

PLANT LIFE

1963

AMARYLLIS
YEAR BOOK

*Dedicated to
Michel Adanson
1723-1806*

*Founder of
Theoretical
Systematics;*

*Father
of the
Amaryllis
Family
and
other plant
families*



*1963
Adanson
Bicentenary
commemorating
Familles des Plantes
1723-64*

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THE AMERICAN PLANT LIFE SOCIETY

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[i]

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CORRIGENDA

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- Page iii, 3rd line, in heading "PLANT LIFE, VOLUME 18, etc.", change "1961" to "1962".
- Page iv, In heading, "PLANT LIFE VOLUME 18, etc.", change "1961" to "1962".
- Page 9, 18th line from top is misplaced; it should be indicated as the first line of text under "South African Travels, 1960".
- Page 13, 20th line from top, change "Sept. 28" to "Sept. 22".
- Page 59, Under "V. MEXICANA ALLIANCE," 3rd line, change "It" to "The species".
- Page 62, under 14a, 3rd line, change "long" to "wide".
- Page 66, 18th and 19th lines from top, indicate that "nel-shaped, margins erect" is to follow 20th line, "Cup 2.2 cm. long, fun-".
- Page 67, under 40a, 1st line, change "cm." to "mm.".
under 40b, 2nd line, change "cm" to "mm."

1962 SUPPLEMENT—THE PHYLA OF ORGANISMS

- Page 7, Table 2, heading of table, change "Heterplantae" to "Heperoplantae".
- Page 9, 17th line from bottom, change "was" to "is".
- Page 14, 6th line from top, change "millenia" to "millennia".
- Page 17, footnote, 4th line, change "movemest" to "movement".
- Page 18, 19th line from top, change "object" to "objective".
- Page 29, 1st line of text, change "1880" to "1888".
- Page 32, 5th paragraph, 2nd line, change "maintain" to "maintains".
20th line, change "are" to "is".
- Page 34, under "KINGDOM III. ANIMALIA":
6th line, change "subkingdom" to "subkingdoms".
13th line, change "infraphyla: Infraphylum" to "Infracamilies: Infracfamily".
16th line, change "Infraphylum" to "Infracfamily".
- Page 35, 17th line, between "bringing" and "mouth" insert "the".
- Page 37, under Superkingdom I. Autotrophae, 3rd line, change "CO₂" to "CO₂".
under Phylum 3. Autoferrophyta, order 3, Leptothringales, Family 1, change "Leptothringescese" to "Leptothringaceae".
- Page 38, 3rd line from bottom, delete "a".
- Page 39, 4th line from bottom, delete "Leptothrix".
- Page 41, under Infrakingdom 2. "Eumetazoe" 3rd line, change "degeneration" to "degeneration".
under Phylum 28, Mesozoa, change "degerate" to "degenerate".
- Page 43, 28th line from top, change "Titis" to "Titus".

[CORRIGENDA, continued on page 160.]

PLANT LIFE, VOL. 19, NO. 1, January, 1963

AMARYLLIS YEAR BOOK 1963

Year Book of
The American Amaryllis Society
30th issue

GENERAL AMARYLLID EDITION

EDITED BY

HAMILTON P. TRAUB
HAROLD N. MOLDENKE

THE AMERICAN PLANT LIFE SOCIETY

Box 150, La Jolla, California

THE AMERICAN PLANT LIFE SOCIETY

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

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

PREFACE

The year 1963 marks the 200th anniversary of the publication of Michel Adanson's "Familles des Plantes". This event is of major significance in the development of the science of biosystematics. It is also of interest to the members of the Society because the work commemorated contains the *first description* of the amaryllids as a natural group. This subject is elaborated in an article in the present issue; in it there is also brief mention of the ADANSON BICENTENARY celebration in 1963-64.

The outstanding ADANSON BICENTENARY cover design is the work of the Artist to the Society, Prof. Penrith Goff, of the University of Chicago. He is to be congratulated on an excellent job.

It is fitting that the 1963 issue of the AMARYLLIS YEAR BOOK is dedicated to Michel Adanson, the Father of the Amaryllis Family, and also to Mr. W. D. Morton, Jr., who received the WILLIAM HERBERT MEDAL award for 1963 for his outstanding contributions toward the advancement of the amaryllids, and also to La Forest Smith Morton (1887—1955). Mr. Morton carried forward the important work started by his wife on the registration of Amaryllis clones, the elevation of the standards for judging Amaryllis, and the encouragement of the organization of local Amaryllis societies—all in collaboration with the officers of the Garden Circles Amaryllis Club, the Dallas Amaryllis Society, the Shasta Garden Club of San Antonio, Texas, the Houston Amaryllis Society, the Hattiesburg Amaryllis Society, the Mobile Amaryllis Society, the Amaryllis Forum of Mobile, the Men's Amaryllis Club of New Orleans, the Coastal Bend Amaryllis Society, and the Valdosta (Ga.) Men's Garden Club. Mr. Morton and the officers of these local Amaryllis societies are to be congratulated for their untiring devotion to this work. It was not possible to award the HERBERT MEDAL to all of these workers, but in awarding it to Mr. Morton, his wife, the late La Forest Smith Morton, and all of the workers are also honored.

Mr. Morton contributes an interesting autobiography, and Mrs. Haydel has favored us with a brief biography of Mrs. Morton.

The present issue contains biographies of Mr. Buller, the South African amaryllisarian, and Mr. Alick Percy-Lancaster, who worked with his father on the descriptions of *Gloriosa*. Mr. Sydney Percy-Lancaster writes a charming report on his journey from Rhodesia to India.

The articles on *Amaryllis* in the present issue are outstanding as usual. First of all, the important reports on the symptoms of *Amaryllis* mosaic disease by Drs. Kahn & Smith, and by Mr. Quinn Buck, are to be noted. All of us have been waiting for reports of this kind because these promise to help in eradicating this disfiguring disease. Equally important are the reports on the effects of the 1962 freeze in the lower South, and the lessons to be learned therefrom, by Mrs. Pickard, and Messrs. Perrin, Latapie, Authement and Davis. These reports are valuable as a base for future programs on overwintering amaryllids in the lower South.

Mr. Goedert's annual report on the *Amaryllis* season just passed is a feature that all members look forward to. Two new *Amaryllis* species are described—*A. starkii* Nelson & Traub, and *A. chionedyanthe* Cardenas; Mr. Fesmire writes on a longer *Amaryllis* flowering season; Mr. Boshoff-Mostert on the culture and breeding of *Amaryllis* in South Africa; Mrs. Seale on the flowering of the Boshoff-Mostert *Amaryllis*; Mrs. Tebban on the moving of her *Amaryllis* from Illinois to Florida; Mr. Beckwith D. Smith on the growing of *Amaryllis* in north Georgia; Mrs. Abendroth on the Blue *Amaryllis* in Brasil; Mr. Sudd on the use of artificial light in *Amaryllis* culture; Mr. Cloutte on seedling records and the clone 'Mrs. Garfield'; and Mrs. Williams on red leaf spot control. Mrs. Flick contributes excerpts from the *Amaryllis* Round Robin letters.

As usual, the other amaryllids are not neglected—new species of *Hymenocallis* and *Zephranthes* are described; Mrs. Shirley and Mr. Clark report on native American *Crinums*; Mr. Hannibal writes on *Crinum flaccidum*; Mr. Hunt on *Lycoris* in North Carolina; Miss Grapes on *Lycoris* in Nebraska; Mr. McNeil on *Cryptostephanus*; Dr. Flory & Mrs. Schmidhauser on the chromosomes of the Blue *Amaryllis*; Messrs. Caldwell, and Jacoway, on *Lycoris* breeding; Mrs. Anderson on breeding *Brunsvigias* and *Crinodonnas*; Dr. Joseph C. Smith on *Hymenocallis velardei*; Dr. Zorbach on amaryllids in Maryland, and Mrs. Schumann on amaryllids in Michigan. There are other interesting items, including the reports on the 1962 *Amaryllis* shows.

Contributors to the 1964 issue of THE AMARYLLIS YEAR BOOK are requested to send in their articles by August 1, 1963, 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.

December 15, 1962,
5804 Camino de la Costa,
La Jolla, California.

Hamilton P. Traub
Harold N. Moldenke

THE GENERA OF AMARYLLIDACEAE

'The Genera of Amaryllidaceae', by Hamilton P. Traub, 85 pages, 10 illustrations, \$5.00 postpaid, is now ready. This represents a great amount of time and work. It includes a short history of the *Amaryllis* Family, a chromosome atlas of the amaryllids, and other introductory matter; a key to, and descriptions of, the 97 genera and 5 bi-generic hybrids, of the Amaryllidaceae; and an index to the genera. This handy reference booklet should be within reach of all who are interested in the Amaryllids. Send orders to: Dr. Thomas W. Whitaker, Executive-Secretary, American Plant Life Society, Box 150, La Jolla, Calif.

COMMEMORATING THE PUBLICATION OF
“FAMILLES DES PLANTES”, 1763-64;
THIS BOOK IS DEDICATED TO
MICHEL ADANSON (1728-1806), FOUNDER OF
THEORETICAL SYSTEMATICS; FATHER OF
THE AMARYLLIS FAMILY;
AND TO
WILLIAM D. MORTON, JR., AND LA FOREST MORTON,
WHO RE-ESTABLISHED THE REGISTRATION OF
Amaryllis L., CULTIVAR NAMES
AFTER WORLD WAR II



Herbert Medalist—William Douglas Morton, Jr.

WILLIAM DOUGLAS MORTON, JR.

AN AUTOBIOGRAPHY

I was born on September 16, 1887, at Louisville, Kentucky, the son of William Douglas, and Rosalie Tandy, Morton, Sr. My father had acquired an interest in a lumber mill at Montague, Florida, and when I was four, we moved to Florida. My mother died when I was nine, and we moved to Ocala, Marion County, Florida, where I was educated in the public schools. My boyhood was lived in the beautiful country side of central Florida where the fascinating Silver Spring is located near Ocala. My education was later supplemented with a special course in mathematics at Morrison's School, Savannah, Georgia.

When my father sold his interest in the lumber mill in 1905, we moved to the lumber town of Cutting, Georgia, where he was general manager of a large lumber mill for the Minnesota Lumber Company. At this time, I took up the vocation of locomotive engineer, and also had the pleasure of first meeting Miss La Forest Smith of Homerville, Georgia, and we became good friends. We began to correspond since I could not visit with her often.

In 1907, I was employed by the Bailey Mfg. Company, of Waycross, Georgia, for the installation of some huge steam equipment for their mill, and while there I was fortunate enough to meet Mr. H. Cardoza Sloan, electrical engineer for a large engineering firm in Jacksonville, Florida, who, on the basis of the work performed, employed me in June 1909 as assistant sales engineer in the large repair plant.

La Forest and I continued to write to each other and on June 8, 1909, we were married. During this period, I went on a tour of duty at Alton, Florida, to supervise the repair of some large electrical equipment damaged by fire. With the completion of this work, we returned to Jacksonville, Florida, where I served as assistant sales manager for the Florida Electric Company.

At Jacksonville, Florida, we bought a home on a large lot, and this gave us an opportunity to indulge our gardening inclinations. My wife specialized in roses, and the beautifully landscaped yard became a show-place. We were blessed with two children—a boy, William Douglas III, and a girl, Rosalie La Forest.

In connection with my vocation, I transferred to Tampa, Florida, as manager of the General Electric Supply Company warehouse in May 1919. We lived in rented quarters where gardening was pursued as best as possible until August 1929, when we moved to New Orleans. Here again, we lived in a rented home for two years while looking around for a suitable location for our permanent home. When this was found, we settled down for gardening as our joint avocation, and we became interested in *Amaryllis*, a hobby that grew and grew with the years. My wife was also active in garden club work, and other activities concerned with civic improvement.

[The reader is referred to the biography of La Forest Smith Morton for the period from 1931 to 1955. See pages 11-12.—*Editor*].

After Mrs. Morton's death in 1955, the American Amaryllis Society headquarters requested me to assume direction of the registration of Amaryllis names as well as the other activities concerned with the organization of local societies, and the Official Show Standards program because I had worked intimately with Mrs. Morton on all of these matters, and they believed that I was best prepared for this important assignment initiated by Mrs. Morton and which was so dear to her.

It was necessary to continue and perfect the standards of judging Amaryllis so that these standards could again be raised to the highest level possible, and also to organize the various Official Amaryllis Judges Instructor sections which were to function under the National Amaryllis Judges Council. Mrs. B. E. Seale of the Dallas (Texas) Amaryllis Society became the Chairman of the Council, and I have functioned as the Registrar of Amaryllis Names, and Secretary of the Council. The forms for teaching Amaryllis judging were gradually improved through the cooperation of Mrs. B. E. Seale, Mrs. A. C. Pickard, Mrs. H. J. Haydel, Mr. Robert E. Parker, Jr., and others, with the approval of National Headquarters.

The first examination for the Amaryllis Judges Certificate since the last war was taken by Mrs. Morton. Having passed the examination, Certificate No. 1 was issued to her, and she was appointed the first Official Amaryllis Judging Instructor, and by 1955, sixteen additional candidates passed the examination and received certificates. Up to the present 117 Certificates have been issued, and it is planned to give refresher courses at convenient intervals of years so that judges may be kept informed about new developments. Up to the present, the number of Official Instructors has increased to seven.

The registration of hybrid Amaryllis clones proved to be a difficult problem. By 1955, Mrs. Isabelle Parker, of Biloxi, Miss., had registered the hybrid Amaryllis clone 'Faith', and the Dutch Amaryllis breeders expressed an interest in registering their clones, but before this could be followed up, the Captain was taken away. The response of the Amaryllis breeders has been notable. They realized that it is necessary to register names first of all to obtain priority to the names, and secondly to avoid duplication of names. The result of the registration of names has been that the quality of the product has been standardized. With the correct descriptions available for the clones, the buyer has a bill of specifications and thus the dealer is not apt to substitute an inferior product. I am happy to report that the cooperation of the breeders and dealers has now been obtained, including Ludwig & Co., Van Meeuwen & Sons, W. Warmenhoven & Zonen, W. S. Warmenhoven, C. Warmenhoven, Van Waveren & Sons, Harry de Leeuw Co., Mr. Boshoff-Mostert, and breeders and growers generally, including the members of the Society who breed Amaryllis. In 1956 Ludwig & Co. appropriately registered an outstanding hybrid Amaryllis clone, 'La Forest Morton'. By 1958, ten breeders had registered clones. In 1959,

five and a half closely printed pages of registered hybrid Amaryllis clones appeared in the Amaryllis Year Book. By 1963, there are 34 active Amaryllis breeders who have registered clones since world war II.

By 1955, in addition to the Garden Circle of New Orleans, three additional local societies interested in Amaryllis had affiliated with the American Amaryllis Society—the New Orleans Amaryllis and Bulb Society, the Shasta Garden Club of San Antonio, Texas, and the Dallas Amaryllis Society. Since 1955, eight additional local societies interested in Amaryllis have affiliated with the National Society—the Amaryllis Society of Mobile, The Houston Amaryllis Society, The Hattiesburg (Miss.) Amaryllis Society, The Men's Amaryllis Club of New Orleans, The Coastal Bend Amaryllis Society, The Men's Garden Club of Valdosta, Ga., and The Greater Houston Amaryllis Club. A local Society is being organized in the Palestine, Texas, area.

There is still work to be done. A catalog of named clones has to be prepared, new named clones have to be registered, the standards for judging Amaryllis have to be kept high, additional local Amaryllis societies have to be organized, and breeders are to be encouraged to breed excellent new clones to edify the tastes of the Amaryllis enthusiasts. However, the work is past the pioneer stage from the slump due to the last war, and the energy can be devoted to conserve the gains and to make additional progress where possible.

Mention should also be made of the wonderful cooperation of Messrs. Robert D. Goedert, Mr. Claude E. Davis, Mrs. H. J. Haydel, and Mrs. A. C. Pickard in assisting with the description of the named Amaryllis clones. Particular credit should go to Mr. Edward F. Authement, who has recently assumed the post of Assistant Registrar, and who is doing an excellent job in helping to extend the goals already reached.

LA FOREST SMITH MORTON, 1887-1955

A BIOGRAPHICAL SKETCH

La Forest Smith, daughter of William Thomas, and Annie Shaw, Smith, was born May 12, 1887, at Valdosta, Georgia. She graduated from the local high school. Her father owned a large parcel of land near the City of Homerville, Georgia, where he built a home and where La Forest was able to indulge her early fondness for flowers. Her mother specialized in roses and she followed in her mother's footsteps for some time. Mr. Smith had some very fine pine timber on his property, and Mr. W. D. Morton, Sr., who was general manager of a large lumber mill at Cutting, Georgia, contracted to buy the lumber for the mill. It was through him that she first met his daughter, Ethel Morton, and in turn became acquainted with Ethel's brother, Mr. W. D. Morton, Jr., her future husband.

[See autobiography of W. D. Morton, Jr., page 7 in the present volume for account of her marriage and life with him until both specialized in Amaryllis at New Orleans beginning in 1931.—*Editor*].



Fig. 2. La Forest Smith Morton in 1954. Photo courtesy The Times-Picayune Publ. Co., New Orleans.

At New Orleans, beginning in 1931, Mrs. Morton purchased many named clones of Hybrid Amaryllis, and she had wonderful success with them. The second world war intervened. After the war she found that the various Holland growers had duplications of names, and sometimes even included bulbs not true to name. All of this was quite confusing as no great dependence could be placed in buying named Amaryllis clones—they varied in color, size and so on. Mrs. Morton visited many Amaryllis growers in New Orleans and they too were confused about the unreliable named clones. She decided that something had to be done about it, but it was a question as to how to proceed. In the 1940's she wrote to Dr. Hamilton P. Traub, Editor, American Amaryllis Society which is affiliated with the American Plant Life Society, about the problem. He explained that before the war, Amaryllis clones were marketed in the United States by American breeders, who registered their clones, but this was stopped by the war. The market was confined to American clones due to the quarantine which greatly restricted the importation of bulbs from abroad. He explained that by registration the duplications were weeded out. Unfortunately, those who were active in this work before the war had either passed to their rewards, or if living, did not go back into it after the war. He suggested that Mrs. Morton assume the position of Registrar of Amaryllis clones, a post that had been vacant since the death of Prof. Ballard. She accepted this responsibility and although progress was slow at first, she persevered and as time went on success was in sight.

