968

FRED J. BUCHMANN, *Show Chairman,*
1766 Avondale Dr., Baton Rouge, La. 70808

The Amaryllis Society of Baton Rouge held its first official show on April 21, 1968. At this time of year, greenhouse plants have nearly finished blooming here and outdoors plants are nearing their peak bloom. This was in keeping with the philosophy that for a first show it would be better to have a reasonably large number of specimens including cut scapes from outdoors rather than a lesser number of potted, greenhouse plants. This objective was achieved in the competitive horticulture sections with a total of about 140 scapes having at least three florets, about 50 of which were potted plants. Ten very artistic arrangements, each containing at least one Amaryllis floret, were contributed by ladies representing a number of local garden clubs. In addition, about 35 single florets, including several in the double division (D-7), were on exhibit and a massed display at floor level of about 70 additional scapes added to the color of the occasion.

In competitive horticulture, six certified judges awarded 86 ribbons: 28 first, 17 second, 23 third and 18 honorable mention. Individual awards were made as follows: Best, potted, registered flower in Division 5, the Ludwig challenge cup and an American Plant Life Society Award of Merit went to Al Diermayer for 'Beautiful Lady.' In the Division 5 competition a close second and an Award of Merit went to J. T. Schmidt for 'Fairyland.' Winner of the best small flower award was B. A. Tower for a potted plant of *A. evansiae.* Mrs. T. K. McKnight received a green ribbon for the best single floret, an unregistered, very greenish white; and Mrs. Jack Welch won the top award in the arrangements for her entry in "Amaryllis on Parade." Three unregistered seedlings in Division 5 received American Plant Life Society Preliminary Commendation awards, two grown by Al Diermayer and one by Clarence J. Crochet. Both sweepstakes awards for most blue ribbons for potted plants and also for cut scapes were won by Clarence J. Crochet.

We were also fortunate to have an outstanding exhibit of more than 60 beautiful flowering orchids by the Baton Rouge Orchid Society and these added significantly to the show.

While we feel that some improvements can be made at our next show, we believe our first show was a very worthwhile event.

CORPUS CHRISTI OFFICIAL AMARYLLIS SHOW, 1968

Mrs. Carl C. Henny, *Vice-President,*
P. O. Box 3054, Corpus Christi, Texas 78404

The Coastal Bend Amaryllis Society held its ninth annual Amaryllis Exhibit in conjunction with the Lola Forrester Flower Show which was held in the City Coliseum for the first time, on April 27th and 28th, 1968. The Texas Garden Clubs, Inc. Convention was held here during March 27th and 28th, so we were really late this year. However, we were very fortunate in having sixty-two entries for judging after all.

Fig. 7. Mrs. R. A. Hornberger, winner of the Ludwig Challenge Cup at the Official Corpus Christi Amaryllis Show, 1968.

Among the pot-grown Registered Leopoldii Type Amaryllis exhibited were: 'Apple Blossom', 'Daintiness', 'Picotee Petticoat', 'Golden Trumphetor', 'Day Dream', 'Fantasy', 'Royal Dutch', and 'Marion'. The Garden Grown Registered Leopoldii Type included 'Apple Blossom', 'Prima Donna', 'Pink Favorite', 'Winter Carnival', 'Indian Orange', 'United Nations', 'Picotee Square Dance', 'Candy Cane', 'Ludwig Dazzler', 'White Giant', 'Maria Goretti', and 'Royal Dutch'.

Mrs. R. A. Hornberger received 97 points on her pot-grown 'Picotee Petticoat' and was awarded the Ludwig Challenge Trophy for the second time (see Fig. 7). She also received the Judges Award of Merit and the American Plant Life Award of Merit for this lovely specimen plant. She also received a blue ribbon on her entry of 'Daintiness'.

Mr. R. L. Retallack received a "Special Trophy" awarded him for his entry in the "Breeder's Class". Mrs. Bill M. Miller, a non-member, received a "Special Trophy" for her entry of 'Winter Carnival', in the Registered Garden Grown Leopoldii Type.

Mrs. Carl Henny received blue ribbons on her entries of 'Picotee Square Dance' and 'United Nations'. She was also awarded the American Plant Life Award of Merit for 'Picotee Square Dance' which scored 95 points. American Plant Life Awards of Merit were also awarded to Mrs. Robert B. Arnold for her entry of 'Firefly' which scored 96 points, and to Mrs. Levi Materne for her entry of a Belladonna which scored 95 points.

Other blue ribbon winners were Miss Winnie Joiner, for her entry of 'Apple Blossom', which scored 94 points; and to Mr. Richard Blucher in the Breeder's Class, which scored 94 points also. Mr. W. M. Neyland was awarded a blue ribbon on his 'Golden Trumphetor' entry and also a blue ribbon in the "Breeder's Class".

Three Accredited National Amaryllis Judges from San Antonio, Texas, Mrs. E. T. Story, Mrs. Larry Miller and Mrs. R. H. Parkinson judged our Exhibit.

1968 SOUTHERN CALIFORNIA OFFICIAL AMARYLLIS SHOW

Joe Werling, *Show Chairman,*
5139 Hermosa Avenue, Los Angeles, California 90041

As usual with our shows in Southern California we have many anxious days preceding our events wondering if we could collect enough exhibition flowers. Our Fourth Annual Show, "Amaryllis-Spring Fantasy" was held on April 27 and 28 at the Los Angeles State and County Arboretum, 301 N. Baldwin Avenue, Arcadia, California. [Fig. 8]

It has been our purpose to encourage the growing of amaryllis in the garden. Much effort is expended by our members to put on a show that will create this interest. We have found this to be rewarding as we note that each year an increasing amount of visitors see our show. As indicated by the multitude of inquiries, the garden enthusiasts are setting aside a choice spot in their garden for these sparkling, pastoral sweethearts of their garden.

Our exhibit entries were comprised mostly of cut scapes. There were sufficient entries of greenhouse pot-grown plants, especially the miniatures and species that added that extra interest.

The awards were as follows: SWEEPSTAKES—Cecil Houdyshel Memorial Trophy (for the most blue ribbons)—Mrs. Bert Williams, So. San Gabriel; RUNNERUP SWEEPSTAKES—Southern California Hemerocallis and Amaryllis Society Award—W. Quinn Buck, Arcadia; BEST NAMED DUTCH (other than Ludwig) 'Orion',—Mrs. Flores Foster, Long Beach; BEST GRACILIS—Joe Werling Award—Mrs.

Bert Williams, So. San Gabriel; BEST SEEDLING—Chairman's Award—Mrs. Eva Turnquist, So. San Gabriel; BEST SEEDLING—Runnerup—Mrs. Kenneth Anderson, La Canada; MOST BLUE RIBBONS in Divisions 2, 3, 6, 7 and 8—Hayes Award—Mrs. Bert Williams, So. San Gabriel; POPULARITY POLL—President's Award—'Golden Triumphator', Mrs. Flores Foster, Long Beach.

Others winning American Amaryllis Society Ribbons were, I. K. Rosoff, S. S. Harshbarger, J. Moramarco, I. L. Doran, C. D. Cothron Duncan Eader.

Fig. 8. Southern California Official Amaryllis Show, 1968, Arcadia, Calif. **Upper,** part of exhibits; **Lower,** trophies awarded. Photo by Jack McCaskill.

Southern California Hemerocallis and Amaryllis Society Special Ribbons—Mrs. Marie Turner, A. E. Angell, J. Moramarco.

Outstanding Flowers—'Courtesy', 'Amazon', 'Ludwig's It', 'New Orleans', 'Symphony', 'Pink Beauty', 'Rembrandt', 'Elvira Armayo', 'Orion', 'Golden Triumphator' and the seedlings.

The Judges were: Mrs. Kenneth B. Anderson, Mr. Quinn Buck, Mr. Roger Fesmire, Mr. Jack McCaskill and Mrs. Bert Williams.

Individual gardens were only open to Southern California Hemerocallis and Amaryllis Society members to compare notes on their hybrids, species and seedlings.

The success of any amaryllis show is also dependent on those who contribute flowers for the non-competitive section. To mention a few who have been so generous, we list the following:

Mr. E. A. Angell of Loma Linda, Calif., has been hybridizing for 27 years (see article on page 67, 1964 Plant Life). He has supplied flowers for all of the shows but in the very near future he plans to curtail the number of bulbs he now is growing, as Mr. Angell no longer has the time to continue with so many plants.

Mr. Bruce Claflin of Upland, California, grows Iris and Gerberas in addition to amaryllis. His first showing of amaryllis was in the 1968 Show. His growing grounds are much higher and colder than the majority of our gardens. His flowers are usually not in bloom in time for our shows, but this year, due to a warmer spring, he exhibited some fine seedling blossoms.

Mr. John A. Moramarco of Fontana, California, is a newcomer in amaryllis growing. He is fond of the Angell strain because of the hardiness. He plans to hybridize and improve this strain within itself.

Mr. Walter Horsey of Temple City, California has contributed hundreds of flowers for added color on our exhibition tables. His passing soon after our last show saddened the hearts of many of his friends in the amaryllis world. We are indebted to him for his many fine contributions.

Marie Turner of Temple City has probably grown amaryllis in the open ground in California longer than any living grower. Please note page 59 under other California Breeders in the Amaryllis Manual. She has been a constant supplier for our shows, and we can remember a green seedling of her's that was the hit of the show.

GREATER HOUSTON OFFICIAL AMARYLLIS SHOW, 1968

Mrs. Sally Fox, *1527 Castle Court, Houston, Texas 77006*

A veritable parade of color greeted visitors to the Greater Houston Amaryllis Club's fifth official show, held in conjunction with the Mens Garden Club Spring Show at the Garden Center on Sunday, April 28, 1968. [Fig. 9]

This was a good growing year for amaryllis, and you name it and you saw it! There were well over a hundred specimens, including the pure white (most popular) and the very delicate pastel shades of pinks into deep rose, salmons and on into the various shades of blazing reds to almost black red. Of course, the bi-colors were not passed by easily as they too drew much favorable comment from the guests.

The trophy table was heavy with beautiful, much sought after, silver prizes. Awards were presented as follows: Mrs. R. A. Fawcett—Ludwig Trophy for potted specimen 'Ludwig's It'. Mrs. Glen Melton—Silver covered dish for Ludwig's 'Sparkling Gem'. Mrs. Chas. Pease—Silver plate for American Meade potted specimen. Mr. E. Joe Pruitt—Silver shell for Dutch seedling. Mr. Kermit L. Warnasch—

Wagner silver tray for Sweepstakes. Mrs. Chas. Pease—Rosette for Sprekelia, ''Other Member of Amaryllid Family''.

Fig. 9. Greater Houston Amaryllis Club Official Show, 1968. **Upper left,** Mrs. Glen Melton, trophy winner in Miniature Division with 'Sparkling Gem'. **Upper right,** Mrs. R. A. Fawcett, Ludwig Trophy winner with 'Ludwig's It'. **Lower left,** Mr. E. Joe Pruitt, winner with Dutch seedling. **Lower right,** Mrs. R. A. Fawcett, Ludwig Trophy winner with potted specimen of 'Ludwig's It', and Mr. Kermit L. Warnasch, sweepstakes winner.

Arrangements featuring amaryllis were at vantage spots, and added much beauty to the show.

The educational exhibit, which clearly showed the visitors what can be done in this area with amaryllis was a point of much interest, with many questions asked of Mrs. Chas. H. Pease, who was most gracious in giving good growing hints.

Even though it takes from eighteen months to sometimes almost three years to produce a blooming size bulb you can bet a few visiting gardeners who have never tried their hand at hybridizing will do so after viewing the many ribbons presented for seedlings—the result of our own crossings, then growing the seed to mature bulbs. The American Plant Life Society is most interested in these novice hybridizers, and to encourage them further prepared Awards of Commendation which were presented for the best seedlings in the show. There were twenty-two ribbons awarded in this division, which clearly indicates what good results have been achieved.

These bold blooms naturally attract the growers of the Mens Garden Club, in which Mr. Kermit L. Warnasch is an active member and keen competitor. He shared his entries between the two shows; and in the Mens Garden Club show won the coveted Ludwig Trophy with a cut specimen of Ludwig's 'Maria Goretti', a beautiful white amaryllis. The men's division had quite a number of amaryllis and along with their usual extraordinary displays of horticulture and arrangements produced a great show.

Those who attended this joint show had the pleasure of an afternoon long to be remembered.

HENRY VAN WOESIK, A GUEST SPEAKER AT HATTIESBURG

Mrs. Loyd Bond, *Hattiesburg, Miss.*

Mr. Henry van Woesik of Ludwig and Company, Hillegom, Holland, was the guest speaker at the meeting of the Hattiesburg Amaryllis Society, May 29th at the home of Mr. and Mrs. Sam Forbert, 1910 Evergreen Lane.

Mr. Woesik is manager and controlling partner of Ludwig and Company, which is the world's largest grower and exporter of Amaryllis bulbs. Mr. Woesik, who is visiting his customers while lecturing, made Hattiesburg his only stop in Mississippi. Luther N. Davis introduced the speaker, who showed color slides of his plant nurseries and of many Holland gardens. This year Ludwig and Company added four new hybrids to their list: 'Marble Arch', an apple blossom colored clone; 'Moulin Rouge', an improved and darker Royal Dutch; 'Salmon Tower', a salmon color, which is the largest Amaryllis with the tallest stem. He stated that 'Gipsy Giant' is being offered again this season.

Previously, Commissioner Walter Parker greeted Mr. Woesik at the airport and presented the guest with an honorary Hattiesburg citizenship.

The welcoming committee which met Mr. Woesik at the airport included Mr. and Mrs. Sam Forbert, Mr. and Mrs. Davis, Mrs. R. A.

Fowler and Mrs. Katie Jackson. Members of the society and their guests had a buffet supper Al Fresco style. There were seventy-five amaryllis enthusiasts in attendance, including visitors from Columbia, Yazoo City, Jackson, Taylorsville, in Mississippi and Detroit, Michigan.

CATALOGS RECEIVED

HYBRID AMARYLLIS CATALOG, season 1968-69, Robert D. Goedert, P. O. Box 6534, Jacksonville, Fla. 32205. (A) Hybrid Amaryllis Seed, 1968-69; (B) Imported large-flowering Amaryllis, including Dutch Hybrids, South African grown Hybrids, and Harrison's Hybrids.

LUDWIG AMARYLLIS (18th EDITION), Ludwig & Co,m P. O. Box 18, Hillegom, Holland (received August 7, 1968); 32 pages and cover; profusely illustrated in color; listing current offerings of hybrid named registered Hybrid Amaryllis clones and *Cyrtanthus purpureus* (syn.-Vallota *speciosa*).

UNIVERSITY HILLS NURSERY, 1968-69 CATALOG, Claude W. Davis, 470 Delgado Drive, Baton Rouge, Louisiana 70808.

AMARYLLIS JUDGES CERTIFICATES

Since the last report in the 1968 Amaryllis Year Book (page 31), the following numbered Amaryllis Judges Certificates have been issued by the American Amaryllis Society: 170. Mrs. John B. Baird, 6 Westlane, Houston, Tex. 77019 (Horticulture only). 171. Mrs. Wm. T. Danes, 15421 Lakeview Drive, Houston, Tex. 77040 (Horticulture only).

EDITOR'S MAIL BAG—continued from page 22.

The new address of Mr. Sydney Percy-Lancaster is now *36/2 Cantonment Road, Lucknow, India.* He writes under date of August 6, 1968: "It is some time since I wrote you last. I was compelled to give up my job with the Indian Botanic Garden owing to damp quarters which had brought on an attack of arthritis. I went back to Lucknow hoping to 'vegetate' for I am 84 and not as vigorous as I would like to be. Unfortunately I came into a very hot period and got heat stroke. I then rushed up to Kasauli, a hill station near Simla, but the elevation was too high for me in my condition—it is a little more than 6000 ft.—and I developed an unbalanced state that caused me to fall for apparently no rhyme or reason. I had to remain till the monsoon broke on the plains and reduced the heat of summer. I went down by early July, and felt better immediately, then after a stay for a month in Delhi I came on to Lucknow. I am feeling much better and except for the trouble at night fall when I must have support, I am well again. . . . I don't think I will go to 'work' any more but just carry on taking things easy. . . ."

Prof. Penrith B. Goff writes under date of Aug. 26, 1968, that he has assumed duties in the Department of Romance and Germanic Languages in the College of Liberal Arts at Wayne State University, Detroit, Michigan 48202.

2. LINEAGICS

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

PLANT EXPLORATION TRIPS IN ARGENTINA

Carlos Gomez Ruppel, *Mendoza, Argentina*

I. WINTER TRIP, JULY & AUGUST, 1967

This current trip which included west, central and northeastern Argentina was my longest one and also the most productive that I have ever taken because of the material which was collected and the fine people whom I met.

Leaving Mendoza by "Belgrano" railroad on 16th July at 11:30 P.M., I reached "Dean Funes", Cordoba, near "Santiago del Estero" border at 7 P.M. the next day. There I spent the following two days going up and down the border and all the while making inquiries for *A. parodii* as this is the "home" area of the species. But unfortunately I found only two big bulbs one of which weighed a full pound. At this time, the species is dormant but I plan to be there again next December, when I have been told that *A. parodii* is in full bloom everywhere by the thousands!

From thence I went to Tucuman for two days and entered into Salta city which latter town was unknown to me and the many flowering plants growing in this area really surprised me. There, luckily, I met Mr. Filiberto Yanello, a young gentleman, who became a good friend of mine, and who, I hope, will be of great help in the searching out of the species which may be found in the wilds. Further, we did take two good trips together and in one trip, he took me about 40 kms. (about 25 miles from Salta into the "Camino Viejo de Tucuman" (Old Road to Tucuman) where we found a good crop of bulbs, especially, of a big *Amaryllis* species which I was told is pink and white, and another one which is a white scented *Rhodophiala* species. Both of these may be new to Science. In what may be a very promising trip during the next Amaryllis blooming season, we plan to go to "Amaicha del Valle" and to "Santa Maria" in Tucuman where apparently grow *A. Aglaiae, "red cochuna", A. immaculata, A. tucumana* and some others. After spending this week in Salta, journeyed northward and arrived at "Embarcacion" which is near the Bolivian border. There I got more *A. apertispatha* and *A. belladonna* species bulbs which may have possibly come from Bolivia. Then, I took a trip into "Oran" and got specimens of an enormous *Hymenocallis* sp. which may be either *fragrans* or *speciosa* (I presume). The amazing development of the species could be due to ecological factors for the plant is evergreen and it looks just like a giant *Eucharis amazonica.*

Then leaving "Embarcacion" and after 36 hours of travel, I reached Formosa to pay a visit to Mr. Carlos Carrara, who is both a close personal friend and a good collector of tropical plants. Several nice

field trips were taken. One was to "Palo Santo" which is 300 kms. westward into a good area, where after a few hours of exploration we found the place where *A. elegans* var. *"albostriata"* grows, of which we got many bulbs. At this place, this species is evergreen in the fields. Also, in Formosa I got more bulbs of *A. belladonna minor* and *A. belladonna major* which grow in the home gardens and which are of unknown origin.

After a week here in Formosa, I left and spent the day going to Resistencia, Chaco, Corrientes which is the Capital of the same province (State), then on to Posadas, Misiones, and, finally, all in the same day, reached Santo Tome, Corrientes. Here, I was very interested in getting more mature bulbs of *Amaryllis* species "Mrs. Sosa" in Santo Tome; here I had gotten them two years before from a home garden. I presume that it comes from south Brasil or Iguazu Falls, Misiones. It is noteworthy as it is a peagreen self *Amaryllis* of the Elegans Group. If I had found it in Peru, then I would have said that it might be *A. viridiflora.* Unfortunately I was given only 6 mature bulbs which I will send to my friends in California (USA). This species flowered this past summer (1967) in Jacksonville, Florida (USA) for Mr. Alek Korsakoff from whom I quote: "Amaryllis specie Mrs. Sosa" produced very unique flowers of "chartreuse green 663/1, R. C. chart."

Then after another week, I returned home in five days, from Santo Tome to Mendoza by way of Buenos Aires. Now, after exactly a month, I was sleeping in my own bed again.

II. MARCH 1968 COLLECTING TRIP INTO SALTA

Salta, which is situated northward of the 25th parallel in the tropic zone and was the home-base for this collection trip, is a modern, liveable city which while surrounded by mountains and at an elevation of 1,800 meters (s. l.) nevertheless has a mild climate and has the plant, animal life and the scenery to go with it to make it a further inviting place.

Among those that aided me, I am most grateful for the young gentleman, Mr. Filiberto Yanello, who kindly took me on his motorcycle to hunt for new and showy plant specimens, especially Amaryllids. On the 7th of March 1968, we took off for the trip into the "El Chamical" which is a small village of less than a dozen humble houses that they call "ranchos". Surprisingly the houses were provided with running water. There was also a police-station, which had been a "tin rancho", with one police-man. There was also a school which was the main building and was big enough, clean and comfortable. This town was reached thru endlessly winding roads which both curved about and climbed hill after hill which were luxuriantly covered with tropical flora. Many a stop was made to collect conspicuous specimens among those were a *Malvaceae* resembling Hibiscus, having 1½" wide blooms of deep yellow blotched brown in its center and bearing myriads of blooms and seedpods all at the same time. Further, we found a member of the *Labitae* (?) which was a climber with 3" long coral red flowers of pos-

sibly great horticultural worth; since no seeds were to be found, several roots were taken to Salta. Also in this area, 18-20 ft. cactus were to be found of which the poorer sort of the "ranchos" were built but the city-folk used the "timber" for ornamental furniture. Among the *Amaryllidaceae* found were *Habranthus brachyandrus* which were identified from their leaves, roots and habitat. In "Chamical," itself, were found some cultivated *Hymenocallis* plants of which several enormous bulbs were dug-up for identification. They told Mr. Yanello that a broad leaved red *Amaryllis* and another white one grew also in this area. After a long search, we found 3 spots that had the supposed species. Two of the spots were rather close to each other on the bank of a dry river. The bulbs were big and the leaves measured some 70 cm. long and 5 cm. wide. We were told that they had white flowers. Later, we located the third spot on the dry top of a low "cerro" (the local name of a mount, need not necessarily be high). On that "cerro" we found, happily, many, many bulbs of a broad-leaved *Amaryllis* sp. and one bulb of a narrow white-striate leaved species. We have given the collection number to the broad-leaved species as *A. Ch. 1-68* (*Amaryllis* "Chamical" 1-1968). We gathered plenty of this material for further study. And on the way back to Salta, we gathered *Tillandsia, Bromelia, Chlores, Koehleria* and *Oncidium* species.

On the next day, we headed 30 Kms. northward on the road to Jujuy to "La Calera" which was more humid and warm but with grand scenery. The flora was commonly ferns, Begonias, Cacti and Bromeliad species, including the interesting epiphyte *Tillandsia*. We saw large groups of *Koehleria* species with several different shapes to the blooms and a range of colors, with the ventricose vivid orange and yellow, and the trumpets mauve, scarlet, red, pink, etc. They appeared to be natural hybrids. But what I was particularly hunting for was *Alstroemeriales* in the area and was lucky to find some *Bomarea* spp. of which 5 plants, possibly, of B. *rosea* were dug up.

Our next area of search was on the 11th into the "Guemes". This area is both dangerous and the climate is hot. The city, "Guemes", is located 55 Km. Eastward of Salta. In this "Guemes" area, what complicates the collecting of *Amaryllidaceae* is the presence of snakes—*Ophidium* with lethal poison, the aggressive "Yarará" (*Bothrops neuwiedii & Bothrops alternata*), the less dangerous "víbora de Cascabel" (*Crotalus terrificus*)—altho having the most "mortal weapon"—does warn us of its presence by the noise of the rattles at the end of its tail; and lastly, the "vibora de coral" (*Micrurus lemniscatus*) which is the most venomous, but human victims are fortunately very rare. Well, keeping a wary eye on the reptiles, we found a few Kms. northward of "Guemes" an *Amaryllis* species that was growing by the hundreds. It resembles *A. parodii* from the likeness of the bulb, leaves and habitat. The Folk told us that the flowers are long, green-yellowish trumpets. From among these, we gathered about 20 huge bulbs. Also, close to these were taken some bulbs of an Amaryllid which looked like a *Rhodo-*

phiala species. Both of these were found in an area where the thorny *Bromelia* species and the *Synadrospadix vermitoxicum* (Araceae), with its large ornamental, deciduous leaves, grow everywhere.

On the way back to Salta, we collected more *Tillandsia* and *Bromelia* species. One enormous, glossy green-leaved *Vriesia* species and an ornamental climber bearing deep coral red flowers in profusion (the same Labiate previously mentioned) were also collected. One additional warning to all about a small danger. In spite of the heat, do not carelessly take a bath in the clear streams of water to wash off the perspiration, and to refresh yourself. I sank happily into the cooling stream. But to my great surprise, on getting on the bank again, I saw my body literally covered by hundreds of little fleshy colored leeches (*Hirudus* sp.) that were difficult for us to take off. My friend, Yanello, had laughed a lot when he refused to join me in the water.

SOME AMARYLLIDS COLLECTED BY DR. RUPPEL

Paul H. Williams, Jr., *6128 Sundown Drive, Fort Worth, Texas 76114*

Due to the efforts of Dr. C. Gomez Ruppel many amaryllid species from South America are now being grown in various sections of the United States. We owe him a great debt of gratitude for his tireless hours spent in tracking down rare and unknown species of the Amaryllidaceae and attempting to naturalize them in comparable climates of this country. His reward will be eventual increase of world botanical knowledge.

A few years ago the writer received bulbs from that most active member of The American Amaryllis Society resident in Mendoza, Argentina. Among these were two *Habranthus* species received as *H.* "Barreiros" and *H.* "Burkart". Both have proven adaptable to the conditions found in Fort Worth and should be brought to the attention of the Society at large.

The first is a possible form of *H. robustus,* but Dr. Ruppel made known his doubts; its delicate light pink is evenly shaded throughout the flower. This species blooms, with or without foliage, at the same time as *H. robustus* and occasionally during the summer and fall. Flower size and seed set compare with *H. robustus* but the scape is shorter and bloom is more graceful. Its true relationship is left to the lineagicist to puzzle out. The writer has small seedlings of a supposedly white form. The above species was collected by Dr. Gomez Ruppel at Barreiros Beach, Florianopolis, Capital of Santa Catarina, South Brazil.

The second species is new! At least I have not located it in Herbertia or Plant Life. This one has been described as giving the appearance of a giant white flowered form of *H. andersonii rosea.* It blooms along with *H.* "Barreiros" but does not set seed as freely. "Burkart" has a light brown shading deep in the throat which is carried forward throughout the bloom as very fine veins of the same color. The general

effect is an off-white color. The flower appears to be sensitive to the amount of light received; being trumpet shaped in shade and open faced in full sun. This species is native to Entre Rios, Argentina and was given to Dr. Gomez Ruppel by his friend Father Arthur Burkart, an Argentine botanist.

A beautiful addition to the Belladonna Group of *Amaryllis* was received as *A.* "belladonna minor". This is another of the fast growing collection of miniatures. A dependable, free blooming species (3 scapes to bulb) which crosses readily and is self-fertile. The flower is a glowing shade of rose with a large yellow eye banded by darker rose. It blooms during late winter and early spring while in full foliage, which does much to enhance the picture.

Other species still await flowering, and will be reported on later.

NOTES BY AN AMATEUR COLLECTOR

J. L. Doran, *1117 N. Beachwood Dr., Burbank, California 91502*

The following notes are concerned with exploration trips that were made during four years: (a) 1964, August & September, Peru; (b) 1965, September & October, eastern Venezuela and southeastern Brasil; (c) 1966, October & November, southern Brasil and northwestern Argentina; and (d) 1967, October and November, Bolivia, northern Peru and Ecuador.

On October 10, 1967, I saw *Chlidanthus boliviensis* brought to the market in Cochabamba by Indians. Brilliant yellow with up to twelve flowers on a scape, and very strongly perfumed. It grows near the top of the Sierra Tachna to the north of Cochabamba. Bulbs were found at an elevation of ten to twelve thousand feet, growing in a clay soil. Cochabamba gets about eighteen inches of rain in two or three months then none until the next year.

Dr. Cardenas states that with the exception of *Amaryllis belladonna* and *A. reginae,* all the amaryllis he has found are growing in a subtropical climate, not in hot, humid areas. *A. starkii* has been found only in a small area which is about 150 kilometers west of Corumbá, Brazil. It grows in a nearly pure sand in sandstone mountains with the name of Sierra Santiago. Rainfall is about 40 cm. per year.

Amaryllis Cybister is found on the north and east slopes of Sierra Tunari growing in very rocky clay soil in partially shaded places. This area has no rain for nine months of the year.

Amaryllis psittacina is another species that grows usually on steep bare rock, which has a thin layer of moss on it, of course some dust and debris collects in the moss. I found that often the roots were two feet long in the moss which is wet every night by dew and at some seasons of the year by condensation of fog. Another noticeable thing about *A. psittacina,* almost always it is found at the side of a plant of *Vriesia reginae.* The *Vriesia* is usually a large one, probably eight to ten years

old and three or four feet in diameter. It would shade the rock and perhaps keep it cool. *A. psittacina* grows at an altitude of 1-2,000 meters at a latitude of 22 degrees south. There are several months of little rainfall but the wet season is during the hot months. In this area they have some very hot days and the rock gets very hot. In 1966, I traced *A. psittacina* for about one hundred miles to check its variability and found that the amount of white appearing in the flower was quite variable but although the range is extensive no pattern was apparent. Some plants grow at the base of the cliffs below where the majority grow. Careful digging showed that the root system was smaller in extent and the roots bigger in diameter. The soil grown bulbs were bigger and the flowers smaller.

Amaryllis striata has been seen south of the range of *A. psittacina* on the Cerro do Mar beginning at Campo Grande. We followed it for about a hundred miles but did not determine the end of its range because we went west from here. *A. striata* grows in this region in a rain forest area where they receive 4,000 mm. of rain. I found it growing in small level areas near the top of the mountain with scapes 60 to 70 cm. high and gorgeous, nearly orange flowers about 125 mm. in diameter with leaves nearly 90 cm. long in almost complete shade. This area has little diurnal change in temperature but gets near freezing on an occasional morning in the winter.

In 1966 we went west from Curitiba to the Rio Paraná where we found *A. reticulata* var. *striatafolia* growing. This bulb bloomed shortly after we returned to California. It was selfed and the resulting four seed produced three plants with no white stripes on the leaves.

I found the first plant of what I believe to be *A. santacatarina* about fifty miles north of Puerto Iguasú. It was in bloom with green spathe valves. Later I found many plants with the same flower two hundred and fifty miles south of this place with green spathe valves. I was told that there was an amaryllis—small yellow flowers in this area but did not find it.

At Puerto Iguasú I waited four days for an airplane which radioed in that it would not come because of a storm at Corrientes. Later radioed that if it came, would be too late to fly out that night—the airstrip was a narrow lane cut out of the forest with no lights or navigational aids. While waiting for the pilot to make up his mind, I went to an abandoned hotel near Iguasú falls where I found the whole front planted to *A. santacatarina* and all in bloom. What a blaze of color!! Upon returning to the airport, found that the plane was coming. It started to rain! Was now completely dark but the pilot said he would go. They put three kerosene lanterns about a foot apart at the end of the runway and a couple along the side. We took off in a blinding rain with the lightning crackling.

Species observed growing in northwest Argentina were *A. aglaiae* *A. immaculata, A. ambigua* and *A. parodii.* It was told that this area has a long dry period which must be observed if these bulbs are to prosper. The exception *A. aglaiae,* which is evergreen, grows in natu-

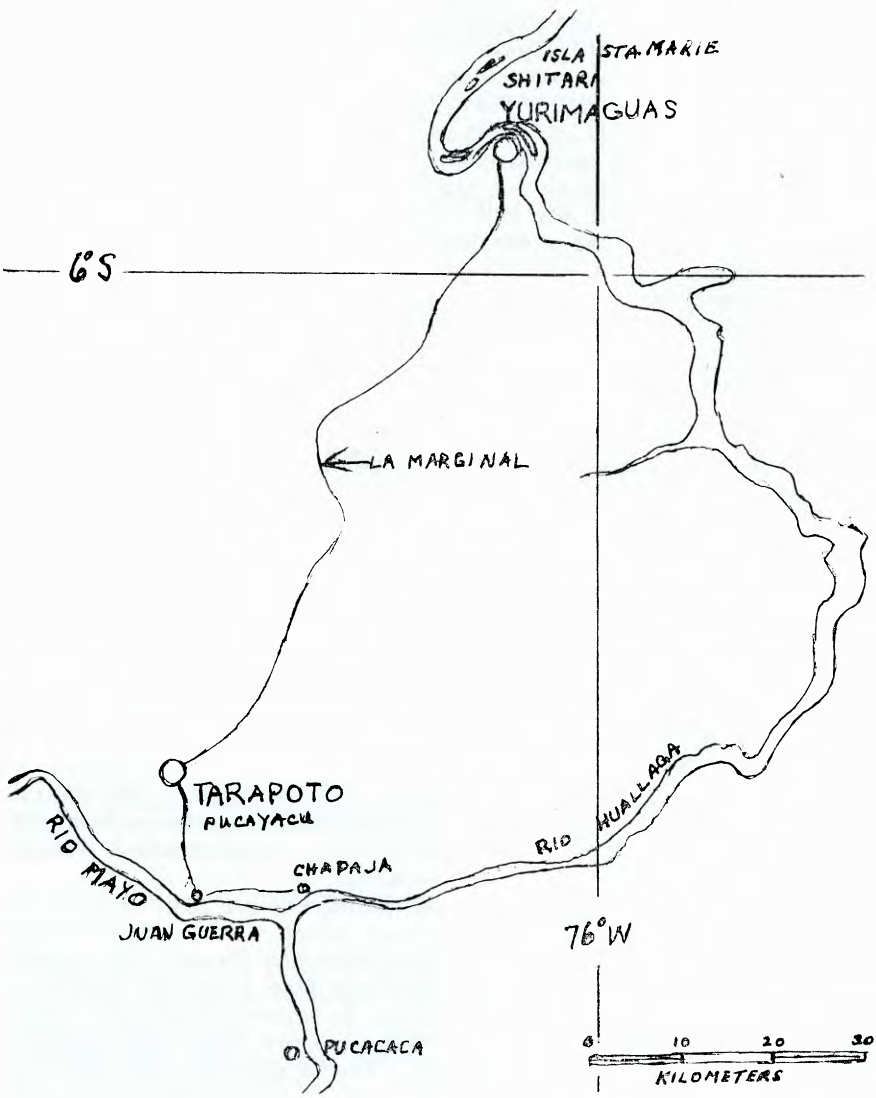

Fig. 10. Map showing the northern part of the Province of San Martin, Peru, in the upper reaches of the great Amazon River Valley where J. L. Doran collected amaryllids. Consult your atlas if more information is desired on this location.

rally damp places. A heavy shade from a summer weed crop protects it in the hot season. The soils of Argentina are clay loams, grey in color, rich in mineral—unlike the tropical red clays. In one area near Tafi de Valle, *A. aglaiae* was growing so thick it covered the sides of the barrancas. Near Vulcan, *A. immaculata* also was observed growing so close together you could not step without crushing some of the leaves.

Santa Cruz, Bolivia is a town of over 100,000 population and not one passenger car was seen here. Only jeeps or trucks; it takes four wheel drive to get through the streets. *A. belladonna* was observed growing all through the city and surrounding villages, in gardens and in wooded areas. Almost every flower set seed.

Also seen is probably *A. pardina* and in two distinct forms. One is dotted heavily with only a hint of striping (where the dots run together); the other is so heavily dotted that it is almost a solid color, but both are white on the back side of petals. Dr. Cardenas thinks these are "escapes" and were brought from the Rio Beni area by early colonists.

Travel to the south of Santa Cruz revealed an area becoming drier and with more cactus and bromelia. Hundreds of *Bromelia serra* were seen in bloom.

In 1964 we went from Juanjui up the river to Tinga Maria and across the Pacalpa. On this trip we found *A. reginae,* an unidentified one, and many *A. belladonna* of various forms and colors. The unidentified flower is white, trumpet shaped with a few fine red lines. Many *Eucharis grandiflora* plants were seen, but near Tinga Maria a very small flowered *Eucharis* was found. We went through El Bocharón de Padre Abat which is a deep canyon with a river in the bottom and several waterfalls flowing into it. On this trip we stopped in Iquitos where grows the biggest flowered *A. belladonna* with wide petals. It always seems to grow in the open places in full sun. The clumps of bulbs get two feet in diameter and all seem to serve as an ant's nest. The several kinds of ants in Peru teach one great respect. One, the natives call "Isura", makes you sick for two or three days. Another called "Tinga tierra" is given a wide berth by the natives.

On a trip up the Rio Mañan we found another distinct kind of *Eucharis,* small with reflexed petals.

In 1967 I was determined to collect *Amaryllis traubii.* We visited Dr. Ferreyra and obtained exact instructions from him. We took José Gómez Carrión, one of his instructors from the university with us. Upon arrival at Pucayacu (Fig. 10) near Tarapoto, we found that most of the area was under cultivation—tobacco. Travel was difficult because the area is covered with brush about twenty feet high. In the open areas were found *A. belladonna.* After two day search we found only a beautiful rose-colored *A. belladonna* growing in dense shade. We went from here down the Rio Huallaga below Yuramaguas to Shitari in search of *Amaryllis ferreyrae* and *Eucharis ferreyrae.* A search of the islands and shoreline revealed only *Amaryllis belladonna.* We did find three kinds of *Eucharis* and hope that one of them is *Eucharis ferreyrae.*

AMARYLLIS ESCOBARURIAE FROM YUNGAS OF LA PAZ, BOLIVIA

MARTIN CARDENAS, *Cochabamba, Bolivia*

The Province of Sud-Yungas has been indicated as the habitat of several *Amaryllis* species. I have collected there *A. belladonna* L., *A.*

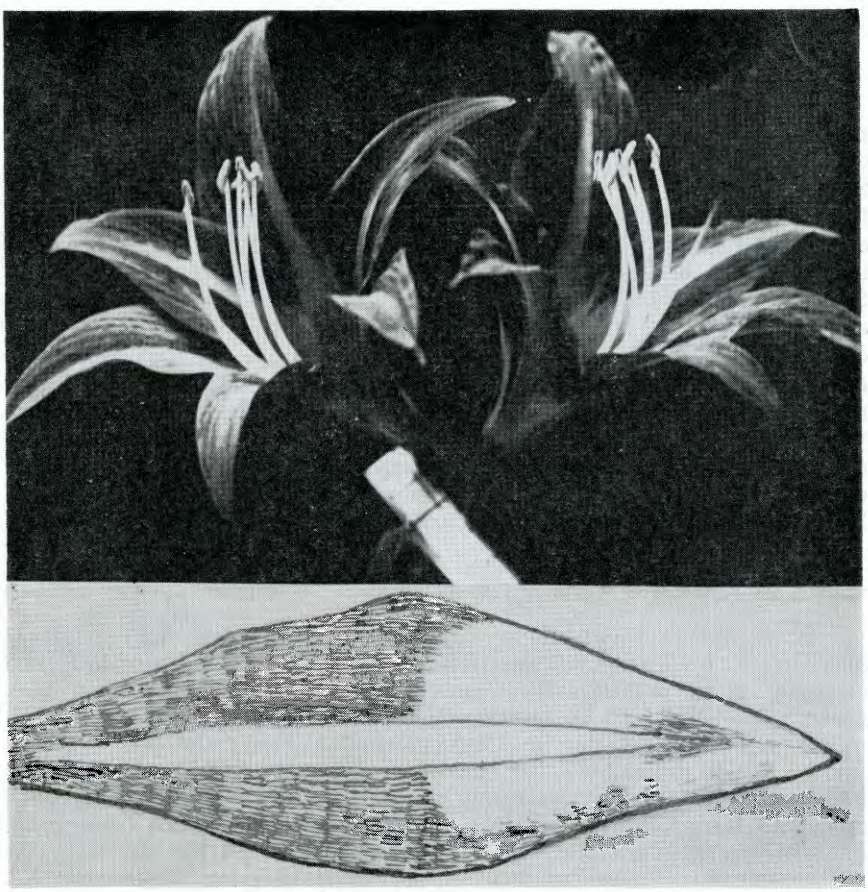

Fig. 11. **Amaryllis escobaruriae** Cardenas, **sp. nov.**

pardina Hook f., *A. yungacensis* Cardenas & Nelson, *A. forgetii* (Worsley) Traub & Uphof, and now *Amaryllis escobaruriae* Cardenas (Fig. 11).

This species reminds one remotely of the Brasilian *Amaryllis moreliana* (Lemaire) Traub by its green star in the throat reaching about

to the middle of the petepalsegs. However, *Amaryllis escobaruriae* differs from it by the darker tepalsegs which are acute at both ends and have whitish star bands reaching almost to the tips of the tepalsegs.

This species has been named for the La Paz Burgomaster, General Armando Escobar Uria, who organized this year (1968) the first flower show in La Paz, and brought back from the high mountains of Comanche, Bolivia, at 4,000 m., a whole fruiting specimen of *Puya raymondii* Harms.

Amaryllis escobaruriae Cardenas, **sp. nov.** Fig. 11.

Bulbo globoso 7 cm. diam. Pseudocollo 7 cm. long., 3 cm. crasso. Foliis plusminusve 6 deorsum deflexis, lineari lanceolatis 30—40 cm. long., 3.5 cm. latis a basim angus tatis, connatis vel vaginatis, atro viridis. Scapo 28—30 cm. long., 1.5 cm. a basim crasso. Umbella 2 flora. Bracteis spathaceis acuto lanceolatis 9 cm. long., 0.5 cm. latis, rubis. Pedicellis 5—6 cm. long., diluto viridis. Floribus actinomorphibus 12 cm. long. Ovario 12 mm. long., 5 mm. crasso atro purpureo vel nigrescente. Tubo 1 cm. long. Setepalsegmentis lanceolatis 12x4 cm. a basim atro purpureis, exteriora superne atro rubis, inferne diluto viridis, interiora superne rubis inferne dilutissime viridis, 5 mm. lata balteus albus linea media praeditis. Petepalsegmentis 10x3 cm. lanceolatis, similia coloribus tamquam setepalsegmentis, omnis segmentis ad cuspis acutis, deflexis. Paraperigonium albo viridiscentibus. Staminibus 9 cm. long.; filamentibus albidus. Stylo 10 cm. long., superne albido, inferne purpureo. Stigma trilobata 2 mm. crassa atro purpurea. Capsula trilocularis 18 mm alta, 26 mm. crassa. Semina membranacea, alata, atro brunea 10-15 mm. diam.

Patria: Bolivia. Provincia Sud-Yungas. Departamento La Paz, prope vicinis supra Puente Villa, 1,700 m.

Bulb globose 7 cm. diam., neck 7 cm. long, 3 cm. thick. Leaves about 6 in two distichous sets deflexed laterally, 30—40 cm. long, 3.5 cm. wide at its middle section, narrowed at base, acute at apex, dark green. The basal leaves membranous below, forming a sheath around the upper ones. Scape 28 cm. long, 1.5 cm. thick at base. Umbel 2 flowered. Spathe bracts 9 cm. long, 0.5 cm. wide, acute, red. Pedicels 5—6 cm. long, light green. Flowers fairly regularly actinomorphic. Ovary 12 mm. long, 5 mm. thick, very dark purple to blackish. Tube 1 cm. long. Setelpalsegments lanceolate, acute, 12x4 cm., dark purple like ovary at its base, light green below, dark red above outside; very light green below, red above with a middle whitish 5 mm. wide band inside. Petepalsegments 10x3 cm. of the same color as that of setepalsegments. All segments acute at base and tip, loosely separate and deflexed. Paraperigone very light green as it is at the bottom of the flower inside. Stamens 9 cm. long; filamets whitish. Style 10 cm. long, whitish below, purplish above. Stigma 2 mm. thick, trilobate, dark purple. Capsule when ripe glaucous, trilocular, 18 mm. high, 26 mm. in diam. (It is interesting to note that the capsules of this species, with flowers similar

to those of *A. pseudopardina (A. leopoldii),* are rather flat as in *A. belladonna* L. and not vertically elongate as in *A. pesudopardina.*) Seeds membranaceous, *unusually small,* 10-15 mm. in diam., dark brown. They suggest those of *A. cybister.*

Bolivia: Province of Sud Yungas. Department of La Paz. Heights of Puente Villa, 1,700 m. July 1967. M. Cárdenas, No. 6296 (Holotype) in Herbarium Cardenasianum.

CRINUM 'QUEEN EMMA' IDENTIFIED

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

Several serious attempts to pinpoint the particular type of red-flowered Asian *Crinum* named after the last Queen of the Hawaiian Islands, Queen Emma, became nearly hopeless when we found at least six specific red-flowered forms from Asia growing in the older gardens of Honolulu along with numerous intraspecific hybrids. The Bishop Museum could not clarify the matter; in fact one reference quoted the white flowered *C. asiaticum* since several variants are grown about the islands. Recently Paul Yamanaka had occasion to visit the Queen's summer home at Lawai on the Island of Kauai where her gardens have been kept intact, and found that the "Queen Emma Crinum" there were entirely *C. augustum* in lieu of the anticipated colored Asian Crinum. Proper plantings of *C. augustum* are now being reestablished at the Queen Emma Museum in Honolulu.

All horticultural examples of *C. augustum* observed in Mexico, Florida and Hawaii appear to be identical and completely seed sterile in all locations. There appears to be no record of the species being recollected in the wild. Thus it appears we either have a sterile cultivar or a single hybrid in circulation. This view was also expressed by William Herbert in his treatise of 1837.

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.]

Allium roguense M. E. Peck, Proc. Biol. Soc. Wash. 49: 109. 1936. Bulb almost globose, 10—12 mm. long [says "tall", probably means long], the exterior scales splitting into fibers, the fibers persistent; leaves 2, shorter than the scape, 1 mm. wide; scape 1.5—2 dm. tall, very slender. terete; bract solitary, opened at one side almost to the base or deeply split, long caudate-acuminate; umbel about 10-flowered; pedicels 8—12 mm. long; perianth 1 cm. long, rose, the segments oblong-lanceolate, scarcely acute, becoming involute, saccate at the base; filaments half as long as the perianth; ovary without a plume [or crest].

Pancratium leavenworthii Standl. & Steyerm. in Amer. Midl. Nat. 36: 166. 1946. Bulb ovoid, about 4 cm. long and 2.5 cm. broad, contracted into a short thick neck; leaves long-petioled; membranous in drying, the petiole very slender, to 19 cm. long, scarcely 2 mm. broad near the middle, the blade lanceolate-oblong, 15 cm. long, 3 cm. wide, acute or acuminate at the apex, acuminate at the base but abruptly contracted into the petiole, slightly paler beneath; scape about 30 cm. tall, scarcely 3 mm. thick near the middle, 2-flowered, the flowers sessile; valves of the spathe lanceolate, scarious, 4 cm. long, attenuate, slenderly nerved [=veined]; ovary about 8 mm. long; perianth white, the tube very slender, 7 cm. long, 1.3 cm. broad, slightly widened upwards, the segments linear, equaling the tube, slightly over 1 mm. broad; filaments very slender, shorter than the segments; anthers appendiculate at the apex, the appendiculation curved outwards, 3.5 mm. long; staminal cup narrow, 15 mm. long, 5 mm. wide.

Chlidanthus x *traubii* forma *oblongitepala* Moldk., *forma nov.* A forma typica speciei segmentis tepalorum oblongis ad apicem subrotundis recedit. Typus: No. 1090 (TRA), cult. La Jolla, Calif.

Veltheimia x *traubii* Moldk., *hybr. nov.* Planta hybrida "*V. glauca* Jacq." et "*V. capensis* DC." intermedia; foliis glabris et plantae florescentia praecoci velut in parenta mascula; aliter intermedia. Typus: Traub No. 1085 (TRA), cult. La Jolla, Calif.

REGISTRATION OF NEW AMARYLLID CLONES

Mr. W. D. Morton, Jr., *Emeritus Registrar*

Mr. James E. Mahan, *Registrar*

Mrs. Emma D. Menninger, *Associate Registrar*

This department has been included since 1934 to provide a place for the registration of names of cultivated **Amaryllis** and other amaryllids on an International basis. The procedure is in harmony with the International Code of Botanical Nomenclature (edition publ. 1961) and the International Code of Nomenclature for Cultivated Plants (edition publ. 1958). Catalogs of registered names, as well as unregistered validly published names, will be published from time to time as the need arises. The first one, "Descriptive Catalog of Hemerocallis Clones, 1893-1948" by Norton, Stuntz and Ballard was published in 1949. This may be obtained at $5.00 prepaid from: Dr. Thomas W. Whitaker, Executive Secy., The American Plant Life Society, Box 150, La Jolla, Calif. Catalog of Hybrid Nerine Clones, 1882-1958, by Emma D. Menninger; and Catalog of Brunsvigia Cultivars, 1837-1959, by Hamilton P. Traub and L. S. Hannibal, were published in 1960 Plant Life, with additions to both in Plant Life 1961. In Plant Life 1961, the first edition of The Genus X Crinodonna was published which serves also as a catalog of cultivars. In Plant Life 1964, the first edition, of "Catalog of Hybrid Amaryllis Cultivars, 1799 to Dec. 31, 1963" was published. Other catalogs of cultivated amaryllids are scheduled for publication in future issues.

The registration activity of the American Plant Life Society was recognized when at the XVIth International Horticultural Congress, Brussels, 1962, the Council of the International Society for Horticultural Science designated the American Plant Life Society as the Official International Registration Authority for the cultivars of **Nerine**; and this was extended

to include all the **Amaryllidaceae** cultivars, excepting **Narcissus** and **Hemerocallis,** at the XVIIth International Horticultural Congress, 1966.

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

Correspondence regarding registration of all amaryllids such as **Amaryllis, Lycoris, Brunsvigia, Clivia, Crinum, Hymenocallis,** and so on should be addressed to Mr. James E. Mahan, Registrar, 3028 Palmyra St., New Orleans, Louisiana 70119. The registration fee is $2.00 for each clone to be registered. Make checks payable to American Plant Life Society.

REGISTRATION OF NEW AMARYLLIS CLONES, 1968

Registered by Ludwig & Co., Hillegom, Holland

'Marble Arch' (Lud. 1968) R; A-873; D-4B; U-4 fld.; 26-28″ H; 8″-9″ diam; white with light Dawn Pink (523/2) almost marble colored with whitish apple green throat; spr.

'Moulin Rouge' (Lud. 1968) R; A-874; D-4B; U-4 fld.; 22″-24″ h; 7″-8″ diam.; deep, velvety orange red, lighter towards middle of petals (almost scarlet 19/1) with suggestion of white streak across petals ending in whitish apple green in throat; spr. and win.

'Salmon Tower' (Lud. 1968) R; A-875; D-4A; U-4 fld.; 30″ h.; 9″-10″ diam.; light Mandarin Red (17½) with suggestion of azalea pink towards middle of petals, darker throat; spr. and win.

Registered by Edward C. Prudhomme, Metairie, La.

'Nova' (Prud. 1968) R; A-869; D-4B; U-4 fld.; 24″ h.; 7″-8″ diam.; striped with Jasper red splashes on white base; spr.

'Satellite' (Prud. 1968) R; A-870; D-4B; U-4 fld.; 24″ h.; 8″ diam.; red stripes on a white base with pale apple green throat; spr.

Registered by L. L. Laine, Chalmette, La.

'Red Twist' (Laine 1968) R; A-871; D-6; U-4 fld.; 20″ h.; 5½″ diam.; chrysanthemum crimson (824) with darker veins running through petsegs; spr.

Registered by Albert T. Diermayer, Metairie, La.

'Jules Robert' (Dirm. 1968) R; A-872; D-5A; U-4 fld.; 20″ h.; 6″ diam.; brick red with white ribs in center of segs, blending to green in throat; spr.

HYBRID **NERINE** CLONE

Registered by Hamilton P. Traub, La Jolla, Calif.

'Alma Moldenke', a clone of **Nerine** x **traubianthe** Moldk., named in honor of Mrs. Harold N. Moldenke. Parentage: **Nerine filifolia** Bak. ♀ x **Nerine** clone 'Rosalba' ♂.

Bulb medium sized, producing offsets readily so that a 6-inch pot will soon be filled, the bulbs together producing 10 or more flower scapes in the autumn; propagation may also be by vertical bulb-cuttage (see Plant Life 1968, page 102-103; and Plant Life 1967, [Suppl.] Review of the Genus **Nerine** Herb., page 32). **Leaves** evergreen, several, deep green, linear, canaliculate, to 32 cm. long, to 6 mm. wide, narrowed slightly below, and to bluntly acute above. **Scape** slightly compressed with rounded edges, to 50 cm. long, 4x6 mm. in diam., medium green. **Spathe** 2-valved, green, held horizontally, 5—6.5 cm. long, lanceolate, bluntly acute. **Umbel** to 13—14-flowered; flowers long lasting, held more or less upright, a pleasing medium **Phlox** pink (HCC 625/1). **Pedicels** green, slender, 3-4-5-5.5-6 cm. long. **Ovary**

3 mm. high, 4 mm. in diam., greenish-reddish. **Perigone** zygomorphic, tepalsegs linear, recurved in upper ⅓, 4.2 cm. long, 5 mm. wide, bluntly acute. **Stamens** (and style) fascisculate-declinate-ascending, shorter than the tepalsegs. **Style** trifid, lobes recurved.

ADDITION TO AMARYLLIS SHOW SCHEDULE

Following the groups A, B, and C on pages 46 to 48, 1958 PLANT LIFE, the following artist's group is to be added:

D. ARTIST'S SECTIONS

SECTION XII.—Paintings of Amaryllis and other amaryllids.
SECTION XIII.—Drawings of Amaryllis and other amaryllids.
SECTION XIV.—Sculptures (bas-relief) of Amaryllis and other amaryllids.

AMARYLLID NOTES, 1969

HAMILTON P. TRAUB

Narcissus humile (Cav.) Traub, *comb. nov.* Syn.—*Pancratium humile* Cav. Ic. pl. 4. 1791-1801.

Section *Tapeinanthus* (Herb.) Traub, *sect. nov.*, genus *Narcissua* L. Syn.—*Tapeinanthus* Herb., Amaryll. 190, 414. 1837. Typus: *Narcissus humile* (Cav.) Traub.

Infragenus *Orthogonios* Traub, *infragen. nov.*, Genus *Galanthus* L. (Amaryllidac.) celluluis epidermalibus rectangularibus. Typus: *Galanthus platyphyllus* Traub & Moldenke.

Epidermal cells rectangular.

Brunsvigio x *parkeri* W. Wats. ex Traub, *hybr. nov.* Plantae hybridae inter "Brunsvigia rosea (Lam.) Hann." et "B. major Traub" cum speciebus aliis hujus generis, inter parentes mediae et per procreatio genitura selectiva inter hybridas postea proficientae.

Hybrids of Brunsvigia rosea and B. major with other Brunsvigia species, intermediate between the parents and later improved by selective breeding among the hybrids.

Holonomenifer (typus): No. 823 a+b (TRA), 10-15-60. Paranomenifers: No. 818 a+b (TRA) & No. 816 a+b (TRA), all cult. La Jolla, Calif.

Syn.—"Amaryllis x spofforthiae Herb." Amaryll. [278], 422, 425, 1837, *nomen;* "Amaryllis x parkeri W. Wats.", in Gard. Chron. Feb. 6, 1909, p. 92 et *ibid.* 50(2): 210, fig. 101. 1911; *ibid.* 1(1911) 211; The Garden 75: 462, fig. on p. 460. 1911; Worsley, in Jour. Roy. Hort. Soc. 51: 66. 1926; Hoog, in Herbertia 2: 113-114, pl. on page 113. 1935; "Brunsdonna parkeri alba W. Wats. ex Worsley", in Gard. Chron. Nov. 14, 1925, pp. 391-392, fig. 164; Worsley, in Jour. Roy. Hort. Soc. 51: 64-65; 66, 67. 1926; Gard. Chron. lxxxiv: 331, with illus. 1928; "Brunsdonna sanderae Hort.", Gard. Chron. 50(2): 210. 1911; The Garden 75: 462. 1911; "Brunsdonna tubergenii Hort.", Haggag, in Hort. Rev. Egypt. No. 39, p. 5, with illus. 1918; "Brunsvigia x parkeri (W. Wats.) Traub", in Plant Life 5: 124. 1949; ibid. 16: 58. 1960.

Brunsvigia x *tubergenii* Traub, *hybr. nov.* Plantae inter "*Brunsvigia major* Traub" et "*B. josephinae* (Red.) Ker-Gawl." hybridae et intermediae.

Hybrids of *Brunsvigia major* Traub and *B. josephinae* (Red.) Ker-Gawl.; intermediate between the parents.

Holonomenifer (typus): No. 810 a+b (TRA), 8-27-60, cult. La Jolla, Calif.

NEW MEXICAN ALLIUM SPECIES

Allium huntiae Traub., *sp. nov.*, Plant Life 24: 136-137. 1968, *anglise.* Bulbo ovoideo solitario; foliis 2 linearibus canaliculatis usque ad 4 mm. latis, deorsum vaginatis; umbella laxa 11—18-flora; pedicellis 1.5—2.2 cm. longis; perigonio late campanulato; tepalis 7 mm. longis; staminibus styloque tepalis brevioribus; capsula obscure 6-cristata.

Typus: Howard 67-19B (=no. 1077 TRA), July 22, 1967, west of Durango, Dur. Mex., Highway 40, K. 1016.

Allium mannii Traub & Howard, *sp. nov.*, Plant Life 24: 138. 1968, *anglise.* Bulbo oblongo per fissuras verticales augmenti; foliis 2—4 canaliculatis 3.5—5 mm. latis deorsum vaginatis; umbella 15—25-flora laxa; pedicellis 2.2—2.5 cm. longis; perigonio albo late campanulato, tepalis 10 mm. longis; staminibus styloque tepalis brevioribus; ovario obscure cristato.

Typus: Traub no. 1088 (TRA), grown at La Jolla, Calif., 8-15-68, from bulbs collected by T. M. Howard 67-14, east of Durango City, Mex. Highway 40, roadside, in low wet pastures and ditches in heavy clay soil.

Allium ownbeyi Traub, *sp. nov.*, Plant Life 24: 139, 1958, *anglise*, et Plant Life 25: v. 1969. Bulbo ovoideo per fissuras verticales augmenti; foliis 5 vel 6 late canaliculatis dorsum 6—8-porcatum, porcis marginibusque foliorum minute denticulatis; umbella 7—13-flora; pedicellis 1—1.3 cm. longis; perigonio pallide lavendulo, tepalis patentibus 5—6 mm. longis; staminibus styloque tepalis brebioribus; ovario 6-cristato.

Typus: T. M. Howard, s. n. (= no. 1066 TRA), Nov. 1966, Nuevo Leon, Cerro del Obispado, within western edge of City of Monterrey.

Allium potosiense Traub, *sp. nov.*, Syn.— "Allium subteretefolium Traub" Plant Life 24: 141. 1968, *anglise.* Bulbo ovoideo per bulbas terminales in rhizomatibus horizontalibus augmenti; foliis 3 vel 4 anguste linearibus leviter canaliculatis interdum subteretibus usque ad 3—3.5 mm. latis; umbella 14- vel 15-flora laxa; pedicellis per anthesin 2—2.3 cm. longis; perigonio campanulato; tepalis albidis oblanceolatis 9 mm. longis carinatis, carina brunneo-lavendula; staminibus styloque tepalis parum brevioribus.

Typus: Traub no. 1089 (TRA), grown at La Jolla, Calif., 7-28-68, from bulbs collected by T. M. Howard 66-3A, n. City of San Luis Potosi, Mex.

AMARYLLIS EVANSIAE FORMA VIRESCENS

In February 1968, Mr. Alek Korsakoff sent in a specimen of a form of *Amaryllis evansiae* (Korsakoff No. 1416) with very light uranium

green (HCC 63/3) flowers, and this is here described as a form of this species. Mr. Korsakoff is to be commended on singling out this form of *Amaryllis evansiae*. It is hoped that others will follow up this beginning by gathering together other green-flowered plants of this species. By intercrossing these green-flowered plants it will be possible to establish this trait so that the green-flowered form can be easily increased from seeds.

Amaryllis evansiae forma **virescens** Traub & Korsakoff, **forma nov.**

A forma typica floribus pallidissime uranio-viridibus differt.

Differs from the nomenifer (typical) form in the uranium green flowers. Holonomenifer (typus): Alek Korsakoff No. K 1416 (= No. 1091 TRA), Cult. Jacksonville, Fla., 2-10-68; paranomenifer: Alek Korsakoff No. K 1416A (= No. 1092 TRA), 5-15-68.

Cyrtanthus elatus (Jacq.) Traub, *comb. nov.* Syn.—*Amaryllis elata* Jacq. Hort. Schoen. 1: 32, pl. 62. 1797.

Cyrtanthus purpureus forma *magnificus* (Bak.) Traub, *comb. nov.* Syn.—*Vallota purpureus* var. *magnifica* Bak., Amaryll. 54. 1888; Fl. Cap. 6: 218. 1896.

Cyrtanthus purpureus forma *albus* Bak. ex Traub, *forma nov.* Descr.—Haec forma a forma typica speciei floribus albis recedit (typus). Cf. Bak., Amaryll. 54. 1888; Fl. Cap. 6: 218. 1896.

Subgenus *Vallota* (Herb.) Traub, *comb. nov.* Genus *Cyrtanthus* Ait. Syn.—*Vallota* Herb. App. Bot. Reg. 29. 1821.

Tristagma uniflorum f. *pauciflorum* Traub, *forma nov.*—(descr.) A forma typica speciei umbella 2—3-flora recedit (typus). Cf. Plant Life 23: 67. 1967.

Pancratium landesii Traub, *sp. nov.* (Amaryllidac.).—Foliis oblongis, parte inferiori angustatis; umbella uniflora; segmentis tepalorum linearibus acutis; poculo staminali segmentis tepalorum dimidio breviore. Fig. 14, Plant Life 24: 50. 1968, *typus.* Habitat: On coast near Salahah, Zufur Region, Sultanate of Muscat and Oman.

Tribus *Brodiaeeae* Traub, *tribus nov. (Amaryllidac.)* Perigonium regulare, inferne tubulosum, superne in segmentis 6 divisum, rhizoma cormosa pedicelli ad apicem saepe articulati. Typus: Genus *Brodiaea* J. E. Smith

Tribus *Milleae* Traub, *tribus nov. (Amaryllidac.)* Rhizoma cormosa; perigonium regulare; ovarium ad apicem gynophorii positum. Typus: Genus *Milla* Cav.

Subgenus *Oporanthus* (Herb.) Baker ex Traub, *comb. nov.*, "Oporanthus" Baker, in Amaryll. 28. 1888. Syn.—*Oporanthus* Herb. App. Bot. Reg. 38. 1821.

Subgenus *Imatophyllum* (Hook.) Bak. ex Traub, *subg. nov.*, "Subg. Imatophyllum Bak." Amaryll. 61. 1888. Syn.—*Imatophyllum* Hook., Bot. Mag. 2856. 1828.

X *Brunserine* Traub, in Plant Life 17: 105. 1961, *anglise* et Plant Life 19: 59. 1963; Traub, Genera of Amaryll. 62. 1963. Syn.—

"Nerinodonna Messrs. van Tubergen," Gard. Chron. CLXII: 11. 1967. *anglise;* Amateur Gardening Oct. 28, 1967, p. 47, with figure, *anglise;* Popular Gardening, Oct. 23, 1967, p. 23, with figure, *anglise;* X *Amerine* Sealy, Jour. Roy. Hort. Soc. XCIII(10); 430-433. 1968.

X *Brunserine tubergenii* Traub, in Plant Life 19: 59. 1963. Syn.—"Nerinodonna tubergenii Messrs. van Tubergen", Jour. Roy. Hort. Soc. XCIII(10): 430. 1968, *anglise;* X *Amerine tubergenii* Sealy, Jour. Roy. Hort. Soc. XCIII(10): 430-433. 1968; Beckett, Gard. Chron. Oct. 18, 1968, fig. p. 19.

In connection with X *Brunserine* and X *Brunserine tubergenii* above, it should be noted that *Rhododendron indicum* Sweet (*Ericaceae*) crossed with *R. mucronatum* Don and *R. simsii* Planch. gave rise to most of the group commonly known as the hybrid Indian azaleas. Similarly, in the *Cruciferae, Brassica neobrassica* Mill. (Rutabaga) crosses with *B. rapa* (Turnip) with fertile offspring. Such examples can be multiplied almost indefinitely in the Plant Kingdom, including various examples from the *Amaryllidaceae.*

Scientists are agreed that it would be *unrealistic* to separate out *Rhododendron indicum* and *Brassica rapa* as the types of two new genera respectively. Mr. Sealy surely will agree with these conclusions since there are also *no morphological characters of generic importance* to justify separation in each example cited.

In one of the examples from the *Amaryllidaceae,* the Cape Belladonna, *Brunsvigia rosea* (Lam.) Hann. crosses with some other *Brunsvigia* species such as *B. grandiflora* and *B. josephinae* with resulting fertile hybrids such as *B.* x *parkeri* W. Wats, ex Traub (see Traub & Hannibal, Plant Life 16: 39-62. 1960; Traub, Plant Life 25: 63. 1969).

Such hybrids were first made in Australia over a century ago, and more recently in Europe and the United States of America. There are now large populations of these hybrids in various generations from the original crosses, particularly in Australia and California where they are grown outdoors. As was the case with *Rhododendron indicum* and *Brassica rapa* crosses, the Cape Belladonna *cannot* be singled out as the type of a separate *unrealistic* genus as proposed by Sealy (see Jour. Roy. Hort. Soc. XCIII(10): 430-433. 1968) because it crosses with other *Brunsvigia* species with fertile offspring. In addition, the chromosome number as far as known is 2n=22, and there are *no morphological characters of generic importance* to set it apart.

Surely, a scientist of Mr. Sealy's stature will agree with these facts. He apparently has not examined these plants in detail. When he does he will come to the same conclusion reached by other scientists and drop the *unrealistic* proposal to uphold the Cape Belladonna as the type of a separate genus from *Brunsvigia,* and will find it unnecessary to attempt to replace X *Brunserine* Traub (1963) with X *Amerine Sealy* (1968).

LECTONOMENIFER OF **ALLIUM GLANDULOSUM**

Under date of July 1, 1968, Prof. Th. Eckardt, Director, Botanischer Garten & Museum, Berlin-Dahlem, Germany, informed the writer that there is no specimen of *Allium glandulosum* Link & Otto in the herbarium of that institution.

Living stock of *A. glandulosum* was first collected by a Mr. Deppe in Mexico in 1826, near Mexico City, and illustrated by Otto & Link from plants grown at the Berlin-Dahlem Garden (1828-31). It is evident that if a specimen ever existed there, it was apparently lost during the last war. A lectonomenifer (lectotype) is therefore designated below.

Allium glandulosum Link & Otto, Ic. Pl. Rar. Berol. 1: pl. 17. 1828-31; Ownbey, Res. Stud. State Coll. Wash. 15: 224-225. 1947, in part; ibid. 18: 219-220. 1950, in part; Traub, Plant Life 23: 92-94. 1967.

Bulbs grown from stock collected by T. M. Howard (Howard No. 65-80) about 11 Km. (K277) n. of Jacala, Hidalgo, Mexico, July, in leaf, in corn fields, have been maintained at La Jolla, Calif.

For the lectonomenifer, bulbs (offsets from a single bulb) were planted singly in 6-inch pots, 6-24-67 at La Jolla, Calif., and harvested at three developmental stages: (a) 9-15-67 when in full bloom and rhizomes have begun to elongate; (b) when seeds were ripe in November 1967 and the rhizomes had elongated further; and (c) in late January 1968 when growth cycle was completed, as indicated by the death of the original bulb, and the presence of mature flowering-sized terminal bulbs on the rhizomes.

LECTONOMENIFER (lectotype): 1093a (TRA), 9-15-67. PARANOMENIFERS: to show the other two developmental stages, No. 1093b and 1093c (TRA) as indicated above.

SPECIES OF **SPREKELIA**

In the August 1968 (Part 8), Jour. Royal Hort. Soc., p. 335, L. S. Hannibal erroneously equates the dwarf *Sprekelia clintiae* (Plant Life 1965, p. 64) with *S. glauca Lindl.* (Bot. Reg. 26, p. 49. 1840). *Sprekelia clintiae* is quite distinct (as the description shows) from *S. glauca* which is a synonym of *S. formosissima* L.

THE CREST ON THE ALLIUM OVARY AND CAPSULE

Hamilton P. Traub

In connection with the description of Mexican and Central American *Allium* species difficulties were experienced in characterizing the extremities of the ovary and capsule due to the inadequate definition of the term *crest*.

The term *crest* as defined at present in biology, particularly in phytology *(Plantae)* and zoology *(Animalia)*, is very uneven and inadequate.

It is worthwhile to take a glance at the definitions as they appear in a prominent general dictionary, and some dictionaries of biological terms. This will serve as a preliminary to arriving at an adequate definition.

According to Funk & Wagnalls (1930), *crest* is defined as (1) A comb or tuft on the head of a fowl. (2) The projection on top of a helmet; a plume or tuft. (3) A ridge of a wave or of a mountain; the top of anything. (4) A heraldic device; coat of arms. (5) Loftiness; pride; courage. (6) The ridge of the neck of a horse or dog. (7) Architecture: (a) The ridge of a roof. (b) Carved work or any continuous ornament on the ridge or other elevated parts of an edifice; a cresting.

Cooke (1873), dealing with plants and fungi, defined *crest* as "having a ridge or crest".

Gray ex Fernald (1950), dealing with higher plants, defines *crested* as "bearing elevated ridges on projections on the surface, especially on petals, etc."

Featherly (1954) defines *crested* as "with elevated and irregular toothed ridge."

Benson (1957), dealing with higher plants, defines *crested* as "with a crest, that is, a projection at a prominent position such as the apex or midrib of an organ."

Jaeger (1962), dealing with biology in general, mostly zoology, defines *crest* as "the crest of a helmet, the plume; the tuft on the head of animals."

It is readily apparent that the concept of the crest as applied to biology at present is inadequately defined. It is therefore necessary to formulate a comprehensive definition of the term *crest* as it applies to biology as a whole.

The term *crest* as applied in biology refers to the design, ridge, tuft, plume, or any projection at a prominent position on top of any part or organ of an organism (Traub, 1964), including *Acellulare* (viruses), and *Cellulare—Procaryotae* (bacteria and former blue green algae), and *Eucaryotae* (*Plantae, Heteroplantae* (fungi) and *Animalia*).

In the *Allium* L. ovary and capsule there are various kinds of crests ranging from designs through tufts, plumes and other kinds of projections. The crests on the ovary are usually not static but are subject to change as the ovary develops into the capsule. In some cases the design or projections on the ovary are barely recognizable, or even unrecognizable, in the mature capsule.

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CHROMOSOME NUMBER IN **LYCORIS "CINNABARINA"**

NATHAN WILLIAM EASTERLY

During the past year an undergraduate student, Thomas Bryan, and I have worked out the chromosome number of *Lycoris "cinnabarina"*. The growth of the plant is very similar to that of *Lycoris sanguinea.* William L. Hunt (Plant Life, 1963, page 51) refers to it as a variety of *L. sanguinea* and Sam Caldwell, (Plant Life, 1965, page 105), says that the plant may turn out to be *Lycoris kiushina.*

Mr. Bryan took microphotographs (x 1000) of root tip smears. Figures 12-A, 12-B and 12-C are three different shots of the same group of chromosomes. I made xerox copies of the prints, took a small pair of scissors to cut out the individual chromosomes, and lined up the chromosomes as seen in Figure 12-D. Later on, I made smears of two other plants of *Lycoris "cinnabarina"* and made sketches (x 1500) as seen in Figures 12-E and 12-F.

Mr. Bryan found 21 rod-shaped chromosomes and 1 V-shaped chromosome. He also found one B chromosome which would make the chromosome number 2n=22+1B. From the xerox copies I did find the V-shaped one as shown in Figure 12-D. In the lower right corner of Figure 12-C, you will notice the median primary constriction. Another chromosome in Figure 12-C appears to have a median constriction, but these are two chromosomes that are overlapped. 16 of the rod-shaped chromosomes have sub-terminal constrictions.

Note in Figures 12-E and 12-F the chromosome which could be the V-shaped one (arrows) and a smaller fat chromosome (arrows). This smaller chromosome is shown at the lower right of Figure 12-D. I did not find the B chromosome to which Mr. Bryan refers. All 22 chromosomes were bivalent. Some of the sub-terminal constrictions were very clear in the aceto-carmine preparation, others were not.

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SENDING LIVE AMARYLLID FLOWERS BY MAIL

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Difficulty had been experienced in sending specimens of live amaryllid flowers through the mails. Since others may also wish to send live flowers for identification by mail, the following method may be of general interest.

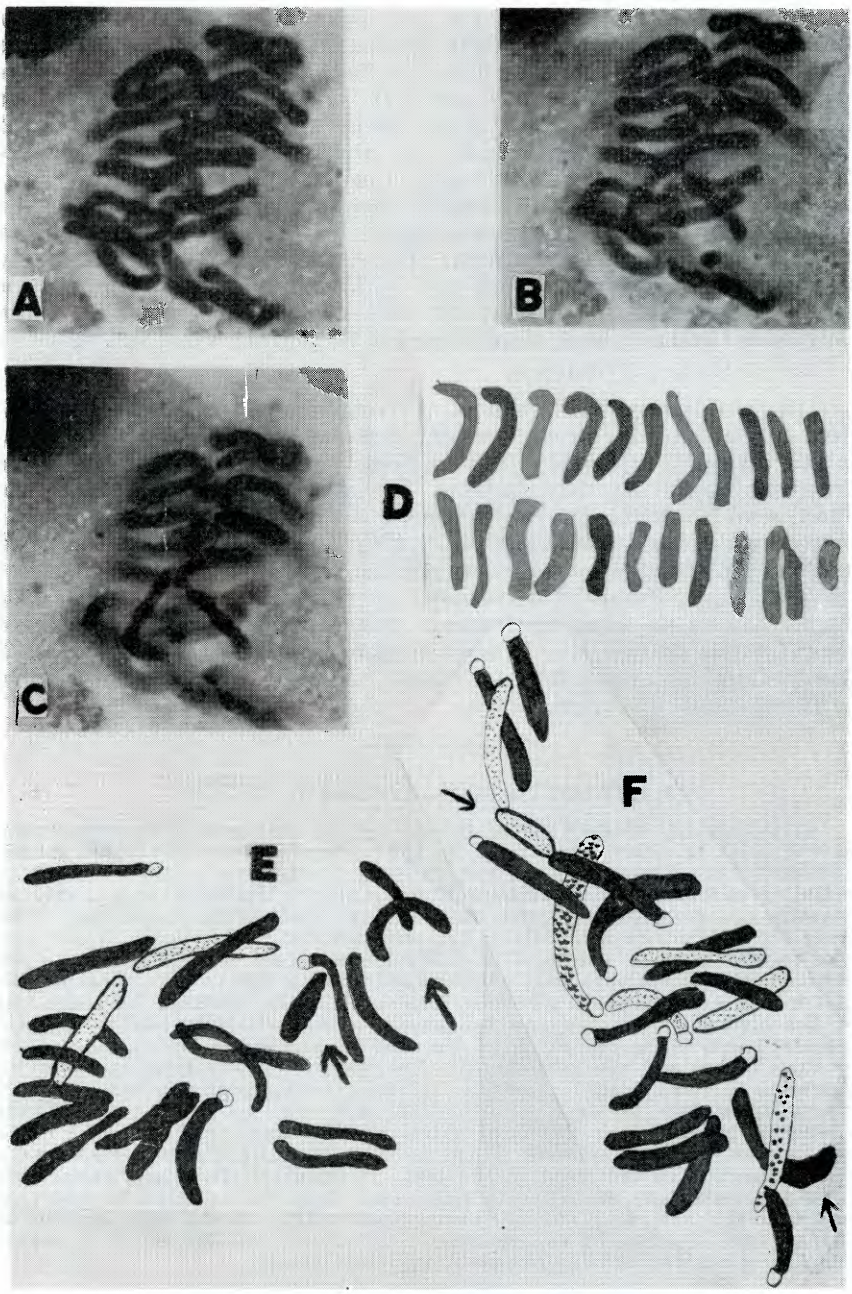

Fig. 12. Chromosomes of **Lycoris** "cinnabaria", 2n = 22, according to Easterly. A, B, C & D, X 1000; E & F, X 1500. For explanation see text.

Formerly specimens were cut just prior to shipment, but mostly the flowers never arrived at their destination in good condition. The new method is as follows: the flower or flowers are cut and placed in a plastic bag *with one end open*, and left for 12 hours in an automatic defrosting refrigerator which gently picks up excess moisture. Thus there is less mushiness on reaching the destination. The usual precautions of wrapping paper table napkins around the bloom before packing in the plastic bag is still followed to help prevent crushing the fragile tepalsegs, and to act as a gentle sponge. Further, it was found that a too small container had been used. The bloom should be left as nearly as possible in the normal shape and with an ample supply of air for the journey. *With the help of air mail,* a bloom of a double *Crinum* (sugnenus *Codonocrinum*) finally reached its journey's end in California with even the perfume intact.

In the October 1959 *Begonian,* the writer saw in the Society's Seedfund column, an offering of seeds of *"Crinum powellii album"*. He obtained 5 seeds. All grew and some three years later they reached the flowering stage. As they flowered, it was noted that one plant produced semi- to double-flowered blooms *but only at random.* Having no source books except the copies of PLANT LIFE since 1965, he turned to Dr. Traub for help in checking out the plant, and a judgment about its uniqueness. Finally, the specimen arrived safely to demonstrate that double flowers do occur in *Crinum.* Others may wish to take note of their *Crinum* species and hybrids to study further the occurrence of flower doubling in the genus *Crinum.* Reports by others on double Crinums would be appreciated.

PLANT LIFE LIBRARY—continued from page 4.

WOODLAND NUGGETS OF GOLD, by Val Hardacre. Vantage Press, 120 W. 31st St., New York 1, N. Y. 1968. Pp. i—xii + 304. Illus. $4.95. Subtitled "The Story of American Ginseng Cultivation", this is mainly a rambling autobiographical account of the author's activities as a digger of Ginseng and Goldenseal in the wild, and the cultivation of ginseng. The story "is interwoven with family life and personal experiences. . . . It is a year-to-year account, arranged in chronological order, with allusions to the events taking place that were significant of those times." Cultural details of Ginseng culture are introduced incidentally. In addition he comments on the history of Ginseng and Goldenseal as an article of commerce from colonial times to the present day. Ginseng is a medicinal herb highly prized by the Chinese and other orientals. Two species are involved, **Panax quinquefolius** L. (Araliaceae), American Ginseng, which grows in rich and cool woods, from Que. to Man., s. to n. Fla., Ala., La., and Okla.; and **Panax schinseng** Nees, Asiatic Ginseng, native to Manchuria and Korea. These two species **are not related** to the garden Parsnip, **Pastinaca sativa** L. (Umbelliferae) as indicated in the text. Goldenseal, **Hydrastis canadensis** L. (Ranunculaceae), is native to rich woods from Vt. to Minn. & Nebr., s. to Ga., Ala., Ark. and (formerly) e. Kans. This is the only history of Ginseng and Goldenseal as American crop plants and the book is recommended to all who are interested in economic botany.

PLANT LIFE LIBRARY—continued on page 76.

CONTRIBUTIONS TO SOUTH AMERICAN AMARYLLIDACEAE—III.

PEDRO FELIX RAVENNA

I. SYNOPTIC TREATMENT OF THE GENUS **PHAEDRANASSA**

During several searching trips to the Andes, I had the opportunity of collecting a large quantity of bulbous plants. Among them were the species of **Phaedranassa.** One of these was the little known **Ph. dubia** (H.B.K.) Macbr., the other proved to be an undescribed species. The purpose of the present article is to present an up-to-date review of the genus.

Phaedranassa Herb.

Herbert, Edwards' Bot. Reg. 31: misc. p. 16. 1845.—Inflorescence few to many-flowered. Flowers pedicellate horizontal to pendulous, varying from yellowish green, pink, scarlet or red and green, more or less tubular throughout or slightly ampliated at the apex. Hypanthium absent. Tepals narrowly oblanceolate, rather connate at the base. Filaments free, filiform or connate toward the base into a membranous cup (subgenus Stricklandia) attached to the base of the free portion of tepals, filiform, of two or four different lengths. Anthers small oblong-reniform, versatile. Ovary ellipsoid obtusely trigonous; ovules many per cell. Style filiform equaling or surpassing the stamens. Stigma capitate or clavate-capitate. Capsule subglobose; rather tricoccous. Seeds flattened, often D-shaped, black, with membranous edges.

Bulb ovoid produced into a short neck. Leaves petioled, blade lanceolate or elliptic, acute. Scape cylindrical not fistulose. Spathe bivalved; valves marcescent papyraceous; inner bracts as many as the flowers. **Type-species: Ph. cloracra** Herb. = **Ph. dubia** (H.B.K.) Macbr. (Ecuador, Colombia).

Range.—Ecuador and Colombia to Costa Rica. Three species were reported by Macbride to Peru (see notes below).

Species recognized: Ph. carmioli, Ph. dubia, Ph. lehmanni, Ph. loxana, Ph. schyzantha, Ph. tunguraguae, Ph. viridiflora and **Ph. eucrosioides.**

Notes.—Three species were quoted by Macbride (1938) to Peru. With the probable exception of one locality datum, referred by this author to **Ph. viridiflora** ("Huancayo, on the way to the montana", Raimondi), the rest concerning the green-flowered species, must be associated with **Rauhia multiflora** (Kunth) Rav. A dissection of Raimondi's specimen (in SM) shows that this sheet is probably the only one which should be truly referred to the genus; due to its membranous staminal cup it should belong to the subgenus **Stricklandia.** Nevertheless a further study on this specimen is needed in order to identify it correctly.

The report of **Ph. carmioli** from Cusco (Peru) seems doubtful; it probably is a misidentification of some **Eustephia** species.

Systematic position of **Phaedranassa** and its allied genera

Due to the fact that our genus is closely related to **Rauhia,** and has an obvious similarity with **Stenomesson,** it is transferred to the tribe **Stenomesseae.** The scape is solid, and not hollow as was interpreted by Traub (1963). The same position is adopted with **Eucrosia** a genus allied to **Phaedranassa.**

The genus **Chlidanthus** has, in my opinion, a striking resemblance with **Castellanoa,** especially concerning the androecium. Moreover it has 20 somatic chromosomes, a quite unrelated number from those found in **Rauhia** (see Flory 1966) and other genera of the tribe **Stenomesseae.** For these reasons it is placed beside **Castellanoa,** within the tribe **Eustephiae,** as follows:

1a. Flowers red pendulous or sometimes cernuus, slightly zygomorphic ..... **CASTELLANOA**
1b. Flowers yellow, upright to suberect, almost actinomorphic ..... **CHLIDANTHUS**

Tribe **Stenomesseae**

1a. Leaves fleshy, almost coriaceous, folded outwards in outwards in prefoliation ..... **RAUHIA**
1b. Leaves not fleshy, nor almost coriaceous, not folded outwards in prefoliation.
2a. Staminal cup, if present, frequently narrow, more or less hidden by the tepals.
3a. Flowers with a true hypanthium. Staminal cup always present ..... **STENOMESSON**
3b. Flowers lacking a true hypanthium. Filaments free or rarely connate toward the base into a membranous staminal cup.
4a. Stamens moderately surpassing the perigone (not more than half of its length); its filaments straight .... **PHAEDRANASSA**
4b. Stamens twice to five times the length of the perigone; its filaments often declinate-ascending ..... **EUCROSIA**
2b. Staminal cup very large, prominent, not hidden by the tepals. Stamens arising from the inner surface of the staminal cup, some distance below its edge ..... **PARAMONGAIA**

Key to species of **Phaedranassa**

1a. Filaments free.
2a. Flowers red more or less tinged with green.
3a. Flowers green at the apex or, in one case, also at the concrescent part of tepals; the rest red.
4a. Tepals somewhat spreading at their apex. Stamens much surpassing the perigone.
5a. Concrescent portion of tepals green ..... 1. **Ph. loxana**
5b. Concrescent portion of tepals red.
6a. Concrescent part of tepals funnel-shaped. Leaves dark green (at least in the adaxial face), not pruinose, with a short petiole ..... 2. **Ph. carmioli**
6b. Concrescent part of tepals, cup-shaped. Leaves not dark green, pruinose (at least in the wilds); petiole rather long ..... 3. **Ph. dubia**
4b. Tepals straight for all their length. Stamens scarcely surpassing the perigone ..... 4. **Ph. tunguraguae**
3b. Flowers red towards the apex; green only at the concrescent part of tepals.
7a. Flower constricted at the end of the concrescent portion of tepals. Stamens exceeding the tepals for 12-13 mm. ..... 5. **Ph. schizantha**
7b. Stamens exceeding the tepals for 12-13 mm. Flowers constricted at the end of the concrescent portion of tepals ..... 6. **Ph. lehmanni**
2b. Flowers green, passing into whitish and greenish yellow towards the base ..... 7. **Ph. viridiflora**
1b. Filaments connated towards the base into a membranous staminal cup ..... 8. **Ph. eucrosioides**

Subgenus 1. **Phaedranassa**

Filaments free to the base. Staminal cup absent.

1. **Phaedranassa loxana** Rav. **nom. nov.**

Phaedranassa cloracra Lindley, Edwards' Bot. Reg. 31: tab. 16. 1845. Excl. syn. **Ph. cloracra** Herbert, l.c: misc. p. 16. 1845.

Bulb nearly globose or broadly ovoid, about 6-6.5 cm. long, 6.4 cm. wide, with a short neck. Leaves oblanceolate, petioled, probably serotine, about 19 cm. long, 45 mm. broad; petiole relatively long; blade with crossing veinlets in the abaxial face. Scape cylindrical apparently pruinose about 7-8 mm. broad. Inflorescence about 12-flowered. Spathe marcescent papyraceous; inner bracts many narrowly lanceolate. Flowers nodding about 58-59 mm. long, 31-32 mm. in diameter at the apex, slightly constricted at the end of the concrescent portion of the tepals, which is green. Tepals oblanceolate about 44-52 mm. long, 75-95 mm. broad; a rose-red for 30-35 mm., upper third greenish with yellowish margins. Filaments biseriate, [the epipetal slightly longer, about 57-60 mm. long]; anthers reniform-oblong, yellow about 5-6 mm. long. Ovary obovoid or ellipsoid obtuse-trigonous, green. Style equaling the stamens or apparently slightly shorter; stigma capitate.

Hab.—Ecuador, region of Loja.

Phycella cloracra Herb. was a superfluous additional name for **Haemanthus dubius** H.B.K. (known at present as **Phaedranassa dubia).** Herbert includes **H. dubius** under synonymy of his species quoting the same locality data mentioned by Humboldt, Bonpland and Kunth. This fact obviously proves that **Phycella cloracra** was correctly referred by authors to **H. dubius** H.B.K. Furthermore when Herbert established **Phaedranassa** (Bot. Reg. 31: misc. p. 16, 1845), he repeats for **Ph. cloracra** (the type species) the synonymy and place of origin as under **Phycella cloracra** Herb. Thus, both names must be associated to the same plant.

In the same volume (under plate 17), Lindley reproduces Herbert's Latin descriptions for the name **Phaedranassa cloracra.** Unfortunately he gives the illustration of a related, but different species. This was found also in Ecuador, near Saraguro, a small town which belongs to the southernmost province of Loja. Actually, Lindley himself was approaching to the truth, when he stated: "Another species of **Phaedranassa** is the **Phycella obtusa** mentioned in the last volume of this work at no. 93 of the miscellaneous matter. It was also one of the discoveries of Mr. Hartweg, who collected it on the arid banks of the river Guallabamba, in the valley of San Antonio, in the province of Quito, at an elevation of about 7000 feet above the level of the sea. As this was the place where Humboldt and Bonpland found their **Haemanthus dubius,** it is not improbably that it is of **P. obtusa** rather than **cloracra** that this plant is a synonym". **Phycella obtusa** Herb. represents a further synonym for **Phaedranassa dubia** (H.B.K.) Macbr.

A question then arises: should we have considered Lindley's plant as a validly published species? The alternative lies in the fact that the new combination **Phaedranassa cloracra** (Herb.) Herb. and **Ph. cloracra** in the sense of Lindley, appeared in the same volume. We could have selected Lindley's article against Herbert's. By this way, the binomial **Ph. cloracra** should have been preserved for Lindley's plant, as published by this author. This statement however, even if possible, would not have helped in clearing up of our knowledge of the genus; moreover, much confusion would be added. It seemed better to accept **Ph. cloracra** (Herb.) Herb., as a validly published combination, even if it would be kept under synonymy of **Phaedranassa dubia** (H.B.K.) Macbr. Thus, a new name for Lindley's plant is necessary.

Having had the opportunity of seeing in the wilds a large number of plants of **Ph. dubia,** no doubts exist in my mind that **Ph. loxana** represents a distinct species.

2. **Phaedranassa carmioli** Bak.

Baker, Saunders' Ref. Bot. 1: tab. 46. 1869.

A native of Costa Rica where it was recently recollected (see Herbertia 1940). The leaves are very similar to those of **Ph. tunguraguae** Rav.

3. **Phaedranassa dubia** (H.B.K.) Macbr.

Macbride, Publ. Field Mus. Nat. Hist. Chicago, Bot. Ser. 11: 12. 1931; **Haemanthus dubius** H.B.K., Nov. Gen. Sp. Pl. 1: 281. 1816; **Crinum quitense** Sprengel, Linn. Syst. Veg. 2: 55. 1825; **Collania dubia** (H.B.K.) Roemer et Schultes, Linn. Syst. Veg. 7(2): LII. 1830; **Phycella obtusa** Herbert, Edwards' Bot. Reg. 30: misc. p. 93. 1844; **Phaedranassa cloracra** Herbert, Edwards' Bot. Reg. 31: misc. p. 16. 1845; **Ph. obtusa** (Herb.) Lindley, **loc. cit.** 31: sub tab. 17. 1845.

Plant about 40 cm. high. Bulb widely ovoid covered with brownish, more or less corrugated coats, these are often produced upwards in a somewhat long pseudoneck (at least in the wild); roots somewhat fleshy. Leaves none at flowering time, [hysteranthous], sometimes decumbent, distinctly petioled, about 30-40 cm. long, 50-65 mm. broad; petiole about 7-10 cm. long; blade oblanceolate, revolute in vernation, often pruinose in the adaxial face, paler and with a thick midrib in the abaxial face. Scape cylindrical, not fistulose, pruinose, about 40 cm. long, 7.5 mm. broad. Spathe 4-6-flowered, bivalved; valves lanceolate, subequal, at anthesis papyraceous; inner bracts linear. Flowers pendulous, about 50 mm. long, 18 mm. in diameter or sometimes less at the apex, bright red from the base to 33 mm., green or greenish upwards. Pedicels cylindrical about 15-20 cm. long. Tepals narrowly oblanceolate, concrescent for nearly 10 mm., permanently imbricate-contiguous for more than three quarters of their length, then somewhat spreading, the green portion paler at the margins; the outer about 42-43 mm. long, 7 mm. broad, the inner slightly shorter and broader, about 38 mm. long, 7.5 mm. broad. Filaments somewhat complanate especially downwards, 4-seriate, pinkish, the lower pair about 4.45 mm. long, intermediate single about 45 mm. long, next pair nearly 47 mm. long, the lower single about 49 mm. long. Anthers yellow, nearly reniform, versatile, about 3 mm. long. Ovary declined, ellipsoid, tricostate, green, about 8.2 mm. long, 3.8 mm. wide. Capsule subglobose, somewhat tricoccous. Seeds flattened, black, D-shaped, with membranous edges.

Hab.—Frequent from Quito province in Ecuador, to Pasto (Colombia). It grows often on slopes in a well drained soil. I have found it, sometimes associated with **Ennealophus** sp. **(Iridaceae), Stenomesson aurantiacum** (H.B.K.) Herb., **Salvia** sp., **Erica** sp., and several small bushes.

Phaedranassa tunguraguae Rav., **sp. nov.** (Fig. 13)

Planta usque 64 cm. alta. Bulbus late ovatus ad 5.5-7 cm. longus circ. 4.5-5.8 cm. latus tunicis exterioribus fusco-ochraceis in collo perbrevi circ. 2.5 cm. longus productis. Folia usque tres autumnali-vernalia prefoliationis revoluta ad anthesin absens petiolata ad 29-40 cm. longa circ. 53-80 mm. vel ultra lata; lamina fusco-viridia subnitida lanceolata vel oblanceolata; petiolus ad 6-9 cm. longus. Scapus teres efistulosus usque 54 cm. longus, prope basin usque 12.3 mm. latus, ad apicem circ. 6.8 mm. latus, pruinosus. Spatha 6-8-flora vivalvata, valvae valde inaequales circ. 3.8-4.2 mm. longae marcescentes papyraceae ad anthesin reflexae; bracteae interiores plures angustissime lanceolatae vel sublineares. Pedicelli ad 12-40 mm. longi. Flores declinati haud penduli ad 4 cm. longi ad basin veram viridi deinde circ. 26 mm. rubro-corallini, ad apicem viridi. Tepala anguste oblanceolata ad basin circ. 3.5 mm. connata subrecta inter se imbricato-con-

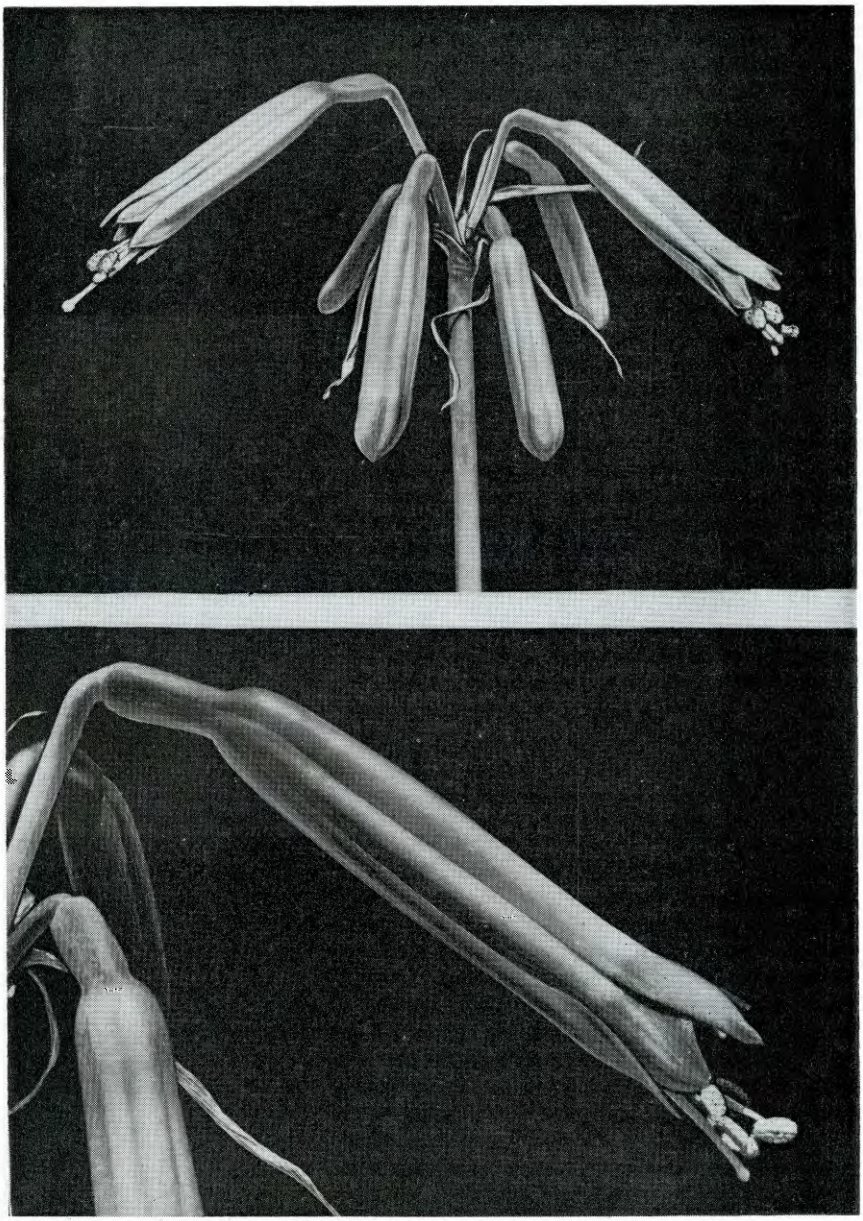

Fig. 13. **Phaedranassa tunguraguae** Rav., **sp. nov.**, native to Ecuador. Photo by P. F. Ravenna.

tigua ad 32 mm. longa circ. 4 mm. lata, exteriora perbreviter apiculata, interiora leviter minora acuta. Filamenta ad basin partii libera tepalorum insaet filiformia alba stricte fasciculata tepalas breviter superantia, 4-seriata Antherae aellypticae ad 1.8-1.9 mm. longae, pollen luteus. Ovarium subaellypticum obtuse triqetrum pruinosus ad 6 mm. longum circ. 3 mm. latum. Stylus filiformis ad 38-43 mm. longus; stigma capitatus. Capsula matura seminaque non vidi.

Hab.—In decliviis abruptis supra fluminem Pastaza prope Baños (locis Spruceanis) prov. Tunguraguae Equatorii. Crescit prope **Anthericum glaucum** Ruiz et Pav., **Ennealophus** sp. **(Iridaceae), Coursetia** cfr. **fruticosa** (Cav.) Macbr. **(Leguminosae), Vicia** cfr. **andicola** Kth. (Ley.) Bromeliaceae et caet. Culte in horto meo.