As one aspect of this work, Mrs. Morton, with the cooperation of the Garden Circle of New Orleans, staged the first local Official Amaryllis Show after the second world war at New Orleans in 1949 (see *Plant Life* 5: 49, 1949). The shows increased in size and quality each year, but it soon became apparent that something had to be done to standardize the methods of judging Amaryllis. Here again, those who had started this work before the war, as far back as 1934, did not return to it after the war. It was necessary to start all over again. Mrs. Morton, and the Garden Circle members, took up the matter with Dr. Traub at National headquarters, who suggested that Official examinations for the Amaryllis Judges Certificate, which had lapsed since the beginning of the late war, should be reinstated. He assisted in making out the first examination questions, and classes were offered under the auspices of the Garden Circle to all interested Amaryllis enthusiasts. In this way the Official Amaryllis Judges Certificate was revived with the cooperation of the Garden Circle. Later, Mrs. B. E. Seale, of the Dallas Amaryllis Society, and other local Amaryllis Societies assisted in this important work. Soon all Official Amaryllis Shows were judged by accredited judges, and the public was well pleased. There were some slight objections from a few who wanted to lower the standards for the shows, but when the arguments in favor of having only the very highest goals for all Official shows was presented to them, all eventually favored upholding the highest possible standards.

Then, suddenly, the Captain was taken away—Mrs. Morton un-

expectedly died on October 28, 1955. Mr. & Mrs. Morton had worked closely together on *Amaryllis*, and he had helped her whenever possible. It was natural that he should be called upon to continue the work now well started that he knew intimately and should carry it to a successful conclusion. On request from National Headquarters, he shouldered this responsibility in cooperation with the Garden Circle, the Men's *Amaryllis* Club of New Orleans, and other local *Amaryllis* societies.

[For the continuation of the account of this work see Mr. Morton's autobiography on pages 8-9 of the present volume.—*Editor*].

It should be noted for the record, that Mrs. Morton was the President for four years of the Garden Circle which is now entitled Garden Circles *Amaryllis* Club.

It required a sizable cabinet to house the many trophies received by Mrs. Morton (see *Plant Life* 11 : 15, fig. 1. 1956). She received cups for being the most outstanding member of the Garden Circle for the years 1953, 1954 and 1955. She received a cup when she was voted Life Honorary President of the Garden Circle. She received two gold keys to the City of New Orleans for her work toward founding the New Orleans municipal *Amaryllis* Garden, and for outstanding work toward beautifying the City of New Orleans, and for staging outstanding annual Official *Amaryllis* Shows since 1949. The many other awards in her cabinet of trophies were received for outstanding exhibits at the annual Official *Amaryllis* Shows. —*Mrs. A. J. Haydel.*

MICHEL ADANSON (1728-1806), FATHER OF THE AMARYLLIS FAMILY

HAMILTON P. TRAUB

The *amaryllids* as a distinct diagnosed, named and validly published systematic group can be traced back exactly two centuries—to 1763.

Previous to 1763, systematic groups below the rank of family—genera and species—had been named, described and validly published. Gaspard Bauhin (1560-1624) was among the first to recognize the distinction between species and genera. He is credited with first adequately describing species (Bauhin, 1623). He indicated the genera but did not describe them. Later, Tournefort (1656-1708), and John Ray (1627-1705) adequately described genera (Tournefort, 1700; Ray, 1686-1704).

Systematic groups above the generic level were indicated and named prior to 1763, but no attempt was made to describe or diagnose them. Pierre Magnol (1638-1715) pioneered in enunciating the concept of the "famille" stating that "plants have certain affinity which does not exist in any part considered separately but as a whole." He did not characterize any families. Linnaeus (1707-1778) toyed with the idea of grouping plants into natural groups above the generic level (Linnaeus, 1740, 1751). He grouped plants into orders that were equivalent to present day families, *but he never diagnosed or described* his orders.

Unfortunately, Linnaeus was satisfied with his static artificial sexual system (Linnaeus, 1753), for his day, in which the genera were grouped artificially on the basis of one or a few sexual characters. In this he took a backward step, and he was lost in this blind alley for the remainder of his life.

Thus matters stood in 1763, when Michel Adanson, the noted philosopher, scientist, encyclopedist, and father of theoretical systematics (see Traub, 1962), published the second volume of his "Familles des Plantes" (Adanson, 1763-64), ten years after Linnaeus had published his artificial system. In "Familles des Plantes" Adanson applied his multivariate principle—considering all of the characters on an equal basis—to the classification of the plants known to him, on the familial level. This revealed 58 natural families which he named and *adequately described* for the first time.*

Adanson ranks among the great biologists of all time. He was so far ahead of his time that his work was not fully understood until the lapse of two centuries when Sneath used the Adansonian multivariate principle in classifying bacteria, including the use of electronic computers (Sneath, 1957a; 1957b). At the time when Linnaeus (1753) championed the artificial method of classifying plants, Adanson had the genius to see that this was in fact a dead-end street, and he had the courage to say so, and to do something about it. This however cost him dearly. For a considerable time systematics fell into the hands of the nomenclaturists who set up petty rules for naming plants. They believed that the tool—the binomial method of naming plants first consistently used by Linnaeus (1753)—was all important. If the work of an original thinker did not meet the petty requirements of their rules, his systematic groups were outlawed. Thus it happened that Adanson's original work was left unrecognized as a contribution of importance until two centuries later when the celebration of the bicentenary of the publication of Adanson's "Familles des Plantes" serves to reveal to the world the rightful place of Michel Adanson in the history of science (see Traub, 1962).

One of the families described by Adanson in 1763 is *Liliaceae* Adans.** under which he recognized and described several subgroups (sections) which are equivalent to present day subfamilies. One of these subfamilies is Section *Narcissi* (=subfamily *Narcissoideae* Adans.**). This represents the first description of the group we now recognize as the amaryllids.

A translation of the description of subfamily *Narcissoideae* Adans., from the French of Adanson (Familles des Plantes, 1763, pp 55-56) is

* A year after Adanson described families for the first time, Linnaeus (1764) repeated himself in publishing a revised grouping of genera under natural orders, **again without descriptions**. He never graduated above this stage.

** The endings are in accordance with Art. 18, Int. Code (Lanjouw, et al., 1961).

given below. This includes also Table 1, a list of the 12 genera included, and with brief tabulation of descriptive data.

DIAGNOSIS (Description) of
Subfamily Narcissoideae Adans. (Narcissi)¹ family
Liliaceae Adans.

Only *Hemerocallis*, *Agave* and *Pothos* [= *Polianthes* L.] have fibrous or tuberous roots; the others produce a bulb, formed of entire tunics which envelop each other.

Mostly the leaves, although alternate in emerging from the bulb, diverge on two opposite sides so that they face each other. They have their origin in the sheath which is split only in *Hemerocallis*, *Agave* and the tuberose [*Polianthes* L.] which is the *Pothos* of Theophrastus. When broken, one can see within (the leaves), except in *Agave*, *Pothos* [= *Polianthes* L.], *Atamasco* [= *Zephyranthes* Herb.], *Nivaria* [= *Leucojum* L.] and *Hypoxis*, especially when dry, that they are composed of a great number of threads which resemble extremely fine silk, and are as white as snow. These [threads] can be distinguished at a glance. One can observe these [threads] also, but a great deal less, in some species of *Ornithogalum*. The threads are like spiral spring tracheae.

Their flowers are arranged in the form of a spike, a panicle or an umbel. Those which have a spike or a panicle, are each subtended by one bract; those which have an umbel are enclosed in a spathe composed of one to six valves or parts. Besides this one can see within the umbel as many bracteoles as there are flowers. In the case of the spike of *Pothos* [= *Polianthes* L.], the flowers are arranged in pairs, subtended by a common bract, which are again each accompanied by a very small bracteole.

Their perianth is united [below]; it is regular or irregular, and is situated on top of the ovary which it envelops, making up part of this organ. It makes up to one-half, or in *Hemerocallis* and *Pothos* [= *Polianthes* L.], up to two-thirds, of the ovary. It [the perigone] appears to be composed of six distinct segments [not united below] in *Acrocorion* [= *Leucojum* L.] and *Hypoxis*. Sometimes it is double inside of this process (the perigone), where a second tube develops which is known as the nectary [= paraperigone], which has the appearance of a perigone, and which accompanies the fruit to maturity [Adanson here refers to the "cup" in *Narcissus*].

They have six stamens attached at the apex of the perigone-tube [= tepaltube] or the nectary [the staminal cup in *Pancretium*], but always in such a manner that they are opposite each of its divisions.

All have only one cylindrical or conical stigma, not distinct from the style, except *Pothos* [= *Polianthes* L.] which has three medium ones.

Gethyllis, which I am naming *Abapus*, because the name *Gethyllis* has been applied to the leek by Theophrastus, undoubtedly belongs to the section [subfamily] *Narcissi* [= *Narcissoideae*]¹ as shown by its spathe, the location of its stamens and by the position of the perigone on the ovary. Of the twelve stamens attributed to it, six apparently are on the nectary as six teeth or threads, placed below the others, in a second rank as in *Pancretium*. This then conforms to all of the botanical knowledge available on the subject of this African plant until we have a more exact description.

Thus the amaryllids as a natural group were definitely characterized by Adanson in 1763. However, A. L. de Jussieu (1748-1836) who was not intellectually honest, and for the rest of his life did all in his power to downgrade the achievements of Adanson, appropriated the plant families of Adanson and included them in his "Genera Plantarum" (Jussieu, 1789) without giving due credit to the source (see Chevalier (1934), Glass (1959), Traub, (1962). Jussieu increased the

¹ Ending according to Art. 18, Int. Code (Lanjouw, et al., 1961).

TABLE 1. List of genera with brief diagnoses included in subfamily **Narcissoideae** Adans.¹ (Sect. *Narcissi*) of family **Liliaceae** Adans., according to Adanson (1763). Translated from page 57, "Familles des Plantes," 1763.

Adanson in most cases cited earlier authorities than the one listed in the footnotes—1763—for his generic names. The starting point of nomenclature was arbitrarily set at 1753 in the International Code in the 19th century.

	Roots	Leaves	Inflorescence	Spathe	Perigone
Hemecrocallis L.	fibrous	opposite	panicle	1 bract under each flower	tube short ²
Agave L.	ditto	radial	ditto	ditto	ditto
Pothos Adans. ³	tuberous fleshy	ditto	spike	ditto	tube medium
Hypoxis L.	bulb	ditto	ditto	ditto	tube absent
Acrocorion Adans. ⁴	ditto	opposite	one or several per umbel	1-valved	ditto
Tanghekolli Adans. ⁵	ditto	radial	ditto	2-valved	tube long
Haemanthus L.	ditto	opposite	ditto	6-valved	ditto
Atamasco Adans. ⁶	ditto	ditto	ditto	2- to 3-valved ^{6a}	tube short
Amaryllis L.	ditto	ditto	ditto	2-valved	ditto, scales alternate with segments
Narcissus L.	ditto	ditto	ditto	1-valved	tube long; cup entire ⁷
Paneratium L.	ditto	ditto	ditto	1-valved ⁸	ditto; staminal cup of 12 parts ⁹
Abapus Adans. ¹⁰	—	—	—	1-valved	ditto; nectary of 6 parts ¹¹

¹ Ending of subfamily name according to Int. Code (Lanjouw, et al., 1961).

² 'tube' refers to 'tepaltube' formed by the union of the tepals for part of their length below.

³ **Pothos** Adans., 1763, non L. 1753=**Polianthes** L.

⁴ **Acrocorion** Adans. 1763=**Leucojum** L. 1753. In the text Adanson uses "Nivaria Heist." (1748), which is superceded by **Nivaria** Medic. 1790. Both are synonyms of **Leucojum** L.

⁵ **Tanghekolli** Adans. 1763=**Crinum** L. 1753.

⁶ **Atamasco** Adans. 1763=**Zephyranthes** Herb. 1821, nom. conserv.

^{6a} Apparently "2-valved" refers to the 2 free tips above the tubular base; and "3-valved" refers to other species included which are now excluded from the genus **Zephyranthes**.

⁷ 'cup entire' refers to the paraperigone or cup in **Narcissus**.

⁸ Evidently a typographical error. Spathe is 2-valved. If he intended "1-valved" then 'ditto' would have been used consistent with rest of table.

⁹ The figure '12' apparently is a typographical error since this fits under **Abapus** below as shown by the discussion under Adanson's diagnosis. See also under (11) below.

¹⁰ **Abapus** Adans. 1763=**Gethyllis** L. 1753.

¹¹ The figure '6' apparently is a typographical error since this fits under **Paneratium** above as shown by the discussion under Adanson's diagnosis. See also under (9) above.

number of plant families to 100. In the case of the amaryllids, he raised Adanson's subfamily *Narcissoideae* to familial rank, again without giving due credit. A summary of the family *Narcissaceae* (Adans.) Jussieu is given in Table 2, below :

It should be noted that six genera—*Bulbocodium*, *Tulbaghia*, *Galanthus*, *Pontederia*, *Alstroemeria*, and *Tacca*—were added, and two genera—*Agave* and *Atamasco*—admitted by Adanson, were omitted. This leaves a net total of 16 genera.

In the latter half of the 18th and early 19th centuries, the rule of priority was recognized and was usually followed as a gentleman's responsibility, but there were sometimes serious breaches in its observance. Thus, Jaume St.-Hilaire adopted the family *Narcissaceae*

Table 2. Family *Narcissaceae* according to A. L. de Jussieu, 1789

	I. Ovary superior	
Gethyllis L. ¹	Hemeroallis L.	Tulbaghia L.
Bulbocodium L. ²	Crinum L. ³	
	II. Ovary inferior	
Haemanthus L.	Pancratium L.	Leucojum L.
Amaryllis L.	Narcissus L.	Galanthus L.
	III. Genera <i>Narcissis</i> non omnino affins ⁴	
Hypoxis L.	Polianthes L.	
Pontederia L.	Alstroemeria L.	Tacca Rumph.

¹ Incorrectly placed, ovary is inferior.² Now included in the *Liliaceae*.³ Incorrectly placed, ovary is inferior.⁴ These genera are now excluded from the amaryllids.

(Adans.) Jussieu in his "Familles Naturelles" in 1805, but quixotically changed the name to family *Amaryllidaceae* Jaume St.-Hilaire (ordo *Amarylleae*), as shown in Table 3, below:

Table 3. Family *Amaryllidaceae* according to Jaume St.-Hilaire, 1805.

	I. Ovary Superior	
Gethyllis L. ¹	Hemeroallis L.	Tulbaghia L.
Milla Cav.	Crinum L. ²	
Bulbocodium L. ³	Agapanthus L'Herit.	
	II. Ovary inferior	
Haemanthus L.	Narcissus L.	Galanthus L.
Amaryllis L.	Eustephia Cav.	
Pancratium L.	Leucojum L.	
	III. Genera qui ont de l'affinité avec les Amaryllidées ⁴	
Hypoxis L.	Pontederia L.	Tacca Rumph.
Leptanthus Mich.	Polianthes L.	
Heteranthera R. & Pav.	Alstroemeria L.	

¹ Incorrectly placed, ovary inferior.² Incorrectly placed, ovary inferior.³ Now included in the *Liliaceae*.⁴ These genera are now excluded from the amaryllids.

It should be noted that five genera—*Milla*, *Agapanthus*, *Eustephia*, *Leptanthus* and *Heteranthera*—are added to those recognized by Jussieu (1789), giving a total of 21 genera.

The lead of Jaume St.-Hilaire was followed by most later workers with the amaryllids. This led to the legalistic adoption of the present name—*Amaryllidaceae*. The nomenclatural Code is peculiar. If a sin is condoned by others and emulated over a period, then the sin becomes a virtue and the illegitimate name is recognized as the acceptable one. This is the reason that the family name *Narcissaceae* (Adans.) Jussieu, a name that goes back to Adanson's subfamily has been replaced with *Amaryllidaceae* Jaume St.-Hilaire. Although the name of the family has been quixotically changed, it is still the same group first described by Adanson in 1763, and does not detract from the genius of the man who first recognized and described it. Thus Adanson is in fact the Father of the Amaryllis Family.

For the later history of the Amaryllis family from 1805 to the present time, the reader is referred to Traub (1963)—"The Genera of Amaryllidaceae."

As indicated above, Adanson was the first to describe plant families (see Traub, 1962), and the Amaryllis family is only one out of a total of 58 which he first described. It is planned to cover these additional families in a separate article later.

We are indebted to Prof. Goff of the University of Chicago for the fine Adanson Memorial Cover of this 1963 Amaryllis Year Book. The reader should also note the World-wide celebration of the Adanson Bicentenary in 1963-64 to commemorate the publication of "Familles des Plantes" in 1763-64. The main symposium is to be held at the Hunt Library, Carnegie Institute at Pittsburgh, Penna., Aug. 18-19, 1963. Those planning to attend should write directly to Dr. Lawrence at the Hunt Library.

Memorial volumes will be published giving evidence to establish the honored place that Michel Adanson holds in the history of science.

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JOURNEY FROM RHODESIA TO INDIA, 1961

SYDNEY PERCY-LANCASTER,

National Botanic Gardens, Lucknow, India

I left Salisbury on the 16th October, missing the glorious avenues of *Jacaranda* that were just coming into bloom. *Bauhinia* had just finished its first flush and *Spathodia* and *Delonix* were in bud. *Schizoloboum excelsum*, with huge spikes of yellow flowers surmounting a tall scarred trunk, had also reached a flowering stage. The journey down to Beira, in Mozambique, where I was to catch the steamer to India, was dull as it was the end of winter. I noticed a *Sabal* like palm growing in swampy land, mature specimens were hardly more than 12 feet high.

We left Beira in cyclonic weather which delayed the steamer and we did not reach the first Port of Call, Dar-es-salaam, till 5-30 p. m., too late to contact the Government official whose office closed at 4 p. m. We left at night and reached Zanzibar next day, I went ashore to meet the District Agricultural Officer from whom I collected a *Gloriosa* called "*G. superba*" but from the dried specimen I was given with the tubers I guess it is a form of *G. carsoni*. I noticed a fine collection of uncommon palms in fruit, specimens of *Cyrtostachys lacca*, *Martinezia erosa*, *Latania commersoni*, and many others. Stepping into a restaurant for a cup of coffee I saw two lovely specimens of *Amaryllis Mrs. Garfield* in full bloom. Two new *Sansevieria* were seen but nothing in the plant line out of the ordinary.

Our next Port was Mombasa and I had lunch at the Mombasa Club with a Gardening friend who took me to the Public gardens and drove me around. I saw a copper coloured foliage shrub that was locally called "Poinsettia," it was Euphorbiaceae right enough but not Poinsettia. The next day I accompanied my friend to the Government Nursery some 12 miles out of town and did enjoy myself. There were a large number of plants new to me, some that might have grown well in Salisbury but would never grow in Lucknow. Prices I noticed were exceptionally high, Bougainvillea Mary Palmer, which by the way is a variety that I had the pleasure of naming and distributing from Calcutta years ago, was selling at 30 shillings, in Lucknow these plants are sold at the equivalent of 3 shillings. The Bougainvillea grown here were very fine but in Salisbury too there are dozens of seedlings raised by keen gardeners who name them without any registration. There were some lovely forms of Pilea, Pellionia, Episeea, Billbergia and several Araceae. Unfortunately most of the plants that I wished to obtain were not in seed and it was impossible to get a phytosanitary certificate at such short notice.

The next Port was the Seychelles and not a hundred yards from the quay I came across an *Inga*, very close to *I. dulcis* but with red arils, seeds collected however failed to give a single plant. I saw again the *Lodoicea* and was fortunate to obtain two nuts from one fruit for the National Botanic Gardens, where they have been planted in the Conservatory. I met a *Gloriosa* like *G. superba* but differing slightly in colour, also a *Maranta* (*Calathea*) similar to one we call *M. regalis* in India, but, whereas the Indian species grows no more than 3 feet high, this variety was not less than 12 feet high and 5-6 feet in diameter! Unfortunately no one knows the names of plants. An enclosed area held a dozen large tortoises, or turtles, on which children were riding. Breadfruit, Mangosteen and Nut-meg were other uncommon plants I saw.

On the 1st November I landed in Bombay and spent a couple of very busy days seeing gardens, there are some very well laid out gardens which I was fortunate to visit. Back in Lucknow I drove to the N.B.G. after an absence of three years and found many changes. What hurt me most was the empty shrubberies, the depleted Conservatory and absence of correct names. During the floods large numbers of plants died, plants in pots were moved to higher levels but those in the ground had to stay under water for 5 days. Where transplanting had taken place names were hopelessly mixed and only after *Amaryllis* and *Cooperathes* (*Zephyranthes*) have finished flowering can I tell what is missing, and which under a wrong name. Parts of this garden were under 13 feet of water—a rushing stream that carried away an avenue of trees. The highest parts of the garden had four feet of water. The collection of years from distant parts of India, some from the Far East, had been damaged with little hope of replacement. *Cannas* and *Cooperanthes* I can soon replace with hybrid seedlings but other plants will be more difficult.

I arrived in India Bombay, on the 1st November 1961 and spent

the next two days making a round of the City and suburbs, visiting gardens and parks. There was a definite improvement in the lay out of most gardens and a nursery man friend acknowledged that he was doing good business. The climate of Bombay is humid but never too hot nor too cold, it has a good rainfall and plants do remarkably well.

I journeyed on to Lucknow, 1420 kilometres away, and arrived at the commencement of winter. The climate of this part of India is dry; in the summer our temperatures go to 112 degrees as a rule, sometimes a bit higher. Winter temperatures are in the region of 40 degrees but this year we had a cold snap and registered 30 degrees, needless to say plants suffered heavily and even dwarf trees died, *Cordia sebestena* for instance. After a wash I left my quarters for a walk round the National Botanic Gardens and what disaster I discovered among the shrubberies, Cannas, etc., I had planted three years ago. A flood in October 1960 flowed over the garden carrying away an avenue of trees and placing the grounds under water for five days, in depth from 13 feet to four feet at the highest point. Lucknow has been called the City of Gardens, (Baghs), and a hundred and fifty years ago it certainly earned the name. The Nawabs of Oudh were keen gardeners, they liked fruit and scented flowers above others but from the Prime Minister down to the rich Zamindars (Landlords) all had their private Baghs. The Queens too had their little private gardens and I have listed some 40 names of areas in Lucknow called Bagh, such as Kaiser Bagh, Wazir Bagh, Secundra Bagh, etc.: that once upon a time were the glory of the city but are now built up areas.

Kanpur only 50 miles away is a large industrial centre and the gardens there are really well laid out. I have merely passed through the city this year, on a plant collecting trip, and could not attend their Shows owing to other engagements.

In February I was called to judge gardens in Calcutta (979 kilometres from Lucknow) and spent three days seeing as much as I could of the old Capital. My father had worked for 12 years with the Agricultural & Horticultural Society of India before his death and I followed from apprentice to Secretary serving the same Society for 51 years. Garden Competitions were held annually and never were there less than 20 gardens that entered. In 1962 there were just 12. Calcutta has a very moist humid climate and plants, with few exceptions, grow very well, though roses are never first class. Vegetation is lush and foliage growth all that could be desired. Having friends among the nurserymen of the city I discovered that business had never been so good, the demand for Cacti was something new and sales were rocketing.

I was back in Lucknow for three days when I had to travel to the Capital, Delhi, 486 kilometres away. Here I helped in judging exhibits in the "cut flower" and "plants in pots" Sections. It was not as well patronised by exhibitors as shows in past years, I was sorry to see, but the feature that attracted visitors was the "International Section." Here exhibits from France, Italy, Siam, New Zealand, Malaya, Thailand and Great Britain were beautifully displayed. Two Air Lines, the

B.O.A.C. and Pan-American, also put up exhibits and I did enjoy this feast of flowers. But the Show was open on Saturday afternoon for four short hours and the exhibits thereafter auctioned for the Y.W.C.A. Large numbers of people were disappointed as they failed to see the foreign exhibits. After the Show I spent a day with a friend who took me over the city, the Government Nursery, and to a new park which is being developed on The Ridge, a backbone of rocky land on which even thorns and thistles found it hard to grow. Water is being provided in ample quantity so that there can be a large canal, grass lawns and flower beds while suitable trees are being planted to give shade and colour. It was already well patronised by picnickers from the city.

I motored to Ghaziabad, a city some twenty miles away, and fast becoming an annexe to the Capital where industries are building huge factories. The garden I visited had been neglected and I suggested a lay out that would not interfere too much with existing trees, etc.

I was back in Lucknow and spent a couple of days at my desk when I had to organise the first Rose Show under the auspices of a Garden Lovers Society of which I am the Secretary. This was a new venture and very successful, the exhibits being numerous, and fairly good, while the visitors thronged the Hall where the flowers had been arranged.

My next engagement was judging gardens in Lucknow and I got the shock of my life when papers were handed to me showing that there were 33 competitors. The three judges were at it till late in the evening; actually there should have been two sets of judges to do justice to the work for these gardens were scattered all over the city. Two days later I had my final job when I helped judging at the Lucknow Flower Show. Quality was down and in vegetables the entries were very poor. Lucknow vegetable exhibits have, in the past, been outstanding and the one tent allocated to them this year—which was not half filled—would have needed duplication a few years back. The gardens in Lucknow are large and in “the good old days” when labour was cheap, every garden had an orchard and a vegetable garden that provided the table with most of the requirements of the kitchen.

Judging from the sale of plants and attendance at Flower Shows there seems to be a revival of gardening in India. The Government and the Municipal Corporations of large Cities are taking more interest in beautifying Public Parks and all who can afford it see that their gardens are a blaze of colour, at least during the winter months. In the dry Upper Provinces of India the summer heat, plus a hot west wind, plays havoc with plants.

ALICK PERCY-LANCASTER, 1912-1961

A BIOGRAPHICAL SKETCH

Alick Percy-Lancaster was born in Calcutta, India, on July 21, 1912, being the younger of twin sons. As a boy he showed great love for plants. He was educated at North Point, Darjeeling and at St. Edmunds, Shillong.

In 1930 he was appointed to the Royal Agri-Horticultural Society of India and spent a year in training under his father before taking a three years' course at the Royal Botanic Gardens, Edinburgh from 1931 to 1934, thereafter he went to the Royal Botanic Gardens, Kew for further training. On his return to India he was appointed Gardener in charge of the Governor's Estates in Bengal, Barrackpur, Calcutta, Dacca and Darjeeling. He worked here until he was appointed Assistant Superintendent, Horticultural Division, Central Public Works Department, New Delhi. In the Capital he was in charge of the Parks, Public Gardens, and Gardens attached to Protected Monuments, and so on, and was also responsible for all roadside and horticultural work in the City. He rose to be Superintendent on the retirement of the incumbent and later became the first Director of Horticulture. During this period his services were often borrowed by other States and he traveled all over India in the course of his duty. After twenty years of horticultural service in India, he resigned and went overseas to South Africa, but ultimately settled down in Salisbury, Southern Rhodesia, where he was joined by his father and mother. Early in 1961 it was discovered that he was suffering from high blood pressure and his heart was in consequence affected. Treatment at home did not bring about an improvement so he was hospitalized. In spite of every hope held out for his recovery, he suddenly passed away on September 22, 1961. He left a widow and three sons to mourn his loss—*Sydney Percy-Lancaster*.

Editor's note.—A brief note on the passing of Alick Percy-Lancaster appeared in *Plant Life* 18: 13, 1962, in which it was indicated that he was engaged on the *Gloriosa* Breeding Project with his father, Sidney Percy-Lancaster, when he died. The date of death there should be corrected from Sept. 28 to Sept. 22.—*Hamilton P. Traub*.

ARTHUR CHEVERTON BULLER, 1874-1959

A BIOGRAPHICAL SKETCH *

Mrs. C. Victor Schweizer,

*“Keerweer,” Meadow Road, Rosebank,
Cape Town, South Africa*

Arthur Cheverton Buller was born on July 3, 1874, at Croydon, England; and died on May 7, 1959, at his estate in South Africa. He came to South Africa in 1893; his family had destined him for the Church but he felt a greater call for farming, and as did so many of the young men of the period like Cecil John Rhodes, he too sought his future in a new country. At first Mr. Buller worked as a learner-farmer on Karroo

* Written by Mrs. C. Victor Schweizer in 1961 at the request of Mr. Leon Boshoff-Mostert.

The information as to the dates of birth and death, and place of birth, of Mr. Buller, was furnished by The Hon. Mrs. J. M. de Villiers, daughter of Mr. Buller, in 1962.

The manuscript was received too late for inclusion in the 1962 issue and had to be held over for the 1963 volume.

farms where ostrich, sheep and cattle were raised. The conditions were most primitive; climatic conditions were extreme—drought, fierce heat, and bitter cold rang the changes with none of the ameliorations which modern conditions have brought; even traveling in cattle trucks was a relief from the tedium of animal-drawn transport. After five years, Mr. Buller moved to one of the most beautiful and fertile parts of the world at Banhoek near the then small town of Stellenbosch, where he bought a farm, "Dwarsriviershoek," for the purpose of growing fruit and vines in the wonderful scenic setting of mountains and valleys a few miles from the Cape Coast, with its superb Mediterranean climate. Here he was associated with the famous fruit grower who was sponsored by Rhodes, H. E. V. Pickstone, and the great statesman of the period, John X. Merriman, in pioneering the deciduous fruit industry. Later he experimented in cooperation with K. B. Quinan of nearby Somerset West in growing export grapes. Buller was one of the first to use the overhead trellising of vines, and specialized in methods of packing fruit in a period when cold-storage was unknown; successfully packing grapes for the long overseas journey in sawdust at one stage.

Buller was a passionate lover of wild life and his farm was a sanctuary for the fast disappearing fauna and flora of the district. He took a great delight in photography and in time became an expert color-photographer. Though so constantly behind the camera, he was a most retiring model himself with the result that there are virtually no photographs of him apart from the compulsory Identity Card—a pallidly inadequate one taken in 1955.

Horticulture was his greatest delight, and he was renowned for his exhibition sweet-peas, roses and daffodils, until he became absorbed in *Amaryllis* (syn.-*Hippeastrum*).

Buller developed a system for propagating *Amaryllis* vegetatively by cutting up the bulbs; he also designed his own "incubator" for their propagation, until he had built up the first collection in South Africa, one of the best in the world. He corresponded and collaborated with breeders in the U. S. A., and in the United Kingdom, including Lionel de Rothschild who held him in high esteem. Eventually a selection from his collection was accepted for the royal gardens at Windsor Castle. With *Amaryllis* his interests were centered in blooms of one pure color or shading; he bred right away from the striped effects, and the funnel-shape, getting enormous wide-faced blooms in pure white, glorious crimson, and orange; one of his triumphs was the brilliant flame-colored, 'African Glow.'

Latterly he took a great interest in the proteas for which his farm was so naturally suited, and concentrated on the fabulous *Protea cynaroides*, leaving at his death a unique plantation of this magnificent indigenous plant; fortunately these plants in their setting are being cherished by his daughter as a fitting memorial to this far-sighted protector of indigenous plants.

Among other friends of his earlier life was the well-known gardening correspondent of the London Illustrated News, Clarence Elliott; their life-long friendship and mutual interest resulted among other things

in the exporting to England of the large-lipped exquisite hardy herbaceous *Salvia azurea* christened "*African Skies*" by Buller, a luminous clear sky-blue many shades lighter than the sapphire blue of the *Salvia azurea* (type).

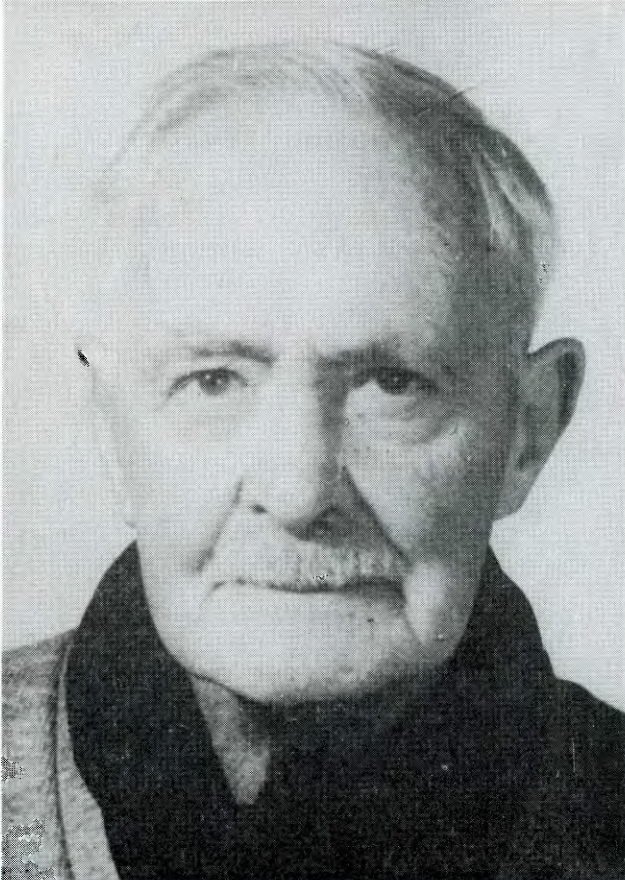


Fig. 3. Arthur C. Buller in 1955. Photo furnished by the Hon. Mrs. J. M. de Villiers, daughter of Mr. Buller.

Some 10 years before his death, Mr. Buller became interested in importing American Iris and making a collection of *Iris kaempferi*. At this time he ordered some Iris from "Kleinskuur" Iris Farm in the Transvaal. When forwarding the order, Mrs. Boshoff-Mostert returned Mr. Buller's check and asked Mr. Buller if he would let her have some Amaryllis for her husband in return. This he did and during the next three years gave Mr. Boshoff-Mostert a wonderful selection of hybrid Amaryllis from his collection as it then was. Mr. Buller visited the

Boshoff-Mosterts at "Kleinskuur," and Mr. Boshoff-Mostert visited with Mr. Buller at his estate, "Dwariviershoek", and was initiated into Buller's techniques and methods. From 1952 onwards, Mr. Buller continued to breed and build up what he called his "exhibition stuff" with which he did not part during his lifetime. After his death, the final collection—the culmination of all his years of breeding—was acquired by Howie's the well-known Cape horticulturists.

A charming introduction to South Africa was made when Clarence Elliot sent Buller seeds of *Leucocoryne ixiooides odorata*, the Chilean "Glory of the Sun". Buller was very public spirited and opened his garden to the public for a small entrance fee, resulting in handsome sums for charity as people flocked to view the beauties of "African Skies", "African Glow", "Glory of the Sun", and the proteas. This tall fearless man was a stalwart in the district where he was a respected authority when he served on the Deciduous Fruit Exchange and Stellenbosch District Council; his influence and example will continue as an inspiration to all nature lovers.

NURSERYMAN GETS TWO YEARS *

A 35-year-old Tampa nurseyman convicted of stealing \$570 worth of amaryllis bulbs from another nurseyman was sentenced to two years in prison yesterday.

Criminal Court Judge Carl C. Durrance imposed the prison term on Robert Lester Solomon, who operated a nursery with his parents at 3806 42nd St.

A jury found Robert guilty last October, but acquitted his parents, Mr. and Mrs. Horace Solomon. They were all accused of stealing 664 bulbs last March from August Bosserez, who operates Bosserez Nursery at 6215 North Himes Ave.

* Reprinted from the Tampa (Fla.) Tribune, Jan. 23, 1962.

EDITOR'S MAIL BAG

Mr. H. Speight, 4 Band Street, Lathlain Park, Western Australia, writes that he is interested in obtaining seeds of *Amaryllis* species in the Belladonna Group. He is a home gardener interested in the *Amaryllis* family and invites correspondence.

Prof. Douglas D. Craft, of the Chicago Institute of Fine Arts, who has served the Society faithfully as Artist since 1959 has had to curtail his load due to increased responsibilities at the Institute, and thus he has relinquished the position as Artist for the Society. However, he continues his interest in the Society and the amaryllids. The Society owes him a debt of gratitude for his excellent art work for the covers and plates in the *Amaryllis* Year Book in the past. His articles on amaryllid culture are also much appreciated.

We are pleased to announce that Penrith Brien Goff, Assistant Professor of German, University of Chicago, has assumed the duties as Artist relinquished by Prof. Craft. Prof. Goff's first artistic contribution appears in the present issue.

Miss F. Weber, Dip. Hort., M. A. C., Wiri, R. D. 1., Manurewa, Auckland, New Zealand, writes that she is interested in Nerines and other amaryllids, and invites correspondence.

Mr. and Mrs. W. R. Collings, 1300 Crescent Drive, Midland, Michigan, visited with the editor on January 23, 1962. The enjoyable visit was all too short.

On March 4, 1962, the editor enjoyed a visit from Mr. and Mrs. Lewis Lloyd, 4516 D'Hemecourt St., New Orleans 19, La. The Lloyds are enthusiastic amaryllid growers.