Plant about 54 cm. high. Bulb widely ovate about 5.5 cm. long, 4.5-5, 8 cm. wide; outer coats brownish produced into a very short (about 2.5 cm. long) pseudoneck. Leaves not more than three, from autumn to the beginning of spring, revolute in vernation, not developed at the flowering time, petioled, about 29-40 cm. long, 53-80 mm. broad; petiole about 6-9 cm. long; blade lanceolate or oblanceolate, dark green, slightly shining, paler on the abaxial face. Scape cylindrical, solid, about 54 cm. long, 10-12, 3 mm. wide near the base, 6 mm. near the apex, pruinose. Spathe bivalved 6-8-flowers; valves marcescent, papyraceous at anthesis; inner bracts several, very narrowly lanceolate to nearly linear. Pedicels about 12-40 mm. long. Flowers declined, not nodding, about 4 mm. long, green in the very base, coral-red for 26 mm., green toward the apex. Tepals narrowly oblanceolate, about 32 mm. long, 4 mm. broad, connate at the base for 3.5 mm., nearly straight, imbricate-contiguous for 23 mm., outer shortly apiculate, inner slightly shorter, acute. Filaments attached to the base of the free portion of the tepals, filiform, white, closely fasciculate, of four different lengths, somewhat longer than the tepals. Anthers elliptical about 1.8-1, 9 mm. long; pollen yellow. Ovary nearly elliptical obtusely trigonous, about 6 mm. long, 3 mm. wide. Style filiform about 38-43 mm. long; stigma capitae. Mature capsule and seeds not seen.

Hab.—In rugged slopes above the river Pastaza, near Baños, prov. of Tunguragua, Ecuador. It grows near **Anthericum glaucum** Ruiz & Pav., **Ennealophus** sp. **(Iridaceae), Coursetia** cfr. **fruticosa** (Cav.) Macbr., (Leguminoses), **Vicia** cfr. **andicola** Kth. (Legum.), Bromoliads and others. Cultivated in my collection at Buenos Aires.

Specimens.—Cultivated at Buenos Aires from bulbs collected in the above mentioned region; leg. Ravenna 373, nov. 1965. (type in Herb. Ravennae).

This species seems to be an endemic of the Baños region, in Ecuador. It was found by me, in the vegetative state, in the same places which were intensively explored by R. Spruce during 1857. Our plant is quite rare and it grows practically concealed by bushes. Thus it is not surprising that the famous English botanist had not found it.

The bulbs were introduced to my collection of living plants. One of them flowered for the first time in 1965. In the following years I have seen flowers twice. The plants seem to be well established in pots. They have to be kept nearly dry when they give flowers and have no leaves.

5. **Phaedranassa schyzantha** Bak.

Baker, Gard. Chron. n. ser., 14(2) : 556. 1880

The flowers of this species were described by Baker (1888) as: "Perianth limb 1½ in. long; tube campanulate green 1/6 in. long; segments lanceolate, bright red, with a salmon coloured obtuse tip ¼ in. broad.

Hab.—Andes of Colombia ("Ecuador" according to Baker), Pasto, about 3200 m. Discovered by André in 1876.

6. **Phaedranassa lehmanni** Reg.

Regel. Gartenfl. 32: 354, tab. 1138. 1883.

Possibly not specifically distinct from **Ph. schyzantha.** The only character which doubtfully separates both taxa is the length of stamens and style. The geographical range of both seems to be practically coincident or at least not very distinct.

Hab.—Columbia, western slopes of the Andes, at an elevation of about 2200 m. Introduced by Lehmann.

7. **Phaedranassa viridiflora** Bak.

Baker, Gard. Chron. n. ser. 8(2): 134. 1877.

According to Baker this could be a colour-variety of **Ph. dubia.** In my opinion it seems to be a good species.

Hab.—Andes of Ecuador. Described from living specimens sent by Mr. H. J. Elwes in June 1877, and Mr. Wilson Saunders.

Subgenus 2. **Stricklandia** (Bak.) Rav. **comb. nov.**

Genus **Stricklandia** Baker, Handb. Amaryll.: 105. 1888.

Filaments united in the lower half forming a staminal cup.
Type-species: Ph. eucrosioides (Bak.) Rav.

8. **Phaedranassa eucrosioides** (Bak.) Benth. & Hook.

Gen. Pl. 3(2): 733. 1833; **Stricklandia eucrosioides** (Herb.) Bak. Amaryll. 105. 1888; **Leperiza eucrosioides** Bak., Gard. Chron. 1(1878) 170; **Stenomesson stricklandii** Bak. loc. cit. 2 (1882) 102.

It does not seem necessary to repeat here Baker's description. According to this author, **Stricklandia** differs from Phaedranassa merely in its filaments united into a staminal cup in the lower half. Excepting this character, it is similar in every respect to the latter genus. Therefore I have reduced it to subgeneric rank. Apparently there exists a second species of this subgenus in Peru.

Excluded or doubtful species

Rauhia multiflora (Kth.) Rav., **comb. nov.**

Phaedranassa multiflora Kunth, Enum. Pl. 5: 502. 1850; **Ph. megistophylla** Kraenzlin, Engler Bot. Jahrb. 54, Beibl. 17: 2. 1916; **Rauhia peruviana** Traub, Pl. Life 13: 73. 1957; **Rauhia megistophylla** (Kraenzl.) Traub, Pl. Life 22: 5. 1966; Ravenna, Sellowia 19: 33. 1967.

In the first series of these notes (Ravenna, 1967), **Phaedranassa megistophylla** Kraenzl. was recognized as belonging to the genus **Rauhia.** Consequently, the combination **Rauhia megistophylla** (syn. **R. peruviana** Traub) was made. The same conclusion was reached by Traub a year before (see Traub 1966), but due to an oversight, his article was not detected.

Recently however, **Ph. multiflora** Kth. a much earlier binominal was found for the same species. The geographic range given by Kunth was "Colasey, Prov. Jaen de Bracamoros". No further reports of country as to habitat were quoted. In spite of this omission, the place was detected by me as belonging to Peru. Therefore, the complete data for the species must be: Peru, Dept. Cajamarca, prov. de Jaén (or "J. de Bracamoros"), Colasay (not "Colasey"). As can be seen, it belongs to the very same region where the other populations were found. Vernacular names are: "puccra" and "oreja de burro". Chromosomes: 2n = 46 (Flory, W. S. Plant Life 22: 52-55. 1966).

"? Phaedranassa vitellina Roezl. ex Wallace" **nomen subnudum.**

Wallace, Gard. Chron. ser. III, 83: 47. 1928. The author of this provisional name, and therefore illegitimate, writes as following: "A new species, probably a **Stenomesson,** described [verbally] as having brilliant orange-scarlet flowers". Collected in Ecuador, this should be associated with **Stenomesson aurantiacum** (H.B.K.) Herb.

"? Phaedranassa ventricosa Roezl. ex Wallace", **nomen subnudum.**

Wallace, loc. cit.: 47. 1928. Concerning this plant, its author says: "has a fine head of bright scarlet flowers very ventricose, with yellow protrudin antlers". Probably it should be referred to **Urceolina** peruviana, or to some allied species. It was found in Peru.

Phaedranassa rubroviridis Bak.

Baker, Gard. Chron. n. ser. 4(2): 7. 1875.

According to Baker (1888), this a synonym of **Eustephia coccinea** Cav.

II. STUDIES IN THE GENUS **GRIFFINIA**

During several collecting trips in Brazil, some species of this genus were found. They were cultivated in Buenos Aires, and their characters were studied and compared with those in other genera.

From a number of seven species gathered, three proved to be new to science, but only two flowered so as to permit descriptions and photographs. The third, a very rare native of southern Maranhao, was lost without flowering.

Invalidity of the genus **Hyline**

The genus **Hyline** was founded by Herbert (1841) who based it on a single species: **Hyline gardneriana** Herb.; this one automatically became the type.

It is of importance to repeat here Herbert's description of the androecium: **"filamenta cum stylo tenuia".** Nothing was said about a staminal cup. Moreover, in a foonote he states: **"Genus a Crino affine".** These points were confirmed by me on living plants recently collected, which were identified by comparison with a photograph of the type-specimen (at Kew). The latter consists of a single scape with flowers and two leaves. Therefore it is difficult to understand how Baker (1888) could have misinterpreted the nature of the androecium, describing it as "filaments very long united in a short cup at the base". Possibly he was influenced by the long narrow tepals, which resemble those of the **Hymenocallis** species.

On the other hand, on Gardner's label of collection is written: "These two withered specimens are all that I have been able to find. The flowers are white and must be very large. I sent plenty of bulbs to Mr. Murray. The bulb is used here as an emetico-purgative medicine in pectoral complaints". In the first line he was evidently referring to the poor and rather squashed specimen. This circumstance is excusable if we consider that the flowers expand late in the evening and last only one night. The flowers were surely decayed when the scape was taken probably in the morning.

Fifty eight years later, and as a consequence of Baker's mistake, the species was redescribed as **Hyline worsleyi** Mallet. Its author says: "The general aspect of the flower is that of **Griffinia**". In fact his opinion was correct, nevertheless in the 1936 edition of Herbertia, Worsley claims against Mallet's remark: "This cannot be substantiated", he says. Worsley was evidently following Baker in considering our plant as belonging to a genus related to **Hymenocallis,** a statement which as we have seen, is not accepted here.

Actually, the flower shows such characters as to justify a subgenus within the genus **Griffinia:**

Subgenus **Hyline** (Herb.) Rav. **comb. nov.** (within the genus **Griffinia** Ker-Gawl.); Genus **Hyline** Herbert, Curtis' Bot. Mag. 66: sub tab. 3779. 1841. **Type-species: Griffinia gardneriana** (Herb.) Rav.

Differs from subgenus **Griffinia,** by having nocturnal flowers, with long narrow tepals, all six stamens closely fascicled, declined, and many ovules per cell in the ovary.

Two species from Brazil: **G. gardneriana** (Herb.) Rav., a native of the States of Ceará, Pernambuco and Piauí, and **G. nocturna** Rav. from southern Goiás.

1a. Hypanthium absent or obsolete. Leaves nearly sessile or very shortly petioled, lorate or narrowly oblanceolate, nearly flat, closely prostrate on the ground (at least in the wilds) .....**C. gardneriana**

1b. Hypanthium well developed. Leaves petioled, broadly oblanceolate, rather canaliculate, not prostrate .....**G. nocturna**

Griffinia gardneriana (Herb.) Rav., **comb. nov.; Hyline gardneriana** Herbert, Curtis' Bot. Mag. 66: sub tab. 3779. 1841; **Hyline worsleyi** Mallet, Gard. Chron. ser. III, 26: 102. 1899.

Plant about 30-47 cm. high. Bulb widely ovate, about 45-70 mm. wide, covered with whitish or pale ochraceous coats; the pseudoneck always present, elongated, to 15 cm. long. Leaves lorate to oblanceolate, sessile or with a short petiole, always prostrate in nature, about 12-48 cm. long, 25-45 mm. broad, often with grayish areas in the adaxial face. Scape edged, about 20-36 cm. long. Spathe 2-3-flowered, bivalved; valves membranaceous, free down to the base. Pedicels about 19-32 mm. long. Flowers white, nocturnal, scented, about 12-15 cm. in diameter. Tepals linear-oblanceolate, subequal, about 15-18 cm. long, 13-16 mm. broad, the outer lateral and inner ones recurved. Stamens long, declined, all six fascicled, its filaments of four different lengths. Anthers linear-oblong, versatile, yellow, about 6-10 mm. long. Style white, about 15.7 cm. long; stigma punctate. Chromosomes: 2n = 20 (Mookerjea, 1955) see Traub (1963).

Hab.—It grows in sandy soil under deciduous woods. Quite common in the "caatingas" of southern Ceará, Piauí and southwestern Pernambuco. The bulb is used by natives as hemetico-purgative. Vernacular name: "cebola braba".

Specimens.—Brazil, Ceará, dry woods; leg. Gardner 1854, oct. 1838 (phototype from K).

Griffinia nocturna Rav., **sp. nov.** (Figs. 14 and 15)

Planta circ. 35 cm. alta. Bulbus ovato-globosus vel deppresso-globosus usque 7 cm. latus in collo productus, tunicis exterioribus albiusculis vel ochraceis vestitus. Folio usque quinque oblanceolata, valde petiolata longitudinaliter canaliculata ad margines revoluta usque 40-50 cm. longa circ. 7 cm. lata. Scapus 14-35 cm. longus circ. 10-12 cm. latus compressus. Spatha bivalvata 3-4-flora; valvae albiusculae vel viridiscentes lanceolatae ad apicem attenuatae valde carinatae et translucidae ad 50-66 mm. longae; bracteae interiores 2-3 anguste lanceolatae. Flores cernui albi ad 11-15 cm. longi horizontaliter usque 11 cm. latus, verticaliter circ. 10 cm. latus. Pedicelli crassi ad 3 cm. longi circ. 5.5 cm. lati vel nulli. Hypanthium subbrectus vel valde curvatus viridescens circ. 50 mm. longum. Tepala angustissima lineari-oblanceolata, exteriora ad 9 cm. longa usque 13 mm. lata, ad margines valde undulata, ad carinam viridescentia, apicem versus arcte recurvata (praecipue superius) apiculata (apiculus arc 4.7 mm. longus), interiori-lateralia ad 8.7 cm. longus circ. 10-12 mm. lata acuta valde recurvata. Filamenta alba fasciculato-declinata, sepalinum superiore ad 83 mm. longum, sepalina colateralia ad 88 mm. longa, petalinum inferiore circ. 72 mm. longum, petalina colateralia circ. 75. Anterae versatiles oblongo-lineares leviter arquatae ad 7.7 mm. longae; pollen luteus. Ovarium aellypticum obtuso-triquetrum pallide viride ovula biseriata 10-12 per loculum ad 8-12 mm. longum circ. 6.7-8.5 mm. latum. Stylus albus declinato-ascendens ad 15 cm. longus; stigma punctato-capitatus.

Hab.—In nemoribus hemideciduis vel deciduis collibusque prope urbem Goias, civit Goiás Brasiliae. Crescit prope **Trimezia lutea** (Kl.) R. C. Fost., ssp., **Alstroemeria** sp. **Aristolochia** sp. (suffrutex erectus floribus luteis concoloribus instructus), Commelinaceae, Euphorbiaceae urticantes, raro pr. **Bomarea** sp.

Plant about 35 cm. high. Bulb ovoid-globose or globose-depressed to 7 cm. wide, produced upward into a pseudo-neck; outer coats whitish or ochraceous. Leaves about five, oblanceolate, distinctly petiolate, chanelled, with slightly revolute margins, about 40-50 cm. long, 7 cm. wide. Scape compressed about 14-35 cm. long, 10-12 mm. broad. Spathe bivalved 3-4

Fig. 14. **Griffinia nocturna** Rav., **sp. nov.,** native to Goiás, Brasil. Inflorescence. Photo by S. Magno.

flowered; valves whitish or greenish lancelate, attenuate towards the apex, rather carinate, hyaline about 50-66 mm. long; inner bracts 2-3 narrowly, lanceolate. Flowers cernuus white, nocturnal, scented, about 11-15 cm. long, 11 cm. in its horizontal diameter, 10 cm. in its vertical diameter. Pedicels thick, about 3 mm. long and 5.5 cm. broad, or obsolete. Hypanthium nearly straight or rather curved, greenish, about 50 mm. long. Tepals very narrow linear-oblanceolate, the outer 9 cm. long, 13 mm. broad, with rather undulate margins and a greenish-cream, markedly recurvate towards the apex (especially the upper), apiculate (apiculus about 4.7 mm. long), inner-lateral about 8.7 cm. long, 10-12 mm. broad, acute, rather recurvate. Filaments white, declined, fascicled, the upper episepal about 83 mm. long, both lateral episepals about 88 mm. long, lower epipetal about 72 mm. long; both

Fig. 15. **Griffinia nocturna** Rav., **sp. nov.,** native to Goiás, Brasil. Flower, front view (left) and side view (right). Photos by S. Magno.

lateral epipetals about 75 mm. Anthers versatile, linear-oblong slightly curved, about 7.7 mm. long; pollen yellow. Ovary ellipsoid obtusely trigonous, pale green, about 8-12 mm. long; 6.7-8.5 mm. wide; ovules biseriate, 10-12 per cell. Style declinate-ascending, about 15 cm. long. Stigma punctate-capitate.

Hab.—Deciduous or semideciduous woodland on hills, near the town of Goiás in the State of Goiás, Brazil. It grows near **Trimezia lutea** (Kl.) Fost. ssp., **Alstroemeria** sp, **Aristolochia** sp. (a small shrub with yellowish unspotted flowers), Commelinaceae, Euphorbiaceae, rarely also near **Bomarea** sp.

Specimens.—Cultivated in Buenos Aires from a bulb collected in the above mentioned region; leg. Ravenna 531, April 1966 (type in Herb. Ravennae).

Fig. 16. **Griffinia espiritensis** Rav., sp. nov., native to Espirito Santo, Brasil. Inflorescences. Photo by P. F. Ravenna.

Bulbs of this handsome species were gathered by me in Goiás during the summer of 1966; at that time no flowers were found. Bulbs were carried to Buenos Aires and introduced to my collection. One plant flowered nearly one month later, a second which served for photographs, in the next spring. The scented flowers open at half past seven and they decay early the next morning, as follows: the first two or three simultaneously, the latter about two days later.

The small town of Goiás, the old capital of the State, was an obvious center for botanists of the last century, as Gardner, Saint Hilaire, Glaziou, and others which were going to collect in central Brazil. Therefore, it seems to me unexplicable, how they could have missed our plant, which is abundant a half kilometer or less, from the center of the town. Even if not in flower, bulbs should have been sent, with many others, to Europe for cultivation.

Crinum stapfianum Kraenzl. also a native of the State of Goiás, differs from our species by its long pedicels (to 6 cm.). Apparently, it was correctly classified in that genus.

A new species of the subgenus **Griffinia**

Griffinia espiritensis Rav., **sp. nov.** (Figs. 16 and 17)

Bulbus subglobosus circ. 5 cm. vel infra latus extus albiusculus vel pallide ochraceus in collo productus. Folia longe petiolata (petiolus erectus circ. 15-20 cm. longus); lamina subaelyptica vel late lanceolata subpatentia, acuta fusco-viridia, interdum obscure maculata sf 12-15 cm. longa circ. 7-8 cm. lata. Scapus teres sed leviter bimarginatus, ochraceo-rubellus, ad 25-75 mm. longus circ. 4.5 mm. latus. Spatha bivalvata 5-6-flora, valvae late lanceolatae basin versus connatae membranaceae translucidae integrae ad 16-22 mm. longae circ. 6-9 mm. latae. Flores pedicellati albiusculi et pallide lilacini ad 3.1 cm. longi horizontaliter circ. 3 an lati verticaliter circ. 3.2 cm. lati. Pedicelli pallide virides tereti ad 10.5 mm. longi. Tepara ad basin circ. 2.3 mm. concrescentia anguste oblanceolata, exteriori-lateralia paullo arquata ad 3.15 cm. long circ. 5 mm. lata apiculata (apiculus circ. 25 mm. long), exteriori-superius ad 3.3 cm. longum circ. 6.3 mm. lata apiculatum; ad basin apiculi minute tuberculata; interiori-lateralia ad exteriori-superius approximata usque 2.95 cm. longa circ. 6.4 mm. lata, leviter arquata, interiori-inferius declinato-horizontale ad 3 cm. longum circ. 4.2-5.4 mm. lata. Stamina fertilia sex; filamenta albiuscula, sepalinum-superius ad tepalum exteriori-superius approximatum circ. 23 mm. longum, caetera declinata, sepalina lateralia ad 24.5 mm. longa, petalina lateralia ad 19 mm. longa, petalinum-inferius circ. 18 mm. long. Antherae oblongo-reniformes ad 1.9-2.4 mm. longae, pollen cinereo-ochraceus.

Hab.—In sylvis civitatii Espiritu-Santo Brasiliae.

Bulb subglobose about 5 cm. or less wide, whitish or slightly ochraceous, produced into a pseudoneck. Leaves long petioled (petiole erect about 15-20 cm. long); blade nearly spreding, elliptical or broadly lanceolate acute, dark green sometimes obscurely maculated about 12-15 cm. long, 7-8 cm. broad. Scape cylindrical but with two slight margins, ochraceous to rufescent, about 25-75 mm. long, 4.5 mm. broad. Spathe bivalved 5-6-flowered; valves broadly lanceolate connate toward the base, membranous, somewhat hyaline, entire, about 16-22 mm. long, 6-9 mm. broad. Flowers pedicellated whitish and of a pale lilac about 3.1 cm. long, 3 cm. in its horizontal diameter, 3.2 cm. in its vertical diameter. Pedicels of a pale green, cylindrical, about 10.5 mm. long. Tepals connate for 2.3 mm. narrowly oblanceolate, outer-lateral somewhat arched about 3.15 cm. long, 5 mm. broad, apiculate (apiculus about 2.5 mm. long), the upper outer about 3.3 cm. long, 63 mm. broad also apiculate, at the base of the apiculus with a minute tubercle; both inner lateral approximate to the upper outer tepal, about 2.95 cm. long, 6.4 mm. broad, slightly arched, the lower inner declined to horizontal about 3 cm. long, 4.2-5.4 mm. wide. Stamens six all fertile; filaments whitish, the upper episepal approaching to the upper outer tepal about 23 mm. long, the rest declined, the lateral episepal about 24.5 mm. long, lateral epipetal about 19 mm. long, lower epipetal about 18 mm. long. Anthers reniform-oblong about 1.9-2.4 mm. long; pollen of a grayish-ochre colour.

Hab.—In woods of the State of Espiritu Santo, Brazil. It grows near **Neomarica** sp. (Iridaceae) and various Commelinaceae and Marantaceae.

Specimens: Cultivated in Buenos Aires from bulbs collected near the Sooretama Biological Reserve, on the way to the water-fall, State of Espiritu Santo, Brazil, leg. Ravenna 399, dec. 1965 (type in Herb. Ravennae). Brazil, Espiritu Santo, mun. Nova Venecia, Serra de Cima; leg. A. P. Duarte 3621, & J. C. Gomes 435, 16-XI-1953 (RB).

This very interesting species has the longest petioles in the genus. The shape of the flowers much resemble those of **G. rochae**, which bear only five stamens. It is somewhat related also to **G. ornata** T. Moore. This one however is a much more robust plant with shorter petioles and longer oblanceolate blades.

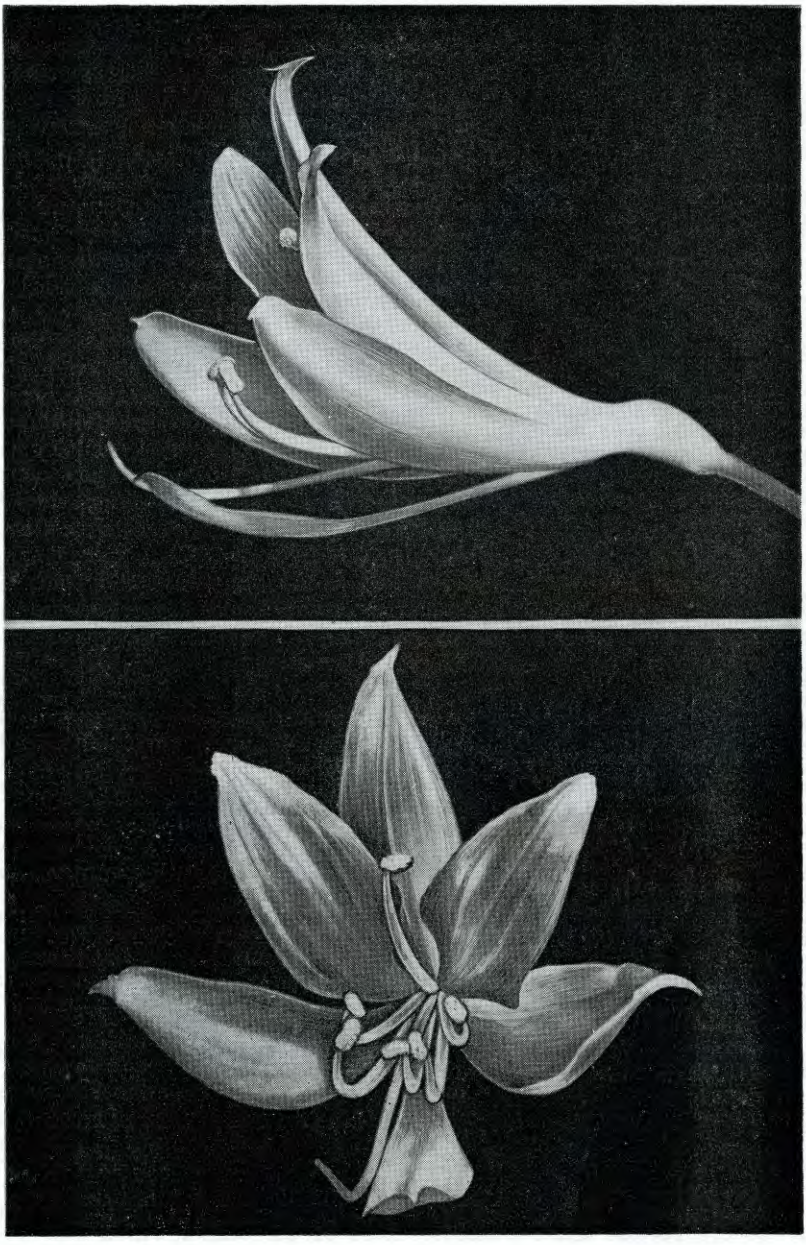

Fig. 17. **Griffinia espiritensis** Rav., Sp. Nov., native to Espirito Santo, Brasil. Details of flower, **upper,** side view; **lower,** front view. Photos by P. F. Ravenna.

III. **AMARYLLIS** NOTES

Some new species from Brazil are reported here. Additional miscellaneous notes are also included.

Amaryllis monantha Rav., **sp. nov.** (subgenus **Amaryllis**)

Planta usque 34 cm. alta. Bulbus parvus subglobosus saepe prolificus usque 38 mm. latus in collo perbrevi productus. Folia ad anthesin nulla serotina modice firma haud flaccida, glaucescentia canaliculata usque 15 cm. longa vel infra, circ. 2.5-3 cm. lata. Scapus teres ad 20-40 cm. longus usque 8 mm. latus. Spatha semper uniflora bivalvata; valvae lanceolatae rufescentes circ. 31-60 mm. longae; bractea interior unica lineari-acuta circ. 11-20 mm. longa. Flos declinatus scarlatinus ad 7-11 cm. longus circ. 9-10 cm. latus perapertus intus stella lutescenti notatus. Tepala 3-35 cm. connata oblanceolata, exteriora ad 72-80 mm. longa, circ. 26-33 mm. lata breviter apiculata (apiculus circ. 1 mm. longus), interiora subaequalia sed haud apiculata praeter inferiorem angustius circ. 20 mm. lata. Filamenta declinato-incurva, sepalinum superius ad 44-45 mm. longum, sepalina lateralia ad 49-50 mm., petalina lateralia ad 53-55 mm. longa; petalinum inferius ad 49-52 mm. longum; antherae oblongae paullo arquatae ad 32-50 mm. longae; pollen luteus. Ovarium obovato-ellypticum obtuso-triquetrum ad 6.3-7.3 mm. longum circ. 3.5-4 mm. latum. Stylus declinatus ad 85-99 mm. longus. Stigma capitatus obscure trilobatus.

Hab.—In rupestris ad Serra de Natividade civit. Goiás Brasiliae, etiam in Maranhao (mun. Balsas) in lapidosis nemoribus hemideciduis.

Plant about 34 cm. high. Bulb small nearly globose often producing bulblets about 38 mm. wide with a very short pseudoneck. Leaves none when in flower, serotinous moderately firm in texture not flaccid, glaucescent canaliculate about 15 cm. long or less, 2.5-3 cm. broad. Scape cylindrical about 20-40 cm. long, 8 mm. broad. Spathe always 1-flowered bivalved; valves lanceolate rufescent about 31-60 mm. long; inner bract single linear-acute about 11-20 mm. long. Flower declinate scarlet about 7-11 cm. long, 9-10 cm. in diameter widely expanded; marked by a yellowish star in the inside. Tepals connate for 3-3.5 cm., oblanceolate, the outer about 72-80 mm. long, 26-33 mm. broad shortly apiculate (apiculus about 1 mm. long), inner nearly equal but not apiculate, excepting the lower which is narrower, about 20 mm. broad. Filaments declined-incurved, the upper episepal about 44-45 mm. long, both lateral episepal about 49-50 mm. long, lateral epipetal about 53-55 mm. long, lower epipetal about 49-52 mm. long; anthers oblong somewhat arched, about 32-50 mm. long; pollen yellow. Ovary obovate-ellipsoid obtusely trigonous about 6.3-7.3 mm. long, 3.5-4 mm. wide. Style declinate about 85-99 mm. long. Stigma capitate obscurely trilobed.

Hab.—Between rocks or in stony soil on the Serra de Natividade, in the State of Goiás, Brazil; also in southern Maranhao (mun. Balsas) growing among stones in hemiciduous woods.

Specimens.—Brazil, State of Goiás, Serra de Natividade, rocky and stony slopes; leg. Ravenna 157, nov. 1962 (type in the Herb. Ravennae, isotype TRA).

This interesting species is closely related to **A. belladonna** Linn. Actually the flower is very similar in shape, but the one-flowered inflorescence, the aspect of bulb and leaves, and its habit, prove unmistakably that it is a distinct species.

It was found by me in northern Goiás, in rocky places on the Serra de Natividade, the same mountain where Gardner collected so many interesting plants. It was growing under partial shade associated with **Cipura flava** Rav. (Iridaceae). I have seen it again on stony soil, in semideciduous flat-woods of southern Maranhao. Unfortunately the bulbs were lost in cultivation.

Amaryllis restingensis Rav., **sp. nov.** Fig. 18 (subgenus **Omphalissa**)

Planta circ. 70 cm. alta. Bulbus ovato-globosus ad 7 cm. longus circ. 6 mm. latus in collo circ. 10-11 cm. longus productus. Folia ad anthesin incipientia ad 20-28 cm. longa circ. 2-2.5 cm. lata viridia canaliculata obtusa vel subacuta paullo carinata. Scapus pruinosus ad 52 cm. longus ad basin circ. 21 mm. latus. Spatha biflora; valvae subaequales marcescentes ad 5 cm. longae; bracteae interiores duae lineares ad 5 cm. longae. Flores rubri ad 10.5 cm. longi circ. 12.2 cm. lati extus nervis fusco-rubris persinuosis notati. Pedicelli ad 77-82 mm. longi, circ. 6.5 mm. lati. Tepala circ. 12-15 mm. concrescentia ad faciem adaxialem stria media viridia notata, exteriora subolanceolata saepe undulata, exteriori-superius ad 10.5 cm. longum circ. 46-47 mm. latum, exteriori-lateralia apicem versus paullo arquata ad in-

Fig. 18. **Amaryllis restingensis** Rav., **sp. nov.,** native to Guanabara, Restinga, Brasil. Photo by P. F. Ravenna.

teriori-inferius approximata usque 9 cm. longa circ. 3.9 mm. lata, interiori-lateralia recurve patentia ad 9.8 cm. longa circ. 30 mm. lata, interiori-inferius anguste oblanceolatum ad 9 cm. longum circ. 17 mm. latum ad fasciculum staminorum appressum. Filamenta arquate erecto-patentia 4-seriata ad 73-83 mm. longa ad 42 mm. e basinalbicantia vel albo-viridescentia, deinde rubella. Antherae oblongo-reniformes ad 5-5.5 mm. longae, pollen luteus. Paraperigonium subobsoletum in ciliis circ. 0.8 mm. longis reductum. Ovarium oblongum ad 16-17 mm. longum circ. 8.5-9.5 mm. latum. Stylus arquate erecto-patens ad 11-11.5 cm. longus, inferne albo-viridescens superne rubrus; stigma trifidus, lobis circ. 3.5-5 mm. longis.

Hab.—In arenosis littoraneis dictis "restinga" prope Yacarepaguá civit. Guanabara Brasiliae. Crescit prope **Diplothemium marittimum** Mart. **Cereus fernambucensis** Lem. **Epidendrum aellypticum** Grah., **Canavalia obtusifolia** D.C. et caet. Culta in horto meo.

Plant about 70 cm. high. Bulb ovate-globose, about 7 cm. long, 6 mm. wide, produced into a 10-11 cm. long pseudoneck. Leaves incipient when

in flower, about 20-28 cm. long, 20-22 mm. broad, green, chanelled, somewhat carinate, obtuse or subacute. Scape glaucescent about 52 cm. long, 21 mm. at the base. Spathe 2-flowered; valves nearly equal, marcescent, about 5 cm. long; inner bracts two, linear, about 5 cm. long. Flowers bright red, about 10.5 cm. long, 12.2 cm. in diameter with markedly sinuose deep red veins in the outside. Pedicels about 77-82 mm. long, 6.5 mm. broad. Tepals united for 12-15 mm., with a green band on the adaxial face; the outer nearly oblanceolate, often undulate, the upper outer about 10.5 cm. long, 46-47 mm. broad, lateral outer somewhat arched toward the apex, approximating to the lower inner, about 9 cm. long, 3.9 mm. broad, lateral inner recurvely spreading, about 9.8 cm. long, 30 mm. broad, lower inner narrowly oblanceolate, about 9 cm. long, 17 mm. broad, appressed to the stamen-fascicle. Filaments arched ascending, pale greenish from the base to 42 mm., reddish upwards. Anthers reniform-oblong about 5-5.5 mm. long; pollen yellow. Paraperigone nearly obsolete, reduced to whitish cilia, about 0.8-1 mm. long. Ovary oblong about 16-17 mm. long, 8.5-9.5 mm. broad. Style archedly ascending, about 11-11.5 cm. long, white-greenish below, red toward the apex; stigma trifid, its lobes 3.5-5 mm. long.

Specimens: Brazil, Guanabara, Restinga near Yacarepaguá, leg. Ravenna, Sept. 1965 (type in Herb. Ravennae).

This handsome species seems to be the only amaryllid which grows at full sun in the restingas of the State of Guanabara and probably too in all the State of Rio de Janeiro. **A. reticulata** is also found near the sea, but in woods as well as **Griffinia hyacintina** Ker.

It is nearly related to **A. maracasa** Traub, from which is distinguishable by the less flattened bright red flowers; its veins in the outside are sinuose in such a way as to give the flower a squared effect.

Amaryllis argentina (Pax) Rav., comb. nov.

Crinum argentinum Pax, Engler Bot. Jahrb. 11: 325. 1890; **Hippeastrum tucumanum** Holmberg, An. Mus. Nac. Bs. As., ser. III, 5: 153. 1905; **H. candidum** Stapf, Curtis' Bot. Mag. 153: tab. 9184. 1927; **Amaryllis candida** (Stapf.) Traub et Uphof, Herbertia 5: 123. 1938 (non tratt nec Lindl.); **A. tucumana** (Holmb.) Traub et Uphof, loc. cit.: 124; **Amaryllis immaculata** Traub et Moldenke, Amaryll. Tribe Amarylleae, 108. 1949; **Hippeastrum argentinum** (Pax) Hunziker, Kurtziana 4: 13. 1967.

Hab.—It grows in mountains of the provinces of Catamarca, Tucumán and Salta, especially on sandy places or between rocks. **Crinum argentinum** (Pax) was an earlier binomial for the species. The complete list of synonyms is given.

Specimens.—Argentina, Catamarca, dept. Andalgalá, common in slopes at El Suncho, 1600 m; leg. Joergensen 1481, II-1915 (SI). Tucumán, dept. of Capital, river Sali, 500 m; leg. S. Venturi 1283, 26-X-1921 (SI, LIL). Dept. Tafi, Tafi del Valle; leg. Schreiter s/n, 15-IX-1941 (LIL). Idem, La Hoyada, 1500 m; leg. Schreiter 4187, 18-XI-1923 (LIL). Idem, Sierra de San Javier; leg. Schultz, IX-1880 (phototype from F 9960, the type at B). Dept. Burruyacu, river Toro; leg. S. Venturi 2733 (LIL). Idem, Quebrada de Lules; leg. Schreiter 1379, 28-X-1920 (LIL). Dept. Trancas, Trancas; leg. M. Lillo 9809 (LIL). Salta, dept. Candelaria, Sierra de la Candelaria, 1200 m; leg. S. Venturi 3671, 2-II-1925 (SI).

Amaryllis argentina (Pax) Rav., ssp. **plicatilis** Rav., **ssp. nov.**

A subspecies argentina hypanthio viridi, foliis erectis prater tertium superiores vel infram arcte conduplicatis recedit.

Hab.—In montibus provinciae Jujuy Argentinae regionibus Tilcarae Tumbayae et caet. Culta in Hortus Botanicus Castelarensis. et in horto meo Bonariae.

It differs from the typical subspecies because of the green hypanthium and its erect stiff leaves, which are strongly conduplicate for much of their length.

Hab.—Mountains of the province of Jujuy, Argentina, near Tilcara, Tumbaya and other places.

Specimens.—Cultivated in the botanic garden of Castelar and in my collection from bulbs obtained from the province of Jujuy, Argentina; leg. Ravenna 505, dec. 1967 (type in Herb. Rav., isotype BAB). Argentina, Jujuy, dept. Tilcara, Yala de Monte Carmelo, 2900 m; leg. Fabris et al. 6446, 19-21-I-1966 (LP). Idem, dept. Sta. Bárbara, on the way to El Fuertè, on front of Madrejón; leg. Cabrera 16253, 23-X-1964 (LP). Idem, dept. Tumbaya, Chilcayo, Quebrada Grande, 2400 m; leg. Fabris et al. 6286, 8-I-1966 (LP).

This is apparently the plant which is cultivated in the United States as **Amaryllis candida.** The subspecies **argentina** has spreading, somewhat recurved, not conduplicate leaves, as in many other species of the genus.

Fig. 19. **Amaryllis reticulata** L'Hérit., as found in Misiones, Argentina. Photo by S. Magno.

Amaryllis reticulata (Fig. 19) in the flora of Argentina

During my searches concerning the identification of **Amaryllis petiolata** Pax, a dry specimen from the province of Misiones, which was determined as this species, proved to be **A. reticulata** L'Her. Thus, the presence of the latter in Argentina is here reported for the first time.

It is not the first case about species from the east side of southern Brazil, which are found in the Argentinian Mesopotamia (including Misiones) or in Paraguay. Among them, **Neomarica candida** (Hassl.) Sprague (Iridaceae) and **Zephyranthes flavissima** Rav. have such discontinuous ranges.

Recently, it seems that also a **Crinum** species has the same peculiar distribution.

Our plants belong to the typical form, without the white streak on the leaves.

Specimens.—Argentina, Misiones, Campiña de Américo; leg. C. Spegazzini (BAB 16700, SI); Argentina, Misiones, dept. of La Frontera, Campiña de Américo; leg. C. Spegazzini, 2-III-1907 (BAB 16701 & 16703, SI), Idem ibid., Barracón; leg. C. Spegazzini, 3-III-1907 (BAB 17154).

The real country of **Amaryllis vittata** L'Herit. Fig. 20

Most of the **Amaryllis** hybrids so appreciated in gardening, were obtained by crossing **A. aulica, A. reticulata, A. reginae, A. vittata** and a few others. Some of the commonest forms in gardens are the striped form known as "vittata hybrids". These come from the first reported breeding attempts in the genus: **A. X johnsonii,** a hybrid between **A. reginae** and **A. vittata.**

The place of origin of **A. vittata** was quoted as "Andes of Peru" but this has not been verified. In fact the species has not been collected in Peru and the exact range remains a mystery up to the present.

Due to the above mentioned reasons, the discovery of this species among dry material from the States of Santa Catarina [1] and Rio Grande do Sul,[2] in Brazil, appeared to be an extremely interesting event. The original text and especially the figure from L'Heritier's Sertum Anglicum (p. 13, tab. 15) were examined and no doubts remained about the identification. This was reinforced by comparing some photographs (one of these is reproduced in Fig. 20), made by P. R. Reitz, after L'Heritier's drawing.

In the 1966 Plant Life (see Fig. 12 in that publication), R. E. Herold reports on a cultivated plant identified as **Amaryllis vittata,** but the flowers are declined, and should apparently be regarded as a hybrid involving **A. belladonna** and **A. vittata.**

The species was collected in the past, in Santa Catarina, by Tweedie. The specimen, consisting of a sole flower, was deposited at Kew and served Herbert for erecting **"Hippeastrum ambiguum** var. **tweedianum".** This variety was transferred by Traub (1958), to **A. vittata** L'Her. var. **tweediana** (Herb.) Traub, the last combination. As Baker says (1888), "it varies much in the size of the flower and distinctness of the stripes". This point proved to be true also in the wilds, varying somewhat also in shape, and number of flowers in the inflorescence. The slight differences does not warrant a specific name. Therefore the variety **tweediana** should be included in synonymy as following:

Amaryllis vittata L'Heritier, Sert. Angl.: 13, pl. 15. 1788; **Hippeastrum vittatum** (L'Her.) Herbert, App. Bot. Reg.: 31. 1821; **Amaryllis lineata** Colla, Hort. Rip.: 3. 1824; **A. superba** Bury, Hexand. Pl: pl. 31. 1831-34; **Hippeastrum ambiguum** Hook. var. **tweedianum** Herbert, Amaryll.: 136, tab. 22, f. 3. 1837; **Hippeastrum solandriflorum** Herb. var. **tweedianum** Herbert, Curtis' Bot. Mag. 66: tab. 3771. 1841; **Chonais vittata** (L'Her.) Salisbury, Gen. Pl. Fragm.: 135. 1866; **Amaryllis vittata** (L'Her.) var. **tweediana** (Herb.) Traub, Amaryll. Man.: 268. 1958.

Specimens.—Brazil, Santa Catarina, mun. Campos Novos, Palmares, 900 m; leg. Klein 4085, 28-X-1963 (HBR). Idem, Marombas; leg. L. B. Smith & R. M. Klein 13349, 16-XI-1964 (HBR). Idem ibid.; leg. Reitz 6748,

[1] The material was sent to the writer, by the staff of the Herbarium "Barbosa Rodrigues" (HBR.), in order to carry out the **Amaryllidaceae** for the "Flora Ilustrada Catarinense".

[2] Herbarium Anchieta (PACA); the material was studied in the Escola de Filosofia at Sao Leopoldo, State of Rio Grande do Sul, Brasil.

22-XI-1964 (HBR). Idem, Campos Novos, 1000 m, campo humido; leg. Klein 4212, 29-X-1963 (HBR). Rio Grande do Sul, mun. Canoas, Esteio, in fossa; leg. P. B. Rambo 752, 5-X-1933 (PACA). Idem, via ferrea; leg. P. B. Rambo, 5-X-1933 (PACA 33948). Idem, Padres, 23-I-1957 (PACA 60220). Idem, Sao Leopoldo; leg. L. Pheissen 129 (PACA).

Fig. 20. **Amaryllis vittata** L'Hérit., native to southern Brasil. Drawing by P. R. Reitz after the figure of L'Héritier.

IV. **NOTHOSCORDUM** NOTES, 1968

Nothoscordum felipponei Beauv. ssp. **lorentzii** (Hert.) Rav. (Fig. 21)

On page 50 of the 1966 edition of Plant Life, the new combination **Nothoscordum lorentzii** (Hert.) Rav. was made. Having had access only to a dry specimen, at that time this position seemed correct. Lately however, after having the opportunity of studying large populations in the field, it became clear that our plant must be regarded as a subspecies of **N. felipponei Beauv.:**

Nothoscordum felipponei Beauv., ssp. **lorentzii** (Hert.) Rav., **comb. nov.**

Beauverdia lorentzii Herter, Boissiera 7: 509. 1943; **Ipheion lorentzii** (Hert.) Traub, Pl. Life 5: 50. 1949; **Tristagma Lorenzii** (Hert.) Traub, Pl. Life 19: 61. 1963; **Nothoscordum lorentzii** (Hert.) Ravenna, Pl. Life 23: 50. 1967.

Plant about 6-12 cm. high. Bulb subglobose or depressed-globose, about 20 mm. wide, covered with whitish or sometimes pale ochraceous coats;

pseudoneck present. Leaves a deep green, linear, with ciliate margins, moderately canaliculate, about 10-19 cm. long, 2-3.4 mm. broad. Scapes often more than one for each bulb, somewhat compressed, often puberulent, about 7-10 cm. long, becoming decumbent after flowering. Spathe one-flowered; valves membranous, lanceolate, ventricose, about 16-17 mm. long,

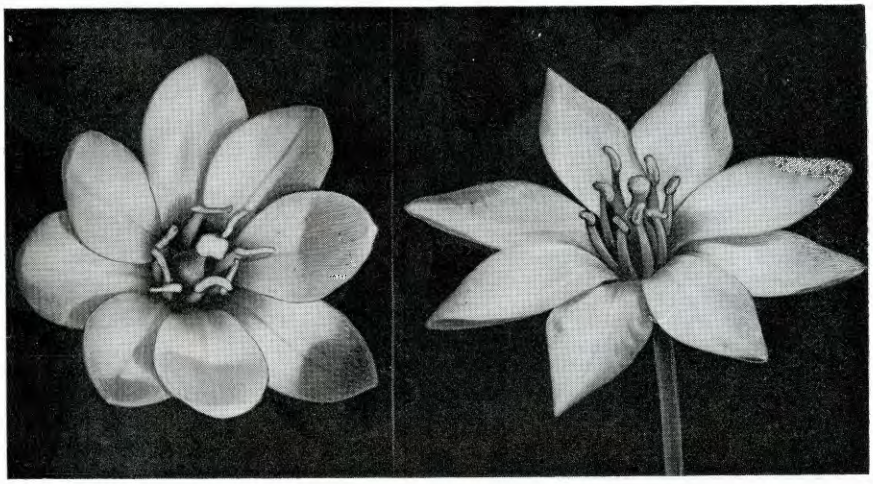

Fig. 21. **Nothoscordum felipponei** Beauv. ssp. **lorentzii** (Hert). Rav., native to southern part of Province of Entre Rios, Argentina.

connate for 2-2.2 mm. at the base, sometimes with purplish streaks. Pedicel often puberulent, about 5-15 mm. long. Flower yellow, about 28-33 mm. in diameter. Tepals always eight, oblanceolate, blunt or acute, about 20-23 mm. long, connated for 3 mm. toward the base, the outer four slightly longer than the inner, tinged with reddish-brown, or sometimes with a green streak, on the abaxial face, the inner not striped. Stamens eight, in two sets, its filaments oblong-subulate, yellow, the four episepals about 8 mm. long, the epipetals to 9.5 mm. long; anthers versatile, oblong, sometimes slightly arched, about 2.5-3 mm. long. Ovary ellipsoid, green, about 5-5.4 mm. long, 3-3.2 mm. wide. Style broadly filiform, about 6-6.5 mm. long; stigma thick, capitate, whitish, sometimes irregularly lobed.

Hab.—Apparently only in the south of the province of Entre Rios, Argentina. It grows near **Nothoscordum bonariense** (Pers.) Beauv. (two varieties), N. vittatum (Gris.) Rav.; sometimes also with **N. inodorum** (Ait.) Nich., ssp. **N. montevidense** Beauv., **Tristagma tweedianum** (Bak) Traub, and **Sisyrinchium pachyrhizum** Bak. (Iridaceae). Cultivated in my collection.

Specimens.—Argentina, Entre Rios, dept. Concepción del Uruguay, Campichuelo, banks of the river Uruguay; leg. Burkart & Troncoso 24138, 10-IV-1963 (SI). Idem, Agricultural Exp. Farm., in fields of rice; leg. Ravenna 625, Apr. 1967 (Herb. Rav.). Idem, dept. Gualeguaychú, near Gualeguaychú, on the way to the stream Gualeyán; leg. Ravenna 623, Apr. 1967 (Herb. Rav.).

This plant (Fig. 21), separable as a species is distinguishable from **felipponei** on account of its amazing tetramerous flowers, its thicker stigma, the ciliated leaves, the almost always pilose scapes and pedicels, and its repellent alliaceous smell. Moreover this is a fall-blooming (April), in contrast with the type which flowers in August-September.

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FLORA OF ALASKA AND NEIGHBORING TERRITORIES, by Eric Hulten. Stanford University Press, Palo Alto, Calif. 1968. Pp. xxii + 1008. Illus. $35.00. This is apparently the definitive work on the Flora of Alaska (U.S.A.), and Yukon and Northwest Territories (Canada), and the eastern extremity of Siberia (USSR). Some 1,974 taxa, belonging to 1,559 species are described; for 1,735 of these detailed descriptions, nomenclature, plant drawings and range maps are provided. There is an artificial key to the families and an analytic key to all species of each genus. The introduction is concerned with the past and present climatic, geologic and ecologic character of the regions covered, and the history of botanical collections. The glossary, plant author's list, bibliography and indexes complete the volume. This excellent book is highly recommended to all interested in the Arctic flora.

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3. GENETICS AND BREEDING

BIGENETIC HYBRID OF SPREKELIA AND HABRANTHUS

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The writer's experience in combating sterility in inbred *Amaryllis* strains has suggested experimentation with hybrids between genera. One cross that was apparently successful used a free-blooming clone of *Sprekelia formosissima superba* as seed parent and a vigorous form of *Habranthus robustus* as pollen parent.

Fig. 22. **Sprekanthus cagei** Traub, **bigeneric hybr. nov.,** center, a bigeneric hybrid involving **Sprekelia formosissima** and **Habranthus robustus,** made by John M. Cage of Palo Alto, Calif. Ruler is 1-inch wide.

Seedlings are very uniform in appearance and growth habit. In two years of growth in a cool greenhouse, the leaves reached a mature height of about 14 inches and a width at the base slightly exceeding ¼ inch. Maximum width at a height of 10 inches is ⅜ inch. The leaf shape resembles *Sprekelia,* but the size is smaller than either parent (Fig. 22). The color of the foliage is dull medium green.

Semi-dormancy occurs in winter. However, blooming does not seem to be clearly related to dormancy. Three of the bulbs have bloomed to date, all at different times, even though all were grown in a community pot. Next season, the plants will be forced into deeper dormancy to encourage free blooming.

The mature bulbs are 1¼″ to 1½″ in diameter and have the long neck shape of *Sprekelia.* They are slightly smaller than the *Habranthus* bulbs of their parent and much smaller than *Sprekelia.* Offsets are produced sparingly.

The beautiful single bloom develops rapidly on a slender scape hardly more than ¼″ in diameter and about 16 inches in height. The form of the blossom is nearly identical with that of *Sprekelia,* but the size is only about one-third. Apparently the flower lasts somewhat longer than *Sprekelia.*

The color is scarlet with a hint of the lavender from *Habranthus.* Two of the flowers were of solid color to the very bottom of the throat, unlike the green-throated *Sprekelia* parent. The other blossom had faint stripes of pale green deep in the throat.

The hybrid seems to be a true mule. Selfing seems totally ineffective, and a back-cross on *Habranthus* forms seeds that are not viable. Further efforts will be made to develop a fertile new plant type.

If viable seeds can eventually be obtained either by selfing or back-crossing, some interesting possibilities exist. Since we have the white-flowered *Habranthus* available, we may produce a white *Sprekelia* form in due course, as well as other colors. The writer believes that selfing can be obtained if the right treatment is found.

The possibility that the *Sprekelia-Habranthus* cross could be made was predicted by Traub in his book, The Genera of Amaryllidaceae (1963). He indicated that x=6 is the basic chromosome number for the *Amaryllidaceae* as a whole, and also the tribe *Zephyrantheae* in which he placed *Habranthus* and *Sprekelia* among other genera. Previously, most lineagicists had placed *Sprekelia* in the same tribe with *Amaryllis* L., and that was apparently wrong. Of course, a cross of *Amaryllis* and *Sprekelia* [often attempted but never realized.—Ed.], though highly unlikely, would evoke some consternation.

In PLANT LIFE, Vol. 23, 1967, Flory & Bose speculate in their paper, "*Sprekelia* Chromosomes", that the highly polyploid commercial *Sprekelia* may have a basic chromosome number of x=6. Since 2n=12 appears in at least some *Habranthus* species, the writer's hybrid may tend to support the above hypothesis.

X **SPREKANTHUS,** BIGENERIC HYBRID

The Sprekelia-Habranthus hybrid has been named for the originator, X **Sprekanthus cagei.**

X **Sprekanthus** Traub, **bigeneric hybr. nov.** et, **Sprekanthus cagei** Traub, **hybr. nov.** typus. Planta hybrida "Sprekelia formosissima superba" et "Habranthus robustus" intermedia; colore plusminusve inter parentes medio; aliter velut in parenta foeminea sed parviora. Holotypus (Holonomenifer): John M. Cage No. 1 (= TRA 1087), Febr. 15, 1968. Fig. 22.

Hybrid between Sprekelia **formosissima superba** ♀ and **Habranthus robustus** ♂. Plant more or less intermediate in color between the parents; otherwise similar to the seed parent but smaller.—**Hamilton P. Traub**

HYBRIDIZING WITH AMARYLLIS SPECIES—1968

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LONG-TRUMPET HYBRIDS

1968 will be remembered by me as the year of the long-trumpets. The first important event was the flowering of *Amaryllis fragrantissima* very early in January. Presumably, this was the first flowering of this species outside of Bolivia. *A. fragrantissima* is a truly magnificent species and even finer in some respects than had been anticipated from Dr. Cardenas' description (Plant Life, Vol. 16, 1960. P. 32-33). The two florets were about 20.5 cm. long (tepaltube about 9.5 cm.) and about 13 cm. in diameter. They were on a very tall, robust scape (68-70 cm. tall) and were held almost horizontally and nearly 180° apart. The substance, regularity, and intensity of whiteness of the segments were outstanding. The fragrance also was delightful; it was detectable two or three rooms away from the flowering plant but was in no way overpowering or objectionable at a distance of only three or four feet.

Since *A. fragrantissima* bloomed so early in the year, there was very little fresh pollen available and this was probably fortunate. One floret was self-pollinated and this gave rise to a seed pod which required nine weeks to mature in a greenhouse at temperatures of 45 to 75°F. with an average probably near 55°F. The seed were quite normal in appearance and germinated very well, approaching 100%. The seedlings are now (July 15) putting on their fourth leaves and for the most part appear moderately vigorous. A pollination with mixed pollen of a white leopoldii hybrid and *A. evansiae* failed to set seed. This particular clone of *A. fragrantissima* is amazingly vigorous. Since flowering it has grown 12 leaves, each one near the size of those of modern large hybrids.

The pollen of *A. fragrantissima* gave viable seed with the following pod parents: *A. striata* var *fulgida; (A. belladonna* x *A. striata)* x 'Senorita'; orange reginae x 'Senorita'; Ludwig's 'Constant Comment'; and Ludwig's 'Fantastica'. Although seed pods were set, no viable seed were obtained from a white leopoldii and a red leopoldii. Of course, it is not known if the trumpet shape and size of *A. fragrantissima* will be dominant in these crosses; if not, back-crosses with *A. fragrantissima* will be desirable. Also, more crosses are needed in the bright colors (red, orange, and rose pink or pink) to get trumpet flowers in these colors. Pollen of *A. fragrantissima* was disseminated fairly widely and some successes are known to have been achieved by others.

The second event of major importance was the flowering in May of a second long-trumpet. This plant was very generously turned over to me by Mrs. U. B. Evans of Haphazard Plantation, Ferriday, Louisiana, who in turn had gotten it from the late Prof. Ira S. Nelson. The history of 'Evans trumpet' prior to this time is apparently lost. 'Evans trumpet' had grown well outdoors in Mrs. Evans' garden for several

years and appears to be a form of *A. ambigua;* the coloring is almost identical but the size of the florets (six) is somewhat smaller (14.5 cm. long and 7.0 cm. tepaltube). Since the plant was dug from Mrs. Evans' garden after the scape had started up and a considerable part of the large root system was damaged or lost, this may account, in part, for the smaller size. The bulb and foliage are large, near large hybrid size, and apparently it does not make offsets. However, the really wonderful characteristic is that 'Evans trumpet' appears to be quite fertile to cross-pollination and quite a few seed were obtained from pollination with *A. fragrantissima* (two pods), also one seed pod from pollen of a "yellow long-trumpet" grown by a friend in California and also a pod from mixed pollen of the "yellow long-trumpet" and a seedling of Ludwig's 'Maria Goretti' x 'Senorita'. All seed germinated rapidly and the seedlings are now showing one broad, dark green leaf. Although facilities for a literature search are limited, no reference has been seen concerning crosses where both parents were long-trumpets and so these may be the first. 'Evans trumpet' failed to set seed to self-pollination. Therefore, it is behaving very much as we have come to expect many *Amaryllis* species to do, very fertile to cross-pollination and sterile to self-pollination. Since it appears not to make offsets and is self-sterile, no progress can be made in multiplying this species until possibly another clone of this "fertile *A. ambigua*" is found or the rather drastic step of cuttage is employed. Pollen from 'Evans trumpet' was used on a late-flowering, pink semi-miniature from Ludwig's 'Constant Comment' x 'Senorita' and a number of seedlings have just put out their first leaf. These first leaves are much narrower than those from 'Evans trumpet' as the seed parent. In any event, 'Evans trumpet' is a most welcome and valuable addition to a species collection and a really lucky break for me.

Other long-trumpets have been acquired. A blooming size *A. viridiflora* from Bolivia has grown four long narrow leaves this Spring and may bloom next year. *A. immaculata* has been obtained from Holland and is expected to bloom next year. So, maybe more long-trumpet crosses are just around the corner.

THE QUEST FOR YELLOW HYBRIDS

Seedlings from the following crosses bloomed in 1968. (See Plant Life, Vol. 24, 1968; p. 69, 70.)

(1) [A. evansiae x A. aglaiae x A. evansiae] x 'Maria Goretti' (two plants).

(2) 'Maria Goretti' x (A. evansiae x White Dutch) (four plants).

(3) 'Winter Carnival' x (A. evansiae x White Dutch) (one plant).

Of course, none of them was yellow. Most of them showed faint to moderate amounts of very pale yellow in a large throat area just as each floret was opening. However, this had changed by the next day to green in the throat and a creamy white further out on the segments. All showed some pink, red or orange-red coloring. One was a quite acceptable, pale pink blush with more tendency toward yellow than the others. Several had considerable light red on the outer parts of the

segments and were fairly attractive but not near the hoped-for result. The really discouraging point was the sterility exhibited by these plants; all self-pollinations failed and only one sib cross gave a seed pod but the seed failed to germinate. Next year an additional six to eight plants from these crosses should bloom and maybe some of them will be fertile. However, this problem may require a really massive attack and therefore five additional clones of *A. evansiae* have been obtained from Mr. Alek Korsakoff of Jacksonville, Florida. Since these are seedlings from three fertile clones of *A. evansiae,* it is hoped that they will set viable seed with pollen from a number of different white leopoldii hybrids and that these offspring will, in turn, have a greater tendency to be fertile.

A number of seedlings flowered this season from 'Firefly' x (A. evansiae x White Dutch), a cross of which I was not particularly proud and which has not been mentioned previously. Most of the seedlings were fairly uninteresting, a light, dull orange-red in an intermediate size. However, one turned out to be quite different, a light reddish-pink with a broad edging of darker red around the segments. This is a picotee of a completely different sort from those currently on the market. Each floret was about 4½ inches and had some suggestion of a semi-trumpet. It produced viable seed with pollen from a good 'Ludwig Picotee' and 'Nivalis' but did not accept pollen from *A. evansiae.* Possibly the lesson here is that occasionally (very infrequently might be better) a "far-out" cross may result in something quite new and different.

Very beautiful flowers resulted from another cross having *A. evansiae* in its ancestry. Maria Goretti x[(*A. belladonna* x White Dutch) x (*A. evansiae* x White Dutch)].

In two of these siblings, the color of the 6½ inch florets was mainly a very pale (yet bright) pastel pink blush not available in commercial hybrids. The relatively large throat area (good leopoldii form) is a pale, bright green and the combination is quite attractive. These, too, had reduced fertility but a few self and sib seedlings were obtained.

An undesirable characteristic has been confirmed in 'Morris yellow' (see Plant Life, Vol. 24, 1968; p. 70); it is very susceptible to "red fungus" even in the greenhouse. Further, its seedlings and also those of 'Senorita' have shown poor winter survival outdoors when mulched with bagasse which gives good results with most other hybrid amaryllis. This is unfortunate since a major objective of this program is to produce hybrids which will survive long range outdoors in our climate. In addition, because of greenhouse space limitations, seedlings can be allowed only their first winter in the greenhouse and then they must go outdoors. Some crosses survive much better than others and possibly experience will teach us more about what to expect.

THE AULICA GROUP

Only one cross of interest was successful in the aulica group this year: *A. forgetii* x *A. cybister.* Only three seedlings resulted in this case. This is a rather far-out cross and it is difficult to imagine what the foliage characteristics will be from the strongly evergreen *A. forgetii* and the strongly dormant *A. cybister.* Further, *A. forgetii* blooms in

December-January and *A. cybister* in March-May. The flowers are compatible at least from the standpoint of very short tepaltubes and possibly this is a small beginning into the orchid-flowered hybrids.

ACKNOWLEDGEMENTS

As I continue to work with *Amaryllis* species, several other people have given valuable assistance. A number of species that I did not have were available from Mr. and Mrs. Alek Korsakoff, Jacksonville, Florida. Mr. Korsakoff also sent pollen. In California, Mr. W. Quinn Buck, Mr. J. L. Doran and Mr. S. S. Harshbarger all helped greatly by exchanging pollen, seed and plants.

SUITABLE POTTING MEDIUM

Finally, a tip should be passed on about a growing medium that has been very valuable to me for germinating the delicate seed that often result from species crosses. "Redi-earth" made by the W. R. Grace Co. appears to have all the attributes required of a good potting mix. At the present, it has been adapted as a germinating medium as follows: Fill the pot or flat with an acceptable soil, sand, leaf mold, dehydrated manure mixture to within ½ inch of the desired level in the container. Wet thoroughly (drainage must be excellent) and smooth. Add about ¼ inch of previously moistened "Redi-earth" and smooth and wet thoroughly. Place the seed next; they need not be set vertically but should be arranged with respect to spacing. Add a second ¼-inch layer of previously moistened "Redi-earth" to completely cover the seed and wet thoroughly. This is a fairly rapid planting procedure. This medium is very porous but holds moisture extremely well. However, it should be wet thoroughly at intervals, depending on the humidity, if there is the slightest sign of drying out. Germination is rapid and complete within the capacity of the given seed to germinate.

AMARYLLIS FROM IRRADIATED SEEDS

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During the Fall of 1967, a number of packets of seeds were sent to an Oak Ridge Radiation Laboratory and all were irradiated with 15,000 roentgen units of nuclear radiation. Among these seeds were 2 lots of *Amaryllis* seeds: (1) *Amaryllis striata* forma *fulgida* and none of these of mine have survived, and (2) *Amaryllis* hybrid in the "Dutch Type" with large red flowers which were pollinated by two different seedling clones of *Amaryllis striata* forma *fulgida.* It is these latter which are now growing and which show variations from the norm. Dr. Traub has written that there are several plants of his which show definite effects of the irradiation. The writer's seedlings were divided into two groups of which the first group were grown as they came back from the irradiation laboratory and the second group were further treated with

a solution of colchicine, gibberellic acid and "Rootone". These latter if they survived the treatment and after sulking for a while make a rank growth that outgrows anything else that the writer has yet grown. In the straight 15,000 R. units treated group of seedlings, there were noticeably seedlings which had a pronounced "curl" to the initial leaf or two, some still appear somewhat stunted and even one after better than 6 months in the soil, it has yet to put forth its first leaf.

Since it was the writer's desire to induce as wide a spectrum of changes in as short a time as possible, various other treatments are being tried this year such as stem injection with a colchicine solution which may overcome the shortcomings which Dr. Henry M. Cathey writes that it has been generally found in *Amaryllis* treated seedlings that diploid tissues overgrow the tetraploid formed tissues and crowd them out.

1968 AMARYLLIS BREEDING REPORT

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The writer has been surprised and confused a number of times in the past two years by the behaviour of certain *Amaryllis* clones, both hybrids and species, which apparently has been caused by their being moved about the country. The bulbs were first moved from a high altitude in Colorado to sea level here in California. Now, bulbs that once grew in the fall (as *A. aulica*) are growing in the spring; others do not want to grow at all here in California; and many have changed considerably both in color and shape of the flowers. One bulb in particular that was a beautiful light pink in Colorado has here produced such dark rose flowers of quite different shape that it was not at first recognizable as the same clone, and yet it had to be the same! Even a move this past February from one location to another one here in the same city has resulted in a difference in the color of the flowers, most blooms this spring being much darker in color than in the previous year. The only conclusion that could be drawn from these experiences was that the character and color of the flowers must be greatly influenced by such factors as *light intensity* at flowering time, soil in which the bulbs are being grown, and perhaps other unknown factors. Hence, the writer was pleased to read in the 1968 Yearbook that Mr. Caldwell had come to the same conclusion in accounting for the unstable color in *Lycoris houdyshelii.*

WINDOW-SILL HYBRIDS

In many respects, the most satisfactory of all the bulbs that the author has raised from seed are the bulbs which he calls his "Window-sill hybrids". Some of these were described in the 1968 Yearbook, but more details can now be added. All of these hybrids had as one of the parents the old orange-scarlet hybrid sold by Cecil Houdyshel under the label of "Rutila hybrids". Ten successful crosses were made with

this clone, seven of which have already bloomed. A self was a very poor grower, but the other six have been characterized by compact foliage, attractive flowers, dependable blooming, and vigorous growth.

Crossed with a Van Meeuwen white Dutch clone, it produced large flowers of orange red, some of which had deeply reflexed tepalsegs. Crossed with a dark red Mead hybrid, it gave 5″ flowers of vivid crimson. Crosses made with a scarlet Indian miniature, and with a white and pink clone of unknown ancestry, both gave flowers identical in color to the original Houdyshel hybrids. Crossed with *A. striata fulgida,* it produced flowers from 4″ to 5″ in size, in shades of orange, and revealing their Striata ancestry in both flower and leaf; these bulbs bloom naturally in mid-winter. The best cross thus far of the ten was the one made with a Ludwig pink Dutch clone. The last bulbs to bloom of this cross finally bloomed this spring at six years of age, with 5½″ flowers which were a blend of rose, white and green in color. Previously there had been flowers in red, dark rose, and white with red markings. Both this cross and the previous one have been used extensively in additional crosses.

When the self bloomed three years ago, it was crossed with a red and white Peruvian Miniature clone, and the plants being raised from this cross are the ones mentioned in the 1968 Yearbook as having the thick gray-green leaves which are so resistant to cold weather and give such a good appearance the entire year. None of these seedlings have bloomed yet, but they are being closely watched. It is rather ironical that the hardiest plants being raised had as one parent this self which was so tender that it perished this past winter when kept outside.

SEARCH FOR RECURRENT-BLOOMING HYBRIDS

The search for recurrent-blooming hybrids is being continued, but with very little success thus far. Up to now, the writer has been working primarily with hybrids of *A. striata,* and although some of these would definitely be recurrent bloomers when grown in a greenhouse, they certainly are not when grown outside. However, by crossing these Striata hybrids with free-blooming, hardier clones of other ancestry, a free-blooming type suitable for outdoor culture in a cool climate may be developed, and so the search continues.

The most promising material grown this past year has been a group of Striata crosses originally made by a friend in Pasadena. Some of the seedlings were raised in his greenhouse in Pasadena, and some by the author in outside plant benches in Torrance. The first and basic cross was between *A. striata fulgida* and a white Dutch clone; these seedlings produced medium-sized flowers of bright orange with a green throat. There was one exception, for one bulb produced a picotee type flower of red on a white background. This bulb bloomed four times within a year, but it was in a greenhouse most of this time. When it bloomed this spring, after having been outside during the winter, the flower was much superior to previous blooms with better color and better substance. However, it refused to start new leaf growth after blooming and eventually perished.

This basic cross has been used in a number of additional crosses by both the author and his friend, having been crossed with 'Tangerine', 'Skildway', *A. evansiae,* and hybrids of *A. aulica, cybister,* and *striata,* as well as being selfed. Two of these crosses have bloomed and are worthy of comment. The first was a self on one of the orange-flowered hybrids. The seed began to germinate Feb. 7, 1966 in a sunny house window, and the seedlings were raised in an outside plant bench. The first one bloomed March 12, 1968, from a bulb only a little over one-inch in diameter. An even smaller bulb tried to bloom, but failed. This first flower was small, under 4″ in diameter, but it may be larger in another year; in color it was a rose red on a white background. The encouraging factors are that this cross is blooming from such small bulbs, and so quickly with outside culture.

The writer's friend in Pasadena also crossed one of the orange-flowered clones of the basic cross with *A. evansiae,* and gave one seedling—the largest—to the writer. After trying to bloom twice last fall, and failing each time, this seedling finally bloomed in May of this year, just a little over two years of age. The short scape produced three beautiful flowers about 4″ in diameter. The color was rather unusual, for the upper half of the flower was a much darker red than the lower half, with a distinct dividing line between the two halves, bisecting the two middle segs. Each tepalseg was tipped with white, and the large star in the throat was a chartreuse green, edged by a narrow band of red purple. This bulb refused to set seed, but it was successfully crossed with a Ludwig white Dutch clone. It is going to be crossed with other hybrids of *A. evansiae* as soon as possible, and in fact, pollen from the graceful hybrid of *(A. evansiae* x *A. aglaiae)* x *A. evansiae* was used on the flower, but the cross failed to take. Incidentally, out of fourteen crosses made with this same pollen, only two crosses yielded any seed, illustrating the point that perseverance pays in the end, since one never knows which crosses will or will not be successful.

MINIATURES

The biggest thrill experienced in the 1968 blooming season came when the first bulb bloomed of a cross between a dark red Indian miniature and a South African clone having large flowers of an unusual shade of rose. This Indian miniature is a recurrent bloomer, and that was the reason for the cross being made in 1964, but the seedlings have grown very slowly. However, the first flower was well worth the wait, because it was a beautiful miniature, in color a glowing dark scarlet with an even darker throat (Fig. 23). The flowers were 4½″ in size, but did not appear to be that large because the tepalsegs were so heavily ruffled, and the blooms were carried so gracefully on a slender scape. The foliage was in correct proportion to the size of the flowers, which even had *quite a fragrance.* The writer would rate this hybrid as the finest one he has yet raised from seed. There are five more bulbs of this cross still to bloom, and since all have small foliage, all will probably be miniatures.

The writer has never been particularly fond of miniature *Amaryllis*, preferring bloom of 5″ to 7″ in diameter, but this new miniature flower is so attractive that he will have to add to his goals one of developing ruffled miniatures patterned after this one. Therefore, a number of crosses were made with it this year.

Many of the Striata crosses, made with the objective of securing recurrent bloomers, are also producing miniature flowers. Of the fourteen Striata crosses which bloomed this past spring for the first time, ten of them produced miniature flowers between 3″ and 4½″ in size, some with

Fig. 23. New ruffled scarlet miniature **Amaryllis** hybrid raised by V. Roger Fesmire, Torrance, Calif.

reflexed or ruffled segments and some of regular form. From a cross between 'Tangerine' and *A. striata fulgida* was secured one miniature with a flower 3½″ in diameter and of good though plain form. It was a clear pale orange in color, with a trace of green and purple in the throat, a rather beautiful flower, but it also refused to set any seed. Another of these Striata crosses, involving the Houdyshel orange scarlet hybrid, a white Dutch clone, and *A. striata fulgida,* produced a real miniature flower, only 3″ in diameter. This pale rose bloom was also quite ruffled, but the shape was not so good since it displayed the peculiar Striata "swan's neck".

Among the Peruvian Miniature Hybrids raised from seed by the writer is one that truly is a miniature. This one has flowers that are barely 3″ in diameter, white in color with the tips of the tepalsegs being a light rose, and with a green throat. In addition, this flower is definitely a long-trumpet type, which fact was not perceived until this spring. Now this might be usable in developing long-trumpet hybrids, for which there is a need. However, it has been the writer's experience with these Peruvian hybrids that they give very poor results when used as the seed parent, although they are satisfactory as a pollen parent. So far only one cross has been successful with this particular Peruvian Miniature, and the seedlings are growing very slowly. Pollen from an unidentified yellow long-trumpet species was secured from a friend and used on this miniature when in bloom, but it refused to set seed. However, all of these Peruvian Miniatures are good growers and next time the story may end differently.

In the summer of 1965, from a field of *Amaryllis* in the San Fernando Valley, some seeds were secured of what was apparently a self on a Diener hybrid crossed with white Dutch. Two of the plants raised from this seed bloomed for the first time this past April, and both produced well-formed flowers about 4½″ in size, one being a dull red in color and the other a rose red. These were shown to some friends, including Mr. Quinn Buck, who immediately identified them as Diener hybrids, even before knowing their history. *A. argilagae* was in bloom at that time in his greenhouse, and a cross was made between it and one of these Diener hybrids. Fortunately, it was successful, and this should give some real miniatures. The writer's bulb of *A. argilagae,* grown outside, bloomed at the end of June, but no crosses were successful.

Last year, every cross made with pollen from a Senorita hybrid was a failure. This year, using pollen from a different source, every cross made with it was successful, as were also the crosses made with pollen from a hybrid of Senorita X *A. calyptrata.* This experience corresponds with the observation reported by Mr. Mertzweiller in the 1968 Amaryllis Yearbook. In the opinion of this writer, these Senorita hybrids offer intriguing possibilities for developing a new race of graceful miniature *Amaryllis,* and so he was quite pleased to finally succeed in crossing the Senorita hybrid on to his previous hybrid of the Houdyshel orange-scarlet clone X *A. striata fulgida.* This cross was described in the 1968 Yearbook in some detail, and briefly referred to at the beginning of this article. Since the flowers are about the same size as those of the Senorita hybrid, and a salmon orange in color, some attractive pastel colors should emerge from this cross. He would also like to cross his new ruffled red miniature with the Senorita hybrid, but that will have to be a goal for next year. Anticipation is the motive for perseverance!

AN AMARYLLIS BREEDING PROJECT—1968 REPORT

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This report will be devoted to (1) amaryllis hybrids and species which bloomed for the first time in 1968 and a few notes in regard to progress in hybridizing, and (2) some comments on cultural practices in growing the species and hybrids.

1968 BLOOM SEASON AND HYBRIDIZING EFFORT

Six seedlings having the parentage SA 63-20 X *(A. evansiae* x *A. aglaiae)* bloomed in January and February, 1968. This cross was made in 1965 and the pod parent, one of Mr. Goedert's unidentified imports, has been described previously (PLANT LIFE, 1967, 1968). Of these six seedlings, four were very similar to the pod parent. Each bore one scape carrying two florets, medium pink in color, with form and markings very similar to SA 63-20. A fifth seedling made two scapes, one four flowered and one three flowered. These flowers were near white with a very slight pink flush. Unfortunately the flowers were not long-lasting and the substance left a lot to be desired. The sixth and best seedling was a delightful miniature with good substance and the most delicate light pink coloring. The single scape was two flowered. Even if no other good plants result from the 20 or more seedlings remaining to bloom, this one was worth all the effort of growing these seedlings.

This group of seedlings appears to have inherited the most outstanding characteristic of the SA 63-20 parent—a high degree of fertility. All attempted pollinations were successful. Most noteworthy was the pollination of the best pink miniature with 'White Christmas' and with *A. fragrantissima.* Pollen from *A. fragrantissima* was generously supplied by Fred Buchmann who bloomed this beautiful long trumpet species in 1968 and who reports on it in this issue. Although a good batch of seed was obtained from the cross with 'White Christmas', only two seedlings resulted. This experience parallels very closely the results of a 1967 cross in which 'White Christmas' was the pollen parent with *(A. evansiae* x *A. aglaiae)* x *A. evansiae.* This cross also gave only two seedlings from 50 or more seed. It may or may not be coincidental that 'White Christmas' was the pollen parent in both cases. Several dozen seedlings resulted from the pollination with *A. fragrantissima.* These seedlings appear to be very vigorous growers; at this writing they are only 6 months old and are already 6-8 inches tall. The potential for obtaining long trumpet or semi-trumpet vigorous hybrids in pastel pink or cream colors is most interesting.

Speaking of trumpet flowered amaryllis, the writer was fortunate to obtain a small bulb of *A. viridiflora.* This bulb was sent by Dr. Cardenas to Prof. Claude Davis. When obtained in the fall of 1967 the one inch diameter bulb was potted in a 3 inch pot. It remained completely dormant until May, 1968, at which time it sent up a bloom scape. The scape was two-flowered and the blooms opened late in May. These

blooms appeared to agree very closely with the description of *A. viridiflora* given in the AMARYLLIS MANUAL, except that all of the dimensions were very much smaller than those quoted. The scape was two inches tall, the flower length 3½ inches, tube length 2½ inches, and diameter across the face of the flower 1½ inches. This miniature size probably is a reflection of the very small size of the bulb. There is little doubt that this is the true *A. viridiflora.* Unfortunately, because of the very late period of bloom, there were no other amaryllis hybrids or species on which to use the pollen of *A. viridiflora.* So an attempt is being made to preserve this pollen for an entire season by dry freezing. It will be used during the 1969 bloom season on hybrids and species which are known to be good seed setters.

To produce yellow or near yellow hybrids in various forms and sizes remains a noteworthy objective. Many amaryllis enthusiasts think in terms of large-flowered yellow hybrids of leopoldii form. Still, there is much to be said in favor of the smaller flowered yellow hybrids. At the spring, 1968 meeting of the Louisiana Society for Horticultural Research held at the University of Southwest Louisiana, there was in flower in the greenhouse a most beautiful small yellow hybrid from the breeding efforts of the late Prof. Ira S. Nelson. This hybrid was of an iridescent buff-yellow color, very full in form, but only about 3½ inches across. The parentage was *A. evansiae* x *A. aglaiae.* To say the least, this hybrid "stole the show" from many larger and unusual hybrids. This served to reinforce the efforts which this writer is devoting to breeding two lines of small yellow hybrids. One line is to be predominantly *A. aglaiae* with a small amount of *A. evansiae,* and the other line predominantly *A. evansiae* with a small amount of *A. aglaiae.* It is believed that both lines will be more vigorous and easier to grow than either of the species. It should also be possible to segregate form and color variations. The program was started in 1967 with a cross of *((A. evansiae* x *A. aglaiae)* x *A. evansiae)* X *(A. evansiae* x *A. aglaiae)* and was continued in 1968 with a cross of [*(A. evansiae* x *A. aglaiae)* x *A. evansiae*] X *A. evansiae.* Even though both groups of seedlings are quite small it is easy to detect significant differences in foliage characteristics.

A limited amount of breeding stock having potential for producing large-flowered yellow hybrids is gradually becoming available. One of the two seedlings having the parentage [*(A. evansiae* x *A. aglaiae)* x *A. evansiae*] X 'White Christmas' is showing excellent growth and has made a few offsets. Mrs. Herbert Kelley has given the writer two seedlings derived from 'Chastity' (white from India) X *A. evansiae.* Dr. Traub has kindly furnished some seedlings derived from 'White Crane' X *A. aglaiae.* Most of this stock is at least two years from bloom.

CULTURAL PRACTICES WITH AMARYLLIS SPECIES

After about 10 years of experimentation in growing amaryllis species and closely related hybrids, this writer has progressed to the point where losses by rotting of the bulbs are infrequent. Most recent losses have resulted from excessive watering of bulbs in a weakened

condition due to having matured seed pods. It is therefore appropriate to pass along to others interested in growing species those observations which are felt to be most important.

All the observations can be put in the form of two rules (1) pay strict attention to all facets of the potting operation, and (2) water very sparingly or not at all during the period of dormancy or semi-dormancy.

The most critical features of the potting operation are (1) pot size and (2) potting medium. It is a serious mistake to pot a small bulb in a large pot. For bulbs less than one inch in diameter the writer uses a two-inch pot; for bulbs 1-1½ inch in diameter a 3 inch pot is used, and for larger bulbs a pot not more than 1½-2½ inches larger in diameter than the diameter of the bulb. Clay pots are used in preference to plastic pots. For the past year experimentation has been underway on use of the foamed polystyrene drinking cups for potting small (one year old) seedlings. These cups are about 2½ inches in diameter at the top, about 3 inches deep and are quite inexpensive. Two triangular shaped drainage holes are cut in the sides at the bottom; the cup is filled to a depth of about ¾ inch with small pea gravel before adding the potting medium. In addition to economy, these plastic cups will not allow the medium to dry out as fast as clay pots and it is therefore not necessary to sink the cups in soil or any other medium to prevent rapid drying out. The results to date (8 month test) with these plastic cups are very promising, but longer term testing will be necessary before they can be fully recommended.

A high porosity potting medium capable of perfect drainage and good root aeration is essential to success in growing amaryllis species. The potting medium currently being used by the writer is as follows:

COMPONENT	PARTS (VOLUME)
Good grade of potting soil	2
Vermiculite (Agricultural grade)	2
Coarse sand	1
Dehydrated manure	1
Steamed bone meal or oyster shell flour	⅓

The components are mixed thoroughly in a suitable container. This potting mixture has been in use for two seasons and has performed well; it gives excellent porosity and drainage. Note that use of peat moss is avoided. Peat moss results in excessive sogginess and is felt to have contributed to much of the bulb rot experienced in earlier years.

As already mentioned, small clay pots dry out very rapidly in the 95° summertime temperatures in this location. Daily watering is a virtual necessity. Sinking the pots in our heavy clay soil is undesirable because of poor drainage during periods of excess rainfall. To overcome this problem the pots are set on the ground and the space around the pots is filled with a mulching material such as sugar cane bagasse, pine straw or leaves. An alternate method is to set the pots in old fruit crates and completely fill the areas between the pots with the mulching material. Six to fifteen pots can be set in a single crate and this makes for easy portability. When the clay pots are protected in this manner, watering every 3-4 days is sufficient.

All of the *Amaryllis* species and hybrids go into a period of rest after having made a season's growth and prior to blooming. This rest period varies from a cessation of growth as in *A. evansiae* to complete dormancy as in *A. cybister*. It is during this period, which normally occurs during the fall and winter, that great care must be taken not to over water. If water is withheld entirely the worst that can happen is for the plant to go completely dormant. Too much water is almost certain to cause rot with many species and hybrids.

HYBRID VIGOR IN AMARYLLIS

J. T. Schmidt,

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For the past fifty years our gardens have contained many *Amaryllis* clones. When Dutch bulbs became available after World War II, a breeding program was undertaken. Mature bulbs were dug in early September, put in cold storage for five weeks at 55° temperature with humidity controlled (PLANT LIFE, 1954), and the blooming period began at Thanksgiving with pollinating and seed maturing at an early date. This coincided with the arrival of new improved bulbs from Holland and new pollen and pod plants.

In retrospect, for the past decade much of the successes resulted from the advice and path led by a gentle, knowledgeable man, Prof. Claude Davis, who distributed Dutch clones and species collected by Dr. Martin Cardenas and the late Dr. Ira Nelson.

A whole new horizon opened with Dr. Ira Nelson's contribution including species collected in South America in 1954 and 1958 and made available with their hybrids through The Louisiana Society For Horticultural Research. His belief and encouragement centered on obtaining vigor through hybridizing species with seedlings more adaptable to outdoor cultures in Southern gardens.

The following crosses have been made: *A. evansiae* X 'Nivalis'; *A. evansiae* X 'Maria Goretti'; *A. evansiae* X 'Christmas Gift'; *A. evansiae* X *A. aglaieae* X *A. evansiae* X 'Nivalis'.

The yellow hybrid known as 'Morris Yellow' (PLANT LIFE, 1968) was used as the pollen plant on the above white Dutch clones. Similar crosses were made using *A. evansiae* pollen on 'Picotee'.

A similar program was followed in using *A. evansiae* and 'Senorita' pollen on some of the pinks such as 'Flora Queen' and 'Dutch Belle' which resulted in new hybrids of beautiful pink florets similar to 'Fairyland' bearing four florets to the scape of 7½ inches in size.

The growing and hybridizing of *Amaryllis* species and hybrids as influenced by Dr. Ira Nelson and others has resulted in Louisiana, especially in the Baton Rouge area, of new and different types of flowers as reported by Fred J. Buchmann and Joe K. Mertzweiller (PLANT LIFE, 1968). One other grower, Mrs. T. K. McKnight, has thousands of *Amaryllis* growing outdoors year round with plants of *A. striata* crosses showing exceptional vigor and numerous off sets.

During the severely cold winters here in 1962, 1963, and 1964, we experienced temperatures as low as 9°. These hybrids survived with pine straw or bagasse mulching.

This past spring we obtained from the hot houses at the University of Southwestern Louisiana *Amaryllis* pollen of *A. evansiae* type, pink hybrid type, etc. and used this on corresponding large Dutch clones and large whites and 'Picotee' flowers. The result was almost 100% in setting seed. At this writing the seedlings now are growing vigorously showing at least three leaves on a nice size bulblet.

There has been a considerable exchange of plants and pollen this past season, and several hard to obtain species, *A. yungacensis*, *A. forgetii*, and *A. pardina* were received from Dr. Martin Cardenas of Bolivia and distributed by Prof. Claude Davis. This will certainly help increase the interest in species and hybrids in this area.

Some notes on growing are: Work the topsoil with rotillers. Then railroad cross ties are used as retaining wall material to allow a top fill of six to eight inches of mixed peat-moss, manure, and coarse sand. This allows the seedlings to be high and dry. Plants are watered when rain is absent and liquid feed is given every three weeks. Species are put (in their pots) in similar beds shaded by pine trees. Shaded plants bring better flowers next season. All potted species are returned to a heated hot house in November before the first frost and "put on the wagon" with very little water till the next scapes appear.

One fringe benefit in our search for pollen and species is the new friends we've made who have helped generously in so many ways.

PLATYASTER AND STENASTER CROSSED WITH CODONOCRINUM

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

Dean William Herbert reported several crosses between *Crinum* species which are placed in different subgenera. Surprisingly he found several of the hybrids fertile and raised second generation hybrids. Recently, with the cooperation of Mrs. Grace Hinshaw, Thaddeus Howard and Charles Harris the writer had occasion to examine a number of these plants and repeat some of the crosses. Nearly all of the combinations have been found hardy, free flowering and fertile. We submit the following comments:

The first *Platyaster* x *Codonocrinum* cross which came to our attention was Elizabeth Lawrence's 'Miss Elsie', a *Crinum americanum robustum* x *bulbispermum alba* cross (see Plant Life 1962, pg. 90) which we have repeated. It is an old and very common garden plant in South Carolina, as it is extremely hardy. It sometimes sets seed, but the pollen is quite viable. A sibling cross of smaller stature is 'Seven Sisters'. It occurs where *C. americanum* is the seed parent. Thad Howard has backcrossed 'Seven Sisters' onto a broad petaled *bulbispermum alba*. The

resulting hybrid 'Ollene' produces blossoms with the erect patent features of *C. americanum* although the tepalsegs are nearly elliptical. Unquestionably 'Miss Elsie' and 'Seven Sisters' are promising breeders.

A cross known as 'Martha Washington' appears to be *C. americanum* by *C. powelli albaum* (The latter has very viable pollen, try it.) 'Martha Washington' has wider tetalsegs than 'Miss Elsie'. As the name indicates it is snow white. *Crinum* 'Catherine' is smaller in stature than the others above and as it produces semi-elliptical tepalsegs the feeling is that it is *C. americanum* by *C. giganteum* (*C. jagus* according to Hortus III). The blossoms are distinctly intermediate between these two species.

The first colored *C. americanum* hybrid to be encountered was Mrs. Hinshaw's 'Elina'. *Crinum* 'Cecil Houdyshel' was the pollen parent. The blossoms resemble a small pink peony with slender elliptical tepalsegs. Recently the writer flowered a richly colored *C.* x *digweedi* Herbert, a cross of *C. americanum* x *C. scabrum.* The blossoms are a vivid Chinese red to pink on the exterior; the interior of the tepalsegs are keeled a warm rose pink. The scape is a rust red-brown. It is one of the most striking hybrids grown in Florida (*C. submersum* Herbert excluded) and excepting for the few blossoms and spreading filaments would readily be taken for *C. amabile,* or *C. erubescens.* However the foliage fits neither.

Although the writer has produced many siblings of *Crinum* 'H. J. Elwes' *(americanum* x *moorei)* none appear willing to flower, thus we cannot report upon the viability or floral pattern, but with the exception of the *C. moorei* crosses which contribute a rosette of leaves not unlike *C. moorei* all of the other *C. americanum* hybrids have strap-like or slender tapering semierect leaves. Similarly, all have 5 to 8 semierect blossoms with patent or flat ray-like tepalsegs which are about ¾th inch wide by 2½ to 3½ inches long. These are oblong or elliptical in shape, not lanceolate. The pollen is always a deep golden yellow and most crosses exhibit a fragrant vanilla type odor.

In contrast the *Stenaster* x *Codonocrinum* hybrids have 12 to 25 slender, erect trumpet shaped blossoms and succulent, long tapering, semi-erect leaves. *Crinum* x *eboraci* Herbert is the type form but the writer has worked mostly with the clone 'June Harris' which is a cross of *C. asiaticum* x *bulbispermum roseum.* This pink flowered plant sets seed occasionally and the pollen is quite potent. Backcrosses onto the red flowered Kimberley *C. bulbispermum* are particularly vigorous seedlings.

Crinum x *eboraci* 'Zimmermann' is an *asiaticum* cross by *powelli album.* The clone may be lost to horticulture, but it was reported as fertile. Mrs. Hinshaw has a similar cross using 'Cecil Houdyshel' as pollen donor. The 'Twelve Apostles' group appear to belong to the *C.* x *eboraci.* This hybrid is slightly smaller in stature. The blossoms are brick pink which suggests a colored parent like *C. scabrum.* All variants have been found sterile.

The writer has crossed the dwarf *C. asiaticum* var *japonicum* and several forms of *C. pedunculatum* with various *Crinum* species and

hybrids. Some show vigorous growth, others like the *C. moorei* crosses make a feeble effort. According to Herbert, his *pedunculatum-bulbispermum* hybrids were vigorous and freely viable. The writer can confirm the vigor, but the plants are still too small to flower.

As stated, all of the *Codonocrinum* x *Stenaster* crosses carry umbels with 12 to 20 or more blossoms which are slender erect trumpets in form. The flowers are not as showy or attractive as the patent shaped *Platyaster* hybrids. As far as the succulent upright foliage is concerned, it is rather unique in that it resembles that of an *Agave*. There is no known counterpart amongst the Crinum species which makes these hybrids easy to recognize.

With the exception of 'Twelve Apostles' all of the bi-subgeneric crosses listed above are fertile. The same appears to apply to other known hybrids of the same general type. There may be instances where seed may not form, or it aborts, but when pollen strikes without difficulty we consider the hybrid viable. Perhaps we should say "pollen viable". Because all of the above crosses involve remotely related species, the ability to be fertile is striking, particularly when one considers that hybrids between the *Codonocrinum* alone are nearly 50% sterile. In other words why should closely related or allied species give sterile hybrids and those remotely related fertile hybrids? In fact we are finding many of the wide crosses to be the most striking hybrids and we would certainly encourage the use of *C. americanum, erubescens* and *amoenum* with *scabrum,* the red flowered *bulbispermum* from Kimberley or *C.* x *grandiflorum* Deleuil.

AMARYLLIS EVANSIAE, MY INSPIRATION AND CHALLENGE

Mrs. Alek Korsakoff, *7634 Oriole St., Jacksonville, Florida 32208*

It all started several years ago. . . . Dreams of a large, flat, green or yellow hybrid. . . .

My first *Amaryllis evansiae* was obtained from Mr. Wyndham Hayward, a large, nice bulb. It bloomed and I made an *A. belladonna* ♀ x. *A evansiae* ♂ cross. Result—not a large yellow or green hybrid but a small one I am pleased to have; one flowering in a 4-inch pot with two scapes to the bulb, four florets in the umbel.

Later I obtained tiny seedlings of *Amaryllis evansiae* from Prof. Claude Davis and coaxed one to maturity meantime losing Hayward's bulb but saving one of the offsets.

When I married Alek he contributed his two *Amaryllis evansiae* (K 730 from Davis and K 788 from Fairchild Tropical Garden). Later he received *A. evansiae* forma *flavescens* (PIM-13724), a very strong grower, and numbered it K 1068. K 1117 and K 1120 were given to my two clones.

In 1965 all bulbs flowered at the same time and pollen from K 1068 was used on K 788, K 1117 and K 1120. K 1068 was also pollinated.

Seeds ripened and were duly planted in very sandy soil with a little humus. When the seedlings produced the second leaf, I started watering twice a month with a solution of ½ teaspoon of "Hyponex" to a gallon of water; later changing to a teaspoon of "Hi-Gro" to a gallon of water.

In due time the seedlings were potted in a mixture of sand, humus and perlite and checked for perfect drainage. Seeds and seedlings of *Amaryllis pardina* that ripened at the same time were treated in the same way, and are doing well. All are grown under roof to control watering, with plenty of light, and are watered sparingly until they lose their leaves. Then, until new growth appears, they get only one watering a month.

When potting the smallest seedlings, I plant then in 2-inch pots in sphagnum and perlite to save space. They grew and grew out of the pots, and believe it or not, *A. evansiae* bloomed with as large scapes and flowers as their siblings in the 4-inch pots. If a bulb begins to rot, I clean and disinfect it and re-root it in sphagnum and perlite, The re-rooted bulbs grow in this medium so fast and fill the pots with offsets, and the offsets and mother bulb bloom in the same 4-inch pot.

This year (1968), my bench was full of *A. evansiae* flowers of all sizes, shapes and colors, tailored and ruffled. *A. pardina* seedlings did not bloom yet. When *A. cybister* opened its octopus flowers, I used its pollen on the narrowest and longest segmented flowers of *A. evansiae*. The capsules are swelling—intriguing anticipation. . . .

I have also crossed the greenest *A. evansiae* seedlings with most green siblings, and the yellowest with the most yellow. I have selected a very wide and wavy segmented ivory colored one, and the palest one with a beautiful pink star in the throat.

All of these are so beautiful and really not hard to grow after one learns to keep them happy.

I hope my seedlings of *A. pardina* will be as diversified as the *A. evansiae* are; and have many different shades of background for the lines and dots.

POSTSCRIPT.—A quote from a friend's letter in Miami: "We went to . . . last week to see if there were any *Euphorbia lophogona* Lam. there. . . . However, I did see the clump of *A. evansiae* which George ..... had discovered there a couple of years ago. It is not, surprising that they survive? Perhaps, the fact that they were forgotten and neglected is the answer. They are planted against a south greenhouse wall. The ground there is slightly raised and not only are the bulbs crowded because they have multiplied but they are also hemmed-in by other species of *Amaryllis*. I am sure they are never watered except when nature supplies it. They were not yet in bloom—only a few showed buds as yet. It is interesting to note, though, that they were all smaller than Mrs. K's—lack of fertilizer perhaps."—*Alek Korsakoff*

PLANT LIFE LIBRARY—continued from page 76.

LANDSCAPING FOR WESTERN LIVING, by the Sunset Editors. Lane Books, Menlo Park, Calif. 94025. 1968. Pp. 160. Illus. $2.95. This completely revised and up-dated profusely illustrated edition of a most popular aid to home gardeners in the Western States, will be welcomed. The topics discussed include the Western approach to home landscaping; effective landscape planning; gardens for dedicated and casual gardeners; remodeling an established garden; plans for hillsides and sloping lots; the garden as an outdoor room; and planting for a purpose. Highly recommended to all gardeners.

IDEAS FOR JAPANESE GARDENS, by the Sunset Editors and Jack McDowell. Lane Books, Menlo Park, Calif. 94025. 1968. Pp. 160. $2.95. The purpose of this excellent and profusely illustrated book is to provide ideas for an entirely new Japanese garden, or the modification of an existing garden with an Oriental touch. The topics discussed include the nature of the Japanese garden; the stability of stone; how to use plants; water creates new dimensions; paths and walks; how to enclose the garden; structures and details; Japanese ideas that work; and plans to get you started. This attractive book is highly recommended to all gardeners.

HOW TO GROW HOUSE PLANTS, by the Sunset Editors, and Barbara Pesch. Lane Books, Menlo Park, Calif. 94025. 1968. Pp. 96. Illus. $1.95. This very attractive and profusely illustrated handbook will be welcomed by indoor gardeners. The topics discussed include an introduction to indoor gardening; plants for foliage and blossoms; African violets; indoor-outdoor plants; succulents and cactus; bromeliads; orchids; pests and diseases; fluorescent light gardening; and year-around gardening. Required reading for all indoor gardeners.

HOW TO GROW AND USE CAMELLIAS, by the Sunset Editors, and an introduction by D. L. Feathers. Sunset Books, Menlo Park, Calif. 94025. 1968. Pp. 80. Illus. $1.95. This is an up-dated, profusely illustrated, practical guide to the use of camellias in western landscaping. The topics discussed include choosing quality camellias; how to plant and care for camellias; Bonasi; landscaping with camellias; propagation; corsages; and a camellia encyclopedia. Highly recommended to all gardeners.

HOW TO GROW BULBS, 2nd revised edition, by the Sunset Editors. Lane Books, Menlo Park, Calif. 94025. 1968. Pp. 96. Illus. $1.95. This book is dedicated to gardeners who want to know more about bulbous plants, including the scientific and common names. The topics discussed include the techniques of bulb culture; container culture; how to combine bulbs; flower arrangements; ten most popular bulbs; and encyclopedia of bulbs; pronunciation guide, and seasonal calendar. To this list the following bulbs should be added for California, **Rhodophiala, Eustephia, Chlidanthus, Calostemma, Eurycles,** etc. (see Traub, the Genera of Amaryllidaceae, 1963). This stimulating book is highly recommended to all gardeners.

EASY GARDENING WITH DROUGHT-RESISTANT PLANTS, by Arno and Irene Nehrling. Hearthside Press, 381 Park Ave. So., New York, N. Y. 10016. 1968. Pp. 320. Illus. $6.95. This beautiful, profusely illustrated book on gardening with plants that require a minimum of water fills a definite need. The topics discussed include, why a book on dry gardens?; designing drought-resistant gardens; soil improvement and garden maintenance; hardy trees; hardy shrubs, ground covers and vines; drought resistant annuals and perennials; desert flora; plants for container gardens; and conservation is everyone's problem. Highly recommended to all gardeners.

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4. AMARYLLID CULTURE

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

PLANTING, FERTILIZING AND CARING FOR AMARYLLIS GROWN OUTDOORS

HENRY VAN WOESIK, *President-Director,*
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1. TREATMENT ON ARRIVAL

Abrupt changes in temperature may occasion Amaryllis bulbs to start sweating in transit, so that they may arrive with some red spots, rot or moisture, around the neck in particular; rub the blubs clean with sand, then apply DURA DUST (50% D T T) but not on the roots, put them aside in a cool place for approximately 48 hours, allowing them to dry and then plant them.