Mr. Zvi Ginsburg-Gazit, of Gevim Bulb Nursery, Gevim, Doar-Na Hof Ashkelon, Israel, writes under date of April 2, 1962, that the following amaryllids are native to Palestine: *Sternbergia spofforthiae*, *S. colchiciflora*, *Pancratium maritimum*, *P. parviflora* (= *Vagaria parviflora*), and possibly *P. sickenbergii*, *Ixiolirion montanum*, *Narcissus tazetta*, and *N. serotinus*.

William Morris, 20 Mills St., Warners Bay, New South Wales, Australia, writes under date of May 22, 1962, that he has started on work leading to the Master of Science (M. Sci.) degree at the University of New South Wales, having chosen as a beginning a survey of the Australian Crinums for their alkaloid content.

Mr. E. A. Angell, of Loma Linda University, Calif., visited the editor on May 28, 1962, bringing two very large bouquets of the Angell Strain of *Amaryllis* hybrids which he developed over a 24-year period from two original bulbs the value of this work is to reveal what species originally went into the large-flowered *Amaryllis* hybrids as shown by the characters in the progeny. The flowers show evidence of at least eight species—*Amaryllis belladonna* L. (color); *A. vittata* (vittate color pattern fragrance); *A. psittacina* (color pattern); *A. pardina* (pardina color with minute dots); *A. aulica* and *A. correiensis* (color and shape); *A. reginae* (shape and color); and *A. calyptrata* (yellow-greenish cast in some flowers). The Angell hybrids are generally 4-flowered, but some have up to 6 flowers in the umbel.

The editor received a most enjoyable visit from Mr. & Mrs. A. J. Haydel of New Orleans, La., on July 1, 1962.

We are sorry to report that Mr. C. J. van Til, general manager, and his wife, director and principal shareholder, of Ludwig & Co., were killed in September 1961, in a motor car accident. The remaining sorrowing members of the firm are carrying on. An outstanding new *Amaryllis* clone will be named 'Happy Memory' in fond remembrance.

Mr. G. E. de Vries of the Atlantic & Pacific Bulb Distributors of Savannah & Atlanta, Bulb Importers, representing Howie's B. C. Buller South African strain of Hybrid *Amaryllis*, writes under date of Sept. 29, 1962, that the firm will have a *very limited* number of high quality

bulbs (vegetatively propagated clones), sizes 26, 28, 30 & up c. m. (=circumference), available on the basis of reservation in *early spring*. Those interested should write directly to the firm—A. & P. Bulb Distr., Box 225, Savannah, Ga. This firm also handles American and Dutch hybrid seedlings—A. & P. Bulb Distr., 3479 Rockhaven Circle, N. E., Atlanta 5, Ga.

Mr. Arthur Hoerl, 4321 Vantage Ave., North Hollywood, Calif., writes that he grows many *Haemanthus katherinae* bulbs and usually harvests many seeds which he offers to share with the other members. Those interested should write directly to Mr. Hoerl.

Mr. Rory McEwen, born in Scotland in 1932, great-great-grandson of John Lindley, the renowned English botanist; educated at Eton and Cambridge (honors in Literature); served two years as officer in Cameron Highlanders; art editor of "The Spectator" for three years; collaborated with Sacheverell Sitwell on a book of "Old Pinks and Carnations"; and who lives and works in London, staged an exhibit of Amaryllis and other floral paintings, Nov. 27 to Dec. 22, 1962, at Durlacher Bros. Gallery, 538 Madison Ave., New York City. Those interested in acquiring such paintings should write directly to Mr. George Dix, owner of the Durlacher Gallery, or to Mr. McEwen at 9 Tregunter Road, London S. W. 10, England.

[PLANT LIFE LIBRARY, continued from page 154.]

TREE GROWTH, edited by T. T. Koszowski. Ronald Press, 15 E. 26th St., New York 10, N. Y. 1962. Pp. 442. Illus. \$12.00. This important book includes symposium papers by a large number of authorities on various topics relating to the growth of trees, including the physiological mechanisms, environmental influences, and methods of measuring growth; and also growth correlations, historical events, silvicultural implications, and tree improvement. This outstanding book is highly recommended.

ORNAMENTAL SHRUBS OF CALIFORNIA, by L. Enari. Ward Ritchie Press, 1932 Hyperion Av., Los Angeles 27, Calif. 1962. Pp. 214. Illus. Paperback. \$5.95. The purpose of this book is (a) to provide a means of identification of 277 native and/or introduced ornamental shrubs grown in California; and (b) to stimulate research on taxonomic problems concerning them. The botanical descriptions, reinforced by the 181 line drawings, have been prepared from living material and have been checked with the published accounts. A comprehensive key precedes the descriptions. Highly recommended.

THE COVERED GARDEN, by K. Lemmon. Museum Press, 26 Old Brompton Road, London, S. W. 7, England. 1962. Pp. 284. Illus. 30/- net. The English term "Covered Garden" as used here is equivalent to "gardening under glass" or "greenhouse gardening" in American English. The author traces the evolution of gardening under glass from the beginnings in ancient Greece and Rome to the orangeries and hot-houses in Europe of the 17th and 18th centuries, and on to later developments up to the present time: the techniques of glass-house construction and maintenance—glass, heating, ventilation and shape. The reader is introduced to the "Age of Grace", the "Conservatory Era", the role of plant hunters, the "Jungle pool", and "Orchidaceous Beauty", and "Decline and Fall". The book ends on the note of the glasshouse of the future. Highly recommended.

[PLANT LIFE LIBRARY, continued on page 36.]

1. REGIONAL ACTIVITY AND EXHIBITIONS

RECORD-BREAKING FREEZE, JAN. 11-12, 1962

[The record breaking freeze of January 11-12, 1962 in the New Orleans, Houston, and Hattiesburg areas made it necessary to cancel some of the Official Shows scheduled in the spring.—*Editor*]

THE GARDEN CIRCLE OF NEW ORLEANS.—The Official Garden Circle Amaryllis Show was canceled because some of the members, including the writer lost Amaryllis bulbs that were not protected. Potted plants that were heavily mulched and in an inclosure were completely frozen. In many cases bulbs planted in the open with crowns exposed were heavily damaged, but bulbs with crowns below the surface were not damaged. The latter bloomed very late and thus could not have been used as show material. In the past we were among those staging outstanding Official shows, we preferred canceling instead of having an inferior showing.

We are planning an outstanding Official Garden Circle Amaryllis Show in 1963 and the tentative dates for this Show are April 6-7, 1963. We are looking forward to many beautiful horticultural specimens and arrangements which will be open to all Garden Clubs and individuals.

—*Mrs. A. J. Haydel, Show Chairman.*

THE HOUSTON AMARYLLIS SOCIETY.—The Official Show of the Houston Amaryllis Society had to be canceled in 1962 due to the unusually hard and prolonged freeze at a crucial period in the development of the plants and thus reduced the number of prime Amaryllis flower scapes essential to maintain the usual high standards for our exhibits.

The Society has completed plans for the 1963 Spring show and will follow its usual practice of adhering to standards which reflect the values wanted by the local group and the National organization.

—*Mrs. Frances G. Boone, Corresponding Secretary.*

OFFICIAL AMARYLLIS FORUM OF MOBILE SHOW 1962

ROBERT E. PARKER, JR.

The high point of the 1961-62 year for the members of the Amaryllis Forum of Mobile was their second annual competitive amaryllis show held on April 21 and 22, 1962 at the Kate Shepherd Elementary School, under the direction of R. E. Chason, Chairman, and Russell Ludlow, Co-Chairman.

Despite record-breaking low temperatures during the winter, a large number of entries were received in the various classes in the open competition. The theme of the show was "In Old Mobile" in keeping with the two hundred and fiftieth anniversary of the city which had been celebrated the previous summer in various community activities.

The theme table (see Figure 4) was dramatically displayed with a single vase of amaryllis blooms of various kinds—on either side of the centerpiece were holders displaying the six flags under which Mobile has lived.



Fig. 4. Amaryllis Forum of Mobile—upper, theme table 1962 Show, flags represent the nations under which Mobile has lived. Lower, educational display; shown are the chairmen of the Show (see text), with the special winter study on soils.

There were four major divisions, with some ten classes, in the competitive sections, including artistic arrangements. There were also individual hobby tables prepared by members to add to the decor of the show and to exhibit the range of varieties within the respective hobbyists' collections.

An important non-competitive feature of the show was the educational display on soil and soil components, with special emphasis on texture of soil and the elements, both primary and secondary and the trace elements. (See Figure 5 which shows the display table. Shown are Russell Ludlow on the left and W. A. McCollum who were responsible for the winter study on soil).

Judging was by official Amaryllis judges and the trophies, which were awarded this year for the first time, went to W. A. McCollum, Club Trophy for best potted American Amaryllis; H. R. Young, Greer's



Fig. 5. Amaryllis Forum of Mobile—general view of the competitive section showing part of the entries at the 1962 Show.

Trophy for best cut specimen of American Amaryllis; Mrs. H. A. Allen, Club Trophy for best potted Dutch hybrid by color; Mrs. A. B. Palmer, Hammel's Trophy for best potted Dutch hybrid; and Mrs. Earl Parker, Courtney Memorial Trophy for best cut specimen of Dutch hybrid by color.

Other trophies were awarded to Mr. W. T. Brown, Russell Ludlow Trophy for best cut specimen of Dutch hybrid by named clone; Mrs. C. D. Dean, President's Trophy for best new seedling; Mrs. H. A. Allen, Swetman Challenge Cup for best novelty or miniature; and Mrs. Russell Ludlow, Club Trophy for best artistic arrangement.

Special awards were given to Mr. and Mrs. Robert E. Chason and to Mr. and Mrs. W. A. McCollum for their hobby table displays, also the Men's Garden Club of Mobile received two (2) special awards for their attractive table display. The Swetman Sweepstakes Trophy was won by Mrs. Earl Parker for the most blue ribbons in the show.

As can be seen from the listing above, there were a very large number of trophies awarded which heightened the enthusiasm and added to the spirit of friendly competition. (See Figure 5 for a general view of the competitive section.)

The retiring officers of the Amaryllis Forum are W. O. Cobb, President; W. A. McCollum, Vice-President; Mrs. Ellen Boe, Secretary, and R. E. Chason, Treasurer.

OFFICIAL AMARYLLIS SOCIETY OF MOBILE SHOW, 1962

MRS. J. A. BROWN, JR., *Secretary*

The focal point carried out the theme of the show, a large globe of the world suspended from the ceiling surrounded by baskets of Amaryllis in the background.

The Amaryllis Society was under the leadership of Miss Mildred Laughlin as President, 1961-1962.

The members of the Amaryllis Society of Mobile, Alabama suffered a very great loss in the extreme 7 degree weather we had here in Jan. of 1962 and it seemed almost impossible to stage a show, but the members decided to put on a show to be as good as possible. To the delight of all members and every one who saw our show on April 14th and 15th, it was the best we had ever staged.

There were seven new Trophies added this year making twenty in all.

Swetmen Amaryllis Garden of Gautier, Miss., awarded to the winner of the most blue ribbons in the combined Dutch Hybrid potted and cut division a large silver tray with handles.

Robert Hiram Swetmen Memorial Trophy was awarded to the winner of the most blue ribbons in the Dutch Hybrid potted amaryllis division—silver tray with handles.

Wesley J. Marshall, Sr. Memorial Trophy was awarded to the winner of the most blue ribbons in the Dutch Hybrid cut amaryllis division—silver tray with handles.

The following annual trophies were awarded:

The Swetmen Challenge cup for most blue ribbons in the Dutch named clones division—sterling silver cup.

The Amaryllis Society of Mobile Hobby Trophy for most outstanding Hobby collection of Amaryllis—silver cup.

The Amaryllis Society of Mobile Trophy was awarded for the most blue ribbons in the unnamed cut seedlings division—silver sandwich tray.

The Amaryllis Society of Mobile Trophy was awarded for the most blue ribbons in the unnamed potted seedlings division—silver sandwich tray.

Our show had many beautiful artistic arrangements (of amaryllis only) and an Art exhibit for both seniors and juniors; with trophies awarded to all classes.

The general show chairman, Mr. Wilmer Smith, was assisted by Mr. J. W. Hanelein, Mr. Maxwell Stewart and Mr. Fritz Templin as co-chairmen. Mr. W. R. Lowe was master of ceremonies.

Fifteen accredited judges judged our show and awarded twenty trophies.

The Amaryllis Society of Mobile, Alabama with a membership of about one hundred is now making plans and looking forward to 1963 and a bigger and better show.

A welcome awaits every one who visits us at any time, but especially when we stage our 1963 show, which will be about the middle of April. That time of year seems most favorable for our Amaryllis.

OFFICIAL CORPUS CHRISTI AMARYLLIS SHOW, 1962

MRS. CARL C. HENNY, *Secretary*

The Coastal Bend Amaryllis Society held its third Official Amaryllis Show in conjunction with the Lola Forrester Flower Show April 7th and 8th, 1962. The Lola Forrester Flower Show of Corpus Christi, Texas is held each spring, with thirty three or more garden clubs within the city participating. The Theme this year was "The Seven Lively Arts".

Mr. R. E. Raasch served as president of the Coastal Bend Amaryllis Society for the year. Mr. and Mrs. R. E. Raasch were in charge of the staging of the Amaryllis Show. Mr. and Mrs. Charles Sanders served as chairmen of the Placement Committee. All members assisted by serving on the various committees. The club consists of twenty members; many of them outstanding growers of hybrid amaryllis. Most of our bulbs are garden grown, with many seedlings being planted. Also many hybrid amaryllis bulbs are ordered from Ludwig & Co., Holland.

The Amaryllis Exhibit was open to members of all Corpus Christi Garden Clubs and also to residents of the city who were interested in growing amaryllis. Long tables were used to display the potted amaryllis and cut scapes. One hundred and fifty entries were made. Blooms on display were divided according to color, ranging from white, pink, salmon to the deepest of red.

Mr. Reed Rogers, Coastal Bend Amaryllis Society Member, received the Ludwig Challenge Trophy given for having received the greatest number of blue ribbons in the Amaryllis Section; a Silver Trophy for the "Queen of the Show"—named 'Apple Blossom'—for displaying the highest scoring registered amaryllis and also a Silver Trophy for the highest scoring "Cut Scape" of a garden grown amaryllis.

Mr. Fred Jones received a Silver Trophy for the highest scoring "Seedling" entered in the show. Three "Awards of Merit" and six "Preliminary Commendations" were awarded to participants for outstanding entries within the Amaryllis Exhibit.

The number of entries in the various classifications were as follows:

Class 79-A—Registered Amaryllis, pot grown Leopoldi Type	13
Class 79-B—Registered Amaryllis, Pot grown Reginae Type	1
Class 80-A—Breeders Class—Seedlings: cut scapes	50
Class 81-A—Garden Grown Amaryllis, Registered and named plants: cut scapes	20
Class 81-B—Unnamed plants, cut scapes	48
Class 82-B—Belladonna Type; cut scapes	9
Class 83-A—Miniature Type—Pot Grown	1
Class 83-B—Miniature Type—Garden Grown, cut scapes	1
Class 84-A—Species—Pot Grown	1
Class 84-B—Species—Garden Grown—cut scapes	4
Class 85 —Australian amaryllis, cut scapes	2
TOTAL NUMBER OF ENTRIES.....	150

Members of the Coastal Bend Amaryllis received 13 Blue Ribbons; 13 Red Ribbons, 12 Gold Ribbons and 8 White Ribbons for their entries, making a total of 46 ribbons received.

Mr. Reed Rogers, winner of the Ludwig Trophy, entered the following named Ludwig Amaryllis specimens: Apple Blossom, Bouquet, Helen, Margaret Rose, White Giant, Picotee, and Love's Desire—cut scapes.

The Accredited American Amaryllis Society Judges who judged our show were: Mrs. Jesse Haver, Mrs. A. L. Hammond and Mrs. R. H. Schmuck—all from Houston, Texas. They were very pleased with our exhibit and said that it was one of the best they had ever judged.

Despite the advent of Hurricane Carla during September, 1961, and a three-day freeze during January, 1962, everyone was amazed with the many lovely hybrid Amaryllis specimens entered in the show.

OFFICIAL VALDOSTA AMARYLLIS SHOW, 1962

VIRGINIA CULPEPPER

[The following report is based on an article by Virginia Culpepper which appeared in the Valdosta Times, April 16, 1962.]

Termed an outstanding success by all who attended was the 6th Annual Official Valdosta Amaryllis Show held on Saturday and Sunday afternoons (April 14 and 15, 1962) at the Garden Center Auditorium.

The Official Show was held in cooperation with the American Amaryllis Society, and was sponsored by the Men's Garden Club of Valdosta. It drew visitors from several near-by cities in Georgia and north Florida, and was well attended.

Mr. Robert D. Goedert, foremost commercial dealer in Amaryllis of Jacksonville, Fla., commented that the exhibit of blooms was worthy of any show of its kind in the South or on the West Coast. Among the

other distinguished visitors was Mr. Sam Caldwell, the well-known horticulturist of Nashville, Tenn.

Awards were made in Class 1. Named clones in pots (horticulture); Class 2. Unnamed seedlings in pots (arrangements); Class 3. Named clones as cut scapes (horticulture); Class 4. Unnamed seedlings as cut scapes (arrangements); and Class 5. Hybridizer's Class, seedlings in pots (horticulture). A special award was made to the only commercial exhibitor, Mr. Robert D. Goedert, who also donated imported bulbs to winners in the Court of Honor. McDonald Nursery also received a commendation for the attractive setting of the Show which included blooming orange trees in redwood tubs and other evergreens.

Mr. Hulyn Smith, President of the Men's Garden Club, and Guy Rice, Show Chairman, both stated that they were well pleased with the Show and the interest displayed by the public. "Let's grow more Amaryllis next year" was the comment heard on all sides by those viewing the blooms.

The judges of the Amaryllis Show were honored on April 14 at a luncheon given by Mr. and Mrs. Guy Rice at their home on Gornto Road.

OFFICIAL HATTIESBURG AMARYLLIS SOCIETY SHOW, 1962

MRS. V. J. LUCAS, *Hattiesburg, Miss.*

The theme of our 1962 Official Show was "determination." In spite of rain, sleet and snow, the members staged a Show.