Of course, you may cut away any rotten part of the scales, or wash the bulbs clean under a running water faucet, using your hand to twist off the rot, but such treatment should only be applied when the bulbs should arrive in very bad shape, so that it will only be necessary in very exceptional cases.

If something bad should actually have happened to the bulbs in transit, send in your claim to the suppliers, as the bulbs have been insured against all possible risks and dangers. When receiving bulbs without roots, use a rooting medium around the foot or at the basal plate as some say; if this is done when planting, it will help a great deal.

2. REMOVAL OF ROOTS

It is extremely important for Amaryllis bulbs to keep their roots. Of course, some suppliers from other parts of the world, where Amaryllis are grown in the open (great changes in temperature between day and night may easily cause Amaryllis bulbs to lose their roots), have great difficulties in getting well-rooted bulbs, so that they cut off what few roots the bulbs have, asserting that Amaryllis should develop new roots every year. Only the latter part of their assertion is true, for the Amaryllis bulbs should flower on their old roots, after which they should develop new roots; the two or three scapes take a lot of substance out of the bulb, but less, if the bulb is helped by the old roots. So only cut off the dried-up parts of the roots and the roots that have entirely shriveled up, but leave the good, healthy and strong roots alone.

3. REMOVAL OF SCAPES

Some people remove the first scapes that appear to give the bulbs a better change to survive and to acclimate; this is not necessary at all, if the bulbs are well-rooted.

4. ROOTING

As stated above Amaryllis bulbs should develop new roots every year again after they have done flowering; if the old roots are still on the bulbs, when they are planted, the flowering process will take less substance out of the bulbs, which should afterwards be well-fed to help them develop new roots and new substance. (often Amaryllis bulbs feel like sponges, when they have flowered).

5. PREPARATION OF AMARYLLIS BED

Remove completely 14″ of the existing soil; then fill the open space with soil preparation as listed below and bring the top of the bed 4″ above the surrounding garden area. By doing so, you will ensure good drainage at the same time provide 18″ of proper soil to grow the Amaryllis in. This bed preparation is a "MUST" to have success in growing Amaryllis in the open ground.

6. SOIL PREPARATION (MIXTURE) FOR ABOVE BED

⅓ Leaf mold (preferably of two years old beech leaves, but at any rate a mixture that has a pH of approximately 6/7, though the pH may be reduced by pure sphagnum peat moss, see below).

⅓ Sharp sand (the same as concrete sand).

⅓ Pure Sphagnum Peat Moss; to which mixture you may add 15 Pounds of Bone Meal for every 25 square feet.

REMARK I: *Pure Sphagnum Peat Moss.* (hydrated . . . 98% Organic—pH 3.5). A good product of Canadian origin and ideal to get down the pH, which is generally too high, is said to be imported by WESTERN PEAT CO., 5800 Monroe Street, SYLVANA - Ohio and your dealer could no doubt get it for you.

REMARK II: *Leaf mold.* The use of leaf mold found close to the coast is somewhat dangerous, due to the presence of salt caused by high water during hurricanes.

REMARK III: *Sharp sand* (concrete sand) is bountiful locally and has been washed, so there is no danger of salt.

REMARK IV: *For growing in pots:* ½ Leaf Mold; ½ Pure Sphagnum Peat Moss; a handful of Bone Meal for an 8″ pot.

7. WATERING

No overhead watering (especially not, when Amaryllis are in full bloom), except occasionally to get dust from leaves, if there has been no rain for some time, in which case a light mist spray is better.

It is always desirable to soak the bed in the late afternoon, as the *alkalinity* of the water is likely not to be so great that time of day, due to heavy use during the day.

The water supply is usually heavily treated with *chlorine* and with late day watering, this does not seem so strong. So you had better not water during the hottest part of the day (between 10 A.M. and 4 P.M.); as the sun rays are very intense during these hours, foliage damage may occur, if watering is done during these hours.

REMARK: Potted Amaryllis should be watered from underneath, placing the pot in a container until the top soil becomes wet. Regular watering always gives better results, never allowing bed or pot to become entirely dry.

8. SPRAYING

In early spring, when the bulbs start developing new foliage, spray with an insecticide or disinfectant (as strong as the local authorities allow you) to kill off as many insects as possible, for insects spread Mosaic Virus.

Spraying is of vital importance, when you spot *aphids* (greenflies or plantlice), in which case spraying will be necessary on a fortnight's schedule, as the disinfectant will kill the aphids, but not their eggs. For safety's sake the spraying may be recommended to be repeated five times; it will make your yard a pleasanter place to be in, for most insects do not just bother Amaryllis plants.

9. MOZAIC VIRUS

Plants suffering from the disease, should be removed relentlessly, as there is no cure possible; if they are overlooked, the insects will spread the disease, and all your valuable Amaryllis plants will soon be infested.

10. FERTILIZING

Fertilizing should also be done on a schedule. Fertilize each one with *OIL EMULSION* (containing fish oil) or *LIQUID SHEEP, COW or HORSE MANURE.*

This feeding along with the Bone Meal already added to the above mixture will be sufficient for the growing months.

The beds should also be kept mulched all during the growing season until time to lift the bulbs in late fall. Foliage feeding, often applied to Lilies, is not necessary at all, if you fertilize in the above way.

11. LIFTING

Lift your Amaryllis bulbs in late fall for a rest, which will greatly stimulate the flower development within the bulbs; putting the roots in Sphagnum in large boxes with plenty of holes for air circulation; stacking them in a dry place. Though this implies a lot of work, it will give better results in my opinion, the more so as you have a chance once a year to do something about the Amaryllis beds. The soil should be refreshed once in two or three years at least, for the roots of Amaryllis plants infest the soil; sterilization or fumigation of the soil would be the solution, but wherever not possible, the soil should be replaced by fresh soil once in a while.

If you do not lift your Amaryllis bulbs, giving them a six weeks' rest, you should mulch them well to protect them from cold weather; some Amaryllis-lovers lost thousands of Amaryllis in one cold night. Lifting your bulbs has one more advantage, viz., the opportunity to check them for RED FUNGUS; if they suffer from the disease, clean

them thoroughly, rubbing the red off with sand, applying a fungicide and drying them well.

SOME USES FOR SYSTEMIC PESTICIDES ON AMARYLLIDS

JOHN M. CAGE, *1501 Page Mill Road, Palo Alto, Calif. 94304*

For two years I have been experimenting with the use of systemic insecticides on amaryllids, particularly hybrid *Amaryllis*. Several hundred seedlings and mature plants are grown both outdoors and in a small greenhouse. These systemic poisons, which function by being absorbed and distributed in plant tissues, as well as by contact, have been very effective under several conditions. *With proper precautions against poisoning,* they are definitely useful to the amateur gardener.

My first experience was with Scope (no longer available) and Cygon CE-2, used as a foliage spray on plants outdoors. The active ingredient in Cygon is ***O, O-dimethyl S-(N-methylcarbamamoylmethy) phosphorodithioate,*** or *dimethoate* for short. I found this spray treatment very lethal to thrips, aphids, and spider mites. The long residual action permits the spray schedule to be simplified to about one treatment per month.

However, foliage sprays with systemics do not solve two very important insect problems. First, I consider the material *far too toxic for use indoors as a spray,* and second, foliage treatment has not controlled several serious infestations of plant roots.

About two years ago, an invasion of an extremely obstinate thrip-like insect came in, apparently on purchased bulbs. This insect, which looks like a microscopic gray fly that does not fly, was associated with a root-lesion nematode, or some similar microscopic worm. Either the worm is the larva of the insect, or they seem to support each other symbiotically. The worms gradually destroy the root system and basal plate of *Amaryllis, Sprekelia, Narcissus, Zephyranthes,* and other bulbs. A strong magnifying glass is required to see either invader.

I should have obtained professional identification of the pest, or pests, but my first thought was to eradicate the trouble quickly. Fortunately, I was successful and have no specimens left for identification. The successful treatment consisted of *soaking bulbs* in a dieldrin solution (1 teaspoon of 28 percent emulsible solution per gallon of water) for about an hour and a *soil drench* of systemics after roots start.

Once roots have been destroyed and nematodes have burrowed into basal plates, the soil drench seems to be ineffective. Bulbs must be cleaned and soaked in the dieldrin solution or a systemic solution before replanting. Soaking in a solution of one teaspoon of Cygon CE-2 per gallon of water for several hours seems to rid the bulb of nematodes, as does dieldrin.

After a new root system has been established, the best control treatment I have found is systemic granules watered into the growing

medium. Several firms sell 2% granules of Di-Syston, a chemical similar to the one mentioned at the beginning of the article, including Green Light and Ortho. Used at the rate of one level teaspoonful per six-inch pot every two months, this material has kept plants clear of all insects, both on leaves and roots. When plants are free of pests, dosage can be reduced. Toxicity to the plants has not been serious, except on some Crinums.

I found an even more effective systemic pesticide to be phorate, again similar to the compound mentioned above. It is so toxic to humans that it is apparently not sold for amateur usage, but I should think it could be profitably employed by the large-scale growers. It is used widely by the commercial lily growers in the Northwest. Because of my chemistry background, a few pounds of Thimet, a version of the chemical made by American Chemical Company, were made available to me for testing. I received the 10 percent granules, and only about ¼ teaspoon per six-inch pot is sufficient. Mites, slugs, white flies, mealybugs, and caterpillers were controlled, as well as the nematode pest described above. The commercial growers should certainly consider this.

A very important side effect of systemic pesticides is the retarding of the spread of virus diseases. For over a year I have kept virus-infected *Amaryllis* plants (too valuable to destroy) in the same greenhouse with healthy plants without further spread of the infection. It is probably sufficient to treat only the infected plants.

Let me emphasize: *these materials are deadly poisons,* by swallowing, absorption through the skin, and breathing of fumes. Irrigation water dripping from a treated pot is one source of contamination.

Of other materials tried for prevention of root pests, nicotine was ineffective and lindane was less effective than dieldrin. Chlordane kills soil pests, but it has stunted *Amaryllis* growth everytime I have used it.

EXPERIENCES WITH AMARYLLIDS

Richard E. Tisch, *20516 Clark St., Woodland Hills, Calif. 91364*

General. Outdoors a home-made A-frame was discarded because its roof panels were too low for my tallest plants. Rather than replace it with a standard greenhouse, I purchased a relatively inexpensive "screen house". This is a set of 12 upright aluminum-framed plastic screen panels, hinged together to form a 6 ft. high 13-foot diameter circle—123 sq. ft. floor space. One panel acts as a door. A domed top framework of tubes (7½ ft. high) is covered with vinyl. The entirety is anchored to bolts secured in the patio concrete. This provides shade, protection from insects, fresh air circulation and a reduced range of temperature extremes for my potted seedlings, which are on patio-style redwood tables and benches. A hanging chemically treated killer of flying insects eliminates unwanted pests which get in under the edges of the panels.

Indoors my small plastic film covered "greenhouses", with thermostatically controlled bottom heat and timed Gro-Lux lamps, continue

to serve satisfactorily for starting seeds and bringing seedlings along to potting size. Flying insect killers hung inside these covered units control black flies.

Plants in plastic juice pitchers, when compared to those in standard clay pots or square plastic pots, continue to appear to have the strongest and healthiest leaf and root growth. So I changed from wooden seed flats to plastic dish pans approximately seven inches deep. Quarter inch drainage holes are drilled in the bottom. Over a layer of ¾-inch gravel and four inches of standard Amaryllis soil mix, the seeds are sown ½-inch deep in a two inch layer of Terralite. By spacing the seeds about two inches apart both ways, the seedlings can be left in the seed pans until their only and final shift into plastic pitchers, plastic pots or clay pots. This method seems to reduce time to flowering.

Amaryllis hybrids. When plants flower for the first time they are evaluated and either discarded or tried as pollen and/or seed parents. The following characteristics show pronounced differences: readiness to set seed, seed quantity and size, percentage of seeds which germinate, percentage of seedlings which have dark green leaves (versus pale green or albino), speed of early leaf growth, shape and size of leaves and bulbs, and root growth. During the winter of 1967 and the spring of 1968 the growth was generally less vigorous than usual, and the flowering season started later and ended sooner than usual; this year there were flowers only from 14 March to 6 May, with no winter or late summer flowering.

Amaryllis argilagae. Five bulblets, approximately ½-inch diameter, received in October 1966 from Dr. H. P. Traub, all have grown reluctantly. Only one has survived and is now in excellent condition under a Gro-Lux lamp indoors, with thermostatically controlled bottom heat. It likes moisture in the air, frequent watering and frequent feeding with weak fish fertilizer solution. Six leaves up to twelve inches long arch up from one to four inches over the rim of the plastic pitcher, the leaf tips drooping down from the horizontal to six inches below the pitcher's rim. Question: with that much droop, in their native habitat the leaf tips may be subject to rot unless soil drainage is very rapid, so how do they stand the high amounts of moisture the plant seems to require for best growth?

Amaryllis striata. There has been frequent year-round flowering indoors and outdoors. All are now outdoors in a bed with southeastern exposure. One plant is presently setting a seed pod resulting from a late June application of refrigerated pollen. Noticing that the leaves arch over flatly as described above for *A. argilagae,* I have watched them for rotting of the tips; it does occur, after the leaves have reached their prime condition and are beginning to decline.

Agapanthus. Both tall and dwarf blue, and tall white variations grow well in a southeastern exposure. While they will stand full sun and will flower readily so exposed, their leaf tips tend to dry out and the flowers fade more quickly. They set seed readily. Their requirements for food and water are not exacting; normal California weather conditions are suitable in almost all areas. This is a very popular plant here. I like the blue because it supplies a touch of cool color when it

is most needed, during June and July. The white provides an excellent contrast.

Allium unifolium. So far I have not determined its optimum growing conditions. One group in full sun and one in almost complete shade did not survive last year's summer and fall heat, followed by a cold wet winter. Many can be seen growing vigorously and flowering well in my neighborhood; but many have also died suddenly for no obvious reason.

Brunsvigia rosea. This is one of Southern California's most commonly-grown plants. It will survive total neglect, needing only our winter rains and our dry summers. From seedlings sown in December 1960, I have many bulbs which should flower this late summer. Some are in partial shade under a small *Albizzia* tree, and some are along a walk on the southeastern side of the house. The latter had more vigorous leaf growth which stayed green longer; they seem most likely to flower first.

Chlidanthus fragrans. From three bulbs potted in March 1965, there was one flower in April 1966 and none since. They were transplanted to a shaded coldframe and set eight to twelve inches deep. Foliage growth has been vigorous, but there is still no sign of flowering.

Chlidanthus x traubii. Eighteen seeds received in July 1967 from Dr. H. P. Traub were sowed in conditions normally used for Amaryllis seed. Germination was good in four days, with each seed lifted up out of the soil on top of a single round stem. True leaves started up in three weeks. Then they suddenly wilted and died. A check showed that the soil below the seed level was normally moist; no reason for the sudden wilting was apparent.

Clivia miniata. This is also a very common plant in Southern California, where it flourishes in deep shade, either in beds or in pots, provided the soil is rich. Flower stalks normally appear in February, but often decide to show up all spring and summer. Seeds are set readily; they germinate very slowly.

Habranthus andersonii var roseus. From a quantity of seed received in October 1966 from Dr. H. P. Traub, germination was excellent in a standard Amaryllis seedling condition. When transplanted outdoors, many died. The survivors are growing well in a shaded coldframe.

Haemanthus katherinae. Excellent growth and annual flowering in June in deep shade. The flowers are spectacular. In August and September "rusty" quarter-inch circles appear on the leaves, which by then are well chewed by worms, grasshoppers and cicadas. When the leaves are making their new growth in May, the center whorls are apparently especially tasty. The plant's habit of pushing new leaf tips right up through the old stalks is interesting to observe. Mine have not yet set seed for me.

Hemerocallis. Seeds have been taken from my two plants, one a deep chrome yellow-orange and one a delicate pale yellow. Germination indoors has not been satisfactory for me, but seeds have germinated well when sown ½-inch deep directly in the shaded coldframe. This is a popular plant in Southern California because it withstands neglect, once

established, and flowers freely under varying conditions of soil and exposure.

Hymenocallis narcissiflora. Several bulbs made fair growth in full sun, but did not survive a cold wet winter and two sharp frosts last February.

Lycoris squamigera. This is a very common plant in Southern California, where it produces leaves from February to June, then goes dormant, flowering with a naked scape in late July and August. Mine do very well in partial shade at the base of a small Olive tree.

Lycoris radiata. In a morning-sun-only exposure on top of a wall, mine grow leaves from November to June, then go dormant, flowering with naked scapes in late September. They have an excellent frilled shape, changing color from a terra cotta to a glowing deep crimson. Mine refuse to set seed.

Lycoris aurea. A grouping tucked under a Juniper tree's overhang, so they get only the early morning sunlight, have produced excellent leaf growth from late November to June, when they go dormant, flowering in mid October. While not very tall, mine have excited pleased reactions with their almost glowing deep yellow, frilled flowers. So far mine have not set seed.

Narcissus. I am still having fun with seedlings from 'King Alfred', 'Fortune' and 'Soleil d'Or'. Last February several more flowered for the first time; two of these will be kept as breeding stock. Seeds germinate readily when sown ½-inch deep in a shaded coldframe. After they flower, they are lifted and moved to a permanent location, where their ability to survive neglect is checked by leaving them in place the year around, watering them only when nearby plants are watered. Thus far, several have shown a tendency not only to survive but to thrive and multiply.

Nerine crispa (undulata?). In a southeastern exposure, mine have excellent leaf growth the year around. One plant surprised me by flowering last February. It had a brick-red flower on a twelve inch scape. The flower was small and delicate, being only one inch across. It would not set seed when selfed.

Rhodophiala x huntiana. Several seedlings are growing well in a shaded greenhouse. From seed received in October 1966 from Dr. H. P. Traub, I had excellent germination in the usual conditions supplied for Amaryllis seeds.

Sprekelia formosissima. This plant is commonly grown here, often in full sun. It grows best for me in a southeastern exposure, where its flowering is sporadic, likely to occur almost any time from April through October.

Tristogma uniflorum violaceum. These have continued to grow and flower with no attention in a raised pocket in full sun. Their blue color is welcome in mid-February, with yellow Narcissus nearby. Those I have in partial shade in a coldframe have larger, brighter flowers. All go completely dormant after producing seed copiously in May and June. Those in the shade restart leaf growth in late July; those in the sun, in September.

Tulbaghia fragrans. Some plants I secured from the stock of the late Cecil Houdyshel grow readily in either partial shade or full sun, but leaf tips yellow in the full sun. Growth is almost lush, but both leaves and flower stalks are loppier than *T. violaceae.* It tends to flower most during the shorter days of fall and spring, with a non-flowering stretch from March through September. Their fragrance is a pungent but fleeting sweetness, best enjoyed from cut flowers brought indoors to complete their opening.

Tulbaghia violaceae. The constant succession of flower stalks all summer, continuing at a slightly reduced rate over the winter, makes this a popular landscape specimen in Southern California. Their steady output of violet flowers offsets their garlic-like smell that is released even by a breeze's stirring their leaves. The growth habit is neat, with a solid clump that steadily increases in diameter. They like generous feedings, but withstand almost total neglect. Although they stop flowering for a while when transplanted or divided, food and water soon force them into renewed growth and flowering. One of my seedlings is smaller than standard; its leaves are six inches long and its flower stalks are twelve inches tall. It flowers steadily from a tight neat clump.

Zephyranthes citrina. These pleasing plants grow and flower well in semi shade. Seed are set without coaxing, and germination is excellent. To gather seed you'll have to compete with any mice that may locate the plants; if given a chance, they'll chew an entire clump to soil level. Seed pods start to split in sixteen to eighteen days from pollination; after fourteen days, I pick mine and put the stalk in water under a lamp to be sure of beating the birds to the seeds. Germination occurs in twelve to fourteen days.

BLUE AMARYLLIS FLOWERED IN SOUTH CAROLINA

CHARLES J. HUDSON, JR.

Curiosity in the blue amaryllis *(Worsleya rayneri)* finally paid off last fall when my plant came into full bloom, producing six perfectly formed flowers with slightly ruffled edges, and of a bluish-lilac color (Fig. 24).

The bulbs of this plant are curiously different from most other members of the amaryllis group, having a long neck of 14 inches. The long, arching strap-shaped leaves arise out of the top of the long neck. The plant now has reached a height of four feet and is still producing new sets of leaves to form a fountain-like effect.

Obtaining *Worsleya rayneri* from its native habitat in Brazil was a long, time consuming task, mostly in getting clearances from the U.S.D.A. and in going through the customary fumigation treatment before releasing the bulb in this country.

When the bulb was first received it was potted in a good soil mixture, the same as used for standard amaryllis bulbs. The plant was placed in a lightly shaded spot in the garden all summer, and was then brought into the greenhouse in the fall for flowering. No trouble was

encountered in the growing process since this plant thrived under the same general care given to amaryllis.

Mr. Harry Blossfeld, in a letter to me, dated January 6, 1968, indicated the difficulties of obtaining bulbs growing in their native habitats. He says, "They are huge things, and a man cannot carry more than two big ones or four medium sized specimens from the dangerous cliffs where they grow, down to the nearest road. That is a neck-breaking work, and you cannot make more than four trips a day, which

Fig. 24. The Blue Amaryllis, **Worsleya rayneri,** as flowered by Charles J. Hudson, Jr., in South Carolina.

means that a day's drudgery will produce a dozen bulbs. Then comes the red tape in shipping them, which will take a week running from one government office to the other to join a dozen distinct licenses necessary to ship live plants. And then comes the risk of fumigation treatment at Washington, D. C. in the U.S.D.A. bureau of Entomology".

From this information it is doubtful that *Worsleya rayneri* bulbs will ever be available in the United States at reasonable prices unless stock is built up from seedlings grown in this country.

GROWING **BRUNSVIGIA** X **PARKERI** IN LOUISIANA

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In midsummer of 1966, L. S. Hannibal sent me a collection of bulbs of *Brunsvigia* x *parkeri* W. Watson ex Traub. They were planted in my *Amaryllis* L. (syn. *Hippesstrum* Herb.) plot which is covered with shade cloth that allows 50% sunlight. Late that summer the bulbs put up flowering scapes and bloomed beautifully. The vegetative growth through the winter of 1966-67 was exceptionally good, but the bulbs gave practically no flowers in 1967.

Again, in the growing season of 1967-68, the bulbs grew exceptionally well, increasing in size and number. When the foliage died down in April of 1968, the bulbs were dug and stored in a dry place for the summer. They were replanted in August 15th and now, in mid-September, they are blooming exceptionally well.

It appears that *Brunsvigia* x *parkeri* must have a dry rest period during the summer months as is the case under natural conditions in the native habitat of the *Brunsvigis* parents in South Africa, where they do so well, and in California with a similar climate. My experience of one season is not necessarily conclusive, but it leads me to believe that *Brunsvigia* species and the hybrids such as *Brunsvigia* x *parkeri* may prove to be satisfactory for the humid Gulf Coast Region provided the bulbs are dug and given storage through the summer months.

Thus, by employing the summer bulb-storage method, the two Cape Belladonnas, the lower growing late-flowering, deeper pink, *Brunsvigia rosea* (Lam.) Hann. (see Plant Life 1963, p. 59); the taller early-flowering light pink species, *Brunsvigia major* Traub (see Plant Life 1963, p. 59), as well as the large number of hybrids in white, and many pink and red color shades and patterns grouped under *Brunsvigia* x *parkeri* W. Watson ex Traub, may be grown in the Gulf Coast Region. For a Comprehensive coverage of these last named hybrids see "Catalog of Brunsvigia Cultivars" by Traub & Hannibal, Plant Life 1960. pp. 39-62.

HARDINESS IN SOME **LYCORIS** SPECIES

NATHAN WILLIAM EASTERLY

Species of *Lycoris* are listed as semi-hardy bulbs in the trade catalogs. Nothing specific is given concerning the differences among the various species. My curiosity led me to plan an experiment to show differences in growth and hardiness among available species of *Lycoris*.

Two dozen bulbs were obtained of the following species: *Lycoris albiflora, Lycoris aurea, Lycoris "cinnabarina," Lycoris incarnata, Lycoris radiata, Lycoris sanguinea,* and *Lycoris squamigera.* All bulbs were planted in 4 inch pots using a mixture of ½ soil, ¼ sand, and ¼ shredded peat. Six bulbs of each species were used as controls. Eighteen bulbs of each species were used as experimental plants.

The controls were grown in a small greenhouse (64 sq. ft.) at my home. The thermostat was set for 68 degrees F. during the day and 60 degrees F. during the night. The experimental pots were imbedded in soil of my bulb garden nearby with the rim of the pot at ground level. No protection of any kind was placed over the pots.

The experiment was run from October 1 to December 31, 1967. Three pots of each species were brought in every two weeks starting on October 21. The last of the bulbs were brought in on December 31. In the greenhouse the pots warmed up after a night in the warmer temperatures so I could make my observations of the plant's growth. The final observation on all pots in the greenhouse was made on February 15, 1968. I was looking for leaf production, first of all; next, the rate of leaf growth; and finally, frost damage or stunting of the leaves.

During October the day temperatures ranged from a high of 85° F. to a low of 45° F. The night temperatures ranged from a high of 66° F. to a low of 28° F. The day temperatures during November ranged from a high of 63° to a low 32° (two days). The night temperatures ranged from 54° to 16° F. Our major cold weather in November consisted of two days of 16° weather during the third week and two days of 18° weather during the fourth week. Although it snowed three times during the month, we had no ground cover of snow.

During the month of December the day temperatures ranged from 59° to 25° F. Seven day temperatures were below freezing. The night temperatures ranged from 41° to 3° F. Nineteen night temperatures were below freezing but only seven of these temperatures were below 20° F.

The results of the experiment are as follows:

Lycoris albiflora—All of the control plants grew vigorously from the start and produced many robust leaves. The experimental plants grew well from the beginning. The outside temperatures slowed up leaf production only slightly; no ill effects at all were caused by the 3° F.

Lycoris aurea—The control plants grew well but not as vigorously as *L. albiflora.* All of these plants were in good condition at the end of the experiment. The experimental plants grew well from the beginning but temperatures below 15° caused stunting. All of the plants, including the stunted ones, were growing well by February 15.

Lycoris "cinnabarina"—This plant is the poorest grower. Only two plants of the six produced any leaves at all and these leaves were dried up by February 15. The bulbs were saved to try again at a later date. The experimental plants produced different results. Pots brought into the greenhouse between November 15 (17° weather) and December 25 (26° weather) produced healthy plants with two or three leaves. Plants brought in before November 15 did not produce. Other plants were killed by the 9° weather on December 26.

Lycoris incarnata—The control plants were very slow in starting to produce leaves. During November the plants produced healthy leaves

but the plants died back by February 15. The experimental plants exhibited the same growth pattern as the controls. The cold temperatures had no effect on the plant's growth other than slowing up leaf production a little.

Lycoris radiata—The control plants grew slowly but steadily from the start. All plants produced leaves which were healthy on February 15. The experimental plants exhibited the same results as the controls. No ill effect, not even frost bite, was observed on any plant.

Lycoris sanguinea—The control plants took very long (November 15) to show leaves. After that, the plants grew very well, produced two to four leaves, and were healthy on February 15. The experimental plants never produced any leaves outside but started producing leaves after November 25 in the greenhouse. The cold temperatures stunted the plants' growth but the plants were growing slowly on February 15.

Lycoris squamigera—The control plants did not show leaves until December 10. The plants grew well after that and were producing many leaves by February 15. The experimental plants produced no leaves outside but started producing leaves in the greenhouse after December 10.

Only *Lycoris "cinnabarina"* was killed by cold temperatures (9° F. on December 26). All other bulbs were in good shape on February 15. My previous experience with *Lycoris sanguinea* showed that I could not leave the bulbs outside during January and February. Note that the growth of *Lycoris "cinnabarina"* was enhanced by temperatures that ranged from 17° to 38° F.

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AMARYLLID CULTURE IN SOUTHWESTERN LOUISIANA—A PRELIMINARY REPORT

William W. Zorbach

Prior to the writer's move from Kensington, Md. to New Iberia, La. in June of 1967, all of his amaryllids were dug, packed in boxes with vermiculite, and shipped to his present location with his household goods. Included in the shipment were all those bulbs that were handled in pots, as well as a number of live plants, which did remarkably well despite the fact that they spent twelve days in a hot moving van without attention.

The sedimentary soils of southern Louisiana appear to be very rich but, being sticky in nature, require a good deal of conditioning to permit adequate drainage. Accordingly, a bulb bed was prepared along the south wall of the writer's new residence, in which much sand and peat moss was added to the soil, permitting the level of the new soil to be

raised about 5″ with respect to the yard. Plantings were made and, because of the milder weather in Louisiana, the depths to which the bulbs have been set are considerably less than in the Washington area. In general, growth has been excellent, but soil fungus is a hazard, and a few losses from this have been encountered.

It has been rather dismaying to find that a number of amaryllids, which attracted much attention in the Washington area, are common garden plants here in New Iberia. This is true of the various hybrid crinums; "Ellen Bosanquet" appears to be the most common. It is of interest to note, however, that the gardeners in this area, who grow crinums, refer to them as "lilies", and it is my impression that they do not, for the most part, know the botanical names for many of the amaryllids grown here, which appear to be taken quite for granted.

Hymenocallis tenuifolia (also in the writer's garden) is common here and is completely hardy. *Hymenocallis galvestonensis* has nearly the status of a weed in this locale, growing well under conditions of poor drainage, with or without adequate rainfall. Synonyms here for this species are "swamp lily" or "snake lily". The writer dug a clump of these from the wild and replanted them in ordinary soil, and it will be of interest to see if they establish by next spring and give blooms.

In the past, the writer has read much about *Lycoris radiata* (red) in the South, and it is certainly true in this area. One sees them in almost every garden and yard, and clumps grow wild in uncultivated fields. They are especially attractive as border plants along walks and, as of this writing, their blooming period is just about finished. Both *L. radiata* (red) and *L. squamigera* were planted out by the writer after his move last year; however, neither have bloomed this year, which is not surprising, owing to the very long time required for each to establish. *Brunsvigia rosea* made excellent growth last winter, but of this writing has not bloomed, although the plants have been dormant all summer.

Crinum asiaticum, although not widely grown, is common here. The two large specimens, grown in tubs by the writer in Washington, were planted outside; each has since divided and the plants have grown magnificently this year. They are perfectly hardy and, although the foliage "kills back" in the winter, the bulbs have withstood temperatures at night as low as 25°F.

With regard to *Sprekelia formosissima,* it is a pleasure not to have to handle this species any longer as tender bulbs. These established rapidly on transplanting, and made good growth during the remainder of last summer and the fall (which reaches nearly to January). In the spring, the writer was rewarded by blooms, 4-6 at a time, lasting for about three weeks. They are, therefore, perfectly hardy, as are also *Habranthrus (robustus* and *brachyandrus),* which did very well this year.

Perhaps the most striking difference between southern Louisiana and the Washington, D. C. area is the onset of growing weather. Because of the early advent of spring here, the crinums, in particular, *C. powelli album,* bloomed in late April and early May, as opposed to

mid June in Washington. The *Sprekelia,* planted directly in front of these, bloomed at the same time, and this proved to be an attractive combination.

In conclusion, it may be stated that there are, indeed, distinct advantages in growing amaryllids in this part of the country. Of course, it goes without saying that the sun is brighter than in northern climes, and the winters are milder, but also, sharp variations in temperature are not encountered and, in the summertime, adequate rainfall is provided, when the "monsoons" arrive. Hopefully, in the future, additional comments of more specific interest will be forthcoming.

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LYCORIS THRIVE IN WESTERN NEBRASKA

Miss Vivian Grapes,
Big Springs, Nebraska 69122

[Editorial Note.—The following is excerpted from a letter received from Miss Vivian Grapes under date of September 30, 1968. This shows that two very beautiful **Lycoris** species are frost hardy in the North. Nurserymen, including Claude A. Barr, Smithwick, South Dakota 57782, are urged to propagate stock of these for general distribution in the North.—**Hamilton P. Traub**]

Thought you would be interested to know that the bulb of *Lycoris chinensis* you so kindly sent me in 1962 bloomed for me July 16, 1966, one scape with four flowers; and this summer, July 18, 1968, two scapes each with four flowers. I am so thrilled to have this beautiful *Lycoris* species to survive and bloom in Nebraska.

Lycoris caldwellii planted in 1958 first bloomed September 11, 1960, and produced two scapes September 9, 1967.

Both species are growing outdoors in my garden.

I would dearly love to try *Lycoris sperryi, L. kiushiana,* and other species making leaf growth in spring and early summer in the hope of finding others that are frost hardy in western Nebraska.

I am not having much success with *Lycoris* species that produce foliage in the autumn and winter.

[Editorial Note.—Those who have **Lycoris** species and hybrids which produce their foliage in spring and early summer are urged to send some surplus stock directly to Miss Grapes for use in her experiments in order to speed up this work with the objective of determining which **Lycoris** species are adapted to the extreme Northern climate.]

AMARYLLID EXPERIENCES IN FLORIDA, 1968

Mrs. Fred Tebben,
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Florida has been plagued for quite a number of years with lack of rainfall, but the season from September, 1967, to May, 1968, was

especially dry and so amaryllis bulbs suffered much. Many lost their entire root systems and even though I watered all the beds almost continually it did not seem to do much good. Bloom was scarce for February, March and April which were cold months and this together with the drought made everything late. In May, however, things changed and we received 5.4 inches of rain, and it has continued to rain in quite large amounts almost every day since.

Outdoor *Amaryllis* bloom was late, the first bud opening on March 9. Many seedlings bloomed but I could not trace the origin of these since dogs and children have done away with all my markers over the years I have lived here. Not many Dutch bulbs bloomed but those that produced flowers were excellent. A seedling Dutch cross much like 'Belinda' produced three bud scapes and only a few produced two scapes. I was most happy to have one scape appear after such a dry season for I think I had only about 20% of my many bulbs to produce buds.

In October I ordered a number of new bulbs from Mr. Goedert. Since this was late for ordering I did not receive all that I ordered but Mr. Goedert always makes this up by sending extra bulbs, all of which were lovely, and were African bulbs. The only Dutch bulb I ordered was 'Tarakan.' For many years I have searched for a lovely black-red shade among the amaryllis listed and 'Tarakan' surely answers this description. It it very fine in both color and form and I can recommend it highly for those of you who like dark red bloom. I had some bloom on old *Amaryllis striata* in the house. It is much like the amaryllis they call "the wild amaryllis" here in Florida which blooms very profusely in protected places out of doors. Several Sundays we had huge bouquets of these "wild amaryllis" in Church and they were really breathtakingly lovely. I was given a dozen bulbs and I hope I have them planted in a spot where they will receive enough winter protection so that I will get bloom in February or March. Old *A. reginae* also bloomed in the house. It has been a shy bloomer for many years but seems to like its Florida home as this is its third blooming season here. Flower is called coral in shade and has no central spot or star but is much the same shade as old "striata".

Crinums bloom after the amaryllis are done and are very attractive in large group plantings. My favorites are "Ellen Bosanquet" and "St. Christopher Lily", the name given here to a *C. giganteum* Hybrid. None bloomed as plentifully as they should have done had our season been better.

Daylilies are rapidly gaining in popularity and are most gorgeous in all the new shades hybridizers are introducing. A friend of mine spent a hundred dollars for plants and will eventually have a lovely display along her lake front when they grow into larger clumps. Mine did not do as well as they should have since I had moved and rearranged them last year but I had some very nice ones. I especially like the new pinks and reds, but for a wonderful bloomer 'Sandalwood' produces

many flowers over a long period and is very nice. I am fond of all the daylilies, the light yellows such as 'White Sails', the golden yellows, the deep orange and even some of the eyed varieties such as 'Varsity' tho these I do not care for as much as the clear colors.

Last summer (1967) I was called north in July by the death of my only sister so now I have no one here in Florida. She lived here but had gone north to spend the summer with her children up there. I I did not care to return home at once so visited a short time in Ohio. Friends at Columbus took me to Mansfield, Ohio, to visit the lovely Kingwood Gardens there. The day lilies were in bloom there and I wandered to my heart's content among them listing names of varieties I liked only to find when I looked them up that they were just too expensive for me to buy since I never know just how long I will live in this house. I kept the list and will watch for lower prices as they become more plentiful. Kingwood Center is a lovely place at any time of the year and well worth a visit if you are in that vicinity. Their many greenhouses have year round bloom and there is always something fascinating to enjoy.

Florida is so green and lovely now I wish you might all see it. Of course we have lots of electrical storms in the rainy season but our lakes are again filled with water and the lawns grow so fast it keeps everyone busy keeping them cut and trimmed. I hope all this rain will make my next amaryllis season the best ever.

FOUR COMMON "MILK & WINE" CRINUMS

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

Four of our most attractive 'Milk and Wine' *Crinum* clones bear a striking similarity to each other and cause no end of confusion in identity. These are *Crinum submersum, grandiflorum, virginicum* and 'Empress of India'. All flower within a few weeks and have large, flat-face, open blossoms which bear typical *scabrum* markings of waxy white petalegs striped by a pink or red keel. In foliage and bulb there is a general similarity, and though the true *C. scabrum* does not have the slender foliage or elongated neck found in this group the bulbs inevitably are classed as variants or hybrids of *C. scabrum.* Actually only one contains *C. scabrum* blood and all are appreciably hardier. If it were not for some senior members amongst the bulb collectors we would be in a bad way attempting identities because these plants date back to the gay nineties and any written descriptions are as brief as the old catalogues.

The first bulb, *Crinum* x *herbertii virginicum,* was introduced by van Tubergen about 1885. We have no way of telling now if it was one of Herbert's original *C. bulbispermum* x *scabrum crosses.* It could be since he distributed samples to Dr. Carey in Calcutta as well as to other friends in tropical areas. If not, then it is a repeat of this cross. It has the foliage stature of a *C. x powelli,* but cleaner, more erect and slightly

more succulent. The 24-inch scape carries an umbel of 8-10 open star-shaped blossoms which resemble an open flowered hybrid *Amaryllis* with pointed tepalsegs. These have pink keels against a white background; the margins are often ruffled. The tepalseg width at the heel of the limb is 1¼ to 1½ inches and the span of the blossoms are 7 inches or more. Usually 4 or 5 buds open each evening.

The second bulb is the old French hybrid *C. grandiflorum* from Marseilles which van Tubergen listed from 1896 to 1910. It is a cross of *C. bulbispermum* with *C. careyanum*. The foliage is noticeably less acutely tipped than *virginicum* and the tepalsegs are nearly linear having an approximate width of one inch; the tips are blunt. The flat faced blossoms have a span of 7 inches and typical pink keels. The blossoms tend to collapse to a trumpet shape and become campanulate on the second day. Some people call the plant *grandum* as Henry Nehrling used this name. Excepting for the slight differences noted in the tepalsegs and foliage shapes, *virginicum* and *grandiflorum* can be readily confused.

'Empress of India' has open star shaped blossoms like *virginicum* but the foliage spreads in a low rosette with the tips arching over to the ground. It may be a *Kirkii* hybrid as there is great similarity in the blossoms and foliage, however, the tepal tubes are quite slender. The breeder is unknown; both Reasoner Brothers at the Royal Palms Nursery and van Tubergen listed the bulb about 1905. It is not as hardy to winter cold as *virginicum,* but grows well in an 8 or 10 inch pot.

The last plant, *C. submersum* Herbert appears to have been introduced by Reasoner Brothers as *C. kunthianum* from Nova Granada on the western slopes of the Mantiqueira Mountains which lie back of Rio de Janeiro, Brazil. It resembles *C. scabrum* or *grandiflorum* with its broad glistening white petalsegs which are striped with deep pink or vivid red keels. The plant has been commonly confused with *C. fimbriatulum* or *C. zeylanicum* due to these floral markings, the acutely curved tepaltubes and declinate filaments—Features which are typical of the *Codonocrinum* subgenus. But the plant also has bright yellow pollen, and the blossoms are patent and have a strong vanilla fragrance. Moreover the foliage is bluntly tipped and closely resembles a broad leafed *C. erubescens* or *C. kunthianum.* All such latter features are common to the American *Platyaster subgenus.* Despite these widely conflicting features which caused Dean Herbert to wonder if he had encountered a transitional species, *C. submersum* is allied to *kunthianum.* The tepals are a good inch wide, linear-oblong in shape and completely patent giving flat faced blossoms of 7 inches span (See American Horticultural Magazine Oct. 1968) not unlike the other three 'Milk and Wine' garden *Crinum* already described. The plant differs from *C. kunthianum* by the larger size of the blossoms, their vivid coloring and the unusual *Codonocrinum* features including the sharply bent tepaltube. The foliage is broader at the base. We can attribute these unusual features, which are indeed transitional, to the misty year-around rains so necessary to the Coffee plantations about Rio. Similar

transitional features are found in some forms of *C. erubescens,* likewise with some *C. flaccidum* growing along the Great Barrier Range in Australia. Evolution was not understood in Herbert's day but his writings indicate that he considered the *Crinum* forms with straight tepaltubes to be more closely allied to *Ammocharis* and *Brunsvigia,* thus he concluded that the *Crinum* with the curved tubes were an offshoot of the straight. This is in agreement with current views.

Apparently *C. submersum* is quite common in Florida. It throws numerous offsets and soon forms compact clumps. It does not need the aquatic conditions as Herbert assumed and is hardier than *C. scabrum* since the writer has grown bulbs out of doors through wet Sacramento winters for several years. We are inclined to believe that this is the plant Henry Nehrling refers to as *C. amabile* in his section in Bailey's Cyclopedia of Horticulture. (The true *C. amabile* resembles *C. asiaticum* and is four feet tall. It is surface growing and would freeze out in Florida.)

The writer has never heard of 'Empress of India' being fertile. The same applies to *virginicum* but other forms of *C.* x *herberti* have been reported as pollen viable on *C. bulbispermum* so it may have possibilities. We have ample proof that *C.* x *grandiflorum* is fertile as it has been crossed both ways with *C.* 'Cecil Houdyshel'. This suggests that *grandiflorum* may be a polyploid. There may be seedlings scattered about Florida. Unconfirmed reports exist that *C. submersum* has very viable pollen. We will try it for seed in Hawaii. The Kona climate would be perfect.

DAFFODILS—AUTUMN, WINTER AND SPRING JEWELS

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How many readers of bulb catalogs are aware of the introduction date of 'King Alfred'? In this jet-age it is surprising that a daffodil introduced in 1899 is still popular. That this is so is due to the lack of knowledge of what has been taking place in the daffodil world. True, careful selections made by reputable dealers over the years has improved the strain since it was introduced; however, it is away below the quality of the many new cultivars (varieties) on the market today. Breeders in Ireland, England, the Netherlands, Australia (including Tasmania), New Zealand, and the United States are responsible for the many fine things available today.

It is recommended that one begin a journey of discovery among the newer daffodils with the catalogs and pricelists as guidebooks. There are forms, colors, types and sizes now, that were not dreamed of in that gas-light era. One of these new developments are the reversed bicolors. These flowers have their tepalsegs darker than the trumpet, corona, or cup, and are enchanting things such as 'Honeybird', 'Entrancement', 'Spellbinder', 'Bethany', 'Daydream', 'Limeade', and 'Binkie'. These clones represent years of selective breeding by growers

in Ireland and Oregon. Mr. Grant E. Mitsch of Canby, Oregon, has done more with this class than has any other breeder; not limiting his efforts to one or two divisions, but continuing this tremendous advancement of color into the smaller divisions, such as Division VII—Jonquil, with 'Pipit' and 'Verdin' available at present with the promise of more to follow. These are exquisite and very fine novelties.

If the thought of the yellow tepalsegs and white cups does not attract you, perhaps the pink cupped forms would, or the clear whites, or maybe the red cupped yellows. All are lovely and each garden should have a smattering of them to give it depth, and to provide a longer and greater enjoyment to all who are privileged to view it. Present day daffodils can be had in a wide range of blooming periods far greater than the two week span of the venerable 'King Alfred'. With a careful study of the catalogs, blooms may be had from late winter until late spring as not all flower at the same time.

Here, in southern California the season starts with that odd little species *Narcissus viridiflorus,* a green flowered jonquil with a heavenly fragrance, which is a fall bloomer opening well before Thanksgiving. The 'Paper-White' and 'Soleil D'Or', members of Division VIII—Tazettas, are in bloom from November through January. Other early blooming cultivars are the Cyclamineus hybrids of Division VI, 'February Gold' and 'Peeping Tom'; the red cupped member of Division II, Rouge; Mr. Mitsch's lovely pale trumpet 'Moonmist' is one of the earliest. These will be in bloom before February; from then on, until the poets close the season in late April or early May, daffodils can grace your garden.

A wind protected location which receives filtered sunlight through a spring flowering tree can be an ideal situation for raising daffodils. If one keeps in mind the scale of the site selected and is governed thereby in the choice of clones, the whole can become a jewel of garden planning, and the memory of which can sustain one through many a hot and trying day.

The requirements for culture are simple. A well and deeply dug soil, enriched at the lower level with humus and bulb food, low in nitrogen and non-burning such as the sludge derivatives. The bed should be prepared in late summer so that it will be settled and ready to receive the bulbs at proper planting time. Here, in southern California, that is in the later part of October and the first of November, or whenever the heat of summer has past and the ground remains cool to the touch, even at mid-day. The bulbs are planted at a depth two to three times their diameter, and are watered well after planting to firm the soil around them and to start an early root action. From then on, the beds are always kept damp. When the tips start showing through the ground, a side dressing of a liquid fertilizer of low nitrogen content is given; when the tips of the buds appear, a similar feeding is given.

If the fertilizer is acid in reaction, such as the 4-10-10 type used for acid loving plants, the color of the blooms will be improved.

Following the blooming period another feeding should be given, this one of a 2-10-10 or 0-10-10 formula to assist in the formation of hard sound bulbs for the coming season. A fertilizer high in nitrogen will produce more succulent bulbs, but in a hot climate this can be detrimental, as such bulbs are more prone to rot when left down during the hot summer months.

Should the drying foliage offend ones aesthetic sense, the planting of screening annuals may be practiced without detriment to the bulbs, provided one doesn't spear them with a planting trowel. Petunias and alyssum are excellent; they require little water during the summer and what is given is absorbed immediately, and they form a nice mat to keep the soil cool during the hot weather. As the foliage dies back, do not break, braid or twist it off, but let it age normally, for in doing so it is storing food and forming buds for the following season. To damage the foliage at this time is to destroy the blooms for the next year and to endanger the life of your bulbs. When the foliage is brown and prostrate, remove it with a slight tug if necessary to free it from the bulb. Where the leaves come through the soil round holes remain. Drop a few granules of insecticide down the holes and fill in with soil. This will discourage sowbugs, earwigs and the like from feeding on the dormant bulbs. When it is again cool in the fall begin watering the bulb beds and give them a good side dressing of bulb food as when planting. Tuck in a few blue violas or white primroses to add another facet to the daffodil setting, and soon another season will begin.

If a word about clones (often incorrectly called varieties) is needed, let it be said that the best is not always the most expensive. It is the newness and the scarcity coupled with the demand that governs the price.

Excellent examples in the Trumpet Division (I) are, in the order of their appearance, 'Artic Gold', 'Kingscourt', 'Gold Court', and 'Ulster Prince', all of which are yellow to golden yellow; of the pale yellows the first is 'Moonmist', with 'Inver' blooming a bit later, both are cool, clean and lovely. Bicolor trumpets are among the first of all to bloom and the clones 'Foresight', 'Lapford', 'Trousseau' and 'Prologue' are recommended. Perhaps, the finest bicolor to date is the elegant 'Descanso', but it is new and a bit high in cost. Pink trumpets are rare, but the bewitching 'Rima' is a "Must have" on anyone's list.

Division II—Large cupped daffodils—is the largest of all the divisions with the greatest number of types to choose from; from the deep gold of 'Ormeau' through to the pale tints of 'Lemnos' to the bicolors 'Polindra', 'Festivity', 'Green Island', 'Statue', and 'Irish Charm'. The gold and red cupped cultivars are 'Revelry', 'Red Goblet', 'Fire Proof', 'Ceylon', 'Border Chief' and 'Ballymarlow' to name but a few to whet the interest in these fiery numbers. This group and their companions, the red-orange cupped whites have the greatest carrying power in the garden. They shine like beacons and a wide selection is available

including 'Arbar', 'Red April' and 'Kilworth'. The all whites include 'Ludlow', 'Purity', 'Arctic Doric', and 'Easter Moon', these are a bit costly due to demand but are most lovely. A characteristic of the whites seems to be the requirement of sharp drainage. If one wishes to have white daffodils without the expense of the higher priced sorts, it is advised that one plant the lovely and quite hardy triandrus hybrid, 'Tresamble'. Some of the most enchanting of daffodils are to be found in this, the Division V—Triandrus. Even their names are poetry, 'Rippling Waters', 'Honey Bells', 'Ivory Gate', 'Dawn', 'April Tears' and 'Rosedown', the latter being yellow as are 'Kings Sutton' and 'Honey Bells'.