Sweepstakes award was made to Mrs. Johnnie Jackson who won ten blue ribbons. Mrs. Ruth Bethea won the award for the most outstanding Dutch type seedling. Mrs. Leonard Broom won in the potted Dutch hybrid class with 'Wyndham Hayward', and in the Indian Dutch hybrid class with 'Fairy Queen'.

Mrs. Johnnie Jackson was the winner in the potted American hybrid class. Miss Donna McCaffery won the sweepstakes in the junior division with five blue ribbons.

Awards of Merit were awarded to Mrs. L. Bond, Mrs. M. W. Lancaster and Mrs. Johnnie Jackson. Silver trophies were given to all top winners. The Judges praised the quality of the blooms exhibited.

THE GREATER HOUSTON AMARYLLIS CLUB

MRS. W. S. WHEELER, *President*

The Greater Houston Amaryllis Club was organized in June 1962 with 19 charter members, and with a membership limit of 25. All members are also members of the American Amaryllis Society which is affiliated with the American Plant Life Society.

We meet once each month in the homes of the members and view the gardens of its members. We are planning a Show in the spring of 1963, weather permitting. Mrs. W. S. Wheeler is President, and Mrs.

Walter D. Wells has been appointed Official Show Standards Chairman in order to keep informed on the proper procedure for staging Official Shows. We have five accredited Amaryllis Judges in our present membership. Some of our members have been growing Amaryllis for twenty years or more.

MEN'S AMARYLLIS CLUB OF NEW ORLEANS 1962 SHOW

HENRY P. FONTCUBERTA

The Fifth show of the Men's Amaryllis Club of New Orleans was held on April 7th and 8th, 1962, at the Edward Hynes School, 990 Harrison Ave., and in spite of the cold winter we had a good amount of entries. Comments indicated the show was a huge success. Registered attendance was five-hundred-and-fifty-six (556), but we estimated about



Fig. 6. Mr. W. R. Latapie; and grand prize table, Men's Amaryllis Club of New Orleans Show, 1962.

seven-hundred (700) to eight-hundred (800) viewed the show. The show was also viewed by many out-of-town visitors from Baton Rouge, Prairieville, Hansville, Luling, Thibodaux, Raceland, Belle Chase, Bastrop, Shreveport, Covington, Destrehan, Port Sulphur, in Louisiana. There were visitors from out of the state, too,—Mobile, Ala., Kansas City, Mo., Timmons ville, S. C., Gautier, Miss., Lincoln, Mass., Schofield, Wis., Dana, Ill., Chicago, Ill., and London, England.

Awards in the *Horticulture Section* were received by: Walter R. Latapie—Steckler Seed Co. Award of Merit (Dutch); Walter R. Latapie—Reuter Seed Co. (Sweepstakes); Tim Calamari, Jr.—Newsham Beemel Award of Merit (American); Milo Virgin—Men's Amaryllis Club Award (Most blue ribbons won by a member); Stephen Gasperc—Men's Amaryllis Club Award (Outstanding Seedling); Walter R. Latapie—Sweepstakes Ribbon (Dutch Class); Edward Authement

and Tim Calamari, Jr.—were tied for the Sweepstakes Ribbon, American Class; Ribbons were awarded for First, Second, Third and Honorable Mention winners.

Awards in the *Arrangements Section* were received by: Walter R. Latapie—Men's Amaryllis Club award (scapes with two florets); and A. J. Haydel—Men's Amaryllis Club Award (single florets).

Mr. Frederic Schmitz, Assistant Professor of Horticulture, Plaquemine Parish Experimental Station, Diamond, La., showed colored slides and held discussions on Amaryllis, which were enjoyed by all who viewed the show on Sunday afternoon, the 8th.

Chairman of the show was Henry P. Fonteuberta. Co-chairman: Walter R. Latapie.

AMARYLLIS JUDGES CERTIFICATES

Since the last report in the 1962 Amaryllis Year Book (pages 25-26), the following named Amaryllis Judges Certificates have been issued by the American Amaryllis Society.—

103. Mrs. Roy T. Sessums, 125 Magnolia Drive, Metairie, Louisiana (Horticulture only).
104. Mrs. M. E. Shelton, 1856 Willow, Liberty, Texas.
105. Mrs. E. H. Blankenship, 811 LeGrun, Houston 8, Texas, (Horticulture only).
106. Mrs. Leon G. Cox, 5643 Edith, Houston 36, Texas (Horticulture only).
107. Mrs. R. L. Culpepper, 2824 Lockett, Houston 21, Texas (Horticulture only).
108. Mrs. Joe B. Faries, P. O. Box 589, Liberty, Texas (Horticulture only).
109. J. R. Gebhart, 432 Euclid Ave., Houston 9, Texas (Horticulture only).
110. Mrs. David W. Hallam, 731 Kuhlman Road, Houston 24, Texas (Horticulture only).
111. Mrs. J. H. Tabony, Jr., 3713 Gulf Street, Houston 17, Texas (Horticulture only).
112. Mrs. K. Virgie Fortier, 5919 Paris Ave., New Orleans 22, La. (Horticulture only).
113. Mrs. Paul Merritt, 523 Turquoise St., New Orleans 24, La. (Horticulture only).
114. Mrs. E. J. Radke, 1319 Burbank Drive, New Orleans 22, La. (Horticulture only).
115. Mrs. J. C. Holderith, 5835 Chamberlain Drive, New Orleans 22, La. (Horticulture only).
116. Mrs. John J. Kieffer, 6501 Wuerpel St., New Orleans 24, La. (Horticulture only).
117. Mrs. W. Alvin Caserta, 5900 Chatham Drive, New Orleans 22, La. (Horticulture only).

ADDITION TO SECTION II. FLORAL ARRANGEMENTS

The following classes have been added to those already admitted in this Section:

Explanation.—There are now many unnamed and unregistered *Amaryllis* bulbs being put on the market. It would be unfair to allow these to compete with the registered clones admitted in Section I. HORTICULTURE, and thus this addition has been made to accommodate these in Section II. FLORAL ARRANGEMENTS by allowing exhibits in groups with separate entries for cut scapes and potted plants. Such exhibits in groups may receive first, second or third prize ribbons on the same basis as those given to the regular floral arrangements in Section II.

- (A)* 3 to 5 of the same kind (all identical)
 - Class a.* Cut scapes
 - Class b.* Potted plants
- (B)* More than 5 of the same kind (all identical), not included under (A)
 - Class c.* Cut scapes
 - Class d.* Potted plants
- (C)* 3 to 5 all different
 - Class e.* Cut scapes
 - Class f.* Potted plants
- (D)* More than 5 all different, not included under (C)
 - Class g.* Cut scapes
 - Class h.* Potted plants

* These letters may be changed to other letters or numbers so as to fit into any show schedule.

[PLANT LIFE LIBRARY, continued from page 26.]

PLANTS: AN INTRODUCTION TO MODERN BOTANY, by V. A. Greulich and J. E. Adams. John Wiley & Sons, 440 Park Av. So., New York 16, N. Y. 1962. Pp. 557. Illus. \$7.50. This outstanding new text by authorities on the subject was written for students who specialize in botany, and also for those who pursue it as part of a liberal education. The text has a refreshing new look, and is in four sections: (1) economic botany—kinds of life; (2) levels of plant organization—molecular, cellular, tissue, organ, and organization and community; (3) plants in action—plant physiology and physiological ecology, and (4) individuals and lineages—reproduction, heredity, evolution and origin of life. This attractive text is highly recommended.

THE PHOTOSYNTHESSES OF CARBON COMPOUNDS, by Melvin Calvin and J. A. Bassham. W. A. Benjamin, 2465 Broadway, New York 25, N. Y. 1962. Pp. 127. Illus. \$6.00. This report on organic syntheses associated with the carbon reduction cycle in unicellular algae is based largely on experimental evidence obtained in the authors laboratory. The topics discussed include—carbon reduction cycle of photosynthesis and evidence in support of this; the carboxylation reaction; balance among synthetic pathways; photosynthesis vs. other forms of biosynthesis; amino acid synthesis; carboxylic acids; carbohydrates; fats; pigments; aromatic nuclei; other biosynthetic products. This book is highly recommended.

[PLANT LIFE LIBRARY, continued on page 55.]

2. LINEAGICS

[DESCRIPTION, CLASSIFICATION, EVCLUTION, AND PHYLOGENY
OF LINEAGES]

AMARYLLIS STARKII SP. NOV.

IRA S. NELSON AND HAMILTON P. TRAUB

Bulbs of this plant were collected in Bolivia by the senior author in 1958, when not in bloom. They bloomed in 1960, 1961 and 1962 at the University of Southwestern Louisiana Ornamental Horticulture Center.



Fig. 7. *Amaryllis starkii* Nelson & Traub, *sp. nov.*, 1- and 2-flowered scapes.

A scape in flower, bulb and leaves were shipped air mail to the junior author in March 1962 for identification. Its suberect posture, subactinomorphic perigone, the relatively small bulbs, and the glaucescent leaves set it off from the rest of the *Amaryllis belladonna* Alliance, and

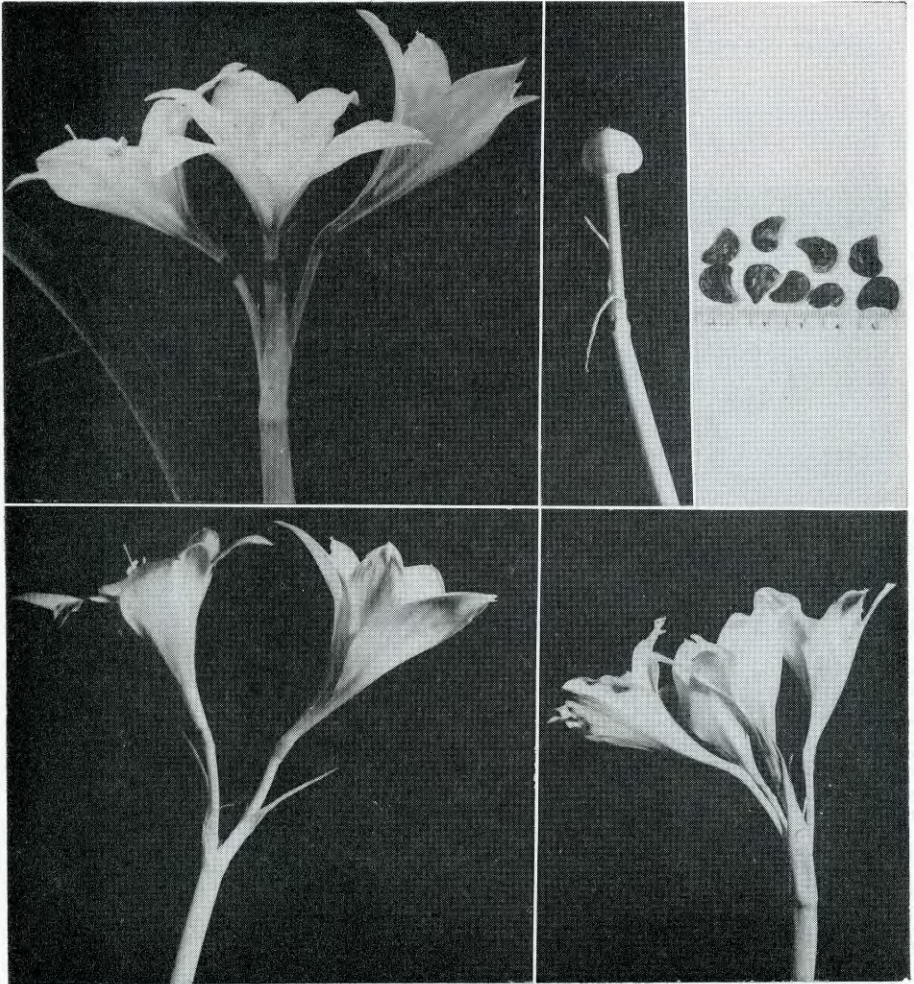


Fig. 8. *Amaryllis starkii* Nelson & Traub, *sp. nov.*, 2-, 3- and 4-flowered scapes; capsule and seeds in upper right.

it represents an undescribed species. It is remarkable that small bulbs may produce scapes with a single flower, but the same bulbs after another year's growth may produce scapes with 2-, 3-, or 4-flowered umbels. It is also characterized by the relatively short, stout tepaltube, and other particulars as indicated in the full description.

The flowers of this species are long lasting (up to 9 days in cultivation), and it should thus prove valuable in breeding hybrid Amaryllis which will produce sub-regular flowers with sub-erect posture.

The new species has been named for Mr. and Mrs. H. J. Lutchter Stark, of Orange, Texas, in recognition of their contributions for ornamental plant explorations, and as a token of esteem in which they are held by the authors.

Amaryllis starkii Nelson & Traub, *sp. nov.*

Bulbus globosus; foliis lanceolato-loratis glaucescentibus; scapo subcylindrico; spatha 2-valvata lanceolata; umbella 1- vel interdum 2—4-flora; pedicellis 2.5 cm. longis; ovario 3-loculato, ovulis per loculo multis; tubo tepalorum crasso 1.8—2.2 cm. longo; perigonio infundibulariforme suberecto; segmentis tepalorum subactinomorphis 6.4—8.2 cm. longis, 2.2—4 cm. latis; staminibus paulo infra apicem tubi tepalorum insertis, paulo declinato-ascendentibus, quam stylo paulo brevioribus; stigmatate capitato breviter trilobato; capsula 3-loculata multiseminata; seminibus D-figuratis planis.

Roots heavy-fibrous to 5 mm. in diameter close to bulb and tapering to tips, well branched 10 cm below bulb, white. *Bulb* globose somewhat flattened longitudinally, to 7.5 cm in diameter, 5.5 cm in height, white. Neck very short, to 1.2 cm long. *Leaves* glaucescent, mostly present at anthesis, 2 to 7, lanceolate-lorate narrowing toward base then widening again at base, to 39.5 cm long, to 3.0 cm wide at base, to 2.2 cm wide at narrowest point, to 3.5 cm wide at widest point 1/3 of length below apex, tapering to bluntly acute apex, flattened V in cross section. *Scape*, sub-cylindrical, somewhat more flattened toward base and at attachment point of spathe valves, hollow, 18.5 cm to 25.6 cm long, 1.0 cm to 1.3 cm in diameter at base, 6.0 mm to 8.0 mm in diameter at apex. *Spathe valves* 2, lanceolate, erect, very light greenish-yellow with infolded margins which shrivel at anthesis, 10.0 cm long, 0.9 cm at base. Several filamentous bractioles present. *Umbel* usually 1-, sometimes 2—4-flowered. *Pedicels* 1.7 cm to 2.5 cm long, 0.4 cm in diameter. *Ovary* 0.8 cm to 1.0 cm long, 4.0 mm to 7.0 mm in diameter, roughly triangular in cross-section. *Tepaltube* stout, widening at apex, 1.8 cm to 2.2 cm long, 1.1 cm to 1.4 cm in diameter at apex, green tinged. *Perigone* funnel shaped, nearly erect, declined at approximately an angle of 125°, limbs spreading but not recurved, tepalsegs overlapping for lower 3/4 of their length. It is among the most regular-flowered species found in the genus—the perigone appearing sub-actinomorphic; delicate satiny azalea pink (RHCC-618/1) or “strong reddish orange” (Nickerson Color Fan 7.5 R 6/12) in color on inside and outside; throat whitish with greenish-bands, nearer to white in center of the throat, with greenish white in between. *Paraperigone* absent, or nearly so, *Tepalsegs* oblanceolate, highly regular. *Setepalsegs* mucronate, upper seg 6.4 cm to 8.1 cm long, 3.4 cm to 4.0 cm wide, Lower two segs 6.8 cm to 8.2 cm long, 3.5 cm to 3.7 cm wide. Two upper petepalsegs 6.4 cm to 7.6 cm long, 2.4 cm to 3.2 cm wide. Bottom seg 6.6 cm to 7.8 cm long, 2.2 cm to 2.7 cm wide. *Stamens* 6, inserted 2 mm below apex of tube, filaments 3.9 cm to 4.5 cm long, white to greenish below, colored same as the perigone above; fasciculate, only slightly declinate-ascending. Anthers 5.0 mm long, pollen bright yellow. Stamens shorter than style and not exerted beyond the perigone. *Style* 7.6 cm to 8.8 cm long, colored as the perigone. *Style* extending about 7 mm beyond the stamens, and not exerted from the perigone. *Stigma* capitate, very shortly 3-lobed. *Fruit*, 3-celled, many-seeded capsule, 2.9 cm in diameter rupturing at maturity. *Seed*, flattened, D-shaped, very thin and paper-like, turning black at maturity, to 1.3 cm long, 0.9 cm wide. *Cytology*, somatic chromosome number $2n=22$. *Habitat*, 950 m altitude. Growing in light sand-humus mixture which overlays gray

bedrock to a depth of 40 cm or more, partial shade exposure. Rainfall seasonal, temperature mild, frost free throughout the year. *Range* extent not known, type colony relatively small, does not exceed 100 clones in the immediate vicinity of a place known locally as the "Natural Arches" about 3 Km southeast of Santiago, Bolivia.

AMARYLLIS CHIONEDYANTHA SP. NOV.

MARTIN GARDENAS, *Bolivia*

This species was collected by J. Saavedra at Cueva de Monos when he was traveling from Rio Sajta to Puerto Villarroel. We received the plants from him for our *Amaryllis* collection. This species is related to *Amaryllis fragrantissima* (subg. *Macropodastrum*) previously described in *Plant Life* by the present writer. It differs from this however in its longer flower, which is the longest among *Amaryllis* known to us, in its clearly cylindrical tepaltube and the yellow-greenish spathe valves.

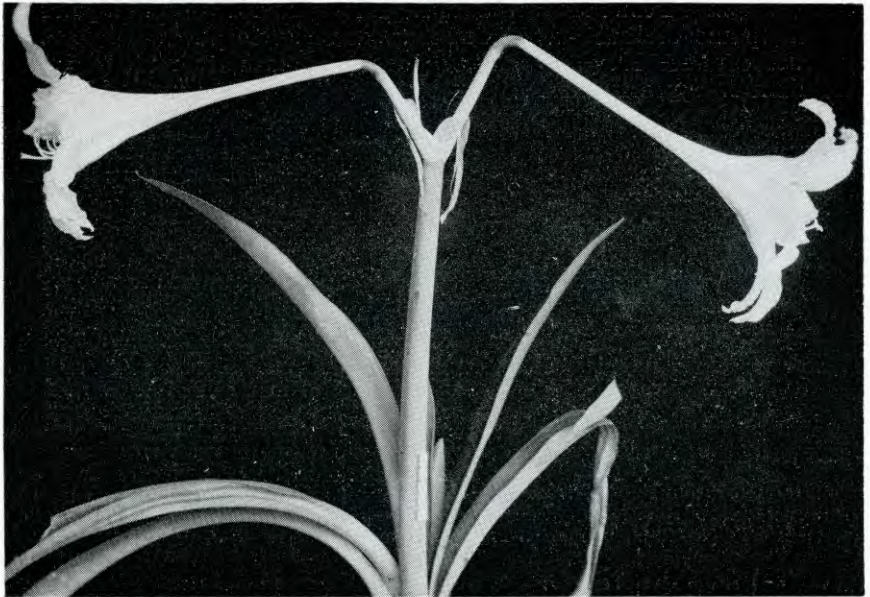


Fig. 9. *Amaryllis chionedyantha* Cardenas, *sp. nov.*, plant in flower, side view.

Amaryllis chionedyantha Cardenas, *sp. nov.*

(*Macropodastrum*) Bulbo magno, 10 cm. long. Pseudocollo brevi, crasso. Foliis plus minusve 12, deorsum deflexis 35-55 cm long., 5-5.5 cm latis. Scapo 40-50 cm long., basim 2-3 cm crasso, glauco viride. Umbella 2 flora. Bracteis spathaceis 11-14 cm long., dilute viridibus. Pedicellis 4 cm long., viride albescentibus. Floribus 28-30 cm long. Ovario cylindrico 1.5-2 cm long., 7 mm crasso, trigono, curvato, atro viride. Tubo 10-14 cm long., 7 mm crasso supra ovarium, inferne viridiscenti, superne niveo. Setepalsegmentis lanceolatis 15 X 3 cm, mucronatis in labro undulatis, niveo albis. Petepalsegmentis lanceolatis 13.5 X 2.5 cm, deflexis in ore undulatis, niveo albis. Staminibus 9-12 cm long. Filamentis albis. Antheris 1 cm long.

curvatis. Stylo plus minusve 11 cm long. albo. Stigma trifida. Lobis 7 mm long. albis.

Patria: Bolivia: Provincia Carrasco, Cueva de Monos in itinere Antahuacana—Rio Sajta, 500 m.

Herbaceous 50—60 cm tall plant. Bulb large, 10 cm long with a short and thick neck. Leaves distichous about 12 deflexed 35-55 cm long, 5-5.5 cm wide, fresh green. Scape 40-50 cm long, grayish green, 2-3 cm thick at base and 2 cm thick at the apex. Umbel 2 flowered. Spathe valves 11-14 cm long, yellow greenish. Pedicels 4-6 cm long, 8 mm thick, very light green. Flowers 28-30 cm long, 19-20 cm limb. Ovary dark green, trigonous, curved, cylindric, 1.5-2 cm long, 7 mm thick. Tepaltube 10-14 cm long, 7 mm thick at base, white greenish below, snow white above. Setepalsegs lanceolate, mucronate, undulate at the borders, 15x3 cm, pure white. Petepalsegs uneven. Laterals lanceolate 13.5 X 2.5 cm. Lower one narrower, 2 cm wide. All petepalsegs snow white and curled at the edges. Stamens inserted at the tube apex, 9-12 cm long, curved at the apex. Filaments pure white. Anthers 1 cm long, curved, yellow. Style not longer than stamens about 11 cm. long, white. Stigma trifid with 7 mm long white lobes.



Fig. 10. *Amaryllis chionedyantha* Cardenas, *sp. nov.*, view into flower.

Bolivia: Province of Carrasco. Department of Cochabamba. On the way from Antahuacana to Rio Sajta. Cueva de Monos J. Saavedra, June 1958. Holotype (nomenifer): No. 5541, in Herbarium Cardenasianum. See Figs. 9 and 10.

HYMENOCALLIS VENEZUELENSIS TRAUB, SP. NOV.

HAMILTON P. TRAUB

On May 30, 1962, Blydenstein (no. 390 = US 2,370,539) collected a *Hymenocallis* species new to science at Estero de Camaguán, State of Guárico, Venezuela, where it is "Fairly common in low wet areas during the first weeks after the start of the rainy season. The leaves die off after the flowers wither."

***Hymenocallis venezuelensis* Traub, sp. nov.** (Amaryllidac.)

Bulbus globosus; foliis linearibus; scapo usque ad 34.5 cm. longo; spatha lanceolata; umbella 5-flora; ovario sessile globoso; ovulis per loculo 3 vel 4; tubo

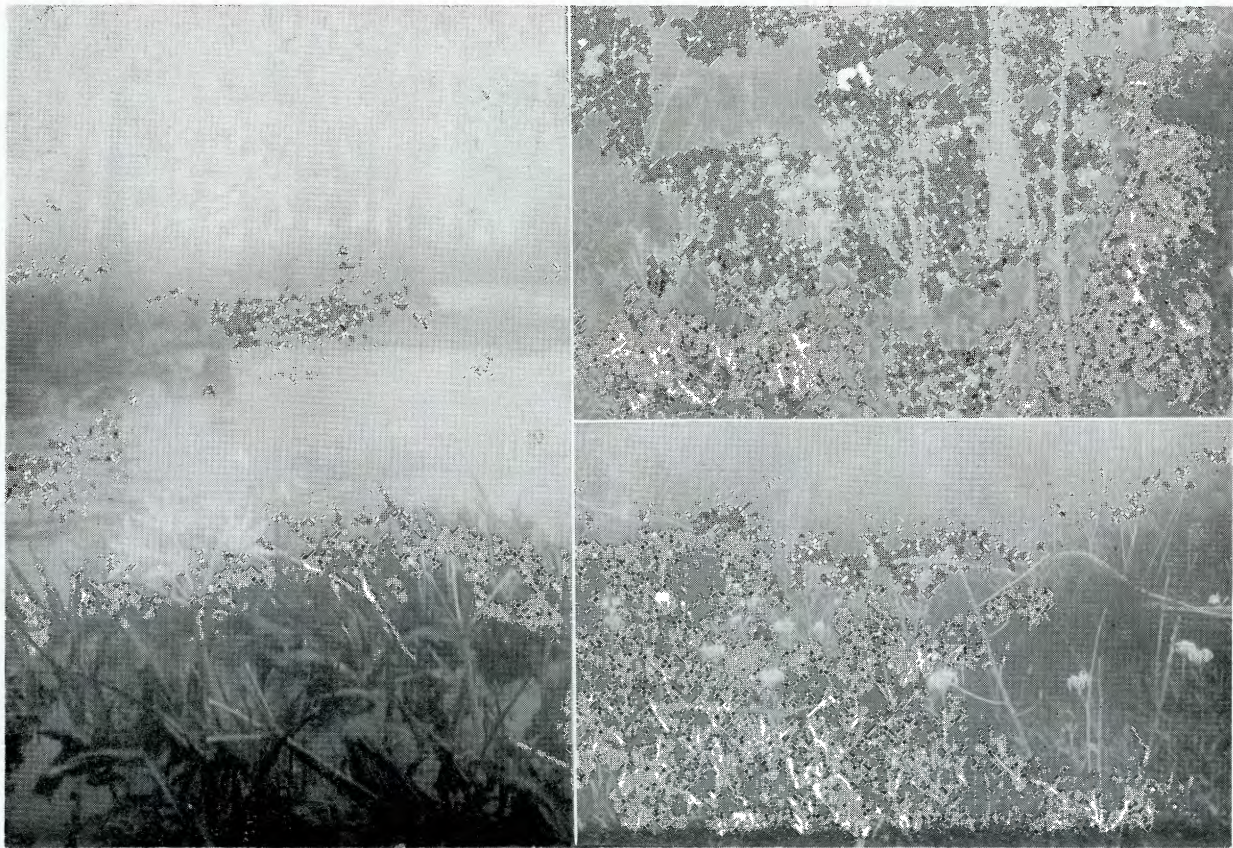


Fig. 11. Right, upper and lower, *Crinum strictum*, on the Neches River, in Jefferson County, on the southeastern edge of the City of Beaumont, Texas, in a small bayou.

Left, *Crinum strictum* var. *traubii*, in overflow swamp on east side of Neches River, in Orange County, within the City limits of Vidor, Texas.

Photos taken on a cloudy day, by Mrs. Carl Shirley.

tepalorum 8.2—8.5 cm. longo; segmentis tepalorum linearibus 7.8—8.2 cm. longis, 0.5 cm. latis; cupula staminorum infundibulariforme 3.5—4 cm. longa; filamentis 2.7 cm. longis; antheris versatilibus; stylo quam staminibus paulo longioribus; stigmatе capitato.

Bulb 4.5 cm. long, 4.2 cm. in diam. (globose), neck 6 cm. long, 2 cm. in diam. *Leaves* several, linear, 26-33-36 cm. long, 1.4 cm. wide below the middle, narrowing gradually to a bluntly acute apex. *Scape* 34.5 cm. long, about 1 cm. in diam. in lower part, narrowing somewhat toward the apex. *Spathe* lanceolate, apex bluntly acute, or acute-truncate. *Umbel* 5-flowered. Lower 2/3 of tepaltube greenish, upper 1/3 yellowish-green, rest of flower white. *Ovary* sessile, globose, 1.3-1.8 cm. long, 0.9-1.0 cm. in diam.; ovules 3—4 per cell. *Tepaltube* 8.2-8.5 cm. long. *Tepalsegs* linear, 7.8-8.2 cm. long, 0.5 cm. wide, apex acute. *Staminal cup* funnel-shaped, 3.5-4 cm. long, margins rising about 0.5 cm. between the filaments, slightly irregularly incised. *Filaments* 2.7 cm. long. *Anthers* versatile, 1.5 cm. long, pollen greenish-yellow. *Style* slightly longer than the stamens; stigma capitate, bluntly 3-lobed.

Holotype (nomenifer): Blydenstein 390 = US 2,370,539, Estero de Camaguán, State of Guárico, Venezuela, May 30, 1962.

This species belongs in the Henryae Alliance, subg. *Hymenocallis*, genus *Hymenocallis* (see PLANT LIFE 18: 55-72. 1962). It is related to *H. praticola* but differs from this in having a longer staminal cup (3.5—4 cm. long), and shorter filaments (2.7 cm. long).

ADVENTURES WITH NATIVE CRINUMS

MRS. CARL SHIRLEY,

1540 Forsythe Street, Beaumont, Texas

Many native Crinum and Hymenocallis can be found along the banks of the Neches River that separates Jefferson and Orange counties, in the central eastern part of Texas. Since childhood, I have been familiar with these "spider lilies" as they are known in this area. My Dad and I spent many hours on the rivers and bayous fishing from a boat and these were always blooming during the summer months. The term "spider lilies" covers both *Hymenocallis* and *Crinum* and few seem to have noticed the difference. *Hymenocallis* start to bloom very early in the season and the Crinum follow—from early July through November.

Some bulbs were collected in September, 1960 near the City of Beaumont, Texas, almost in sight of the skyscrapers (see Fig. 11). The City lies on the banks of this river. Dr. Traub has identified one sent him as *C. strictum*. Some were in bloom at the time. Later, we collected seeds, but I do not know if they were seeds of *C. strictum* or of *C. americanum* which is an earlier bloomer. Most of the seeds were large, with antenna-like tops.

To reach these, my husband, Carl, and I had to go by boat as there is no known road leading to any of the places where they are found. Otherwise, these would be inaccessible, as there is about six miles of swamp on the Orange County side of the river and it is really "primitive," infested with cottonmouth moccasin snakes that will keep you in the boat. A few bulbs can be found scattered along the river banks, but usually are in small overflows from the river or up a little slough where they seem to seek protection, either from the cold or the waves

from the boats going up and down the river. Without exception, these plants were on the North or East side of the banks, which puts them in Orange instead of Jefferson County.

The tides from the Gulf of Mexico affect this river. The bulbs are always covered with some water and at times completely covered, foliage and all. As the tides recede, the water level changes and rarely can one find them growing where there is no water over them. Salt water also backs up into the river and I am sure, at times, it is really "brackish." It was found to be salty fourteen miles up the river recently.

The soil is heavy clay, black and mucky. Bulbs are usually barely covered to the neck, but some are about one-half out of the soil. We found only one place where you could get on the bank to collect them, and this was at low tide. We collected a few and Dr. Moldenke has identified them as *Crinum strictum* var. *traubii*. We did not venture over an area greater than five by ten feet. In this small area, we found tracks of deer, raccoon, mink, bobcats, nutria and others we could not identify. Evidently they had come to drink from the river.

It is my belief that *C. americanum*, *C. strictum*, and *C. strictum* var. *traubii* grow together as they are scattered blooms in most places at different times of the summer and fall. I will check these more closely next year and bring in more bulbs from different places to grow and further check the blooming season of each. The blooming time for *C. americanum* is early July to August; *C. strictum* apparently blooms in September; and *C. strictum* var. *traubii* flowers in October and November, and even later into December in cultivation in California.

We checked for bulbs up and down the river from the City of Beaumont for a distance of about ten miles or more. We found them to range that far. They are noticeably scarce along the most traveled part of the river, indicating they would be washed loose and float away from that area. My husband and a friend checked these by flying over them and they report that there are some deep into the swamp or marsh, but they could not tell whether they were crinums or *Hymenocallis*.

To collect them might take four or five trips before you can find them again. During the rainy seasons, the water in the river is up and they are covered. If the water is down, the tide might be in. So, they have to be checked when everything is just right. And you will decide to dig most of them without getting out of the boat!

Under date of October 10, 1962, Mrs. Shirley writes:—

You asked for the locations of collection: Figs. 11, right, were of the pink ones which we found up a small bayou just in the southern edge of the City of Beaumont off the main course of the Neches River, on the east bank which would be apparently in Jefferson County and within the City limits. The others (Figs. 11, left) are from a greater distance in the overflow or swamp. This was across the main course, up a bayou just north of the City and on the Orange County side (considered part of the City of Vidor, Texas). Orange and Jefferson counties are separated by the Neches River and Beaumont is in Jefferson

County. The River runs almost due north and south. Vidor is east of Beaumont 6 miles, and the swamp is between them. The bulbs were found on the north side of the Bayou. There are a very few scattered bulbs on the south side of the shores. There they grow in water almost without exception. The tide affects even the bayous and the water may recede enough so that they are uncovered, but with the next tide they are again covered, at least a few inches, or up to 18 inches so that the leaves barely show.

LOUISIANA CRINUMS

BARRY W. CLARK, *New Orleans, Louisiana*

We have been collecting native crinums for several years now, and have noticed some variation in *Crinum americanum*. This plant is generally of two different types in the wild. The first type is remarkably uniform in flowering and growth habits. The plants are small, compact with short leaves, and bear four flowers per scape. The plants generally bloom at one time.

The second type is much more variable in all respects. The individual plants may bloom from spring to late summer and each scape bears 2-4 flowers. Some plants have flowers with twisted and curled tepalsegs. The leaves are long and are of shaggy growth. We are growing both types under nearly identical conditions to determine if the differences are due to environmental conditions or represent natural variations.

Another type of *Crinum* collected is what we believe to be *C. strictum*, which has not been up to now reported as growing in Louisiana. This plant is not plentiful in the wild, but should be propagated so it could be widely cultivated. *C. strictum* is easily distinguished by its rough edged sub-erect leaves and the tepaltube which remains during seed maturation. Our plants differ from the previously described type plant in being larger with longer leaves and tall flower scapes.

There may be 2-5 or 7 flowers (var. *traubii*) on a 24 inch scape. No bulbs were observed with six flowers. In the wild only a few seeds are produced, but with hand pollination under cultivation, many more result.

Both of the above *Crinums* deserve to be more widely grown because of their open faced fragrant flowers which measure up to 9 inches in diameter and are pure white with carmine red stamens and style. Anyone who has *Crinums* surely should have these two in their collection, as they make an excellent show, especially when planted in masses.

REFERENCES

- Traub, H. P. Robust Form of *Crinum Americanum*? *Plant Life*, 1958, page 51.
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VARIATION IN *CRINUM FLACCIDUM*

L. S. HANNIBAL

For some hundred years there has been considerable confusion over *Crinum flaccidum* Herb., and in several instances the plant has been keyed out and published with the caption of *C. pedunculatum*, a *Crinum* which resembles *C. asiaticum*. The confusion increased when a number of variants were recently collected and flowered in Australia. The general trend of the discussions indicated that there was difficulty concerning the subgenera classification—Whether the flowers exhibited bilateral symmetry as in subgenus *Codomocrinum*, or radial symmetry with lance like tepalsegs which identifies subgenus *Platyaster*. And to add to the confusion there was no agreement as to the arrangement of



Fig. 12. *Crinum flaccidum*, yellow-flowering form, near Pichi-Richi Pass, Flinders Range, South Australia; spring growing and flowering.

the stamens, whether spreading or if contiguous and declinate. Photographs indicated both conditions and also disclosed that the tepaltube lengths varied significantly, that some were slightly curved, and that in some the tepalsegs formed a funnel form arrangement while in others they opened flatly (patent) as in *C. americanum*. The one thing in common was the long slender recurving foliage which tends to drop down upon the ground. Preliminary surmises were that there were two or more similar species involved which belonged to different subgenera. The fact that white, pink, and yellow or cream colored blossoms were available tended to bear this out.

Finally a yellow flowered form was flowered at the Los Angeles

Arboretum (Fig. 12), only to be followed by a bulb in the writers greenhouse. The latter was from an alkaline desert area some forty miles east of Adelaide. This plant had been the cause of much of the discussion regarding identity so it received close attention. It turned out to be variable in performance. The pedicel of the first blossom was barely a half inch long when the flower-bud opened and the tepaltube was scarcely two inches long. In place of being straight as expected the tepaltube bent sharply to the horizontal with a near 90 degree turn. The setsegs were semi-deciduous, and the petsegs opened flatly with spreading stamens. The second blossom repeated the unusual pattern except that the setsegs were better formed, but the bent tepaltube and spreading anthers were quite an oddity. Then the third blossom shot up and it had a six-inch tepaltube which was not curved. In place of the tepalsegs being patent, the limb was symmetrically funnellform complete with spreading anthers. The fourth blossom was like the third, but in this instance the stamens were contiguous and declinate. Was the plant subgenus *Platyaster* or *Codonocrinum*? The stamens were noted to be attached to the base of the limb in place of the apex of the tepaltube as occurs in *Codonocrinum*. The degree of development of the attachment area determined the arrangement of the anthers. As additional blossoms opened the variations of form continued. Temperature and sunlight were noted to have some influence on the strange behavior. Then photos of the bulb which flowered at the Los Angeles Arboretum's greenhouse arrived. The stamens were all spreading. Subsequently the writer has flowered several more bulbs and a re-evaluation of collected species was made in Australia.