The Cyclamineus, Division VI, include among the earliest and most distinctive of daffodils, with their wind-swept tepalsegs resembling the true cyclamen, but coming in yellows which the cyclamen do not. Valuable additions to the garden are 'Jenny', 'Dove Wings', 'Charity May', 'Bushtit', 'Wood Cock', 'Spring Peeper', 'March Sunshine', and the tiny and enchanting 'Mite'.

The jonquil derivitives of Division VII are among the most fragrant and bloom from February with 'Hesla' and 'Sweetness' through until the last of April with the smaller 'Baby Moon' and 'Baby Star'. Pink tinted jonquil forms are scarce, but 'Cherie' is available to all and an excellent one.

Specimens from Division III—small cupped daffodils and Division IV—doubles should be placed in a cool shaded spot with plenty of moisture as they are among the last to flower due to their close relationship to the poets of Division IX. The all white forms from Division III, 'Chinese White', 'Bryer', 'Silver Mine', 'Silver Princes', and reprieve are listed in many growers' catalogs and a few should be included in any collection. A pine tree makes an excellent foil for such as these and for the poets 'Actaea', 'Milan', 'Dactyl', and the late, late 'Sea Green', which is sometimes in flower as late as May. Yes, even here in southern California. The pine tree needles make an excellent summer mulch for the bed to keep the soil cool and provide additional acidity.

Not every one enjoys the large puff-ball doubles of 'Windblown', 'White Lion' or 'Sunburst', but few can resist the precise elegance of 'Acropolis'. While this clone is still in the novelty category, even new and finer forms are being bred in Ireland and Oregon. Mr. Murray W. Evans of Corbett, Oregon has been active in the development of hardier doubles more suited to the various climates of the United States than are the previous introductions from Ireland.

There are many more than can be listed here, some of which are as easy to grow as weeds, others are most difficult. But, which ever you prefer take the time to come to know them well and you will be rewarded.

THE 1968 AMARYLLIS SEASON

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Many seasons have passed since as many fine blooms were seen as during this past season. Especially fine reports were received regarding seedlings that flowered for the first time. Many are enjoying raising seedlings. Seedlings are interesting particularly as one can add many colors to his collection not available in named clones. The lighter colors, blends and bi-colors are very popular. Each seedling is an interesting individual and much satisfaction can be obtained in having a few to flower each year.

Some fans make their own crosses. This is interesting; however, if one does not choose the seed parents wisely the results will be inferior. It is wise to obtain the best seed possible because you are going to pet these seedlings along for 3 to 4 years and you surely do not want to be disappointed after spending many hours of watering and caring for them. While raising a few seedlings from your own crosses is interesting unless you have a large collection it is very hard to time the flowering period to have the exact two plants in flower at the same time (unless one cold-stores pollen). One should not waste his time on chance crosses when good seed can be obtained from a reliable hybridizer.

Whether you live in the north and grow your amaryllis in pots or in the south where they grow in the border I recommend trying a few seed each year. In three or four years you can have several new ones blossom each season. It will give you a lot of satisfaction and pride in its accomplishment.

CULTURAL RECOMMENDATIONS

Again this past season, as in most seasons, I received letters from those who dearly love *Amaryllis* but just fail in keeping them growing from year to year. Part of this failure, I am sure, is due to the lack of understanding of this plant. One must first understand that the commercial clones of amaryllis are hybrids. The exact requirement for each variety is a little different. In addition one must understand that most clones come from but a relatively few growers in Holland. The bulbs are raised in greenhouses under ideal conditions and since Holland is on a latitude with Canada, they have to provide heat even in the summertime to maintain a temperature of 68°F. This is the optimum growing temperature for some Dutch amaryllis. Few of us in the United States can duplicate this condition especially in the South unless we have an air conditioned greenhouse.

There is another factor we should recognize when we grow the Dutch clones. The Dutch hybridize to produce prime bulbs in as short a period as possible that will produce a fine flower when potted up. They do not breed for garden type plants, neither do they breed for pot plants that will flower year after year for you. We owe a great deal to the Dutch growers for their work on amaryllis for today I seriously

doubt we would have the beautiful hybrids we have if it were not for them. They stubbornly and constantly worked with this plant when its commercial value was questionable. The Dutch are due a great deal of credit for their work with amaryllis; however many of the faults we find with todays clones, especially in the south, is our dependency on the Dutch growers for our bulbs. They are not as adaptable to our climate as they would be if we had local hybridizers and growers. This is a weakness that few fans understand or show much interest in changing. They just have not supported the American grower in the past.

In what I have said I do not mean to infer any discredit on the Dutch grower. The point I am making is that the faults we find with our amaryllis clones should be expected. We will never find a fully acceptable amaryllis strain to grow in Florida by depending on the growers in Holland. Neither could the Dutch depend on us to develop a strain commercially satisfactory for them. It just does not work this way.

We do need to develop improved hybrids for pot culture and for the border in our country. What will grow in the cooler dry, higher areas of California are not going to do as well in our warm wet coastal areas. Each area needs to develop its own strain. This is why I encourage all fanciers to grow a few seedlings each year.

I do not wish to encourage you to give up growing the fine Dutch clones for I never would do this and they surely are especially needed in hybridizing. The point I am trying to make is you can be more successful with them if you try to understand their requirements and not be one of those 'know it alls' who believe amaryllis are tropical plants and the hotter it is the better they like it. Try to understand how they are raised in Holland and try to duplicate these conditions as far as possible. One can improvise and I will try to give you a few hints I have found helpful myself.

I have grown many of the Dutch clones in the past 10 to 15 years. I have had many failures. I have had success with some clones the Dutch introduced and found they failed for them in a few years but here they thrived. You will find some Dutch clones will adapt themselves to your conditions much easier than others and some are going to fail. Of course I feel all the Dutch clones are worth the money even if we only get one flowering season from some. *You surely could not get anything nearly as beautiful in cut flowers from the florist for a comparable price.*

Here are a few points one should keep in mind when growing the Dutch clones although generally this is good for all others.

1. Most amaryllis hybrids do not like it too warm. 68° to 80° F. is best and I am told 70°F. is near the temperature the Dutch use.
2. Do not over water. The Dutch grow their amaryllis in beds or vats in the greenhouses where watering can be controlled.
3. Start with clean soil. Clean cultivation is essential.
4. Soil used should be slightly alkaline, open texture and rotted for two years if it contains much organic material.

5. Do not put large amounts of manure with your mixture. If you do you will have root trouble. Top dressing lightly with manure is better.

6. Avoid sudden changes in temperature of the bulb during the flowering season and during the growing season.

7. Try to keep your amaryllis growing through July and August for if you can they will make their best growth as the weather cools.

The trick is to find out how one accomplishes this in his own area. I will particularly comment on what I have found best in my area. First, I grow my amaryllis in pots. A porous pot will help cool itself from evaporation, especially if set up off the ground. I use tables with air spaces between each board. If the amaryllis bulb is planted well down in the pot and covered with a good insulating soil it will help. Lightly watering in the heat of the day will cool the plant. One should also give some shade but not too much. In a west exposure the ground apparently does not heat up quite as much. You may have other ideas.

Second, if you have amaryllis in a greenhouse or under cover do not over water. They will stand more dryness than wetness for if the soil gets soggy you will surely lose the roots and your bulb crop. If you have your amaryllis protected from the rain it is a matter of not over watering, but if yours are outside like mine and many others, I am sure, then you must guard against a steady rain which will flood the pot and may cause water logging unless you have excellent drainage. Drainage is getting rid of the excess water in the soil. Many factors are to be considered in this. Normally the larger the pot the better drainage you will need. You will need better drainage in a plastic non-porous pot than in a clay or porous pot. How do you get drainage? First you should provide an open textured soil that will hold some water and still drain sufficiently. You can have a soil too open textured which will retain too little water. However, normally the reverse is the case and you will have to take other precautions to eliminate excess water. One way is to use a clay or porous pot. A second is to reduce the size of the pot. This will foster drainage, particularly in a clay or porous pot but even in a plastic pot it will lessen the ratio of the volume of the soil and water to the bulb's ability to take up water. Planting more than one bulb to a pot will also help reduce excess water in the soil as two or more bulbs will take up water two to three times as fast as one. I recommend very strongly planting several bulbs in one pot. *Amaryllis* seem to naturalize in clumps and often a clump can cope with a prolonged rainy spell where a single bulb will lose its roots. I have found particularly with the species *A. belladonna* that once a clump has established itself it can cope with growing in damper areas where it ordinarily would not thrive. Once your bulbs have established a good root system they can stand a lot more water.

There are some advantages in a large pot. *Amaryllis* bulbs do not like sudden changes in temperature. The larger the pot the greater the mass and the longer the pot has to be exposed to a change in temperature before the temperature of the pot will change. Of course if you

have controlled conditions this will not be a factor but in the open it definitely is. Planting several bulbs in a larger pot will insure better drainage and prevent the bulbs from being subjected to as much change in temperature. If you raise your amaryllis in pots in the open you must remember a hard rain will often wash away much of the food in the soil and you will have to fertilize them more often particularly after prolonged rains.

One should maintain clean culture. Start with clean soil. It pays to soak your bulbs in a good insecticide before planting. I also find drenching the soil of my potted amaryllis, about every 8 weeks, with a solution of Cygon and water very helpful. This is especially true if you have a plant that is not doing well and you do not have time to repot it. A drenching of Cygon and water will often start it back to recovery. Clean soil can not be over emphasized as it is where most of your trouble lies. In making up your soil if it has much organic material in it be sure it is well rotted. Green organic material especially if the soil is not well drained will rot your roots. If you can not control your water do not put much organic material in your potting soil. It is much better to add it later as a top dressing. Large amounts of manure in your potting soil should be avoided.

In planting amaryllis if they do not have live roots or have done poorly somewhere and you have dug them, washed them and are replanting them, if there is any doubt as to their being free of disease or insects, it will often be wise to cut the basal plate off even with the bottom of the bulb. This will cut away infection both from insect and fungus that often goes up into the bulb when the roots die away.

If your bulbs have good roots they probably are fairly free of insects and disease. When planting in this case pull off all damaged or dried roots. Fill your pot about half full of soil. Turn the bulb upside down and let the roots fan out. Then insert the bulb into the pot holding the roots in place letting them spread out up the sides of the pot and over the edge. Fill the pot and if you have the time tuck the roots hanging over the sides back into the surface of the soil. In forcing new bulbs I find using pure sphagnum moss in a Tuffy pot excellent. No fertilizer is needed until the bulb has flowered. I do add at times a little fertilizer to my watering when the scape is about finished developing and the flower bud begins to elongate. This gives the bud the extra boost to win the tri-color. Fertilizing before the bulb flowers will often bring leaves to the detriment of the flower. During the growing season your amaryllis need a steady supply of fertilizer. Liquid fertilizer is good but do not make the solution too strong. I do hope some of the things I have found helpful to me may prove helpful to you. One has to perfect his own method, however, as it is difficult to explain just what one does in raising his plants. Often one does not give all the little details that are important and again the one receiving the instructions often discounts the small details that are important. Well, anyway better luck next season.

I think we probably all get too excited over the new clones each season. But then again I guess we all need a little excitement in our

lives and new amaryllis clones may be a harmless type of excitement although it may prove costly. I sometimes think we neglect to raise as many of the older clones as we should and spend too much time and money on the new ones. However again the new ones are the ones in which we look for improvement in color, etc. It is a great temptation.

AMARYLLIS CLONES

In reading over some of my comments on clones during the past several years it sounds like a record on the stereo that just keeps playing over and over. So this year I would like to give you a 'Quicky' list on some of the older clones and a few new ones that have done particularly well for me. Here they are!

WHITE: 'Marie Goretti', 'White Christmas', 'White Giant', 'Flying Cloud', 'Queen of the Whites' and 'Oasis'. PINK AND WHITE: 'Apple Blossom', 'Love's Desire', 'Pygmalion', 'Rose Elegance', 'Rose Marie', 'Little Diamond', 'Floriade'. SALMON & WHITE: 'Maragret Rose', 'Sweet Seventeen', 'Day Dream', 'Loveliness', and 'Mozart'. ORANGE & WHITE: 'Pinksterflower', 'Golden Triumphator' and 'Glorious Victory'. LIGHT PINK: 'Flora Queen', 'Eastern Dream', 'Dawning' and 'Dutch Belle'. MEDIUM ROSE PINK: 'Pink Favorite', 'Fritz Kreisler' and 'Daintiness'. PICOTEE: I like them all. some difficulty with some but new clones are improving. WHITE STRIPED RED: 'Peppermint', 'Orion' and 'Schubert'. RED & WHITE HEART: 'Hellas' and 'United Nations'. BRIGHT RED: 'Loberia'. MEDIUM RED: 'Ludwig's Scarlet', 'Scarlet Leader' and 'President Kennedy'. DARK RED: 'Vintage', 'Purple Queen', 'Ludwig's It', 'Belinda', 'Bernice' and 'Tarakan'. ROSE: 'Rubra', 'Rosedale', and other African varieties. DARK ROSE: 'Violetta', 'Morena' and 'Bordeau'. ORANGE: 'Orange Wonder' and 'Tangerine'. SALMON: 'Beautiful Lady' and 'Salmon Giant'.

You can compare this list with your list and I am sure it will be very interesting to see how they compare. Of course I did not name all the good ones but these happened to stand out in my memory at this time. I am sure I could add others as well as I know you have your favorites. I am sure many of us have our own favorite seedlings also. I know many of you have unnamed clones you would not part with and I also have many. Once in a while I like to talk about these as I feel sure you do about yours.

MY UNNAMED SEEDLINGS

First I would like to comment on the parents of the hybrid I call "Leopardina". This is a coined name for some hybrids I have that, in my opinion, are closely related to *A. leopoldii* and *A. pardina*. The parent stock of most of the "Leopardina" hybrids are three clones. One I call "Bloody Mary", another "American Beauty" and a third "clone No. 700". I do use the seedlings of these clones for breeding but mostly the "Leopardina" hybrids are from these three clones. You might be interested to know where these clones came from. "Bloody Mary" was found in some India hybrids. The clone, "American

Beauty'', originally came from Guatemala many years ago. The Lady who gave it to me, that is the original clone, obtained it in Guatemala. However she says Mr. Cammack had it or one very similar to it which he called ''American Beauty'' and that is why she called it by that name. She feels it is the same clone Mr. Cammack had. The third clone is an odd clone I received from Warmenhoven in a shipment of pink and white clones.

All three clones grow vigorously. ''Bloody Mary'' is very white with blood red flushing. It actually looks as if it is bleeding, the red is so brilliant. The tepalsegs are extra wide, often 5 inches across, very round and the flower is a good 8 to 9 inches across. ''American Beauty'' is white and rose, about 7 to 8 inches in diameter and of good form. Both of these are very beautiful flowers. ''Clone 700'' is a well formed flower 7 to 8 inches in diameter but is somewhat of an ugly duckling. It is whitish green spotted and picoteed red to violet red, very dark, not much of a looker but has color pigment, is vigorous and makes nice seedlings. I cross these on self seedlings of these three parents generally and get whites, red and white, rose and white, some with purple tones and picotee types. Most people who have flowered these seedlings marvel at their coloring and beauty.

Another interesting hybrid I have developed is what I call ''Sunsets''. These are crosses of the Dutch Ludwig's Pink clones on seedlings of a cross between an Indian hybrid and 'Daintiness', I believe. These hybrids have many fine pinks, rose pinks, brick rose, orange and salmon colors among them. The original Indian clone was a large rose with white throat that appears to have quite a bit of *A.* x *johnsonii* in it. I feel if one would cross Ludwig's Dutch clones on *A.* x *johnsonii* he would get interesting large flowering hybrids good for cultivation in the south.

Over the years I have saved the best seedlings of ''Gracilis'' that I have flowered. At first I had trouble with this strain growing here but I have about ten clones now that grow very easily. Most have 6 flowers per scape and are orange. Possibly by selecting these still further I can obtain a strain that can easily be raised in a pot. I feel we give too little attention to these fine small amaryllis. They are wonderful pot plants when established. I had some pots last spring with as many as 20 flowers open at a time. They were really beautiful.

I have another cross from Mr. Cooper of Hawaii. It is *A. aulica platypetala* x 'Floriade'. I can not make this cross myself but it is a fine one that produces large late flowers, mostly pen stripes; a very fine hybrid. I feel it should be called ''Cooper's Hybrid''.

THE HARRISON HYBRIDS

Before I quit rambling I would like to say a little something about the ''Harrison hybrids'' which will be available to the public this season. I know many will be asking questions about them. This is an interesting group of hybrids developed by the late Mr. Harrison in his mountain garden in Mexico. They are interesting for a number of reasons and since Mr. Harrison was murdered this adds a strange and interesting

side line to this strain. As I said they were developed and raised in the mountains of Mexico where I am sure the temperature is cooler and much more even than here in the south. These bulbs should be best suited to the cooler areas of California and the west where the nights have been too cool for other amaryllis hybrids. Try a few of these if you are in one of these areas. The bulbs of the "Harrison hybrids" vary a lot in size. I am sure Mr. Harrison was growing these for his own pleasure and was not interested in commercial production as I do not feel he let size of bulb influence him in his selection. I feel with the many medium size flowers in this strain he saw beauty where it was and size did not influence him greatly. Most men like large flowers and this is somewhat strange as many Men's idea of beauty in women is not bigness. But then I am talking about amaryllis and this is quite a different thing. The size of the Harrison bulbs vary a lot; so do the size of the flowers. Some are very large; others are what I call medium size. None are as small as the "Gracilis".

I do not think Mr. Harrison had anything particularly in mind but beauty. The color range is quite extensive. If there are any dominating colors it is possibly pink and white and striped varieties. However, there are solid colored ones from lightest pink to dark rose, from light red to near black, some exceptionally beautiful large salmon and orange ones that are very scarce among the Dutch clones. If there was one color he preferred, I would say it was the 'Apple Blossom' types. These show the influence of 'Apple Blossom', I am sure. There are some beautiful pink and whites that vary in color to lavender pink. These in my opinion are very beautiful. There are some huge white penciled red. There are picotee types, some have six or more flowers per scape. They open up quite a possibility for new types and colors in hybridizing; something we need.

As I write this to make the last minute dash before publication I look back to the same situation each year and if I might take the privilege to make a little personal observation, now that I am retired from my regular work, I do hope in the future I will find time to be more timely. I am sure your editor will agree that this is desirable and I would like to thank him for his patience. I feel we all should appreciate the great effort he puts into editing the Amaryllis Year Book.

AMARYLLID CULTURE IN VIRGINIA

Mrs. Mary J. Forberg, *21 Albermarle Av., Richmond, Virginia 23226*

In the State of Virginia we find four general divisions for growing plants, according to the topography. They are namely, Tidewater, where the soils are nearly sea level, Piedmont plain, where the salt water comes up as far as Richmond in the James River and stops at the locks, the mountainous Shenandoah section, and the Southwest, where the land is very productive.

Richmond offers a pleasant climate and is a mecca for plant lovers. Chesterfield county adjoins on one side and here the growing is affected by a variety of soils and weather as it is influenced by the Appomattox and the James rivers. A County Agricultural Agent in extension work showed slides at my garden club. Among them was *Crinum americanum* grown in a large clump in his yard. This was in full bloom with many umbels fully headed out at once. This clump has been there for six years; having been transferred from a bog in Alabama.

On the opposite side of Richmond is Hanover and Henrico County. This section produces lush bulb growth and good farm products for the table. According to the County Agent, there is a favorable current of air over this section which persists. The vegetables, fruits and flowers from this section have great vigor, substance and color and are ready for the early market.

As the hardy amaryllids resent being moved and cultivated, it is necessary to start by planting in good friable soil, using a quantity of old well rotted manure and leaf mold, at planting time. A goodly amount of this placed under the bulbs when planted pays off in later years. A while back we had a long rainy spell when moisture fell each day for six weeks. This resulted in die-back of some bulbs. When lifted the entire clumps had turned black as coal. We were informed by the State Dept. of Agriculture that this was the result of salt being picked up into the air and deposited later through the rains.

Plantings of *Sternbergia* and *Zephyranthes* have been successful only when in a sheltered position. *Zephyranthes atamasco* and *candida* flourish well and are the most rugged. The evergreen foliage is always pretty; these generally decorate our table for Thanksgiving.

Lycoris radiata is perfectly adjusted to this section. They multiply and thrive no matter where they are placed as long as they receive water during the flowering period. They seed easily too. *Lycoris squamageria* also grows well. *Lycoris* seeds should be thick, glossy and black and should go into the ground when in this condition. *Lycoris* should be planted a little further apart than other bulbs to keep the blooms from tangling in the wind. These bulbs should be planted up to their neck in the earth. Do not plant too deep as they will grow upwards, somewhat like a tulip droplet. This causes them to skip a blooming season or two while they rebuild the plant structure. All amaryllids resent winds which mar the large strap-like leaves and cause the flowers to fade. Many enjoy partial shade, especially Crinums. It keeps their color clear and the blooms crisper.

Many uses of mulching with leaf mold have been found. It keeps the tips of the leaves from browning, the bloom shaft is protected and soil moisture is conserved. If some of your plantings do not multiply and bloom properly, try placing some large stones or bricks about the plants. Stones are best. This helps the plant to keep the heat near the bulb longer; thus these semi-tropical bulbs feel at home again and divide normally.

During World War II, a naval officer was given his orders to return

to the States. It was necessary for him to walk several miles and carry his gear on his back in order to make his check-out station. This was Leyte, hot and humid. The officer was nearly exhausted when all at once he spotted a large group of *Lycoris squamageria,* waving in the wind in full bloom. It seemed to him to be a signal to push on as he had seen them in my yard here at home for he was my son. These are more temperamental and bloom less often than *L. radiata,* which always bloom. *Lycoris aurea,* the Golden Lycoris only responds to container-culture here. It is well worth the extra attention for it has such exquisite detail of form. *L. sprengeri* or Blue-tipped Lycoris has blunt, green foliage. It does bloom freely but appears to do best when grown in a container.

Powell's white and pink Crinums (*Crinum* x *powellii album* and *roseum*) bloom every year and are disease free it seems. They are grown in full sun, and only need extra moisture during the blooming period. The Milk-and-Wine clone I have is rather fluted and needs some protection from full sun or it does not last. These are larger flowers, more showy, but rather delicate. These bulbs multiply fast and do not mind being separated or moved. The foliage is rather a grayish green; broad and strap-like. I shall try some other species this season and let you know how they do here.

I grew one of the Chalice Lilies, *Hymenocallis narcissiflora* which is native to Peru. These bear large white, fragrant blossoms. They freeze easily and must be dug one week after the first frost. Allow the full seven days for the foods in the stalk and leaves to move back into the bulb. The roots are never removed. If you plant before June 1st., in Virginia, the plant will go to stalk and leaves, feed and multiply but will not bloom. By waiting for the ground to warm up you gain, as it will often grow very rapidly and bloom in fourteen days. Thus you can plan for a show or display and be assured of blooms. If you wish a longer blooming period, stagger the plantings two weeks apart.

I will try to grow some of the beautiful native American Chalice Lilies. These are found from North Carolina to Florida, and on to Texas. *Hymenocallis palusvirens* is found in North Carolina, and many others are found further south. *Hymenocallis caroliniana* ranges from the Carolinas and Georgia to Missouri, Oklahoma and east Texas; it is one the finest.

PLANT LIFE LIBRARY—continued from page 96.

WEATHERED WOOD WITH FLOWERS, by Mary G. Knight. William Morrow & Co., 425 Park Ave. So., New York, N. Y. 10016. 1968. Pp. 127. Illus. Mrs. Knight has found inspiration in designing floral arrangements featuring wood as she has found it in nature. She points out that all materials suited to various flower designs are appropriate with weathered wood. Highly recommended to all who are interested in flower arranging.

TRIPLE RIDGE FARM, by Ruth Fauts Pochmann. William Morrow & Co., 425 Park Ave. So., New York, N. Y. 10016. 1968. Pp. 233. Illus. $5.95. This is a "glowing account of a family's devotion to their Wisconsin farm and how they restored its natural wonders and beauty." This is a worth while inspirational book and is highly recommended to all who are interested in the restoration of the American heritage, and conservation.

FLOWERS AND FURNITURE IN AMERICAS HISTORIC HOMES, annotated by Elfreda Finch. Hearthside Press, 381 Park Ave. So., New York, N. Y. 10016. 1967. Pp. 120. Illus. $10.00. This beautiful book is concerned with the **historic houses all over the United States,** and the flowers which complement the furnishings within. Each of the 45 houses illustrated is accompanied by a few succinct paragraphs giving its history. This utterly delightful and profusely illustrated book is indispensible to all interested in home furnishing and flower arrangements.

FLOWERS AND SYMBOLS FOR THE CHRISTIAN YEAR, by Ruth E. Mullins. Hearthside Press, 381 Park Ave. So., New York, N. Y. 10016. 1967. Pp. 160. Illus. $6.95. This is the outstanding book on flower arrangements for the Christian Year. The topics discussed include new trends, new needs; Christian symbolism; flower arrangements for major events, and special Christian occasions; secular days observed in Church and home; and the Church, the club and you. Highly recommended to all flower arrangers.

ROSE CALENDAR 1969, by Hearthside Press, 381 Park Ave., So., New York, N. Y. 10016. 1968. Illus. $1.75. This Rose Calendar for 1969, sponsored by Helen Page, of Hearthside Press, is suitable for use in a popular fund raising project for club groups. For the twelve months appropriate illustrations, mostly formal flower arrangements featuring roses are included. Clubs interested should write directly to Helen Page, c/o Hearthside Press.

INDOOR GARDENS, by Ware Budlong. Hathorn Books, 70 5th Ave., New York, N. Y. 10011. 1968. Pp. 175. Illus. $6.95. Subtitled "A Collection of Novel Ideas for House Plant Grouping" serves as an inspiration to the gardener as well as a practical guide about the details of indoor gardening. The topics discussed include starting the indoor garden; garden decor; waterfall, larger, nostalgia, movable, herb, rock, gesneriad, and children's gardens; terrariums; no-sun gardens; personalized gardens; garden projects; and doors to more gardens. Highly recommended to all gardeners.

FRUITS FOR THE HOME GARDEN, by Ken & Pat Kraft. William Morrow & Co., 425 Park Ave. So., New York, N. Y. 10016. 1968. Pp. 287. Illus. $6.95. The first part of this book introduces the subject of dwarf fruit trees, including culture, pest control, pruning and espaliers. The second part presents a treasury of fruits, including tree fruits, berry fruits and grapes. The third part is concerned with the experimenters garden, the suburban fruit garden, sharing fruits, fruits and health, and the future of fruits. Recommended to all home gardeners.

HOW TO PRUNE ALMOST EVERYTHING, by J. P. Baumgardt. William Morrow & Co., 425 Park Ave. So., New York, N. Y. 10016. 1968. Pp. 192. Illus. $5.95. This is a guide to pruning practices, including specific directions for more than 300 different plants grown in the United States. The topics discussed include why we prune, how to prune, when and where to prune, special techniques for special purposes, and encyclopedia of plants, from **Abelia** to **Zizyphus,** with pruning instructions; Do's and Don'ts, and a seasonal guide. Recommended to all gardeners.

A MERRY CHRISTMAS HERBAL, by Adelma G. Simmons. William Morrow & Co., 425 Park Ave. So., New York, N. Y. 10016. 1968. Pp. 160. Illus. $5.95. This is a book of lore and legend, decorations and recipes for all who are under the spell of Christmas. The topics discussed include Christmas at Caprilands; Christmas trees; wreaths from the herb garden; Heartha and Huldah; fire and flax; St. Barbara's Day; St. Nicholas' Day; St. Lucy's Day; Christmas Reveillon; New Year's Day; Epiphany; growing the Christmas garden, and herbal gifts from the kitchen and garden.

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GENERAL EDITION

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ADAPTING NATIVE PLANTS TO GARDEN CONDITIONS

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For many years in Michigan I had practiced ways of moving plants directly from their native "wild" locations to locations within the around-the-house flower borders. Such new homes were carefully and thoroughly selected and prepared to simulate as closely as feasible the conditions to which the plants were accustomed. There was enough success achieved to warrant the continuance of this tedious and exacting procedure.

Now that I am in California, I have gone at the problem in a totally different way. I now sow seeds and select from the seedlings those plants which indicate a tendency to adapt to the totally different environment, using these selected plants as seed parents for succeeding generations. To date I have had encouraging success with two interesting plants. Seed of both were secured from the Santa Barbara Botanic Garden, Mission Canyon, Santa Barbara, California. My fundamental purpose was to develop additional sources of bright blue color, much needed in California gardens.

Pentstemon azurea. Seed were soaked for six days in a colchicine solution, then sowed in an outdoors bed under a lath and polyethylene film shade. This was done in September; by April of the following year there were seedlings large enough to be spaced out and to be transplanted to varying locations to try to determine if the plant has a noticeable preference for certain exposures and moisture levels. In June of that same year (nine months from sowing) the first flowers showed. From these flowering plants, seed were taken from the one plant which had the most desirable combination of bright blue flowers with a minimum of purple at the base of the tubes, stems which were erect and strong, and a general neatness of clump growth. In late September these seeds were in turn soaked in a colchicine solution for six days, then sowed in similar conditions. From these, one plant with a deep, bright blue flower coloration, which also flowered early, was selected to be a seed parent.

At the present time I have accumulated approximately twenty parent plants, being evaluated further for their ability to withstand the usual garden conditions, which include periods of total neglect. Attrition has been high, and I have not hesitated to rogue out any plants which went loppy or off-color. Two of the plants are low, compact, spreading to twelve-inch diameter neat clumps which flower the entire set of stems at one time. Another, which flowered in early March, flowered again in mid July; its flower stalks had been cut in April, to prevent seed formation.

Even without further development, I feel that I have a stock of parent plants from which, by asexual reproduction, I can provide considerable quantities of the bright blue color that was needed.

Pentstemon spectabilis. This plant was chosen as a possible source of tall spikes of blue. The same methods were used as with *P. azurea,* as described above, but success was limited. Only one plant remains, the balance having been too rank in growth, with resultant loppiness. Further, only one plant showed what could be classed as "blue", most being a weak lavender or magenta.

Sisyrinchium bellum (Blue-Eyed Grass). After a six-day soak in a colchicine solution, seed were sown in a deeply shaded location outdoors in September. Germination was excellent, and spacing the seedlings was accomplished with very little loss. From June of the next year, to the following June, flowering occurred regularly. Most were small, plain purplish-blue, with scraggly or rank and loppy growth. These were rogued out. One plant of the hundreds grown was saved as a seed parent: it was upright, formed a neat clump, had larger flatter flowers of bright blue. Its first year it flowered from mid-March to early June.

The second year, the parent plant was divided into two smaller clumps, which were planted so that one had morning exposure and one had afternoon exposure. The latter flowered heavier and set more seed. However, with the coming of full summer both plants faltered and dried out by mid-July, indicating that the plant is not yet ready for exposure to so much sunlight and dryness. Seeds taken from these two clumps will be sown in the shade for a repeat of the process.

Iris douglasiana. Per instructions for growing this type of plant, seeds were layered in sphagnum moss in the refrigerator until there were signs of growth. The seeds were sown in different locations, in different soils and with different moisture levels. Of all the many seeds, only one plant survived germination and transplanting operations. This one is tucked into a corner where it sees only morning sunlight, but it just doesn't want to prosper. I intend to try again, with this plant as well as the taller *I. longipetala.*

PRUNUS PERSICA FORMA ZEYLANICA, FORMA NOV.

Prunus persica Batch, forma *zeylanica* Traub, *forma nov.* (Rosaceae), forma tropica, a forma typica speciei enim florens frigus hiemis non imperens; fructo putamente libero, carne cremeo differt. Holonomenifer (typus): No. 1086 (TRA), Jan. 25, 1968, cult. La Jolla, Calif.

A tropical form not requiring a winter cold period for flowering, fruit up to 3.8 x 4.2 cm. in size; free-stone, flesh greenish to cream-colored.—*Hamilton P. Traub*

ELECTRIC DRYING PRESS FOR HERBARIUM SPECIMENS

PHILLIP VAN DER MERWE [1] AND P. J. GROBLER [2]

Government Herbarium, Stellenbosch

In the past various methods were used to speed up the drying time for herbarium specimens. Amongst others, ventilated electrical ovens were used, but without much success as the centre of the press is not adequately heated, with a resulting condensation of moisture, which retarded the drying process.

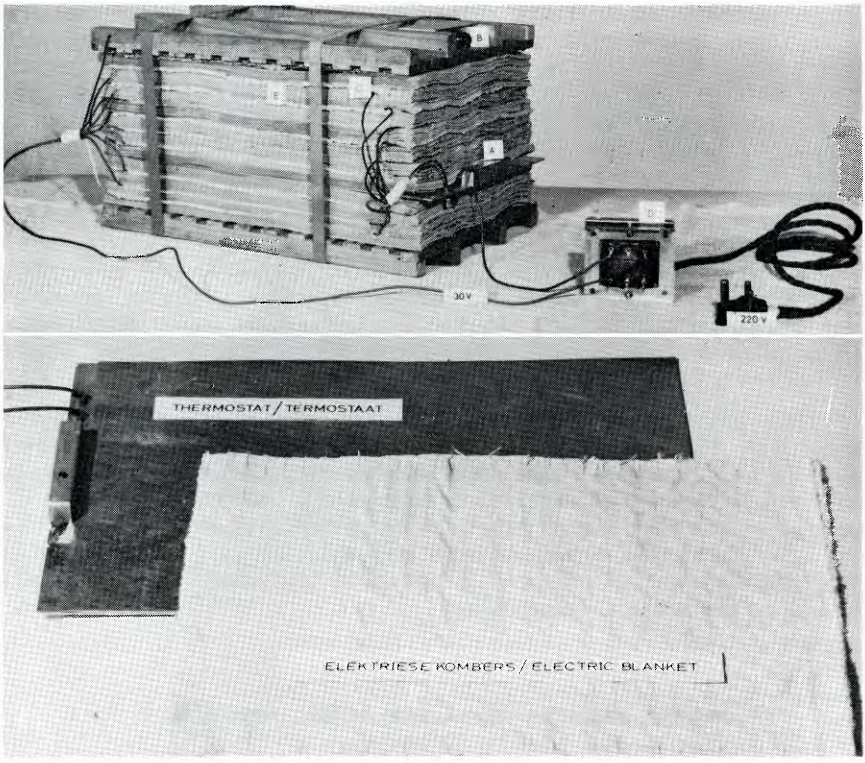

Fig. 25. **Upper,** Electric drying press for drying herbarium specimens: **A,** thermostat, **B,** indicator light, **C,** electric blanket, **D,** transformer (primary 220 V/ secondary 30 V) and **E,** drying paper. **Lower,** electric blanket and thermostat.

[1] Present Address: Dept. of Nature Conservation, Cape Province, Republic of South Africa.

[2] Present Address: National Botanic Gardens of South Africa, Kirstenbosch.

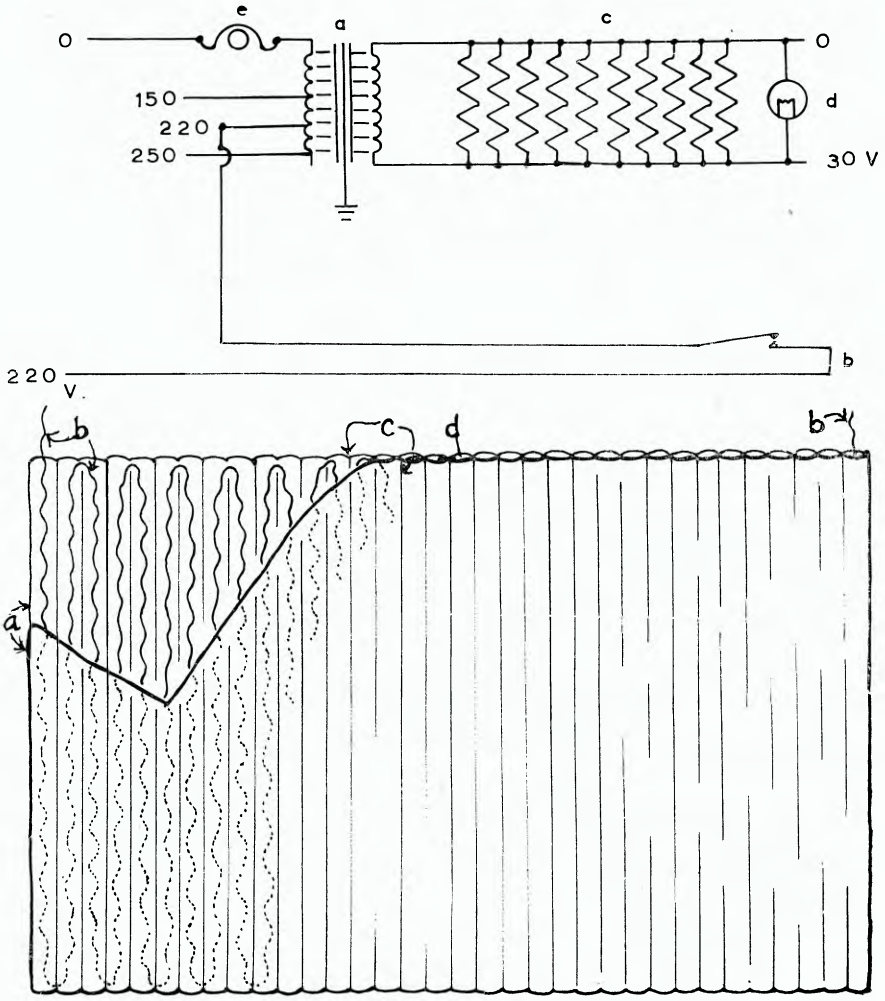

Fig. 26. Electric drying press for herbarium specimens: **Upper,** diagram of wiring of electric press: **a,** transformer; **b,** thermostat; **c,** 220 V/ 600 W resistance (10); **d,** indicator light; and **e,** fuse.

Lower, electrically heated blanket: **a,** two canvas squares stitched together; **b,** element wire; **c,** stitching; and **d,** parallel openings.

THE CONSTRUCTION OF THE ELECTRICAL PRESS (See Figs. 25 & 26):

The electrical plant press is basically a conventional press with electrically heated blankets (25 x 40 cm.) evenly spaced amongst the normal drying paper.

A thermostat is included in the circuit to regulate the working temperature.

Because open resistance wire is used in close proximity to moist plant material, a transformer is used to bring the 220v current down to 30v—to eliminate any shocks.

A fuse is incorporated to prevent overloading of the transformer. A red indicator light shows the "on" and "off" positions of the apparatus.

Not to curb ventilation in the press, the heating blankets are made of canvas. Each "blanket" is made up of two 25 x 40 cm. canvas squares stitched together in such a way that parallel openings 1 cm. wide are left through which the resistance wire is threaded.

For each blanket, one spiral 600w/220v element wire is used. The spiral is stretched so that a little kink is left in the wire before it is threaded. The kink keeps the canvas apart to facilitate ventilation. Each end of the element is connected to a 30 cm. piece of insulated wire.

Ten electrical blankets (the number depends on the current the transformer can supply) are connected in parallel and connected to the transformer (30v). The primary coil of the transformer is connected to the 220v mains.

An adjustable thermostat, mounted on a stainless-steel sheet of 25 x 43 cm., is connected to the circuit.

The electrical blankets are evenly spaced between the drying sheets of a conventional drying press. The steel sheet with thermostat is placed between sheets 5 and 6, the hottest part, and is set to cut out at 60°C.

EXPERIMENTS WITH THE ELECTRICAL DRYING PRESS:

With the electrical drying press, plants can be dried using one of two methods by either placing the plants in a cold press or into the press already at its working temperature. The last method is important in cases where the leaves tend to drop, as with Erica spp., to kill the plants as soon as possible.

An experiment was conducted to establish the drying speed of the press; on 14th January, 1967, 17 plant species were collected in duplicate and on 15th January, 1967 at 9:00 a.m. one set was placed in a cold electrical press. As a control a duplicate set was placed in an ordinary plant press at 8:00 a.m. on 15th January, 1967.

RESULTS:

The specimens in the above experiment took 23 hours to dry in the electrical press and 116 hours in the conventional plant press.

In the case of the electrical plant press, the laying out and placing the plants in the press and taking them out took 20 minutes and no change of paper was necessary. The laying out and taking out in the

conventional press also took 20 minutes, but an additional 60 minutes was spent in the changing of the wet paper during the drying process.

These specimens were then judged taking into consideration colour, appearance and probable/possible fungal damage. One, two or three points were awarded, depending on the quality of the specimen. The judging was done by three persons independent of each other and in such a way that they were not biased. The specimens dried in the conventional press were awarded 29, 25 and 27 (mean 27) points by the three judges and the specimens dried in the electrical press were awarded 29, 36 and 35 (mean 33) points.

CONCLUSIONS:

According to the judging of the 17 specimens, the electrical press produces as good and even better specimens than the conventional press (mean 33 against mean 27) points.

The higher points were awarded mostly because the better specimens were produced by the fast drying coupled with the heat. Colour reaction was confined to certain spp. with some reacting better to the conventional and others to the electrical drying press.

The considerable saving of time is the greatest advantage of the electrical drying press. The 17 spp. were dried 93 hours sooner than those in the conventional press and required 60 minutes less handling time (drying paper in the electrical press is not changed).

It is expected that more specimens and damp weather conditions would have increased the difference in drying time considerably. With the saving in handling time, more specimens of a better quality can be produced at a great saving in cost per unit.

SUMMARY:

By using electrically heated blankets in a conventional plant press, herbarium specimens of a better quality can be reproduced with less handling and a great saving in time. The necessity to change drying sheets in the press is entirely eliminated and no fungal damage occurs.

APPRECIATION:

1. Prof. P. G. Jordaan, Department of Botany, University of Stellenbosch, Republic of South Africa, is thanked for his encouragement and supplying material and services. 2. Prof. J. T. R. Sim, Department of Pasture/Agronomy, University of Stellenbosch, is thanked for giving consent to build the first electrical press for Departmental use. This made the final improvements possible. 3. The Secretary, Department of Agricultural Technical Services, is thanked for the cash bonus awarded to both authors for developing a time saving apparatus.

PLANT LIFE LIBRARY—continued from page 128.

MACROMOLECULES OF LIVING SYSTEMS—STRUCTURE AND CHEMISTRY, by Herbert S. Rhinesmith and Luigi A. Cioffi. Reinhold Book Corp., 430 Park Ave., New York, N. Y. 10022. 1968. Pp. xi + 164. Illus. $4.75. The purpose of this book is to present a "macromolecular anatomy" which might be preliminary to a "macromolecular physiology." The topics discussed include the origin of living matter; structural units; carbon compounds; three-dimensional structures; atomic structure; lipids; carbohydrates; amino acids; proteins; nucleic acids, and the genetic code. This highly stimulating book is highly recommended to all interested in the coming into being of organisms, physiology and biochemistry.

'TORREY CANYON' POLLUTION AND MARINE LIFE, edited by J. E. Smith. Cambridge University Press, 32 E. 57th St., New York, N. Y. 10022. 1968. Pp. ix + 196. Illus. $9.50. The whole world was shocked to read about the cargo of 117,000 tons of crude oil which leaked into the sea from the "Torrey Canyon" for ten days in March of 1967. Enormous quantities of detergents were applied in the effort to disperse the oil. This in turn had a deleterious effect in poisoning marine life. The latter effect is the subject of this report of the Plymouth Laboratory of the Marine Biological Assoc. of Britain. The ten-week project is described in detail, including results from field observations and laboratory experiments. Its great value lies in the outline of methods for predicting and plotting the movement of oil at sea. Highly recommended to all interested in conservation, including ecologists and marine biologists.

INTRODUCTORY PLANT SCIENCE, by Henry T. Northen. 3rd edition. Ronald Press, 79 Madison Ave., New York, N. Y. 10016. 1968. Pp. viii + 586. Illus. This third edition of an excellent text on introductory plant science will be welcomed. Its purpose is to present to the beginning student a clear view of the plant world. The topics discussed include plants in human affairs; plant physiology; anatomy; genetics; plant communities; conservation; variation and bioevolution; groups of plants. This outstanding profusely illustrated, easy to read text is highly recommended to all beginning students and amateur plantsmen who wish to take a refresher course in introductory plant science.

PHOTOSYNTHESIS, by G. E. Fogg. American Elsevier Publ. Co., 52 Vanderbilt Ave., New York, N. Y. 10017. 1968. Pp. xii + 116. Illus. $3.95. This balanced, easy to read review of recent discoveries about the mechanism of photosynthesis, and of the wide implications of the subject, will be welcomed by the beginning student. The topics discussed include the nature of photosynthesis; role of chlorophyll, etc.; the supply of light; carbon dioxide and water; the absorption of light; the conversion of light energy; the path of carbon assimilation; the flexibility of photosynthesis and its interrelations with other processes; and photosynthesis and life, past, present and future. This stimulating book is highly recommended to all beginning students.

TAXONOMY OF AMERICAN SPECIES OF LINDEN (TILIA), by G. N. Jones. University of Illinois Press, Urbana, Ill. 1968. Pp. 156. Illus. $5.95. This is a taxonomic monograph on the four American species of Linden (**Tilia**). It includes discussions of the taxonomic position of **Tilia,** generic diagnosis, morphology, chromosomes, hybrids, properties and uses, propagation, geographical distribution, etc. This is followed by the analytical keys to, and detailed descriptions of, the species, including citation of numerous specimens, excellent illustrations, and an adequate index. Recommended to all interested in the American Flora.

CRITICAL REVIEW OF THE GENUS **GALANTHUS** L.

Z. T. Artyushenko,

Komarov Botanical Institute, Leningrad

In a recently published article (Artyushenko, 1966) an attempt was made to appraise the related connections of the representatives of the genus *Galanthus* growing mainly in the Caucasus. The areas of some of the native snowdrops lie outside the Soviet Union. This fact as well as the desire to represent the taxonomy as a whole has compelled us to investigate in greater detail all foreign materials available to us.

To attain these objectives, we tried to make our collection of live specimens of foreign snowdrops as complete as possible, cultivating them along with the snowdrops of our flora. This enabled us to study them under conditions comparable between themselves.

Great assistance in creating such a collection was rendered to me by Elliot Hodgkin, Patrick Synge, Brian Mathew, Frederick Stern and others from England, K. A. Zahariadi from Roumania and D. D. Delipavlov from Bulgaria. I take the opportunity to express my cordial gratitude to all of them for the dispatched plants.

I. PREVIOUS WORK

The first scientist to divide the genus Galanthus into taxonomic groups was Günter Beck von Mannagetta, 1894. In his treatment the genus Galanthus is represented as follows:

I. Rank **NIVALES**

Leaves with prominent rib below, with flat margin:

1. **Galanthus nivalis** L.

This species comprises the following varieties:

Var. 1. **europaeus** G. Beck.

Twenty forms belong to this variety and they differ from each other by the following characters:

(a) by the shape of outer tepals —(1) **stenotepalus** G. Beck, (2) **platytepalus** G. Beck;

(b) by the shape and number of inner tepals—(3) **poculiformis** Hort., (4) **hololeucus** Celak., (5) **hortensis** Herb., (6) **plenissimus** G. Beck;

(c) by the colour of tepals—(7) **albus** Allen, (8) **sandersii** Harpur Grew, (9) **pallidus** Smith, (10) **viridans** G. Beck, (11) **virescens** Leichtl.;

(d) by the flowering period—(12) **aestivalis** Burbidge, (13) **olgae** Orph., (14) **corcyrensis** Hort.;

(e) by the shape of spathe—(15) **candidus** G. Beck, (16) **scharloki** Casp., (17) **cathcartiae** Allen;

(f) other deviations—(18) **biscapus** G. Beck, (19) **biflorus** G. Beck, (20) **trifolus** G. Beck.

Var. 2. **major** Ten.
Var. 3. **caucasicus** Baker.
Var. 4. **redoutei** Rupr.

2. **Galanthus graecus** Orph.

3. **Galanthus elwesii** Hook.

This species comprises the following forms—(1) **typicus,** (2) **maximus** Velen., (3) **reflexus** Herb.

4. **Galanthus latifolius** Rupr.

This species comprises the following forms—(1) **typicus,** (2) **alleni** Baker, (3) **fosteri** Baker.

II. Rank **PLICATI**

Rib not so prominent; leaves plicate on margin.

5. **Galanthus plicatus** M. B.

This species comprises the following varieties:

Var. 1. **genuinus.** This variety comprises the following forms: 1) **typicus,** 2) **excelsior** G. Beck, 3) **maximus** Allen.
Var. 2. **byzantinus** Baker.

6. x **Galanthus valentinei** G. Beck

7. x **Galanthus hybridus** Allen

Among numerous garden forms enumerated by Beck, there are such, which at present are considered as independent species **(G. reginae-olgae, G. corcyrensis, G. fosteri).**

One also cannot agree with the author in considering **G. Caucasicus** as a variety of **G. nivalis,** and in treating **G. byzantinus** as a variety of **G. plicatus.** They are quite independent species.

In 1947 L. M. Kemularia-Natadze published a summary of the taxonomy of Caucasian snowdrops. According to that author, the classification of the genus is as follows:

Sect. I. **Viridifolii** Kem.-Nath.

Leaves not glaucous but green.

Ser. **Woronowii** Kem.-Nath.