The possibility of several species or different subgenera being involved can be rejected. The species appears to belong to *Platyaster*. Numerous variants exist covering an area of 1500 miles diameter in scattered localities. Some forms grow on semi-bogland and others are adapted to the most arid of deserts. Two strains grow in alkaline soil with a pH of 8 to 9. All are fragrant, but some are near to sickening, particularly when conditions become humid at sundown. In the north along the Darling River basin (in New South Wales) the blossoms of *Crinum flaccidum* are completely patent. In some instances blossoms with declinate stamens prevail on some bulbs in place of spreading stamens. Often both flower types occur in the same umbel. Near Quirindi in N. S. W., plants have been found which have broad elliptical tepalsegs. In an adjacent area the tepalsegs are of varying shades of pink in place of white. The tepaltubes of all forms are long and erect. Most of the bulbs grow in overflow land and flower with the late summer rains.

In contrast the bulbs growing out in the desert east of Lake Eyre exhibit tepalsegs with an amber hue. Under the arid conditions the bulbs are found down some 30 inches away from the heat and nearer to moisture. Root systems spread twelve feet in diameter have been noted. Flowering occurs in the early spring when a heavy rain occurs. Since less than three inches per annum of rain falls, the bulbs often remain deciduous for several years.

Usually patent shaped blossoms with slender tepalsegs are found along the flood plains of the Murray River in South Australia. The prevailing color is white but amber is not uncommon. However the plants found growing up on the higher alkaline terraces tend to have funnel-form limbs and often display slightly curved tepaltubes. Those about Mannum are most representative. The most striking variant is the yellow flowered strain found growing in the rocky Pichi-Richi pass in Flinders range, which is 200 miles north of Adelaide. These bulbs have funnel-form blossoms with relatively short tepaltubes, and also seem to be quite hardy to our winter conditions. Of all the types this group appears to be most promising for California gardens.

Initial tests indicate that *C. flaccidum* is a good breeder. Crosses have been effected with *Crinum moorei* and *C. pedunculatum*. Dean Herbert crossed it with *C. asiaticum* sometime previous to 1835. Since our *C. americanum* is also a member of Subgenus *Platyaster* serious effort should be made to cross it and *Crinum flaccidum*. The combinations with either the pink or yellow *C. flaccidum* would be of particular interest and it is possible that the resulting hybrid would be fertile.

Further investigations are also in order in Australia, particularly in Queensland and the northern territory since several *Platyaster* forms may be subtropical variants of *C. flaccidum*. *C. pestilentis* unquestionably is a tropical variant of *flaccidum*. And finally an investigation of the species shown in Botanical Magazine 47: t. 2133, leads to the conclusion that the plant may not have had the proper growing conditions under glass in England and that the flower buds were never properly matured when they opened. This may have resulted in its classification as *Codonocrinum*.

The writer wishes to thank David Symon, Systematic Botanist of Waite Institute, and Dr. William Morris of the New Castle Hospital Biochemical Laboratory, for their generous assistance in the preparation of material which has made this study possible.

ZEPHYRANTHES HOWARDII SP. NOV.

HAMILTON P. TRAUB

This plant was first found growing in Laredo, Texas, by Mr. Fred B. Jones on July 4, 1954. A specimen without leaves (No. 902-B, TRA) was received from him. Since there are various hybrids to be found in Texas, it was considered necessary to rediscover this plant in the wild if it were to be considered as a candidate for species rank. On one of his collection trips to Mexico, Dr. Thad Howard did actually find this plant growing in the State of Leuva Leon, in the mountains north of Monterey. He sent bulbs to the writer under date of May 14, 1956. When these bloomed on May 29, 1956, it was at once apparent that this plant was the same as the Fred B. Jones collection in Laredo, Texas. The plant comes nearest to *Zephyranthes concolor* but it differs from that species—the leaves are narrower, the flower is upright and somewhat smaller, the flower color is light yellow, the stamens are longer

than the style, and there are other differences. Thus it is in fact a species new to science. It has been named in honor of Dr. Thad Howard who first collected the species in the wild, and is noted for his outstanding *Zephyranthes* hybrids, and for his amaryllid collecting trips into Mexico.

***Zephyranthes howardii* Traub, sp. nov.**

Haec species a "Z. concolor" foliis angustioribus, floribus erectis leviter minoribus flavidulis, staminibus quam stylo longioribus, et caeteris characteribus differt.

HOLOTYPE: Traub No. 900 (TRA), 5-8-58, grown from bulbs collected in the state of Neuva Leon, Mexico, in the mountains north of Monterey in 1956. Paratypes: Traub No. 902-A, 5-29-56; and Fred B. Jones No. 902-B, 3-27-56.

HYMENOCALLIS VELARDEI SP. NOV.

HAMILTON P. TRAUB

In October 1961, Dr. Joseph C. Smith of La Mesa, Calif., brought to the writer a plant in flower grown from a bulb collected by Dr. C. Vargas, Dept. La Libertad, Prov. Trujillo, alt. 500 m. in sandy places. Dr. Smith indicated that a specimen of it could be made for the Traub Herbarium. It was at once apparent that it was a species in the subgenus *Elisena* of the genus *Hymenocallis* and nearest to *H. longipetala*. A description was made from the living plant. Since it differed from *H. longipetala* in a number of characters it was considered as a new species. It would have been named for Dr. Vargas, but there is already *Hymenocallis* (sug. *Pseudostenomesson*) *vargasii* (Velarde) Traub, which had been named for Dr. Vargas by his colleague Dr. Velarde of the University Cuzco, Peru. Thus it has been named for Dr. Velarde.

***Hymenocallis* (subgenus *Elisena*) *velarde* Traub, sp. nov.**

Haec species a "*H. longipetala* (Lindl.) Macbr." praecipue pedicellis 6 mm. longis (vs. ovaria paene sessile), tubo tepalorum 5 mm. longo (vs. 6—9 mm. longo), segmentis tepalorum 7.4 cm. longis (vs. 10 cm. longis), cupula staminorum 2.4 cm. longa (vs. 3.8 cm. longa), et filamentis 5.2 cm. longis (vs. 6.4 cm. longis) differt.

Holotype: Dr. Joseph C. Smith no. 890a+b (TRA), 10-3-61, cult. La Mesa, Calif. grown from bulbs collected in Prov. Trujillo, Peru by Dr. C. Vargas.

The species differs from *H. longipetala* in having pedicels 6 mm. long (ovary nearly sessile), tepaltube 5 mm. long (vs. 6—9 mm. long); tepalsegs 7.4 cm. long (vs. 10 cm.); staminal cup 2.4 cm. long (vs. 3.8 cm.); and filaments 5.2 cm. long (vs. 6.4 cm.) long in *Hymenocallis longipetala* (Lindl.) Macbride.

LYCORIS X LAJOLLA HYBR. NOV.

HAMILTON P. TRAUB

In 1956, the writer made reciprocal crosses of *Lycoris aurea* Herb. and *L. traubii* Moldk. The first of these seedlings flowered in 1961 and flowers were again obtained in 1962. These plants promise to be useful ornamental garden plants. The characters of the parents are variously dominant in the F-1 generation—leaves glabrous, spathe ovate, pedicel short and with flower shape similar to *L. aurea*. In 1962 the flowers were selfed but only one seed has set. The second generation seedlings will be raised beginning with this one seed and additional seeds to be obtained in later years.

Lycoris* × *lajolla* Traub, *hybr. nov.

Planta inter "*Lycoris aurea*" et "*L. traubii*" in utramque partem hybrida; plantae generationis primae foliis glabris, spatha ovata, pedicellis brevibus, colore formaque sicut *L. aurea*.

The leaves are glabrous, spathe ovate, pedicels short, and flower shape and color is similar to that of *L. aurea*.

HOLOTYPE: Traub no. 880a+b, 9-13-61 (TRA), grown at La Jolla, Calif.

EARLY BURSTING OF OVARY IN HYMENOCALLIS

HAMILTON P. TRAUB

In connection with the exposition of his theory of the angiosperm flower, Melville (Kew Bull. 16: 41, 1962) refers to "Gymnospermous Angiosperms". This condition is due to the rupture of the capsule by differential growth rates of its parts. Melville states that "such a lack of coordination of growth rates might be expected in the early evolution of a structure like that of the angiosperm ovary." He cites various examples. To this list might be added the genus *Hymenocallis* which is notorious in this respect. Unless the seeds are underdeveloped, the ovary walls are usually broken early in the development of the seeds which may protrude as a group so that the ovary wall is not noticeable. This is particularly true in *Hymenocallis mexicana* (L.) Herb. ex Druce, a dwarf species of easy culture which might be used as an experimental object for the study of lack of coordination of growth rates in ovary and seed development in angiosperms.

LYCORIS SANGUINEA AND L. "CINNABARINA"

WILLIAM LANIER HUNT, *North Carolina*

The existence of at least three different burnt orange lycorises in my collection makes me begin to wonder if it is not going to take quite some time and work to unscramble the sanguinea-cyrtanthiflora-koreana complex.

Two different lycorises have come to me from different sources as *L. sanguinea* Maximowicz. The first one has flattish tepalsegs which

reflex slightly but have absolutely no crimping or curling. The head of flowers measures $7\frac{1}{2}$ inches across. Pedicels are upright, $1\frac{1}{2}$ inches long. Spathe valves are $1\frac{1}{4}$ inches long and $\frac{1}{2}$ inch wide after drying. (See Fig. 13.) This flower looks very much like the illustration at Fig. 3 A, Traub & Moldenke, "Amaryllidaceae: Tribe Amarylleae", 179. 1949.

The other plant that came to me as *L. sanguinea* is only about a third of the size of the above described plant. The tepalsegs are not crimped nor reflexed, and the total result is that of a large bright deep apricot freezia. This is naturally a small plant as I have it because it is growing in rich soil and has flowered several times as a dwarf. A mass of these would be beautiful in the summer garden, but they are small and ephemeral. (See Fig. 13.)

Lycoris "cinnabarina" looks to me like what Col. Grey called *L. sanguinea cyrtanthiflora* Hort. Grey, Hardy Bulbs 2: 58. 1938. (See Fig. 13.) The color of this flower is "burnt orange" HCC-014/1, one of the most stunning colors imaginable. The main differences between this plant and the larger *sanguinea* described above lie in the slightly crimped tepalsegs, the reddish brown pedicels (They are green in *L. sanguinea*) and the much earlier blooming season. *L.* "cinnabarina" flowers several weeks (beginning as early as July 7th, 1962) earlier than the two types of *L. sanguinea*. In fact, they just barely overlap. As shown in Fig. 13, seeds have formed on *L.* "cinnabarina". This is the same scape shown by itself in flower in Fig. 13. The vases are $6\frac{5}{8}$ inches tall.

By no stretch of the imagination can I get any of these three flowers to be "brick red". They are burnt orange or apricot to me. Only one, the little one, answers to the description of *L. sanguinea* as having "segments that are neither crisped nor reflexed" as old John Weather says in his reliable bulb book of 1911. No matter what the true *L. sanguinea* is like, we certainly have three distinct plants here.

It may even be possible that there are still other types. Among the several hundred bulbs I have, there is some strange looking foliage that singles it out from its fellows in March. The foliage of all these bulbs is, of course, contemporary with that of *L. squamigera*. It is shorter and more grey green than that of *L. radiata* though quite similar, with the typical ridge down the back. Incidentally, in with the different batches of *L.* "cinnabarina" have come some *L. radiata* bulbs that flower at a different time from the season of any of the three types of *L. radiata* in my collection. These will bear watching for fertility possibilities.

L. "cinnabarina" is self fertile as will be seen by the seeds formed in the vase. There is no other amaryllid blooming at the time this flower opened except crinums. I have had a bitter contest with a little creature that looks like a bee. [See also *Herbertia* 3:111-112. 1936.—*Ed.*] It has been necessary to go out in the heat of the middle of the day or in late morning and collect pollen just before anthesis takes place because this little creature is apt to beat me to it if I am late. The minute anthesis takes place, he and his children are there gathering



Fig. 13. *Lycoris* species: left, flower scapes—tall form, *L. sanguinea*, tepalsegs not crisped, pedicels green, July 29, 1962; dwarf form, *L. sanguinea*, tepalsegs neither crisped nor reflexed, July 27, 1962. Scape with seed pods—*L. "cinnabarina"*, same as scape in flower to right, now gone to seed. Right, *L. "cinnabarina"*, tepalsegs burnt orange and slightly crisped; pedicels brownish. July 7, 1962. The vases are 6 $\frac{5}{8}$ " high. Photos by William Lanier Hunt.

pollen and storing it on their "hind" legs. They are so greedy for it that they will almost allow me to close them up in the medicine capsules I use to store pollen. Again, as fast as pollen is brushed onto stigmas, the tiniest members of this insect family can light right on the stigma and steal it away. The larger insects have to alight in the flowers and climb out on the styles, but baby can snatch it off while flying by! If these little creatures were not so intriguing, more pollenating might be done. By repollenating the stigmas several times in the day, I seem to have overcome the difficulty because seeds have been produced right along.

Pollen of *L. "cinnabarina"* has inspired *L. squamigera* to produce lots of seeds this year—whether parthenocarpic or just dead seeds remains to be seen. Last year, after some 44 crosses on one of the new "whites", I harvested one healthy looking seed which failed, however, to come up. With a dessicator full of pollen, everything in sight is destined for pollination from these beautiful burnt orange flowers this year.

The blooming performance of *L. "cinnabarina"* and the two sanguineas is not as good as it might be. They have been through five and three extra snowy, cold winters respectively here in middle North Carolina at 500 feet elevation. Temperatures were occasionally low in March at the time when the foliage is about grown. Low temperatures held back *Cyclamen repandum* nearby, and it seems that these lycorises were adversely affected. Only about one sixth of several hundred bulbs have bloomed, and the same has been true of *L. squamigera*.

Whatever these variations on the same theme turn out to be, they are welcome in the mid-summer garden in the South, for they are truly exotic. With any blue flowers like the veronicas, they are stunning. None of the brownish orchids is more beautiful or unusual.

SPROUTING CLIVIA CYRTANTHIFLORA SEEDS

HAMILTON P. TRAUB, *California*

In the past, seeds of *Clivia cyrtanthiflora* were planted directly in a potting medium of 1/3 each of granulated peat, coarse sand and garden loam. In each case the seeds failed to sprout, and gradually decayed. A change in procedure was indicated.

On March 23, 1961, the writer harvested 17 seeds of *Clivia cyrtanthiflora*. These were placed in a plastic bag together with a quantity of vermiculite which had been sparingly wetted. The closed bag was placed in the garage and was forgotten. Recently, on July 15, 1961, the writer remembered about the seeds, and was pleasantly surprised to find that 16 out of the 17 seeds had germinated with leaves 2 inches long, and roots from 2 to 5 inches long. The seedlings were then planted in the potting medium previously described. The seeds had apparently sprouted some time previously, and normally would have been potted earlier.

The writer desired selfed seedlings of *Clivia cyrtanthiflora* in order to check the statements in the literature to the effect that this is a hybrid. If the seedlings will segregate in the direction of the reported parents according to the Mendelian ratios, then the hybridity of this plant can be established. If the seedlings come true to form, then the plant is apparently a true species and not a hybrid, unless parthenocarpy is involved. This latter possibility is unlikely however.

CRYPTOSTEPHANUS VANSONII

GORDON McNEIL, *South Africa*

Cryptostephanus vansoni Verdoorn was found by Georges van Son in 1935 in the Vumba Mountains of Southern Rhodesia. Baker places this genus near *Narcissus* due to the corona in the blossom, however the plant resembles a *Clivia*. It produces a thin flattened peduncle and the umbel of blossoms resembles that of *Tulbaghia fragrans*, particularly in the internal structure of the flowers. The segments are star shaped opening white and fading to a violet mauve. The fruit is a scarlet berry containing one or two spherical seeds some 3 mm. in diameter. The seeds take 18 months to ripen. Dr. Gouws reports the chromosome number as $2n=24$. A few plants are grown for botanical interest at the Pole-Evans garden in Southern Rhodesia.

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.]

Elisena sublimis Herb. Bot. Mag. pl. 3873.—scape 9 inches tall; spathe 3 inches long, 6-flowered; peduncles $\frac{3}{8}$ ths to $\frac{3}{4}$ of an inch long; limb becoming whitish, 2 inches long, surpassing the filaments by $\frac{3}{4}$ of an inch; corona about $\frac{3}{4}$ of an inch long, acutely many-dentate; style subequaling the limb or finally surpassing it by half an inch; stigma minute. Specimen collected by J. MacLean in the Andes of Caxamarquilla.

Hymenocallis adnata var. *disticha* Herb. Amaryll. 215. 1837.—*P. distichum* Bot. Mag. 44 (1879) as to the plant of Herbert, not as to the illustration. The tepaltube and segments $4\frac{1}{2}$ inches long, the leaves somewhat broader and more nervose.

Hymenocallis crassifolia Herb. Amaryll. 215. 1837.—From Port Saint Mary, western Florida, lat. about 29° . Leaves thick, suberect, lorate, obtuse, canaliculate, almost 36 inches long, 2 inches wide, green; corona of the perianth almost like that in *H. caribaea*, tepaltube longer.

Pseudourceolina Vargas, Bol. Facult. Sci. Univ. Cuzco, No. 1: 7-8. 1960. Bulb pyriform, 32—35 mm. long, 22—24 mm. in diameter, the neck 15—18 mm. long; leaves produced after the time of anthesis, similar to those of the genus *Eucharis*, acuminate, long-petiolate; scape to 14 cm. long, 2-flowered; pedicel long, slender, pendulous; perianth yellow, urceolate to $\frac{1}{3}$ the height, and with the stamens similar to those in the genus *Urceolina*, but the tepals only connate half way up; free stamens equaling the tepals; gynoeceum rather long. It differs from the genera *Eucharis* and *Urceolina* in its leaves and perianth. Type species, *P. robledoana*.