Leaves shiny, green, channelled, folded inside with hood on the top: 1. **G. woronowii** Losinsk.; 2. **G. caspius** (Rupr.) Grossh.; 3. **G. valentinae** Panjut.;

Ser. **Latifoliae** Kem.-Nath.

Leaves broad lanceolate, with small hood on the top. No anther apiculus: 4. **G. latifolius** Rupr.

Ser. **Fosteriae** Kem.-Nath.

(not available in the Caucasus)

Ser. **Angustifoliae** Kem.-Nath.

Leaves flat, narrow, matt-surfaced, not glaucous, without hood on the top: 5. **G. lagodechianus** Kem.-Nath.; 6. **G. ketzkhovelii** Kem.-Nath.;

Sect. II. **Glaucaefolii** Kem.-Nath.

Plants glaucous; mark heart-shaped or horseshoe-shaped.

Ser. **Nivales** Kem.-Nath.

Leaves flat, top thickened but without hood: 7. **G. alpinus** Sosn.; 8. **G. caucasicus** (Baker) Grossh.

Ser. **Elwesiae** Kem.-Nath.

(not available in the Caucasus)

Ser. **Plicatae** Kem.-Nath.

(not available in the Caucasus)

Ser. **Schaoricae** Kem.-Nath.

Leaves convolute in vernation, channelled, top with hood: 9. **G. schaoricus** Kem.-Nath.

With such minute division of the genus into sections, any further subdivision into series is not justified. Thus, for example, **G. caspius,** a species close to **G. lagodechianus,** as mentioned by the authors in their study of genetical relations of this latter species, was erroneously included into the series **Woronowii,** whereas the species **G. latifolius** close to the series **Woronowii** is considered as an independent series.

The section **Glaucaefolii,** in addition to the feature of glaucous leaves, is characterized by the presence of a definite shape of a mark which has not been mentioned in the examination of the foregoing section. However, this character varies greatly and the mark of such a shape inherent in the snowdrops of this section can also be found in other species. A photograph (Fig. 27) given as an example illustrates the variability of the mark shape in individuals of **G. caucasicus** gathered from 1 sq.m. in Tbilisi region (Kodzhori) as well as in **G. platyphyllus** collected from 1 sq.m. in Krestovy pass.

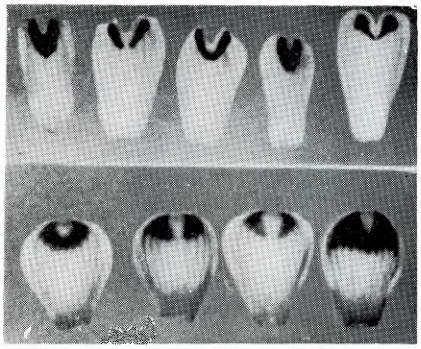

Fig. 27. Variability of markings on tepals of two **Galanthus** species: **upper, Galanthus caucasicus; lower, Galanthus platyphyllus.**

It should also be noted that snowdrops classified by the author under the series Nivales are in no way characterized by flat leaves neither in vernation nor in mature state. Their outer leaf embraces the inner one and at least the wider outer leaf in vernation is rather channelled. Species with genuinely flat leaves in vernation and in mature state **G. caspius, G. lagodechianus** and **G. ketzkhovelii**—are classed by Kemularia-Natadze with a different section.

In 1948, Traub & Moldenke published "The Tribe Galantheae", including lineagic treatises of the genera **Galanthus** and **Leucojum.** They divided the genus **Galanthus** into two subgenera: **Eugalanthus** Traub et Mold. and **Plicatanthus** Traub et Mold.

The character of the leaves was chosen as the principal feature for distinguishing the subgenera. The species of the subgenus **Eugalanthus**

are characterized by flat leaves in vernation, with prominent midrib on the lower surface. The following species belong to this subgenus:

1. **G. nivalis** L.; 2. **G. gracilis** Celak; 3. **G. olgae** Orph.; 4. **G. elwesii** Hook; 5. **G. graeous** Orph.; 6. **G. caucasicus** (Baker) Grossh.; 7. **G. maximus** Velen.; 8. **G. perryi** Baker; 9. **G. alleni** Baker; 10. **G. transcaucasicus** Fomin; 11. **G. platyphyllus** Traub et Mold.; 12. **G. fosteri** Baker; 13. **G. cilicicus** Baker; 14. **G. ikariae** Baker.

Species characterized by leaves plicate along the margins belong to the subgenus Plicatanthus. They are as follows: 15. **G. alpinus** Sosn.; 16. **G. plicatus** M.B.; 17. **G. grandiflorus** Baker; 18. **G. woronowii** Losinsk; 19. **G. byzantinus** Baker.

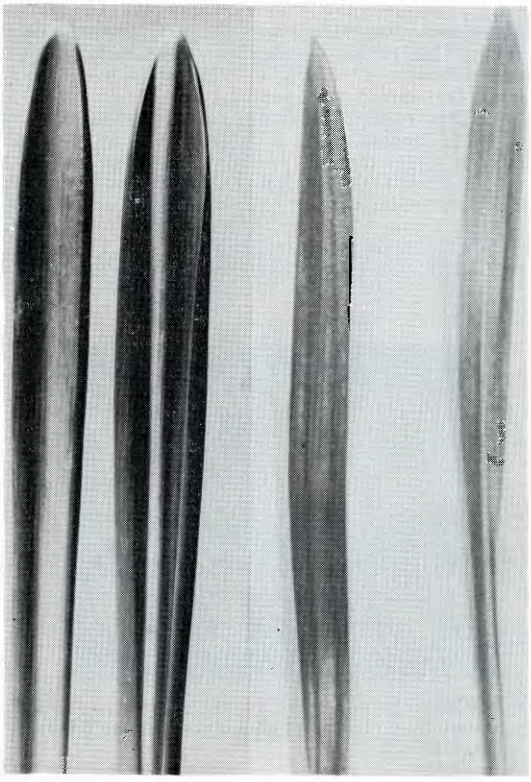

Fig. 28. Folding of leaves in **Galanthus** species: **left, Galanthus plicatus; right, Galanthus ikariae (G. woronowii).**

One cannot agree with the authors in integrating the above-mentioned species into the subgenus **Plicatanthus.** The folding of leaves is inherent in many platyphyllous snowdrops but its origin is dissimilar. Thus, in **G. plicatus** and **G. byzantinus** folding emerges as a result of the turning of the margins toward the lower side and this feature is typical of the two species. As to the folding of leaves in such snowdrops as **G. ikariae (G. woronowii), G. bortkewitschianus, G. alpinus,** it is caused by bending of leaf margins to the upper side, and this feature is generally not constant since it occurs not in all plants (Fig. 28).

The species **G. perreyi** and **G. grandiflorus** are now regarded as cultivated forms.

In 1956 a profusely illustrated monograph by F. C. Stern devoted to the genera **Galanthus** and **Leucojum** was published.

The classification of the genus **Galanthus** according to F. C. Stern is as follows:

Ser. 1. **Nivales** G. Beck

1. **G. nivalis** subsp. **nivalis**; 2. **G. nivalis** subsp. **cilicicus** (Baker) Gottlieb-Tannenhain; 3. **G. nivalis** subsp. **reginae-olgae** (Orph.) Gottlieb-Tannenhain; 4. **G. corcyrensis** (Beck) Stern; 5. **G. rizehensis** Stern; 6. **G. graecus** Orph.

Ser. 2. **Plicati** G. Beck

7. **G. plicatus** M. B.; 8. **G. woronowii** Losinsk; 9. **G. byzantinus** Baker.

Ser. 3. **Latifolii** Stern

10. **G. ikariae** subsp. **ikariae**; 11. **G. ikariae** subsp. **latifolius** Stern; 12. **G. fosteri** Baker; 13. **G. caucasicus** (Baker) Grossh.; 14. **G. elwesii** Hook; 14a. **G. elwesii** var. **maximus** (Velen.) G. Beck; 15. **G. alleni** Baker.

The investigation by L. M. Kemularia-Natadze and a number of other materials concerning the snowdrops of the flora of the USSR were unknown to F. C. Stern as has already been mentioned in the critical review of his work (Artyushenko, 1958). As a result, a number of Caucasian species remained outside the knowledge of F. C. Stern, whereas several species were improperly included in the key (for example: **G. woronowii** is really typical of vernation inherent in species belonging to the series **Latifolii** and not **Plicati**).

Owing to the lack of herbarium specimens and living plants, F. C. Stern had no opportunity to familiarize himself fully with the species, **G. woronowii** and **G. latifolius** all the more that the drawing of **G. latifolius** in "Gartenflora" illustrating this species has been carried out inaccurately—the inner tepals are shown with a sinus at the top and this is not inherent in this species. A number of species described by Y. I. Koss (1951) and Kemularia-Natadze (1947) after the publication of the "Flora of the USSR" comprising the description of snowdrops (Lozina-Lozinskaya, 1935) were unknown to F. C. Stern.

In 1966, Khokhryakov published his taxonomy of the genus **Galanthus** divided into two subgenera on the basis of the following characters:

Subgenus **Grinoides** Khokhr. Bulbus perennis, scapus fistulosus, perigonii phylla interna integra.

Subgenus **Galanthus.** Bulbus biennis, scapus solidus, perigonii phylla interna excisa.

The first two characters cannot be taken as a basis for the detailed classification of the genus from the following considerations:

Species classed by Khokhryakov with the first subgenus—**G. Krasnovii, G. Latifolius (= G. platyphyllus)** and **G. valentinae (= G. krasnovii)** have biennial and not perennial bulbs, i.e. are made up of scales of two last years and of unformed scales of the leaf-bud. The structure of the biennial bulb is given in the "Atlas of descriptive morphyology of higher plants" (Fedorov, Kirpichnikov and Artyushenko, 1962) and illustrated by a drawing.

However, Khokhryakov ignored these data. Such species as **G. caucasicus, G. alpinus, G. lagodechianus** etc. also have biennial bulbs but they are classed by Khokhryakov with an other subgenus which comprises bulbs of an annual cycle—**G. nivalis, G. plicatus, G. graecus, G. elwesii,** etc.

As to the number of scales of the annual cycles, the following can be said. If the number of scales in the annual cycle is more or less definite for the given species, the number of annual cycles may vary, depending on the

change of environmental conditions. With prolonged and cold winter, when metabolism in the bulb is greatly delayed, a greater number of scales is maintained and conversely, with alternating thaws and frosts, the bulbs become considerably exhausted and the number of scales diminishes.

Consequently we consider that the number of annual cycles in the bulb cannot serve as a systematic feature.

Khokhryakov defines the scape as hollow for the first subgenus, whereas the second subgenus is considered as having no cavity. Our study of scapes in all species of **Galanthus** has demonstrated the following. At the first stages of its development its core is filled with colourless parenchyme cells which slime subsequently and a cavity is created inside the scape. No deviations from this type have been observed by us in either of the species.

Consequently, the subgenera are essentially divided on the basis of a single feature, namely, the shape of inner tepals. Sections distinguished by the Khokhryakov are not valid because no characteristics are given for them and there is no justification in discussing the validity of such classification.

The author divides the first section into two subsections, namely, Subsect. **Viridifolii,** green leaves and Subsect. **Glaucifolii,** glaucous leaves. Within the first subsection Khokhryakov distinguishes three series which differ from one another in the width of leaves and the green mark on the inner tepals.

He includes G. fosteri and G. ikariae into the series **Fosteriani. G. Fosteri** actually has a green mark at the base of the inner tepals, whereas no such mark exists in **G. ikariae.** The study of living specimens **G. ikariae** received from England, where they are cultivated in Kew Garden, as well as the description of this species by Baker (1893) and Stern (1956) served as a basis for such a statement.

The series **Alleniani** Khokhr. is characterized by Khokhryakov as follows: "Folia apice albida, obtusata supra glauca infra virida" and he classes with this series such species as **G. alpinus, G. bortkewitschianus, G. schaoricus** which are characterized by leaves glaucous on both sides.

The series **Graeci** Khokhr. is defined as follows: "Folia angusto-lanceolata vel supra glauca". Along with G. graecus characterized by glaucous leaves, the author classes with this series **G. rizehensis, G. cabardensis, G. kemularia** which have bright green leaves. We do not intend to enumerate all the errors admitted by the author in his system. The examples cited are sufficient to prove that the author's approach to this difficult problem was careless and irresponsible.

His attempt to create taxonomy cannot be regarded as serious. One more factor should be emphasized. As a result of such a useless classification of the genus into intrageneric taxons, the series as presented by Khokhryakov are in most cases represented by one species only. Thus, the author's view is inconsistent with the very idea of distinguishing the groups of related substituting species as suggested by Komarov (1940) and, as a matter of fact, Khokhryakov dissociated the groups of related species contemplated in one of our papers (Artyushenko, 1965).

In examining the phylogeny of the genus **Galanthus,** Khokhryakov is of the opinion that the genus has its origin in the tropical bulbous plants.

In his opinion, they are closest to the species of the genus **Haemanthus,** the most primitive genus of the **Amaryllidaceae,** growing in tropical Africa. Even with most superficial comparison of both genera one may be certain, how different they are in appearance.

The morphological features which characterize the genus **Haemanthus** in no way coincide with the data presented by Khokhryakov. So, in the opinion of Khokhryakov, the principal features which bring closer together the genera **Haemanthus** and **Galanthus,** comprise hollow scapes and free tepals. Actually, however the representatives of the genus **Haemanthus** have no hollow scapes and the tepals are coalescent in the lower part forming a tube. Consequently the features of similarity as presented by Khokhryakov are really distinctive characteristics of these genera.

In addition, a number of essential distinctions are available as well. In **Haemanthus** the filaments are long, adnate to the gorge, often longer than the perianth; small anthers; umbelliformis inflorescence with several free bracts; berry-shaped fruit etc. In snowdrops the flowers are solitary, with two united bracts forming a spathe; very short filaments; stamens halved the length of the perianth; free tepals; capsular fruit etc.

We are of opinion that the evolutionary range **Haemanthus-Galanthus** as suggested by Khokhryakov is not confirmed by facts and is essentially wrong.

II. THE PRESENT GROUPING

An enumeration of characters which should be used as the basis for the taxonomy of the genus **Galanthus** was given in our earlier work (Artyushenko, 1965).

The study of anatomical characters of the leaf structure and of epidermal cells especially, made it possible to distinguish two geographical groups of snowdrops—the group which essentially comprises European species and, partially, Asia Minor species (from western portion of Asia Minor) and that of Caucasian-Asia Minor species.

The division of snowdrops into such groups based on anatomical characters and distinctive characteristics of geographical distribution is corroborated also by morphological features. Thus, in all the species of the first group the leaves are glaucous, whereas the snowdrops of the second group have in most cases bright green leaves without any glaucous bloom. As a rule, the presence of glaucous bloom is peculiar to the plants from drier habitats. As a matter of fact, the climatic conditions of Central and Southern Europe where snowdrops with glaucous leaves grow, are characterized by greater dryness as compared with the Black Sea coast and the Caucasian highlands. The snowdrops with glaucous leaves of the Caucasus are also confined to the drier areas (Stavropol hills, Eastern Georgia).

Moreover, almost all snowdrops of the first group are characterized by flat leaves in vernation, whereas most of the species belonging to the second group have leaves convolute in vernation. Finally, all snowdrops of the European group have chromosome numbers $2n=24$, whereas typical of the Caucasian-Asia Minor group are chromosome numbers $2n=24$, 36 and 72.

On the basis of the above-mentioned facts, we consider it possible to assign the taxonomic grade of sections to the group revealed by us.

The recognized groups as well as the key for the identification of species are placed under the adopted sections as given below.

Genus GALANTHUS L.

Typus generis: **Galanthus nivalis** L.

Sect. I. **Galanthus**

Syn.—Reihe **Nivales** Beck, (1894), Wiener Ill. Gartenz., 19: 47 p.p.; Reihe **Plicati** Beck, l.c. 56; Sect. **Glaucifolii** Kem.-Nath. (1947), Tr. Tifl. Bot. sada 2, II: 182 p.p.; Sect. **Viridifolii** Kem.-Nath., l.c. 117, p. min. p.; Subgen. **Eugalanthus** Traub et Mold., (1947), Herbertia, 14: 104 p.p. (excl. nonn. sp. plerumqus caus.); Subgen. **Plicatanthus** Traub et Mold., l.c.: 112, p.p.; Ser. **Latifolii** Stern, (1956), Snowdr. and Snowfl., 20 p.p.

Foliorum epiderma e cellulis elongatis plerumque subrhombeis (non rectangularibus) constans. Species Europae mediae et australis ac partis boreali-occidentalis Asiae Minoris.

Leaves glaucous, epidermal cells tapering to the ends. Species growing in Central and Southern Europe and in the north-western part of Asia Minor.

Typus sectionis—**Galanthus nivalis** L.

1. Inner tepals, with single mark at the top, around the sinus 2
+ Inner tepals, with mark at the sinus and with mark at the base ..4
2. Spring flowering 3
+ Autumn flowering 6
3. Leaves flat in vernation, with flat margins .....1. **G. nivalis** L.
+ Leaves flat in vernation, with margins folded back .....6. **G. plicatus** M. B.
4. Leaves up to 0.7 cm. wide .....4. **G. graecus** Orph.
+ Leaves from 1 to 3 cm. wide 5
5. Outer leaf embraces inner leaf in vernation ....5. **G. elwesii** Hook.
+ Leaves flat in vernation with margins folded back .....7. **G. byzantinus** Baker
6. Flowers appear before leaves .....2. **G. reginae-olgae** Orph.
+ Flowers appear simultaneously with leaves .....3. **G. corcyrensis** (Beck) Stern

1. G. nivalis L.

1753, Sp. Pl. 288. Syn.—**G. nivalis** var. **europaeus** Beck 1894, Wiener Ill. Gartenz., 19: 50.

Bulb 1.5-2 cm. long and 1.2-1.5 cm. wide, sheath 6-9 cm. long. Leaves dark green, glaucous, 8-10 cm. long and 0.4-0.6 cm. wide during flowering, up to 25 cm. long and up to 1 cm. wide after flowering. Scape (7—) 9-12 cm. long; spathe 2.5-3 cm. long; pedicel equal to or longer or shorter than spathe. Outer tepals oblong-obovate, 1.5-2.5 cm. long, 0.7-1.1 cm. wide, inner tepals cuneate, 0.7-1.2 cm. long, 0.4-0.7 cm. wide. Stamens 0.6-0.7 cm. long, anther with an apiculus. Ovary 0.3-0.4 cm. in diameter. (Fig. 29). $2n = 24$ [1]

In low, middle and alpine zones; in the outskirts of forests, in bushes, on free spaces.

Distribution: central and southern Europe, Ciscaucasia.

G. nivalis L. ssp. **angustifolius** (G. Koss) Artyush., **comb. n.** Syn.—**G. angustifolius** G. Koss, 1951, Bot. mat. gerbariya Bot. inst. A.N. SSSR, 14: 134.

This species is distinguished from the basic species by the lesser dimensions of the whole plant; these features are maintained under long cultivation. $2n = 24$.

The northern slopes, at a height of 700 m. above sea level, in bush thickets.

Distribution: Ciscaucasia (Kabardino-Balkarsk Autonomous Soviet Socialist Republic).

2. G. reginae-olgae Orph.

1874 (1876), Atti Congr. Intern. Bot. Firenze, 214. Syn.—**G. olgae** Orph., Boiss., 1884, Fl. Or., 5: 146; **G. olgae-reginae** Hort., 1888, ex Gard. et For. 1: 499; **G. nivalis** f. **olgae** (Boiss.), G. Beck, 1894, Wiener, Ill. Gartenz., 19: 51; **G. nivalis** ssp. **reginae-olgae** (Orph.) Gottlieb-Tannenhain, 1904, Abh. Zool.—Bot. Ges. Wien, 2, 4: 32.

Bulb 2 cm. long, 1.5 cm. in diameter; sheath 3-4 cm. long. Leaves green, glaucous, linear, 15 cm. long, 0.6-0.8 cm. wide, appear after flowering (September-October). Scape 9-11 cm. long; spathe 2.5 cm. long; pedicel equal to spathe in length. Outer tepals broad, lanceolate, concave, 2.3-2.5 cm. long and 0.8 cm. wide, inner tepals obovate, with rounded parts of sinuous top, 1.2 cm. long, 0.6 cm. wide. Stamens 0.5-0.6 cm. long, anther with an apiculus. $2n = 24$.

In the outskirts of fir and spruce forests, in ferns.

Distribution: Greece.

[1] Chromosome numbers for snowdrops are given according to L. I. Sveshnikova's data (1965, 1967).

3. G. corcyrensis (Beck) Stern

1956, Snowdr. and Snowfl., 34; Syn.—**G. praecox** Hort., 1891, Allen, Journ. R. Hort. Soc., 13: 180, **nomen nudum**; **G. corcyrensis** Shortt, 1883, Gard. Chron. New Ser., 20: 728, **nomen nudum**; Baker, 1888, Handb. Amaryll., 17, **nomen nudum**; Leichtlin, 1888, in Le Jardin, 2: 139; **G. nivalis** f. **corcyrensis** G. Beck, 1894, Wiener Ill., Gartenz., 19: 51; **G. nivalis** f. **corcyrensis** Halaczy, 1904, Consp. Fl. Graec., 3: 206; the same author, 1908, Suppl. N 1: 103; **G. imperati** f. **australis** Zodda, 1904, Fl. Ital. Exicc. N 726.

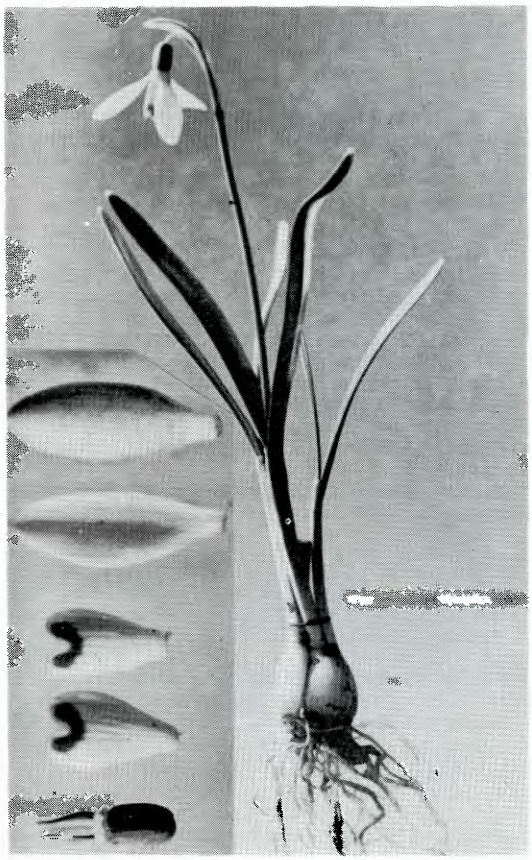

Fig. 29. **Galanthus nivalis** ssp. **angustifolius** from the suburbs of Nalchik: **right,** general view of the plant; **to side, lower left,** parts of the flower.

Bulb 1.5 cm. long and 1.5 cm. in diameter; sheath up to 4 cm. long. Leaves green, glaucous, linear, with blunt and flat tip, appearing in November simultaneously with flowering; up to 18 cm. long and 0.6 cm. wide. Scape more than 8 cm. high; spathe 3 cm. long; pedicel 2.5 cm. long. Outer tepals narrow, oblong, 2.1 cm. long and 0.9 cm. wide; inner tepals cuneate, 1.1 cm. long and 0.5-0.6 cm. wide, with a green mark around the sinus

at the top. Stamens about 0.5 cm. long, anther with an apiculus. 2n = 24.

Native habitat unknown.

Distribution: The islands of Corfu and Sicily.

4. G. graecus Orph.

1884, ex Boiss., Fl. Or., 5: 145; Syn.—**G. nivalis** subsp. **graecus** (Orph. ex Boiss.), Gottlieb-Tannenhain, 1904, Abh. Zool.—Bot. Ges. Wien, 2, 4: 40; **G. bulgaricus** (Velen. ined. 1886) Velen., 1891, Fl. Bulgar., 539; **G. gracilis** Celak., 1891, Sitzungsb. k. Böhm. Ges. Wiss. Math-nat. Cl., 9, 184: 198.

Bulb 1.5 cm. long, 1-1.2 cm. in diameter; sheath 3.5 cm. long. Leaves green, glaucous, always wavy, up to 7 cm. long and 0.5-0.7 cm. wide during flowering. Scape 7-9 cm. long; spathe up to 3 cm. long; pedicel equal to or longer than spathe. Outer tepals obovate, about 2.5 cm. long and 0.7 cm. wide, inner tepals narrow cuneate, 1.1 cm. long, about 0.5 cm. wide. Stamens about 0.7 cm. long, anther with an apiculus. 2n = 24.

In the foothills and mountains, along outskirts of forests and in forests.

Distribution: Greece, Bulgaria, Rumania.

5. G. elwesii Hook.

1875, Curt. Bot. Mag., 101, t. 6166. Syn.—**G. elwesii** var. **whittalii** Arnot, 1898, Gard. Chron., ser. 3, 24: 466.

Bulb 2.5-3 cm. long and 1.8-2.2 cm. diameter; sheath up to 5 cm. long. Leaves green, glaucous, 7-10 cm. long, 1.5-3 cm. wide, with a cucullus on the top. Scape 10-13 cm. long; spathe 3-3.5 cm. long; pedicel 2-2.5 cm. long. Outer tepals broad obovate, about 2 cm. long, 1.3 cm. wide, inner tepals oblong, slightly widening towards the top, 1.1 cm. long, about 0.6 cm. wide, with a green mark around the sinus at the top and at the base. Stamens about 0.7 cm. long, anther with an apiculus. 2n = 24, 48.

Confined to mountain habitats.

Distribution: Europa (Bulgaria, Roumania, Moldavia), Asia Minor and islands in Aegean Sea.

F. Stern recognizes a variety, established by Beck, for the North Greece, Bulgaria and Yugoslavia, attaching to it the following synonimics and features:

G. elwesii var. **maximus** (Velen.) Beck G., 1894, Wiener Ill. Gartenz., 19: 55; Syn.—**G. maximus** Velen., 1891, Fl. Bulgar., 540; **G. graecus** Orph. var. **maximus** (Velen.) Hayek, 1932, Prod. Fl. Balcan., 3: 102.

This variety distinguishes from G. elwesii by waviness of leaves, inherent to G. graecus, and by leaves from 1 cm. to 1.5 cm. wide, rarely 2 cm. wide. The study of this variety in nature has shown that a series of transition forms is available from the typical **G. elwesii** to **G. graecus.** This circumstance allows to assume that **G. elwesii** var. **maximus** is a hybrid between the two mentioned species. It is envisaged to study this problem thoroughly in future (in collaboration with D. D. Delipavlov).

6. G. plicatus M. B.

1819, Fl. Taur.-Cauc., 3: 225. Syn.—**G. nivalis** subsp. **plicatus** (M. B.) Gottlieb-Tannenhain, 1904, Abh. Zool.—Bot. Ges. Wien. 2, 4: 35; **G. latifolius** Salisb., 1866, Gen. Pl. 95, non Rupr.; **G. plicatus** var. **excelsior** G. Beck, 1894, Wiener Ill. Gartenz., 19: 57.

Bulb 2-3 cm. long, 2-2.8 cm. in diameter; sheath 4-6 cm. long. Leaves green, glaucous, linear, with margins folded back and flat against each other in vernation, 8-12 cm. long and 0.4-0.8 cm. wide during flowering. Scape 12-16 cm. long; spathe 3-5 cm. long; pedicel 2.5-3.5 cm. long. Outer tepals broad elliptical, spoon-shaped, tapering to the base, 2.5-3 cm. long, 1.8-1.5 cm. wide, inner tepals cuneate, 1-1.1 cm. long and 0.8-1 cm. wide, with a green mark around the sinus at the top. Stamens 0.7 cm. long, anther with an apiculus. 2n = 24.

In foothills and mountains, in the outskirts of forests, in bushes.

Distribution: Roumania, Moldavia, the Crimea.

7. G. byzantinus Baker

1895, Gard. Chron., Ser. 3, 13: 226. Syn.—**G. plicatus** var. **byzantinus** (Baker) G. Beck, 1894, Wiener Ill. Gartenz., 19: 57; **G. nivalis** subsp. **byzantinus** (Baker) G. Beck; Gottlieb-Tannenhain, 1904, Abh. Zool.—Bot. Ges. Wien, 2, 4: 41.

Bulb 2 cm. long and 2.5 cm. in diameter; sheath 8 and more cm. long. Leaves green, glaucous, lanceolate, with margins folded back and flat against each other in vernation. Scape 11 cm. long; spathe 4 cm. long; pedicel 3 cm. long. Outer tepals broad elliptical, spoon-shaped, tapering to the base, 2.2 cm. long and 1.2 cm. wide; inner tepals cuneate, 1.1 cm. long, with a mark at the top around the sinus and at the base. Stamens 0.8 cm. long, anther with an apiculus. $2n = 24$.

Open, sodded places, in bushes.

Distribution: Asia Minor: Bosporus, Asian coast, Göksu.

Sec. 2. **Viridifolii** Kem.-Nath.

1947. Tr. Tifl. Bot. sada, Ser. 2, 11: 177. emend. Artyush., hoc loco.

Syn.—Reihe **Nivales** G. Beck, 1894, Wiener Ill. Gartenz., 1947, p.p.; Sect. **Glaucifolii** Kem.-Nath., l.c. 182, p. min. p.; Subgen. **Plicatanthus** Traub et Mold., 1947, Herbertia, 14: 112.; Subgen, **Eugalanthus** Traub et Mold., l.c., 104, p. min. p.; Ser. **Latifolii** Stern, 1956, Snowdr. and Snowfl., 20, p.p.

Foliorum epiderma e cellulis rectangularibus constans. Species Caucasi et Asiae Minoris /parte euis boreali-occidentali exclusa/.

Leaves glaucous, shiny or matt-surfaced, with rectangular epidermial cells. These snowdrops grow in the Caucasus and Asia Minor, with the exception of the north-eastern part of the latter.

Lectotypus sectionis **G. platyphyllus** Traub et Mold. (Syn.—**G. latifolius** Rupr.)

1. Leaves unglaucous 2
\+ Leaves glaucous 8
2. Leaves flat in vernation 3
\+ Outer leaf embraces inner leaf in vernation 5
3. Leaves bright green ..... 10. **G. lagodechianus** Kem.-Nath.
\+ Leaves dull but without glaucous bloom 4
4. Outer tepals about 2 cm. long ..... 9. **G. cilicicus** Baker.
\+ Outer tepals from 2 to 2.5 (3) cm. long ..... 8. **G. transcaucasicus** Fomin.
5. Inner tepals with a sinus at the top 6
\+ Inner tepals without a sinus at the top 7
6. Inner tepals with a green mark only under a sinus ..... 4. **G. ikariae** Baker.
\+ Inner tepals with a green mark under a sinus and at the base ..... 7. **G. fosteri** Baker.
7. No anther apiculus; inner tepals with a rounded top ..... 5. **G. platyphyllus** Traub et Mold.
\+ Anther with an apiculus; inner tepals with a rounded or obtuse top ..... 6. **G. krasnovii** Khokhr.
8. Leaves 2-2.5 cm. wide 9
\+ Leaves 1-1.6 cm. wide, as a rule ..1. **G. caucasicus** (Baker) Grossh.
9. Flowers up to 1.5 cm. long; fruits not developed ..... 3. **G. bortkewitschianus** G. Koss.
\+ Flowers from 1.5 to 2 cm. long; fruits developed 2. **G. alpinus** Sosn.

1. G. caucasicus (Baker) Grossh.

1924, Pl. Or. Exsicc., Fasc. 1:4. Syn.—**G. nivalis** ssp. **caucasicus** Baker, 1887, Gard. Chron., Ser. 3, 10: 313; **G. nivalis** f. **major** (Redoute) Rupr., 1868, Gartenfl., 17: 131.

Bulb 2.4-4 cm. long, 1.5-2 cm. in diameter; sheath /2/ 4.5-5.5/8/ cm. long. Leaves dark-green, glaucous, linear, /2/ 4-6.5 /8/ cm. long and 1 cm. wide during flowering, /10/ 12-15 /18/ cm. long and 1-4 cm. wide after flowering, with a nearly flat top. Scape 5-6 cm. long; spathe 2.5-3.5 cm. long; pedicel slightly shorter than spathe. Outer tepals concave, obovate /1.5/ 1.7-2 cm. long, 0.8-1 /1.2/ cm. wide; inner tepals cuneate, 0.8-0.9 cm. long and 0.5-0.6 cm. wide, with a mark around the sinus at the top. Stamens 0.6-0.7 cm. long, anthers with a small mucronatum. Ovary 0.3-0.7 cm. in diameter (Fig. 30, left and upper center). $2n = 24$.

In mountain forests of middle and low zones.

Distribution: The central Transcaucasia /district of Tbilisi/, the western zone of Ciscaucasia /district of Stavropol/.

2. G. alpinus Sosn.

1911, Vestnik. Tifl. Bot. Sada, 19: 28. Syn.—**G. schaoricus** Kem.-Nath., 1947. Zam. po sist. i geogr. rast., 13: 6.

Bulb 2.0-2.5 /3.5/ cm. long and 1.5-2 cm. in diameter; sheath 3.5-6 cm. long. Leaves dark-green, glaucous, broad lanceolate, /4/ 5-5.5 /7/ cm. long and 1.5-1.8 cm. wide during flowering, up to 25 cm. long and 2-2.5 cm. wide after flowering. Scape 6-9 cm. long, with fruits 12-14 cm. long; spathe 3.5-5 cm. long; pedicel slightly shorter than spathe. Outer tepals concave, obovate, 1.5-2 cm. long and 0.8-1 cm. wide; inner tepals cuneate, 0.8-0.9 cm. long, 0.5-0.6 cm. wide, with a sinus at the top and with a green mark around the sinus. Stamens 0.6-0.7 cm. long; anthers with small mucronatum. Ovary 0.5 cm. in diameter. $2n = 24$.

From low to alpine zones, in bushes thinned as a result of sheepherding, on exposures of limestone rocks, in alpine pasturable meadows.

Distribution: The western Transcaucasia, district of the Shaorsky reservoir; the south-western part of the Transcaucasia, districts of Borzhomi, Bakuriani, Keda.

3. G. Bortkewitschianus G. Koss

1951, Bot. mat. gerbariya Bot. inst. A.N. SSSR, 14: 130.

Bulb 3-4 cm. long, 2-3 cm. in diameter; sheath 3-6 cm. long. Leaves dark-green; glaucous, lanceolate, from 2.5 to 6 cm. long and 1.2-1.4 cm. wide during flowering; up to 30 cm. long and 2.5 cm. wide after flowering. Scape 4-6 cm. long; spathe 2.5-4 cm. long; pedicel equal to or slightly longer than spathe. Outer tepals concave, obovate, 1.5 cm. long and 0.8-1 cm. wide; inner tepals cuneate 0.8-0.9 cm. long, 0.5-0.6 cm. wide, with a sinus at the top and with a green mark around the sinus. Stamens 0.6-0.7 cm. long; anthers with small mucronatum. Ovary 0.3-0.4 cm. in diameter. $2n = 36$.

The plant grows under the cover of beech forest, on loose humus soils.

Distribution: Ciscaucasia, upper reaches of the river Kamenka, where an area of 5-6 hectares is occupied by this species; the plant is not found in other places.

4. G. ikariae Baker

1893, Gard. Chron., Ser. 3, 13: 506. Syn.—**G. woronowii** Losinsk. 1934, Flora USSR, 4: 794; **G. ikariae** subsp. **ikariae** Stern, 1956, Snowdr. and Snowfl., 48.

Bulb 2-3 cm. long and 2-2.5 cm. in diameter; sheath 2-5 cm. long. Leaves 12-16 cm. long, 1-2 cm. wide, during flowering, 18-22 cm. long after flowering, bright-green, with yellowish hue, glossy, slightly coiled. Scape 10-15 cm. long; spathe 2.5-4.5 cm. long; pedicel 2-3 cm. long. Outer tepals obovate, slightly concave, 1.5-2.4 cm. long, 0.8-1.0 /1.2/ cm. wide; inner tepals oblong, widening toward the top, 0.8-1.0 cm. long and 0.4-0.5 cm. wide, with a sinus and a green mark at the top. Stamens 0.6-0.7 cm. long, anthers with mucronatum at the top. Ovary 0.3-0.5 cm. in diameter, (Fig. 30, right, and lower center). $2n = 24$.

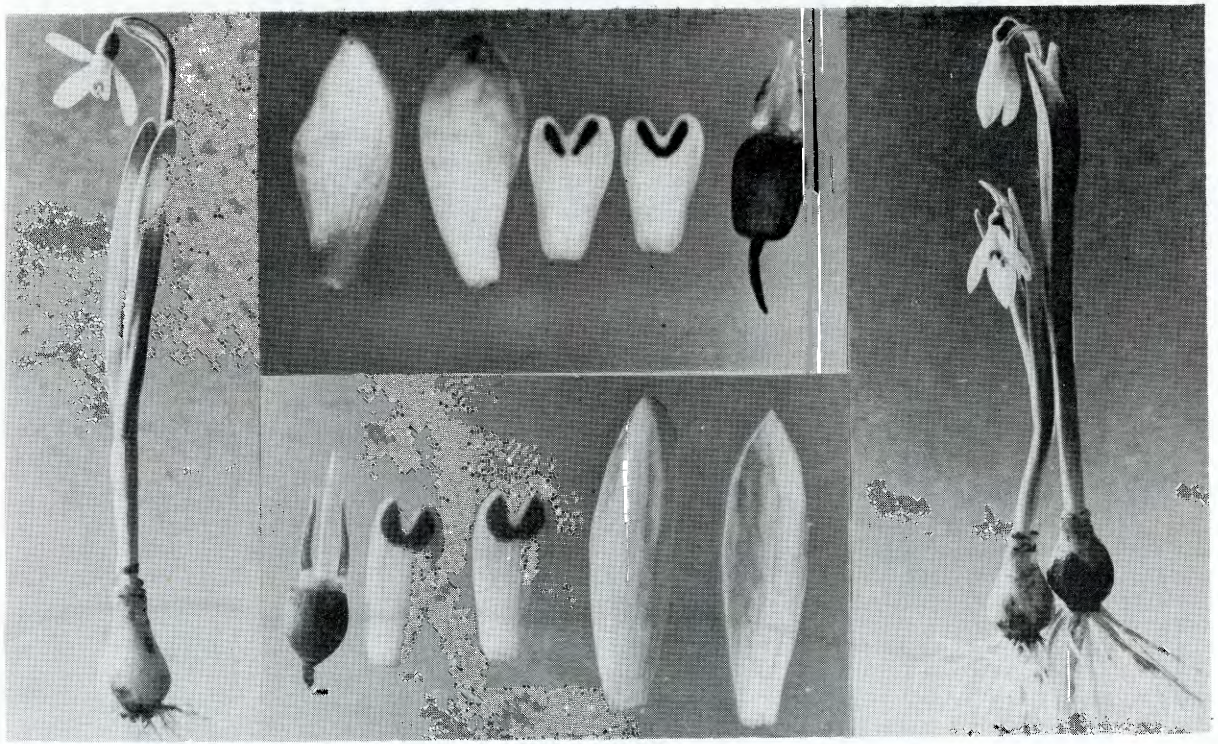

Fig. 30. **Galanthus caucasicus** from the suburbs of Tbilisi **left,** general view of the plant; **upper center,** parts of the flower.
Galanthus ikariae (G. woronowii) from the suburbs of Sukhumi: **right,** general view of the plant; **lower center,** parts of the flower.

In forests on foothills, on the Black Sea coast of the Caucasus the plant grows together with **G. krasnovii.**

Distribution: The western Transcaucasia—from Tuapse to Batumi, the eastern part of the Black Sea coast of Turkey, the island of Ikaria.

5. G. platyphyllus Traub et Mold.

1947, Herbertia, 14: 110; **G. latifolius** Rupr. 1868, Gartenfl. 17: 130; **G. ikariae** subsp. **latifolius** Stern, 1956, Snowdr. and Snowfl., 50.

Bulb 4-5 cm. long and 2.5-3 cm. in diameter, sheath 3-5 cm. long. Leaves dark-green, shiny, 15-16 cm. long and 1-1.5 cm. wide during flowering, 20-25 cm. long and 3-3.5 cm. wide after flowering. Scape 10-15 /20/ cm. long, 20-22 cm. long after flowering; spathe 3-5 cm. long; pedicel 1.5-2 cm. long. Outer tepals elliptical or oblong-ovate, 1.8-2.7 cm. long, 0.8-1.5 cm. wide, with an apiculus at the top; inner tepals obovate 0.8-1 cm. long and 0.5 cm. wide, without a sinus at the rounded top, with a green mark of indefinite shape. Stamens 0.4-0.5 cm. long, without an apiculus at the top; ovary 0.3-0.4 cm. in diameter. $2n = 24$.

In subalpine and alpine zones, snowdrops descend sometimes along slopes into gorges.

Distribution: western part of the Greater Caucasus from Gagry range in eastern direction to places slightly eastwards of the Krestovy pass.

6. G. krasnovii Khokhr.

1963, Bull. Mosk. obstsch. ispyt, prir., 63, 4: 140; Syn.—**G. valentinae,** 1940, Fl. Kavkasa, 2: 194.

Bulb 2-2.5 (3.5) cm. long, 2-2.5 cm. in diameter; sheath (2.5) 6-9 cm. long. Leaves 10-18 cm. long, 1-2 cm. wide during flowering, bright-green, glossy, slightly coiled. Scape 12-15 cm. long, up to 30 cm. long after flowering; spathe 2.5-4 cm. long, with slightly expressed green keels; pedicel 2-3 cm. long. Outer tepals obovate, slightly concave, 1.5-2 /3/ cm. long, 0.8-1.2 cm. wide, inner tepals lanceolate, 1-1.5 cm. long, 0.4-0.6 cm. wide, with an obtuse or acuminate top and with a diffused green mark at the top. Stamens 0.5-0.7 cm. long, anther with an apiculus. Ovary 0.4-0.5 cm. in diameter. $2n = 24$.

In beech, hornbeam and mixed forests, in glades, on the floors of damp gorges.

Distribution: the Caucasus—the Black Sea coast of the Caucasus (from Novy Afon to Batumi); Turkey-Artvin district.

7. G. fosteri Baker

1889, Garden Chron., Ser. 3, 5: 458; Syn.—**G. latifolius** Rupr. f. **fosteri** (Baker) G. Beck, 1894, Wiener, Ill. Gartenz., 19: 56.

Bulb 2.5 cm. long, 2 cm. in diameter; sheath up to 5 cm. long. Leaves dark-green, 15-17 cm. long and 1.7-2.6 cm. wide, turned back, with a flat top. Scape up to 9 cm. height; spathe 6 cm. long; pedicel up to 3.6 cm. long. Outer tepals oblong-obovate 2.6 cm. long, 1.2-1.5 cm. wide, inner tepals oblong-obcuneate, 1.2 cm. long, 0.6 cm. wide, with a green mark around a sinus at the top and at the base. Stamens about 0.6 cm. long; anther with an apiculus. $2n = 24$.

In foothills and mountains, in the outskirts of forests, in bushes.

Distribution: Turkey and Lebanon.

8. G. transcaucasicus Fomin

1907, Opred, rast. Kavkasa i Kryma, 1: 281; Syn.—**G. nivalis** f. **caspius** Rupr., 1868, Gartenfl., 17: 132; G. caspius (Rupr.) Grossh., 1928, Flora Kavkasa, 1: 244.

Bulb 1.5-2 (2.5) cm. long, 1.2-1.5 cm. in diameter. Sheath 4-6 /8/ cm. long. Leaves dark-green, matt-surfaced, but without waxy bloom, linear,

10-14 cm. long and 0.5-1 cm. wide during flowering, 20-25 cm. long and 1.2-2.2 (2.5) cm. wide after flowering. Scape 8-10 (13) cm. long; spathe 2.5-3 cm. long; pedicel equal to or slightly longer than spathe (in rare cases shorter than spathe). Outer tepals obovate, 1.5-2.5 /3/ cm. long and 0.7-1 cm. wide, inner tepals 0.8-1 cm. long, 0.5-0.6 cm. wide, with a green mark around a sinus at the top. Stamens 0.6-0.7 cm. long, anthers with an apiculus at the top. Ovary 0.3-0.5 cm. in diameter. $2n = 24$.

In the forests of foothills.

Distribution: the Caucasus-Talysh mountains, The Lesser Caucasus.

9. G. cilicicus Baker

1897, Gard. Chron., Ser. 21: 214. Syn.—**G. nivalis** subsp. **cilicicus** (Baker) Gottlieb-Tannenhain, 1904, Abh. Zool.—Bot. Ges. Wien, 2, 4: 33; **G. rizehensis** Stern, 1956, Snowdr. and Snowfl., 37; **G. glaucescens** Khokhr., 1966. Bull. GBS., 62: 62.

Bulb 1.5-2.2 cm. long and 2 cm. in diameter; sheath 4-6.5 cm. long. Leaves dark-green, matt-surfaced, but without glaucous bloom, linear, 10-12 cm. long, and 0.4-0.5 cm. wide during flowering, and 20-25 cm. long and up to 1 cm. wide after flowering. Scape 12-18 cm. long; spathe 2.5-3 cm. long; pedicel equal to or longer than spathe. Outer tepals oblong-oval, tapered to the base, 1.9-2.1 cm. long, 0.6-0.8 cm. wide, inner tepals oblong, widened at the top, 0.9-1 cm. long 0.4-0.6 cm. wide, with a green mark around a sinus at the top. Stamens 0.7 cm. long, anther with an apiculus. Ovary 0.5 cm. in diameter. $2n = 24, 36$.

In foothills and mountains, in the outskirts of forests, in bushes.

Distribution: Asia Minor—district of Trabson and Cilicia, the Caucasus (suburbs of Batumi).

10. G. lagodechianus Kem.-Nath.

1947. Zam. po sist. i geogr. rast. instituta bot. A. N. Gruz. SSR. 13: 5. Syn.—**G. ketzkhowelii** Kem.-Nath., 1947, Tr. Tbil. Instituta bot., Ser. 2, 11: 181; **G. cabardensis** G. Koss 1951. Bot. mat. gerbar. bot. Instituta A. N. SSSR, 14: 133; **G. kemulariae** Kuth., 1963, Zam. po sist. i geogr. rast. Instituta bot. A. N. Gruz. SSR, 23: 128.

Bulb 2.5-3 cm. long and 1.5-2 cm. in diameter; sheath 4-6 (9) cm. long. Leaves flat, dark green, shiny, without glaucous bloom, linear; 10-12 cm. long and 0.6-0.8 cm. wide during flowering; after flowering 20-30 (45) cm. long and 1-1.5 cm. wide. Scape (3) 8-10 cm. long; spathe 3-4 cm. long; pedicel equal to or slightly shorter than spathe. Outer tepals obovate, (1.5) 2-2.5 (3) cm. long and 0.8-1 cm. wide; inner tepals cuneate, 0.8-1 (1.2) cm. long and 0.4-0.6 cm. wide, with a sinus at the top and a green mark around it. Stamens 0.6-0.8 cm. long; anthers with an apiculus on the top. Ovary 0.4-0.5 cm. in diameter. $2n = 24$.

From subalpine to lower forest zone.

Distribution: the Caucasus—Greater Caucasus (regions of Nalchik, Ordzhonikidze, Khasavyurt, Lagodekh, Zakataly, Nukha, vicinity of Tbilisi—monastery Zedazeni).

As regards the origin of the species belonging to the genus Galanthus, the following can be said. The most likely assumption suggested by F. C. Stern (1949, 1956) is that the genus Galanthus has emerged from an ancestral group common to the genus Leucojum which was confined to the Northern and Central Europe, but shifted to the south (Spain, Portugal, North Africa) and east (The Caucasus, Asia Minor) under the effect of glaciation. From this ancestral group the genus

Leucojum has emerged in the western part of the Mediterranean area and the genus Galanthus—in the eastern part of the latter.

This view is confirmed by chromosome number data. In the genus Leucojum the series of basic chromosome numbers is from 7 to 11 and the basic number in snowdrops continues the ascending series.

The evolution of the genus Galanthus can be represented as follows. We consider the most ancient group of snowdrops as constituted by species from the section Nivales characterized by flat leaves in vernation, epidermal cells tapering to the ends and large cavities in the leaves. All these features are also inherent in the species of the genus Leucojum, whose areas alternate with those of some of the snowdrop species.

The representatives of the section Viridifolii are characterized by rectangular epidermal cells, some of the species have no clearly defined cavities in the leaves; vernation within the section is of two types, but species with vernation inherent in snowdrops of the series *Latifolii* are predominant. The polyploid series 2n=24, 36, 72 is especially noteworthy for this section.

The presence of polyploids in the section is in itself a sufficient proof that this is a younger group of snowdrops. It should be noted that in the Caucasus the species with chromosome numbers equal to 36 and 72 are confined to the Greater Caucasus which was affected by considerable glaciation in the Quaternary period, whereas the lowlands of Kolkhida were not affected by glaciation. And it is there that the most ancient snowdrops such as *G. ikariae* have been preserved.

We do not attach evolutionary significance to the feature of presence or absence of waxy bloom on the leaves as assumed by Kemularia-Natadze (1947). Rather this is a feature of ecological importance inherent in drier habitats of snowdrops more exposed to sun.

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LATIN AMERICAN AMARYLLIDS, 1969

PEDRO FELIX RAVENNA, *Argentina*

Amaryllis aviflora Ravenna, Sellowia 19: 25. 1967. (subgen-*Omphalissa*). Plant about 40 cm high. *Bulb* nearly globose, 6 cm wide, prolonged in a neck about 2-3 cm long. *Leaves* 2-6 at flowering time or serotine, green, somewhat flaccid, about 38 cm long, 3-4 cm wide, somewhat canaliculate down to the base, nearly flat upwards. *Scape* cylindric, lateral, about 6-11.5 mm wide, with dry spathe-valves at anthesis. *Flowers* horizontal or cernuus, about 9 cm long, nearly 6.5-7 cm in diameter, whitish with green throat and red nerves inside. *Ovary* oblong about 11.5 mm long, 7.2 mm wide. *Tepals* connate about 14 cm, the outer ones about 7.5 cm long and 2-2.2 cm wide, somewhat reflexed at the apex, the inner lateral nearly oblanceolate, about 6.7 cm long, 13 mm wide, curved outwards, the lower outer pair contiguous to the lower inner, this much smaller than the others, appressed to the fascicle of stamens. *Filaments* ascendent, curved upwards, whitish. *Anthers* versatile reniform after dehiscence, about 5 mm long; pollen pale yellow. *Style* declinate-ascending about 10 cm long; stigma shortly trifid, lobes about 2.5 mm long.

Hab. and exsiccata: Cultivated in Buenos Aires from bulbs collected by Lic. E. Nicora between Trancas and Rosario de la Frontera, province of Salta (Argentina); flowered Oct. 1962; leg. Ravenna 148 (type in Herb. Ravenna).

A very pretty species similar to *Amaryllis maracasa* Traub; however, this has orange or brick-red flowers. It has also some resemblance to *A. calyptrata* Ker-Gawl., differing by the disposition of the lower tepals (two of the outer and the lower inner), which in *A. aviflora* are contiguous.

The use here of the name *Amaryllis* instead of *Hippeastrum* (synonym) agrees with the 13th article of the International Code of Nomenclature. The existence of an unannoted African specimen (*Brunsvigia rosea*) in the Cliffort Herbarium does not affect the Linnean concept in considering the American species *Amaryllis belladonna* Linn. (syn. *Hippeastrum equestre* Herb.) as the type of the genus *Amaryllis*. Any attempt to select a lectotype which could be at variance with the Linnean opinion goes against the 8th article of the mentioned Code. Actually the work "Hortus Cliffortianus" of the famous botanist is not based only on that herbarium, but includes many other species, and among them our American species.

In the last edition (1966) of the Code of Nomenclature, is published the name *Hippeastrum* Herb. (1821) against *Leopoldia* Herb. (1821, nom. prov.); hereby must be understood that the former appears as valid rather than the latter, but even so, the status of the earlier name *Amaryllis* Linn. is not affected.

Amarryllis angustifolia (Pax) Traub et Uphof. Pax says at the end of the original description, that it is intermediate between the sub-

genera *Omphalissa* and *Habranthus* (the latter is considered as a different genus). Traub and Moldenke (1949) include it in the subgenus *Lais*. This is in disagreement with the flower characters. In fact the very narrow tepals, the lower embracing the stamens near the base, these very long and prominent, are evidence enough supporting the transference of the species to the subgenus *Omphalissa*. The inflorescence has four to nine magnificent red flowers, very similar in shape to those of *Sprekelia formosissima*. *Sprekelia spectabilis* Hoehne is a synonym which proves the existence of it also in Brazil. *Hippeastrum rutilum* in the sense of Hassler and Chodat (Bull. Herb. Boiss. ser. 2, 12: 1101. 1903) is also the same still not reported to Paraguay.

Zephyranthes flavissima Ravenna, Sellowia 19: 28. 1967. (subgen. *Zephyranthes*). Plant about 10-20 cm high. *Bulb* ovoid about 16-17 mm long, 13-14 mm wide, prolonged in a neck about 35-40 mm long. *Leaves* often two at flowering time, bright green somewhat thick, nearly flat in the adaxial face, about 12-18 cm long, 2-2.3 mm wide. *Scape* about 7-18 cm long. *Spathe* somewhat reddish, tubular downwards, fenestrated near the apex, about 17 mm long. *Flower* widely funnel-shaped, intensely yellow, pedicellate (pedicel about 11 mm long), nearly 3.5-4 cm in diameter. *Ovary* obovoid, green, about 2.9 mm long, 2 mm wide. *Tepals* oblanceolate-spathulate or oblanceolate, connate about 1.9 mm, the outer about 2.4 cm long and 7 mm wide, the inner about 2.3-2.35 cm long, 6.1 mm wide. *Filaments* somewhat broadish, sepalines about 9.9 mm long, petalines about 11.5 mm long. *Style* erect, straight, as long as the stamens or somewhat longer; stigma capitate, obscurely trilobed.

Habitat.—Stony grassy fields on Serra da Rocinha (Brasil, R. G. do Sul), about 1060 m over sea level; Serra do Oratorio, Santa Catarina, about 1440 m; also in Entre Ríos, Argentina, on stony banks of the river Uruguay, near the water or covered with it (at Parque Rivadavia, near Concordia), and in the prov. of Corrientes and Misiones.

Hab.—Stony grassy fields of the Rocinha mountains (Rio Grande do Sul, Brazil), about 1060 m above sea level; also in the Oratorio Mountains in Santa Catarina, about 1440 m and in the State of Paraná; in the province of Entre Ríos, Argentina, among stones near or under the water at the river Uruguay banks, in the Rivadavia Park near Concordia; also in the provinces of Corrientes and Misiones.

Zephyranthes stellaris Ravenna, Sellowia 19: 28. 1967. (subgen. *Zephyranthes*). Plant about 17 cm high. *Bulb* ovoid, about 20 mm long and 14-15 mm wide or smaller, covered with dull ochraceous coats. *Leaves* suberect, green, nearly filiform or very slightly canaliculate, smooth, about 17 cm long and 1.15 mm wide. *Scape* about 17 cm long. *Spathe* tubular 1-valved, undivided to the apex, 1-flowered, about 14-18 mm long. *Flower* white, greenish at the base, rotaceous, about 4 cm in diameter. *Tepals* oblanceolate, connate about 0.8-1 mm, the outer about 25.5 mm long, 7.6 mm wide, the inner about 24 mm long, 8 mm wide. *Filaments* nearly erect three about 8 mm long, the other three

nearly 9.9 mm long. Anthers nearly straight after dehiscence, or somewhat curved, about 3 mm long. *Style* ascendent about 11 mm long; stigma capitae-trilobed. Related to *Zephyranthes candida.* People know it as "vivina"; bulbs are supposed to be edible.

Hab.—In damp grassy places among *Prosopis,* in the Argentinean provinces of Entre Ríos, Santa Fé and Misiones; also in Paraguay near Villa Rica.

Bulbs of this species were taken from some "dry" specimens which were covered with poison two years before. One of these flowered after several months. By the shape of its perigonium, anthers and stigma, it rather resembles *Z. candida.* It is easily distinguishable by its nearly filiform leaves and the very weak habit of the whole plant. According to the collectors the bulbs are edible.

Zephyranthes filifolia Herbert ex Kraenzlin. According to Baker (1888) the name *Zephyranthes filifolia* was proposed by Herbert, but never published. The first description with that name was made by Kränzlin using a specimen from northern Patagonia (at Kew). In fact the species was recently re-collected in the province of Río Negro. However, it has a much wider distribution to the north, through the provinces of La Pampa, Buenos Aires, Mendoza, Córdoba, San Luis and Catamarca. Therefore it seems necessary to draw its geographical distribution by means of the specimens determined by me.

Habranthus andalgalensis Ravenna, Sellowia 19: 30. 1967. Plant about 23-25 cm high. *Bulb* nearly globose or globose, about 27 mm wide, covered with dark tunics, these prolonged in a neck. *Leaves* 3-4 at floweringtime, or none, filiform, ash green, narrowly canaliculate, about 15-20 cm long, 2 mm wide. *Scape* cylindric, weak, about 12-13 cm long. *Spathe* 1-valved, 1-flowered; valve membranaceous, very often undivided, about 3 cm long, tubular downwards for 5-10 mm. *Flower* cernuus pedicellate (pedicel about 6-12 mm long), whitish, about 4.5 cm long, 3-4 cm in diameter. *Ovary* oblong, about 4.7 mm long and 2.5 mm wide. *Tepals* oblanceolate, somewhat connate at the base, the outer about 44 mm long, the inner about 42.5 mm long, nearly 11.5 mm wide. *Stamens* fascicled, declined, the shorter pair about 13 mm long, the longer pair nearly 23 mm long, the intermediate ones about 19 mm and 21 mm long; anthers curved semilunate, about 3 mm long. *Style* declinate about 28 mm long; stigma shortly trifid, lobes about 1.6 mm long recurved at the apex.

Hab.—In sandy places among prickly bushes near Andalgalá (prov. of Catamarca, Argentina), in a place known as La Aguada.

This species resembles somewhat *H. gracilifolius* Herb. It can be easily identified because of the narrowly channeled grayish leaves, which frequently appear at the same time as the flowers. These are whitish, not pink. The range and habit of both are quite different.

Habranthus magnoii Ravenna, Sellowia 19: 31. 1967. Plant about 20 cm high. *Bulb* ovoid or nearly ovoid, about 3 cm long, 2 mm wide, or smaller, covered with dark coats. *Leaves* serotine, somewhat firm in texture, flat, not canaliculate, obtuse, about 20-25 cm long, 5-7 mm

wide. *Scape* about 9-10 cm long. *Spathe* 1-flowered, bifid at the apex, about 3 cm long. *Flower* pink, greenish downwards, about 4-5 cm long, 3.5 cm in diameter. *Tepals* oblanceolate slightly connate at the base, the outer about 45 mm long, 6-8 mm wide, the inner nearly of the same length as the outer. *Filaments,* petalines about 25-28 mm long; anthers lunulate about 2.5-3 mm long; pollen yellow. *Ovary* obovoid, about 2.7-3.2 mm long, 2-2.5 mm wide; style about 4 cm long; stigma trifid, its lobes about 2.5 mm long.

Hab.—Among rocks or stones in the mountains of the province of Córdoba (Argentina).

Habranthus magnoii is related to *H. brachyandrus* (Bak.) Sealy, and also to *H. robustus* Sweet. The former has larger flowers with a purple base. The latter is a native of the Island of Santa Catarina (State of S. C., Brazil) and neighbouring island. Named in honor of S. Magno, painter and naturalist.

Habranthus robustus Herb. The geographical range of this species has not been cleared up till now. According to Herbert, the bulbs were found in the neighbourhoods of Buenos Aires. The only species, which for a long time made me hesitate, is the native of the province of Córdoba, which I have named *Habranthus magnoii.*

Habranthus robustus was synonymized by Traub under *H. tubispathus* (L'Hér.) Traub, but this is a smaller different species which grows really not far from Buenos Aires. On the other hand, Cabrera (see Man. Fl. Alr. Buenos Aires: 148. 1953) calls *H. robustus* another species which has about three flowers in each umbel.

Our species is frequent in the rocky hills of the island of Santa Catarina (S. C., Brazil), for example Morro das Pedras and also in the neighbouring islands. I found it cultivated at Sta. Ana (Misiones), Argentina. The mentioned region of Brazil was explored by Tweedie the Scottish collector, during the years 1824 and 1825; it is proved that several plants collected by him were erroneously assigned by authors to Buenos Aires. This is the case of *Amaryllis breviflora* (Herb.) Seub., a native of the bogs of Santa Catarina. Even if Herbert does not mention any collector, it seems to me probable that this was Tweedie, especially if we consider the real origin of the plant. This thesis appears to be confirmed by the fact that a specimen was referred by Baker to the species, with the following data: "Buenos Aires, Tweedie!" (see Handb. Amaryll.: 35. 1888). Owing to the fact that Tweedie was in Córdoba for the first time only in 1835, we can be sure, even without judging characters, that *Habranthus magnoii* is not *H. robustus.*

Habranthus brachyandrus (Bak.) Sealy. According to Holmberg the bulbs of his *Zephyranthes porphyrospila* were gathered during a trip to the Argentinian province of Formosa; notwithstanding, he was not sure if they were found in the province of San Luis or truly in Formosa. Fortunately, it was possible to establish from the original description (no type-material exists), that *Zephyranthes porphyrospila* Holmb. is identical with *Habranthus brachyandrus* (Bak.) Sealy. The species is found in Paraguay and the Chaco region of Argentina; it is

frequent in Formosa and much cultivated in the former country and in the Argentinian province of Misiones (Oberá).

Rhodophiala bifida (Herb.) Traub, ssp. *aemantha* Rav. Hab.—Hills and fields southwards of the province of Buenos Aires.

It differs from the subspecies *bifida* by the smaller size of the plant, which has 2-3-flowered umbels and blood-coloured tepals, not pink or purple.

Eustephiopsis marginata (Pax) Fries. A species with pinkish flowers marked with yellowish and greenish inside. The leaves are almost always of a bright green or only slightly glaucescent; this point disagrees with Pax's statement. I found it in the province of La Rioja, in the mountains above Chilesito and of Famatina.

Eustephiopsis marginata (Pax) Fries, ssp. *latifolia* (Fries) Rav. It has red flowers yellowish inside; the larger leaves are grayish-glaucescent. I found a large population in the valley of Granadillas (28 km from Belén, Catamarca, Argentina), but not in flower. Flowers were found at Rumi-Rayán (Catamarca, dept. Tinogasta), a place at 2800 m of altitude; the inflorescences appeared alone, without leaves, in the hard vulcanic soil.

Hab.—Argentina from the province of Catamarca, through the mountains of Tucumán, Salta, Jujuy, to Bolivia; altitude 1800-3800 m above the sea level.

Rauhia megistophylla (Kraenzl.) Traub, Pl. Life 22: 5. 1966.—Ravenna, Sellowia 19: 33. 1967 (see also Pl. Life 24: 1969).—*Phaedranassa megistophylla* Kraenzlin, Engler Bot. Jahrb. 54, Beibl. 117: 2. 1916.—*Rauhia peruviana* Traub. Pl. Life 13: 74. 1957.

Phaedranassa megistophylla is an earlier binomial for the plant known as *Rauhia peruviana* Traub. Owing to the fact that *Rauhia* is considered as a valid genus, the specific epithet *megistophylla* is transferred. *Callithauma spathulatum* Herb. is probably referable to the same species; due to the fact that it is practically a *nomen nudum,* its use is not advisable.

During a memorable trip to the department of Amazonas (Peru), I had the unusual opportunity of observing in full flower a population of this amazing species. I found it at Pucará, near Bella Vista (Cajamarca, prov. of Jaen); this place can be considered as practically the same as the original one. I brought some of the large bulbs to Buenos Aires, but they could not stand for a long time our damp climate. However, it was possible to observe the peculiar large unusual leaves before its growth begins (in prefoliation or vernation); they are folded outwards in such manner that their margins touch.

Castellanoa marginata (Fries) Traub. A monotypic genus allied to *Chlidanthus* and *Stenomesson* (subgen. *Clinanthus*). The flowers of *Stenomesson humile* appear to be very similar to those of this genus.

In spite of the fact that *Castellanoa marginata* was already known not far from the Bolivian border, its presence was never recognized in that country. This is the first time that the genus is reported in the flora of Bolivia; this fact is supported by the existence of a dry specimen.

Hab.—High mountains of northern Argentina and the south of Bolivia; altitude, 3400-3700 m above the sea level.

Hieronymiella aurea Ravenna, Sellowia 19: 34. Oct. 1967—Syn.: *Hieronymiella tintinensis* Hunziker et Cocucci, Kurtziana 4: 7. Dec. 1967.

Bulb and *leaves* in the type-specimen absent. *Scape* cylindrical about 6-8 mm wide. *Spathe* 7-8-flowered, bivalved; valves marcescent, membranaceous, unequal, ventricose downwards, narrower upwards, the lower about 94 mm long, the upper 100-104 mm long; inner bracts much smaller, often lanceolate or filiform. *Flowers* golden yellow, pedicellate, about 62-70 mm long, nearly 44 mm or more in diameter. Pedicels about 28-45 mm long. *Ovary* oblong about 9-14 mm long, 2-3 mm wide. tepaltube nearly 19-24 mm long. *Tepals* lanceolate, the outer ones about 45-50 mm long, 12.2 mm wide, apiculate (apicula about 1.2-2 mm long; inner ones subequal or narrower, acute. *Filaments* winged, somewhat unequal, wider near the apex, tepal-textured, rather connate between them, narrower and free downwards, about 37-38 mm to the base of the anthers, then prolonged in two lanceolate lobes, longer than the anthers (about 9 mm long), for each. Anthers oblong, sessile or nearly sessile, about 3-3.2 mm long. *Style* about 67-80 mm long; stigma trifid, lobes recurved, about 1.8-2.5 mm long.

Hab. and exsiccata.—Argentina: province of Salta, Amblaio; leg. C. Spegazzini, I-1987 (type LPS 19466). Cultivated in my collection from bulbs collected in the same place of the specimen.

This is the second species of the genus. Differs from *Hieronymiella chlidanthoides* because of its yellow flowers with a shorter tepaltube.

1a. Flowers white sessile or very shorty pedicellate .....*H. chlidanthoides*
1b. Flowers yellow, distinctly pedicellated .....*H. aurea*

The genus Solaria, its presence in the flora of Argentina.

In the following lines, a new species of the genus Solaria are described. Here the genus is noted for the first time in the flora of Argentina. In addition, the chromosomes of the species are reported.

Solaria R. A. Philippi, Linnaea 29: 72. 1857.—*Symea* Baker, Saunders Ref. Bot.: tab. 260. 1871.

Flowers slightly zygomorphic, pedicellate. *Tepals* lanceolate, united near the base, greenish or purple, narrow, attenuated toward the apex, the inner somewhat shorter, often slightly cucullate at their base. *Androecium* with three fertile stamens: the upper episepal and both lateral epipetal, sometimes with three staminodes without any trace of anthers, rarely bearing only one staminode; *filaments* connate toward the base in a ring; anthers introrse in the bud, basifixed, extrorses by reflexion after dehiscence when the flower expands. *Ovary* sessile with three ovules in each cell; style elongated ± arched; stigma apical, simple. Fruiting pedicels ± reflexed, longer than the floriferous ones. Capsule globose irregular loculicidal, with few seeds. Seeds globose-angled or oblong, slightly rugose, black, with a whitish hylum. Basic number of chromosomes, x=7.

Plants almost always weak, with a tunicated bulb. Leaf solitary navicular. Scape cylindrical. Spathe bivalved; valves membranous.

Type-species: *Solaria miersioides* R. A. Phil.

A genus closely related to *Ancrumia* Harv., from which it differs basically by having three fertile stamens (instead of two). Two or three species from high mountains of Argentina and Chile.

Solaria attenuata Ravenna, Bol. Soc. Arg. Bot. 11: 160. 1967.

Plant about 10-14 cm high. *Bulb* oblong-conical about 3-3.5 cm long, 9-12 mm wide; external tunics whitish or ash-ochraceous. *Leaf* single, naviculate, falcate, dark green, about 20-22 cm long, 4.4-6.5 mm wide. Scape about 11 cm long. *Spathe* bivalved, many-flowered; valves narrowly lanceolate. *Flowers* greenish about 10-22 mm in diameter. *Pedicels* floriferous about 10-22 mm long. *Tepals* narrowly lanceolate, united for 1.6 mm, outer ones about 10 mm long, 2 mm wide; inner ones slightly cucullate at the base, about 6.8 mm long, 0.9 mm wide. *Filaments* complanate, connate in a ring for 0.67 mm, free part about 1.25-1.4 mm long, 1 mm wide at the base, narrower at the apex; staminode shorter, acute, or none. *Anthers* quadrate-rotundate, about 0.7 mm long. *Ovary* sessile, nearly globose or nearly ellyptical, about 1.6 mm wide; locules with three ovules; *style* often curved or declined, rarely nearly straight; *stigma* at the summit, simple. *Pedicels* fructiferous about 11-50.6 mm long, flexuose, recurved. *Capsule* nearly globose, trivalved, about 8-9 mm wide, partially covered with the remains of the perigone. *Seeds* black somewhat rugose, with a distinct whitish hylum, about 22 mm wide. Chromosomes, 2n=14.

Habitat.—Rare in the Andes of Linares, Chile, and in the province of Neuquen, Argentina; it grows on stream banks and in woods.

This species differs from *Solaria miersioides* Phil. which is very similar, on account of the absence of two staminodes; apparently also the third is also sometimes lacking. Tepals are longer and more acute (from here the specific epithet). The whole plant is somewhat more robust, especially when in fruit. *Solaria major* Reiche was described as a higher plant.

Among the material of the genus determined as *Solaria miersioides,* deposited in the Natural History Museum (BA), a single sheet from the province of Santiago (Chile) was confirmed as belonging to that species. Due to this lucky circumstance, it was possible to make comparisons and to verify that the original description is correct. Another specimen from the province of Linares, proved to be identical with the Argentinian material. On the other hand, among the places of the genus quoted by Philippi, it is also written Linares; this points suggests that Philippi had the opportunity of seeing some material of *Solaria attenuata* Rav., but apparently he did not recognize it as belonging to a different species.

Solaria attenuata appears to connect the genus with *Ancrumia* Harv. The latter is distinguishable merely because of the existence of only two fertile stamens; This point could be a difference of specific rank.

Chromosomes.—From one of the herbarium specimens in fruit cited (Boelcke 10815), a bulb already with poison applied, but still alive, was taken and planted. A short time later, appeared roots, and a leaf which was not able to develop. Root tips were cut (approximately 3 mm); they were pretreated with a saturated aqueous solution of paradiclorobenzene for 4-5 hours and then were fixed with Carnoy for 48 hours. One of the tips was washed with distilled water, then immersed in normal 2 solution of hydrochloric acid for 5-10 minutes. The next step was the squashing in an orceine drop. This technique was successful. Chromosomes were seen distinctly from the cytoplasm not excessively stained. Several cells were in an optimum stage for study. Three cells were drawn with camera lucida, but only one was selected for this work. Later permanent slides were made in the following way: freezing, detaching slide and cover-slip in absolute alcohol; previously these were smeared with Mayer's albumin.

Solaria attenuata Rav. was shown to have a chromosome complement of 2n=14, as follows: two pairs with a submetacentric centromere, two pairs with an acrocentric centromere, three pairs with subterminal centromere. In a pair of the latter group, the existence of satellite was noted.

Tristagma anemophilum Ravenna, Bol. Soc. Arg. Bot. 11: 147. 1967. Plant about 10 cm high (to the apex of leaves). *Bulb* oblong-ovoid about 12 mm. long, 7 mm wide, prolonged in a neck for 3.5-4.7 cm or more. *Leaves* 4-5 at flowering time, linear, slightly flexuose, about 5-10 cm long. 0.8-1.1 mm wide. *Scape* about 3-4 cm long, 1 mm wide. *Spathe* biflora; valves unequal, the lower about 15 mm long, the upper about 14 mm long. flowers pedicellate, whitish, cernuus, about 8-14 mm in diameter. *Pedicels* about 4.5-6 mm long. *Tepals* flattened, very narrow, nearly lanceolate, connate at the base for 2.6 mm; the outer about 11.4 mm long, 1.1 mm wide, the inner subequal. *Filaments* complanate, subulate at the apex, sepalines about 1 mm long, 0.4 mm wide at the base, petalines about 2 mm long, 0.6 mm wide at the base. *Anthers* oblong, yellow, about 0.7-0.8 mm long. *Ovary* obovoid, about 2.3 mm long, 2 mm wide; style thick, about 1.5 mm long, 0.7 mm wide, green downwards, whitish upwards; stigma capitate-trilobed.

Hab.—Argentina, Neuquén, on the mountains called Cordillera del Viento, alt. about 2200 m.

A closely related species to *T. patagonicum* (Bak.) Traub, from which it differs by the much smaller tepaltube and the very short filaments.

Tristagma nivale Poeppig. Plant about 12-22 cm high. *Bulb* ovoid-oblong about 12-32.5 mm long, 6-16 mm wide, whitish with somewhat fleshy roots; pseudoneck about 3.5-7 cm long. *Leaves* 3-6, linear, very often circinate especially toward the apex, or sometimes falcate or straight, about 8-24 cm long, 2-3.5 mm broad, somewhat obtuse at the apex. *Scape* about 5-18 cm long, 0.8-2.8 mm broad. *Spathe* 2-5-flowered; valves lanceolate about 14-23 mm long, connate for 1.6-4.2 mm at the base. *Flowers* purplish-black or greenish, cernuus. *Pedicels* about

10-35 mm long. *Tepals* united in a tube for 8.5-12.5 mm, then spreading, fleshy, blunt, about 4.7-7.5 mm long, 1-1.2 mm broad. *Filaments* nearly filiform or flattened but very narrow, the episepal group inserted at 3.5-3.7 mm from the base of the tube, about 1.2-2.5 mm long. *Anthers* erect oblong, yellow, about 1.3-1.7 mm long. *Ovary* sessile, ovoid about 2.2-3.5 mm long, 1.5-2.5 mm broad; style about 1.4 mm long; *stigma* capitate.

Hab.—Argentina, from the province of Mendoza to Tierra del Fuego, in the damp Patagonia or in the steppe; it is found also in Chile.

Variability in the flower colour and the circumstance that the leaves are not always spiraled has caused it to be classified as *T. eremophila* Speg. *Tristagma chubutense* Gandoger, poorly described, is a further synonym of the species.

Tristagma nivale Poepp., forma *australe* (Neger ex Dusen) Rav. It differs from the typical form because of its very short, nearly obsolete pedicels, and the shorter obtuse spathe-valves; no differences are found in the flower. *Tristagma inflatum* Rendle was based on a specimen with incipient fruits: during the fruiting process, the tepal-tube becomes swollen due to the growth of the ovary in the inside.

Tristagma patagonicum (Bak.) Traub. Additional synonym to be added: *Brodiaea viridior* Killip and *Tristagma viridior* (Killip) Traub.

Plant about 7-9 cm high. *Bulb* ovoid or ovoid-oblong, about 16-20 mm long, 7-9 mm wide, prolonged into a pseudoneck for 20-25 mm long. *Leaves* 1-2, linear, about 6-8 mm long, 0.7-1.8 mm broad, with a blunt apex. *Scape* weak, about 4.5-8 mm long, 0.8-1.1 mm broad. *Spathe* bivalved one-flowered; valves whitish, somewhat striated, lanceolate, about 19 mm long, 2.2-2.8 mm broad, connate for 2.2 mm toward the base. Flower pedicellate, erect, white, with a brown or greenish-brown streak on the outside of tepals, about 12 mm long, 20-35 mm in diameter. *Tepals* united for 11-20 mm, then spreading, the outer about 10-14.5 mm long, 2-6.4 mm broad, the inner about 8.5-10 mm long, 2-5.8 mm broad, both series blunt or more often acute. *Filaments* very narrow, the episepal group attached at 3.3-5.3 mm from the base of the tepal-tube, about 3-4.8 mm long, the epipetal group attached at 5.5-6.5 mm from the base of the tepaltube, about 3.5-5.5. *Anthers* oblong, obliques, yellow, about 1.1 mm long. *Ovary* oblong, about 2.6-3 mm long, 0.9-1.5 mm wide. *Style* filiform, about 5.5-7.7 mm long; stigma capitate-trilobed.

The name *Brodiaea luzula* was proposed by Macloskie in order to replace *Luzula patagonica* Speg. *(Juncaceae)*. This was due to a mistake of Spegazzini. In fact, when this author made the combination *Triteleia patagonica* (Speg.) Speg., he assigned erroneously the type to the sheet 366 (instead of the correct 362). The new name of Macloskie, was on account of Baker's earlier homonym in the same genus. Actually the number 366 was the type of the above mentioned *Luzula patagonica* (see Hauman 1917), a genuine member of the Rush Family. Spegazzini had never had the intention of transferring it to the genus *Triteleia (Liliaceae)*. Therefore, *Brodiaea luzula* Macloskie (and its further

combinations in other genera), must be considered as an absolute synonym of *Luzula patagonica* Speg., and not as was interpreted by Traub (1955), as belonging to the member of the *Liliaceae* mentioned. Incidentally, *Brodiaea patagonica* Bak., and *B. patagonica* Speg. are the same species; as a result, the further name given by Macloskie for the latter appears as superfluous.

Tristagma circinatum (Sandw.) Traub. and *T. viridior* (Killip) Traub, correspond to the very same species. Concerning the size of its flowers and tepals, *Tristagma patagonicum* is quite variable.

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THE BERING LAND BRIDGE, edited by David M. Hopkins. Stanford University Press, Stanford, California. 1967. 495 pp. Illus. $18.50. The history of Beringia, defined to include Western Alaska, Northeastern Siberia, and the shallow portions of the Bering and Chuckchi Seas, has from the beginning of the 20th century fascinated geologists, biogeographers, anthropologists, paleobotanists, mammalogists, and many others. There is good reason for the intense multidisciplinary and international interest in this strategic area of the earth's surface. It was over this narrow land bridge, joining Asia and North America, that numerous land plants, along with the horse, bison, mammoth, and many other animals including man himself, made their way into the New World. The Beringia land bridge was not a one-way street. Newly evolved species of land plants were exchanged between continents as readily as land mammal populations during Tertiary time.

This book of nearly 500 pages originated as a Symposium with the title, "Late Cenozoic History and Environments of the Bering Land Bridge", held at Boulder, Colorado, in August, 1965. The book is edited by the organizer of the Symposium, Dr. David M. Hopkins, Research Geologist with the Geological Survey. Dr. Hopkins has written the Introduction, and a concluding chapter with the significant title, "The Cenozoic history of Beringia—A Synthesis." This chapter attempts to condense the diverse subject matter of the Symposium into a meaningful summary. As a layman in such matters, I judge Dr. Hopkins efforts to be highly successful. In his role as Editor, Dr. Hopkins must have exerted a strong editorial hand. The subject matter of the Symposium is drawn tightly together, compared with other Symposia published in book form. In all, there are 24 chapters and 27 contributors, 9 of them Russian. Incidentally, the Russian contributions have been translated into English.

To one not knowledgeable about the complex geological history of the area, it comes as a surprise to learn that the Beringia land bridge was established and receded several times during the course of geological time. For instance, Beringia lay above sea level during most of the early and middle Tertiary. During this period it was part of a series of floral provinces that extended far to the south on both shores of the Pacific. During the Quaternary, which began about 3 million years ago, there were several fluctuations in sea level, alternately severing and reestablishing the land bridge. Even more surprising, a rapid rise in sea level drowned the Bering Land Bridge for the last time as late as 10,000 years ago.

For those persons with botanical training and interest, there are four chapters that deal with several aspects of the vegetational history of the area during the Quaternary, and one chapter that traces the history of the Okhotsk and Bering Seas by means of the diatom floras. Plant scientists with an interest in systematics and the processes of organic evolution will find much that is new and stimulating in the chapter by A. W. Johnson and A. G. Packer on "Distribution, Ecology and Cytology of the Ogotoruk Creek Flora."

Johnson and Packer have made skillful use of cytological data to supplement distributional and fossil information. They conclude that the Ogotoruk Creek-Cape Thompson flora consists of four major geographical elements; (1) an oceanic element, widespread along northern strands; (2) an arctic element that evolved in the mountainous regions to the south, in North America or Eurasia; (3) an arctic element that evolved and remained **in situ**; and (4) a boreal element that is primarily associated with the boreal forest.

In discussing the four elements in this flora. Johnson and Packer make the significant statement that, "On the basis of the polyploid spectrum within each of these elements, it appears that the oceanic and montane elements, both high in diploids, have evolved under relatively stable conditions, whereas the high frequency of polyploid species in the arctic and boreal elements suggests conditions of relative instability favoring the survival of newly formed polyploid species."

This review cannot do justice to the merits of the book. The two chapters on man will be of special interest to all biologists; one by Hansjürgen Müller-Beck of the University of Freiburg (On Migrations of Hunters across the Bering Land Bridge in the Upper Pleistocene), and the other by W. S. Laughlin of the University of Wisconsin (Human Migration and Permanent Occupation in the Bering Sea Area).

The book is attractively printed and bound for which we can thank the Stanford University Press. There is a General Index and an Index to Faunal and Floral Taxa. Regrettably the book is so expensive ($18.50) it will probably not be purchased by those for whom it would be most useful.—**Thomas W. Whitaker**

GENETICS OF FUNGI, by Karl Esser and Rudolf Kuenen. Springer Verlag, New York. 1967. Pp. 500. $18.50. "Genetics of Fungi" by Karl Esser and Rudolf Kuenen is a typical example of German scholarship; thorough, meticulous, detailed, and comprehensive. The authors are well qualified for the task of summarizing and interpreting the results of genetic research with fungi. Each has been a steady contributor to an understanding of hereditary mechanisms in **Podospora anserina**, an organism infrequently used by American and English investigators.

"Genetics of Fungi" comprises about 500 pages, organized into seven chapters which follow each other in logical sequence. They are: Morphology, Reproduction, Replication, Recombination, Mutation, Function, and Extrachromosomal Inheritance. One of the short chapters has a terminal Summary, but for the remainder, every topic within a chapter is summarized when the discussion is completed. Each chapter ends with a list of Literature Cited which for some chapters runs to as much as 21 pages and 550 titles. A supplement has been added to the literature list of each chapter after the German manuscript was completed. This device is an obvious attempt to make the text current in this fast moving field of investigation where much work is out-of-date before it reaches the press. The supplement updates the literature through 1966.

This book will no doubt have permanent value as a reference work. Graduate students with a primary interest in fungi, and senior investigators of problems concerned with fungal genetics will have constant need for the book, if for no other reason than as a handy source of pertinent literature for their investigations. I should make haste to add that the book is no annotated bibliography, but attempts the difficult assignment of explanation, interpretation and synthesis. The authors must be given good marks for achieving in a large part their major objectives.

While they usually define the technical terms peculiar to fungal morphology and genetics when first used, in my opinion it would have improved the book for use as a reference tool if these definitions were gathered together in a Glossary. Also, I find it strange that the genetics of plant pathogenic fungi go practically unmentioned. For example, the elegant experimental work of H. H. Flor with flax rust certainly deserves

a prominent place in a reference book on fungal genetics, but this fundamental work is not even cited.

Fungal geneticists will applaud Prof. Erich Steiner of the University of Michigan for a first rate translation. It indeed must have been a labor of love. Translating a technical reference work of this magnitude is something that is not lightly undertaken, and cannot be done in spare time between classes, or riding to and from the laboratory on bus or subway.

The book has a short Appendix, an Author and a Subject Index. It is pleasantly written and copiously illustrated. Investigators and students with an interest in fungal genetics are now served by two excellent texts that complement each other to a considerable degree; the one under review, and Fincham and Day's "Fungal Genetics." The "Genetics of Fungi" is priced at $18.50, which at first glance seems excessive, but is nevertheless reasonable for a book of this nature.—**Thomas W. Whitaker**

PHYLO-GENETIC SYSTEMATICS, by Willi Hennig; translated by D. Dwight Davis and Ranier Zangerl. University of Illinois Press, Urbana, Ill. 1966. Pp. 362. Illus. $12.50. Hennig's 1950 work on phylo-genetic systematics had been available only in the German Language and thus had not been adequately considered by others in the continuing synthesis of bioevolutionary theory as applied to systematic biology. Therefore, we are greatly indebted to Drs. Davis and Zangerl, and the University of Illinois Press, for this translation of the completely revised edition of Hennig's text, and which makes it available to students of biosystematics. Although the book is difficult to read, the extra effort required is well worth the stimulation received in learning about Hennig's outlook on biosystematics. He is uncompromisingly in favor of a system of phylogenetic classification. The book is divided into four sections: (1) the position of systematics among the biological sciences; (2) tasks and methods of taxonomy, (3) problems, tasks and methods of phylogenetics, and (4) concluding remarks. This is required reading for all interested in biosystematics.

PLANTS, MAN AND LIFE, by Edgar Anderson. University of California Press, Berkeley, Calif. 94720. 1967. Pp. ix + 251. Illus. This revised edition of a stimulating book by an outstanding authority on "man's influence on plant life, particularly crop plants" will be welcomed by all. The topics covered include: man and his transported landscape, history of weeds; the greater paradox (inadequate study of cultivated plants and weeds by botanists); the clue from the root-tips—caryology and genetics; the clue from diversity—variation under cultivation; how to measure an avocado; budgets vs. scholarship; uneconomic botany; dung heaps and the origin of agriculture; our most important crop plants and their probable origin; sunflowers, the one native American crop; and adventures in chaos—need of application of the taxonomic method to cultivated plants. This outstanding book in its field is highly recommended to amateur and professional plant scientists.

INTROGRESSIVE HYBRIDIZATION, by Edgar Anderson. Facsimile of the 1949 Edition. Hafner Publ. Co., 31 E. 10th St., New York, N. Y. 10003. 1968. Pp. ix + 109. Illus. $5.50. The reprinting of this stimulating book on introgressive hybridization, the repeated back-crossing of hybrids to one or both parents, by an outstanding authority, will be welcomed. It is concerned with such hybridization in the field under natural conditions, particularly with how the effects of hybridization can best be measured in natural populations. Highly recommended to all plant scientists.

AMERICAN BOTANY, 1873-1892, by Andrew Denny Rogers III. Facsimile of the 1944 Edition. Hafner Publ. Co., 31 E. 10th St., New York, N. Y. 10003. 1968. Pp. 340. Illus. $8.75. Subtitled, "Decades of Transition", this book provides an historical perspective for an important period in the development of American Botany. The account begins with the work of Asa Gray; and then follows consideration of Government surveys and explorations, including paleobotany, and explorations in North America; morphology; paleobotany and the coal floras; Englemann's work; agricul-

tural experimentation, the Greene-Gray controversy; Mexican, Central, and South American explorations; Gray's last years, and the beginning of the new era in North American botany. Required reading for all interested in plant science.

ARBUSTUM AMERICANUM, by Humphrey Marshall. Facsimile of the 1785 Edition; and CATALOGUE ALPHABETIQUE DES ARBRES ET ARBRISSEAUX, by Humphrey Marshall (French translation). Facsimile of the 1788 Edition. Hafner Publ. Co., 31 E. 10th St., New York, N. Y. 10003. 1968. Pp. xii + 174; xxiii + 278. Illus. $20.00. This is the first book on American trees—"the American Grove"—published in the colonies. The facsimile edition of the English text and the translation into French are preceded by an introduction by Joseph Ewan. The text was written by the nurseryman, Humphrey Marshall, who established the second botanic garden in the colonies. This is an important work since many tree species were described in it for the first time, based on living plants. Up to now, the work has only been known as a rare book, and we are indebted to Dr. Ewan and the Hafner Publ. Co., for this fine facsimile reprint which makes it available to all plant scientists. It is highly recommended to all interested in plant science.

FLORULA LUDOVICIANA, by C. S. Rafinesque. Facsimile of the 1817 edition, with an introduction by Joseph Ewan. Hafner Publ. Co., 31 E. 10th St., New York, N. Y. 10003. 1968. Pp. xl + 178. $12.50. The controversial book is subtitled, "A Flora of the State of Louisiana; translated, revised, and improved from the French of C. C. Robin". It was composed by the eccentric Rafinesque, who never visited the State and "who rashly equated the running text of C. C. Robin's catalog into a systematic account." Effectively suppressed by Asa Gray and his colleagues, this book was almost unknown to plant scientists. Now, thanks to Dr. Ewan, who has contributed an adequate introduction, and the Hafner Publ. Co., who produced this fine facsimile edition, it is now made available to all students of systematic biology for critical study.

THALASSIOPHYTA AND THE SUBAERIAL TRANSMIGRATION, by A. H. Church. Facsimile of the 1919 Edition. Hafner Publ. Co., 31 E. 10th St., New York, N. Y. 10003. 1968. Pp. 95. Illus. $4.00. This reprint of Church's stimulating views on the evolution of land plants will be welcomed by the new generation of plant scientists who have not had the opportunity of obtaining the original edition. Highly recommended to all interested in evolutionary biology.

ON THE INTERPRETATION OF PHENOMENA OF PHYLLOTAXIS, by A. H. Church. Facsimile of the 1920 Edition. Hafner Publ. Co., 31 E. 10th St., New York, N. Y. 10003. 1968. Pp. 58 + 16. Illus. $3.50. This facsimile of the 1920 edition will be welcome since it has long been out of print. In it the essential theory behind phyllotaxis is explained according to Church. It deals with the causes of leaf origin, the meaning of the term, "leaf"—extension of a plant soma, its phylogeny and secondary adaptation. Highly recommended to all plant scientists.

SWARTZIA (LEGUMINOSAE, CASEALPINIOIDEAE, SWARTZIEAE), by Richard S. Cowan. Monograph No. 1. Flora Neotropica. Hafner Publ. Co., 31 E. 10th St., New York, N. Y. 10003. 1968. Pp. 228. Illus. This represents a thorough study of the American species of the genus **Swartzia,** with 127 species in Tropical America. After a brief consideration of the history of the genus, the morphology, phylogeny and distribution, generic diagnosis, and keys to subgeneric groups and species, the individual species are described in detail. Highly recommended to all interested in the flora of Tropical America.

PLANT PROPAGATION, by Hudson T. Hartmenn and Dale E. Kester. 2nd Edition. Prentice-Hall, Inc., Englewood Cliffs, N. J. 07632. 1968. Pp. x + 702. Illus. $14.00. Subtitled, "Principles and Practices", this second edition, revised and un-dated encyclopedic work on plant propagation for amateur and professional horticulturists will be welcomed. The five sections

are devoted to general aspects of propagation; sexual and asexual reproduction; special methods of propagation; and propagation of selected plants. Although the coverage is wide, the extensive literature on bulb-cuttage (for survey see Traub—"The Amaryllis Manual, 1958; Herbertia 1934-1949) is omitted. Such minor defects can easily be remedied, and this outstanding cyclopedia on plant propagation is highly recommended to all horticulturists.

PLANT PATENTS; WITH COMMON NAMES, 1967 SUPPLEMENT, 2699 THROUGH 2783. Publ. by the American Association of Nurserymen, 835 Southern Bldg., Washington, D. C. 20005. 1968. Pp. 7. $0.50. This is a supplement to the listings of plant patents granted in 1967. The subject matter is arranged under three parts: I. Numerical Listings, II. Alphabetical Listings under common names, and III. Alphabetical Listing of names and addresses of originators or discoverers and assignees.

MANUAL OF WAYSIDE PLANTS OF HAWAII, by Willis T. Pope. Charles E. Tuttle Co., Rutland, Vt. 05701. 1968. Pp. 289. Illus. $6.00. Most of the Hawaiian "wayside plants" have been introduced from other regions. These include "smaller plants that may ordinarily gain attention in the fields, waste-lands and along road-sides . . . which persist without intentional human assistance." These are considered under the color of flower key; poisonous and medicinal plants; weeds and their control, and an extensive descriptive catalog of plants with illustrations arranged under plant families. Recommended to all who are interested in the flora of Hawaii.

POISONOUS PLANTS OF HAWAII, by Harry L. Arnold. Charles E. Tuttle Co., Rutland, Vt. 1968. Pp. 69. Illus. $2.50. Most of the more than 90 poisonous plants of Hawaii discussed in this book have been introduced from other regions. First the common and dangerous plants of Hawaii are grouped on the basis of allergic reactions, and mushroom-like fungi. This is followed by a detailed catalog of poisonous plants with illustrations. Recommended to all residents of, and visitors to, the Hawaiian Islands, and to students of poisonous plants.

HAWAIIAN FLOWERS & FLOWERING TREES, by Loraine E. Kuck and Richard C. Tongg. Charles E. Tuttle Co., Rutland, Vt. 05701. Popular edition, 7th printing 1967. Pp. vii + 158. Illus. $2.95. Subtitled "A Guide to Tropical & Semi-tropical Flora", this attractive book will be welcomed. The many flowering herbs and trees that appear in the Hawaiian floral pageant have been introduced from various regions of the world, and these are profusely illustrated in color in the descriptive catalog. In each case the common and scientific names, place of origin, plant description, notes on habitat, flowering season, and other details of interest are given. Highly recommended to all interested in the flora of Hawaii.

MORPHOGENESIS IN PLANTS, by C. W. Wardlaw. Barnes & Noble, 105 5th Ave., New York, N. Y. 10003. 1968. Pp. 451. Illus. $14.50. Subtitled "A Contemporary Study", this new enlarged and completely revised version of the 1952 edition, by the outstanding authority in this field, will be welcomed. It incorporates the notable contributions made in plant morphology since 1952, and emphasizes the integrated unity of the individual organism. This sets it apart from other texts. This is required reading for all interested in plant science.

PLANT VIRUSES, 4th Edition, by Kenneth M. Smith. Barnes & Noble, 105 5th Ave., New York, N. Y. 10003. 1968. Pp. ix + 166. Illus. $5.00. This completely rewritten, and expanded new 4th edition of an outstanding text fills a definite need. After characterizing viruses, chapters are devoted to symptomology of virus-infected plants; physiology of plant virus diseases; isolation of plant viruses; morphology and ultrastructure and chemistry of viruses; transmission by vectors and other than vectors; quantitative assay and serology of plant viruses; tissue- and cell-culture of plant viruses; indicator plants; and nomenclature and classification. The subject is presented in a concise and easily readable manner, and is highly recommended to all interested in plant viruses.

ESSAYS ON FORM IN PLANTS, by C. W. Wardlaw. Barnes & Noble, 105 5th Ave., New York, N. Y. 10003. 1968. Pp. xiv + 399. Illus. $8.75.

This volume includes various essays published previously by the author on the subject of form in plants. In Part 1, the history of plant morphology is detailed, including the author's outlook on the subject. Part 2 is concerned with discussions on the unification of botanical science; and Part 3, is devoted to perspectives in morphogenesis. These stimulating essays are highly recommended to all interested in plant science.

SUPPLEMENT (1961—1965); CHECK LIST OF PLANT AND SOIL NEMATODES, by Armen C. Tarjan. University of Florida Press, 15 N.W. 15th St., Gainesville, Fla. 1967. Pp. xiii + 115. $6.00. This book supplements the original "Check List of Plant and Soil Nematodes" (1960), and brings the subject up-to-date, from 1961 through 1965. The changes and additions to species names validly proposed under the Int. Rules of Zoological Nomenclature are listed chronologically. This book is indispensable to all interested in nematology.

THE PRESERVATION OF NATURAL HISTORY SPECIMENS, edited by Reginald Wagstaffe and J. H. Fidler. Volume II. 1968. Philosophical Library, 15 E. 40th St., New York, N. Y. 10016. 1968. Illus. Pp. xv + 404. $17.50. This work includes sections on the preservation of fishes, amphibians, reptiles, birds and mammals as well as botanical and geological material. In addition, special sections deal with casting reptiles, amphibians, whales, and the modeling and casting of relief maps. Vol. I (Part 1), previously published, covers the invertebrates. Vol. II, under review here, is in three parts: Part 2. Zoology, vertebrates; Part 3, Botany and Part 3, Geology. This is a required reference work for all naturalists, professional and amateur.

PAPERS ON PLANT SYSTEMATICS, edited by Robert Ornduff. Little, Brown & Co., 34 Beacon St., Boston, Mass. 02106. 1967. Pp. x + 429. Illus. paper cover, $6.00. The editor is to be congratulated on a happy choice of research papers pertinent to plant systematics. About half of these papers have appeared since 1960, and all but four were published since 1950. They are grouped under I, anatomy and morphology; II, cytology, embryology and genetics, III, biochemical systematics, and IV, field and garden studies. Indispensable for all interested in plant systematics.

PAPERS ON PLANT GROWTH AND DEVELOPMENT, edited by W. M. Laetsch & R. E. Cleland. Little, Brown & Co., 34 Beacon St., Boston, Mass. 02106. 1967. Pp. x + 479. Illus. $6.00. The reprinting of these research papers by outstanding authorities is timely, in response to the attention being given to developmental problems in plant physiology. The papers are grouped under: I, natural plant growth regulators; II, control of growth in intact systems by growth regulators; III, correlative control of growth; IV, role of light in plant growth; V, control of growth in isolated organs; VI, control of differentiation; VII, experimental control of form, and VIII, mechanism of growth regulator action. Highly recommended to all interested in plant physiology.

CELL FUNCTION, by L. L. Langley. 2nd Edition. Reinhold Book Corp., 430 Park Ave., N. Y. 10022. 1968. Pp. xiii + 364. Illus. $10.00. This thoroughly revised edition of an outstanding text on intracellular activities will be welcomed. The topics discussed include size and organization of the cell; biostatistics; gas laws, the liquid state and solution; electricity; methodology; protoplasm and cell membrane; metabolism, basic principles and reactions; mitochrondria; lysosomes; electrical activity; movement, reproduction; growth and decline. Highly recommended to all interested in physiology.

PLANT LIFE LIBRARY—continued on page 4.

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

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[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, by Hamilton P. Traub. This is the first outline text for the undergraduate student on the grouping of organisms into lineages. The text is divided into four parts: (a) the history of lineagics and lineagics as an integrated science; (b) basic lineagics, principles and procedures; (c) applied lineagics, principles and procedures; and (d) research methods in lineagics. Recommended for the student in biology. Publ. 1964. 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.

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