P. robledoana Vargas, l. c. Leaves 2, produced after the time of anthesis; petioles 6—8 cm. long, slightly alate; blade 12—15 cm. long, 8—9.4 cm. wide, acuminate, obscurely parallel-veined, the acumen 6—8 mm. long; flowering scape to 14.5 cm. long, 8 mm. wide at the base; bracts yellow, membranous, 30 mm. long,

4.5—5 mm. wide; umbel 2-flowered; pedicels pendulous, 3—3.5 cm. long; ovary pale-yellow, subglobose; perianth yellow, green at the apex, 4.5—5 cm. long, the tube narrow to 1/3 its length, 1—1.5 mm. wide, finally expanding and 18—25 mm. wide; tepals connate to the middle beyond that free; stamens exerted, narrow, yellow, free; anthers 2.5—3 mm. long; style longer than the stamens; stigma more narrow; fruit not seen. The species is dedicated to Luis Maria Robledo.

Tribus *Traubiae* Moldenke, *tribus nov.*, genus *Brunsvigia* Heist. (Amaryllidac.)

Rhizoma bulbosa; foliis hysteranthis; scapo gracile usque ad 3.5 cm. longo; spatha bivalvata quam pedicellis longioribus; ovario inferiore 3-loculato, ovulis per loculo multis; tepalis 6 linearibus acutis patentibus, nervis 3 purpureis in centro ornatis; filamentis filiformibus purpureis quam tepalis dimidio brevioribus; antheris ad basin sagittatis quam filamentis vix dimidio brevioribus; stylo gracile purpureo quam staminibus paulo longioribus; lobis stigmatibus vix aspectabilibus.

Typus: genus *Traubia* Moldenke, gen. nov. (Amaryllidac.)

Rhizoma bulbosa; foliis hysteranthis; scapo gracile usque ad 3.5 cm. longo; spatha bivalvata quam pedicellis longioribus; ovario inferiore 3-loculato, ovulis per loculo multis; tepalis 6 linearibus acutis patentibus, nervis 3 purpureis in centro ornatis; filamentis filiformibus purpureis quam tepalis dimidio brevioribus; antheris ad basin sagittatis quam filamentis vix dimidio brevioribus; stylo gracile purpureo quam staminibus paulo longioribus; lobis stigmatibus vix aspectabilibus.

Typus: *Traubia chilensis* (F. Phil.) Moldenke, *comb. nov.*; syn.—*Lapidia chilensis* F. Phil., in Anal. Univ. Chile xciii: 144-145, Lam. VI. 1896.

[PLANT LIFE LIBRARY, continued from page 36.]

TAXONOMY OF SETARIA (GRAMINEAE) IN NORTH AMERICA, by J. M. Rominger. University of Illinois Press, Urbana, Ill. 1962. Pp. 132. Illus. This monograph on the 43 species of the North American foxtail or bristle grasses incorporates the research reported in the literature of the past 40 years relating to the taxonomy, morphology, cytology, anatomy, geographical distribution and economics of *Setaria*. The author has studied about 6,000 pertinent herbarium specimens and has made field collections and observations in the course of the preparation of this monograph. Highly recommended.

FLOWERING TREES OF THE WORLD: FOR TROPICS AND WARM CLIMATES, by E. A. Menninger. Hearthside Press, 118 E. 28th St., New York 16, N. Y. 1962. Pp. 336. 425 Illustrations. \$18.95. This book is based on experience gained from a quarter century devoted to the study of flowering trees for subtropical and tropical climates. In the present book, 500 of the finest flowering trees have been selected, and they are described, and many of them are illustrated in color or black and white. At the end of the book, valuable indices are included—flowering trees by special features, half-hardy trees, color of flowers, leaf color other than green, quickie guide for travelers, common and scientific names. This most attractive book is highly recommended.

COMPARATIVE PLANT ANATOMY, by Sherwin Carlquist. Holt, Rinehart & Winston, 383 Madison Av., New York 17, N. Y. 1961. Pp. 146. Illus. \$5.00. This important new book is presented as a guide to taxonomic and evolutionary data in angiosperms on a comparative basis. After considering the ethics of comparison, the chapters are devoted to cellular components, epidermis and trichomes, xylem, phloem, vascularization of the shoot, root, histology of the stem, leaf, and flower and associated topics. This stimulating guide is highly recommended to all who are interested in the comparative anatomy of the angiosperms.

[PLANT LIFE LIBRARY, continued on page 62.]

SOMATIC CHROMOSOMES OF **WORSLEYA RAYNERI**

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The "Blue *Amaryllis*," long carried under the name *Amaryllis procera*, had its nomenclature reconsidered by Traub and Moldenke in 1949. At that time the taxon was given the new combination *Worsleya rayneri* (J. D. Hooker) Traub and Moldenke.

Traub had earlier (1939) established the monotypic genus *Worsleya*, separating it from the genus *Amaryllis* L. chiefly because of its four spathe-valves, rather than two; its D-shaped, rather than discoid, round or subglobose seed; and its bulb with a long aerial neck, rather than a bulb with no—or a very short—aerial neck.



Fig. 14. Somatic chromosomes from a root-tip of *Worsleya rayneri* (J. D. Hooker) Traub and Moldenke. $2n=42$. X2500.

Worsleya rayneri has been found to have 42 somatic chromosomes (Figure 14). These may be divided into 16 longer, 8 shorter, and 18 intermediate ones so far as length is concerned. Of the 16 longer ones, one pair has approximately median centromeres, 5 pairs are submedian, and 2 are subterminal. The 18 chromosomes of intermediate length are made up of 6 pairs with submedian centromeres and 3 pairs with subterminal ones. The 8 shorter chromosomes are apparently divided equally into groups with median or with submedian centromeres. The longest chromosomes are 6 microns, and the shortest are about two microns, in length.

A number of *Amaryllis* species, in contrast, have 22 somatic chromosomes, although polyploids with 33, 44, 66 and 77 chromosomes, re-

spectively, are known. Our single bulb of *A. aulica* is aneuploid with 23 somatic chromosomes. The somatic chromosomes of *Amaryllis* range from approximately 4 to 10 microns in length, when preparations are fixed and prepared in the same way as were our *Worsleya* slides (root-tips pretreated with 0.2% colchicine 2 hours; fixed in 3:1 acetic alcohol over night; squashed in aceto carmine).

The monotypic *Worsleya rayneri* thus not only has a different chromosome number than found in *Amaryllis*, but in our preparations these chromosomes have been smaller, and there has been a slight difference in the proportions of observed types (a somewhat higher proportion of ones with median centromeres, and a somewhat lower proportion of those with subterminal constrictions)—when compared with known *Amaryllis* chromosome complements. The cytological picture thus tends to confirm the correctness of separating *Worsleya* from *Amaryllis*.

The 42 chromosomes of *Worsleya*—both in number and type—suggest, however, a possible derivation from a tetraploid *Amaryllis*, and a close affinity to the latter genus.

LITERATURE CITED

Traub, H. P. *Herbertia* 6:118-119. 1939.

_____ and H. N. Moldenke. *Amaryllidaceae: Tribe Amaryllaeae*. 22-24. 1949.

AMARYLLID NOTES, 1963

HAMILTON P. TRAUB, *California*

HABITAT OF AMARYLLIS × MOSTERTII

This naturalized hybrid was collected by Mr. Leon Boshoff-Mostert near Acornhoek, District of Pilgrims Rest, in Eastern Transvaal Lowveld. He writes that "Reliable old-timers who have known these flowers all their lives, having grown up there, assure me that the plant can be found there in the wilds of those areas over a radius of some 30 or 40 miles." The type (nomenifer) specimen (see *Plant Life* 17: 55. 1961) was prepared from a plant grown from stock propagated by Mr. Boshoff-Mostert from his Acornhoek collection.

× *Rhodcbranthus molfinoi* Traub, **hybr. nov.**

Planta hybrida sterilis, spatha infra connata, interdum prope usque ad basin fisso, floribus "spinel"-rubris.

Hybrid between *Rhodophiala spathacea* (Herb.) Traub and *Habranthus juncifolius* Traub; spathe united below, sometimes almost cut to the base; flowers spinel pink. Holotype: Traub No. 601 (TRA) 9-11-57, and No. 600, 8-27-57, paratype.

When X *Rhodobranthus woelfleanus* Traub was described (*Plant Life* 14: 48. 1958; 15: 41. 1959), *Rhodophiala spathacea* (Herb.) Traub was included under *Rhodophiala bifida* (Herb.) Traub. Thus the hybrids of *Rhodophiala spathacea* with *Habranthus juncifolius* Traub

(Herbarium specimens Nos. 600 and 601 TRA) were included under *Rhodobranthus woelfleanus*. With the recognition of *Rhodophiala spathacea* (Herb.) Traub as a distinct species (see Plant Life 17: 55. 1961), these two specimens have to be considered as the basis of a distinct new hybrid, which is hereby named \times *Rhodobranthus molfinoi* Traub, in honor of Dr. Jose F. Molfino, Director of Instituto de Botanica y Farmacologia, Buenos Aires, who sent the bulbs of the Argentinian plant that was later recognized as *Habranthus juncifolius* Traub.

Subg. **Moldenkanthe** Traub, **subg. nov.**, genus *Brunsvigia* Heist. (Amaryllidac.)

Umbellae multiflorae; pedicelli graciles 6-9-15-30 cm. longi; ovarium 7 mm. longum 3.5 mm. diametro; tubus tepalorum rectus 7mm. longus; segmenti tepalorum 2.8-3 cm. longi, supra mediam 3-4 mm. lati; stamina usque ad 3 cm. longi; stylus usque ad 2.5 cm. longus; stigma minutum; capsula parva acute triquetra, semine singulo globoso juxtim apex placentae posito sessile.

Differs from subgenera *Coburgia* (Herb.) Traub, and *Brunsvigia*, of genus *Brunsvigia* Heist., in having a single globose seed sessile near the apex of the placenta.

Type: *Brunsvigia kirkii* Baker, Amaryll. 99. 1888. Tanganyika: Kirk, Usagura [= Uluguru?] Mts. (fide Baker, Amaryll. 99. 1888); R. M. Davies 747= 47-220 (SRGH), Mbosi (dist.), Zambi, alt. 5500 m. 11-15-32.

Subgenus **Vallota** (Herb.) Traub, **comb. nov.**, genus *Cyrtanthus* (Amaryllidac.)

Syn.—Genus *Vallota* Herb., App. Bot. Reg. 29. 1821.

Type: ***Cyrtanthus purpureus*** (Ait.) Traub, **comb. nov.**

Note.—A new combination with “speciosus” is ruled out by the prior *C. speciosus* Dyer, Fl. Pl. S. Afr. 22: pl. 868. 1942.

Syn.—*Crinum speciosum* L. f. Suppl. 195. 1781; *Amaryllis speciosa* (L. f.) L'Hérit. Sert. Angl. 12. 1788; *Amaryllis purpurea* Ait. Hort. Kew. 1. 417. 1789; *Vallota purpurea* (Ait.) Herb. App. Bot. Reg. 29. 1821; *Vallota speciosa* (L. f.) Durand & Schinz, Consp. Fl. Afr. 5: 258. 1893 (1895).

With the description of *Cyrtanthus gutbrierae* L. Bolus (in Ann. Bolus Her. 3: 76. 1921) which is allied to *Vallota speciosa* (L. f.) Durand & Schinz, the genus *Vallota* became untenable. Either the former species had to be transferred to *Vallota*, or *Vallota* had to be reduced to *Cyrtanthus*. Since species of *Cyrtanthus* cross with *Vallota speciosa* there is very close relationship, and *Vallota* has to be reduced to the earlier genus *Cyrtanthus*.

***Cyrtanthus* \times *brownii* traub, hybr. nov.** (Amaryllidac.)

Planta hybrida inter “*C. sanguineus* var. *flammeus*” ♀ et “*C. purpureus*” ♂, habitu parentis polleniferi sed foliis angustioribus, umbella nonnulliflora, et floribus intermediis recedit.

Hybrid between *Cyrtanthus sanguineus* var. *flammeus* ♀ and *C. purpureus* ♂. Habit resembles pollen parent, but leaves are narrower, umbel is several-flowered; flowers are intermediate. Type: Fig. 177, in La Semaine Horticole 3: 376. 1899.

Named for the renowned N. E. Brown, of the Royal Botanic Garden, Kew, who first reported this hybrid as “*Cyrtanthus hybrida*” (in Gard. Chron. 24: 391 (Sept. 26) 1885, and indicated that *Vallota* should be reduced to *Cyrtanthus*. Other reports include “*Vallota hybrida*” in La Semaine Hort. 3: 376, Fig. 177. 1899; W. Miller & F. T. Hubbard, in Bailey, Standard Cyclopaedia of Hort. ed. 1930, p. 3429; and Weston, in Herbertia 4: 188, plate 67 (on page 58). 1937.

Pancratium centralis (Chev.) Traub, **comb. nov.**

Syn.—*Mizonia centralis* Chev., in Rev. Bot. Appliq. 30: 626; 628, Pl. 33 & 34. 1950.

Lectotype of **Zephyranthes insularum** Hume ex Moldk.

In 1959, Dr. H. H. Hume kindly donated a specimen ex-10725 Hume & West (now No. 622, TRA) which is one of the specimens on which he based the original description of *Zephyranthes insularum* Hume ex Moldk. Bulbs were collected from culture at Key West, Florida by H. H. Hume and E. West, and grown at Gainesville, where the specimens were taken on June 14, 1936. This specimen is now designated as the lectotype of this species in place of temporary lectotype indicated in Taxon 7(4): 111. 1958.

Lectotype of *Zephyranthes insularum* Hume ex Moldk., Hume & West No. 622 (TRA), formerly Hume & West 10725, Herbarium, Univ. of Florida, Agr. Expt. Sta. All other Hume & West 10725 specimens are designated as isolectotypes. Traub Nos. 306 and 502 are designated as paratypes.

X **Brunserine** Traub, **hybr. gen. nov.**, (Amaryllidac.)X **Brunserine tubergenii** Traub, **hybr. nov.**

Plantae inter species generum *Nerine* et *Brunsvigia* hybridae, habitu intermediae. Hybrid between species of *Nerine* and *Brunsvigia rosea* (Lam.) Hann., intermediate between the genera. Type: Fig. 1, Plant Life 14: 20, 1958.

Brunsvigia rosea (Lam.) Hann. **emend.** Traub (Amaryllidac.)

Haec species solum formas tardifloras (Septembro et tardiore) prius in hoc apposite inclusas comprehendat.

Brunsvigia major Traub, **sp. nov.** (Amaryllidac.)

Haec species solum formas praecocifloras (tarde Julio per Augustam) prius in "B. rosea" inclusas comprehendat.

Holotype: Traub No. 811a+b+c (TRA), 8-30-60, originally from South Africa, specimen from plants cultivated at La Jolla, Calif. Paratype: Traub No. 835a+b+c+d (TRA), 8-10-56, cult. La Jolla, Calif.

Hymenocallis x spofforthiae (Herb.) Traub, **comb. nov.**

Syn.—*Ismene x spofforthiae* Herb. in Bot. Reg. 20: pl. 1665. 1834: Amaryll. 223; 224. 1837. "Sulphurea" Worsley, *Herbertia* 1: 56. 1934. *Hymenocallis narcissiflora* x *H. amancaes*.

Lectotype: plate 1665, Bot. Reg. Lond. 20: 1834. Specimen: Traub. No. 860a+b+c (TRA), cult. La Jolla, Calif. 4-2-61.

Notes.—This plant is similar to the parents; the flowers are sulfur yellow. This cross has been repeated by others, particularly in Holland, and in the United States. The Dutch bulb dealers list a number of clones, including 'Sulfur Queen'.

Herbert (Amaryll. 224. 1837) crossed *Hymenocallis x spofforthiae* with *H. amancaes* ♂ and from this expected to obtain a more vigorous *H. amancaes*. He did not report further on this cross.

Herbert used the name "*Hymenocallis x spofforthiae*" (in Amaryll. 218: 410. 1837, *nomen nudum*) for a reported cross between *Hymenocallis rotata* var.

disciformis ♀ and *H. adnata* var. *disthica* ♂, but this never flowered, and thus was never described. Thus this is a *nomen nudum* and the name is available for a new combination.

Amarylloidinae Traub, *infrafam. nov.* (*Amaryllidac.*)

Paraperigonium adest vel nullum; stamina insolenter manifeste mutata. Typus: Genus *Amaryllis* L.

Pancreatioidinae Traub, *infrafam. nov.* (*Amaryllidac.*)

Paraperigonium nullum: stamina plerumque mutata aut libera et inferne incrassata vel diverse appendiculata vel inferne in cupulo staminali unita. Typus: Genus *Pancreatium* L.

Gageeae Traub, *tribus nov.* (*Amaryllidac.*)

Inflorescentia subumbellata vel umbellata; ovarium superius; perigonium in segmentis 6 divisum. Typus: Genus *Gagea* Salisb.

Clivieae Traub, *tribus nov.* (*Amaryllidac.*)

Rhizoma subbulbosa vel bulbosa sparse tunicata; scapus solidus; tubus tepalorum brevis; segmenti tepalorum 6 divaricati; fructus baccatus. Typus: Genus *Clivia* Lindl.

Stenomesseae Traub, *tribus nov.* (*Amaryllidac.*)

Folia sessilia vel petiolata; cupula staminalis plerumque adest vel stamina insolenter libera; semina dura angulares vel plana saepe alata. Typus: Genus *Stenomesson* Herb.

Alliinae Traub, *subtribus nov.*, tribu *Allieae* Kunth (*Amaryllidac.*)

Perigonium regulare, tepalis 6; pedicelli ad apicem non articulati; rhizoma bulbosa tunicata. Typus: Genus *Allium* L.

Brodiaeeinae Traub, *subtribus nov.*, tribu *Allieae* Kunth (*Amaryllidac.*)

Perigonium regulare, inferne tubulosum, superne in segmentis 6 divisum; rhizoma cormosa; pedicelli ad apicem saepe articulati. Typus: Genus *Brodiaea* J. E. Smith.

Millinae Traub, *subtribus nov.*, tribu *Allieae* Kunth (*Amaryllidac.*)

Rhizoma cormosa; perigonium regulare; ovarium ad apicem gynophorii positum. Typus: Genus *Milla* Cav.

Platyphyllanthae Traub, *subgenus nov.*, genus *Galanthus* L. (*Amaryllidac.*)

Folia in vernationi convoluta. Typus: *Galanthus platyphyllus* Traub & Moldk.

Hymenocallis x *lajolla* Traub, *hybr. nov.* (*Amaryllidac.*)

Plantae hybridae inter *H. narcissiflora* et *H. vargasii*; floribus erectis; tubo tepalorum viridi, residuum floris album; filamenta staminorum leviter incurva; cetera parentibus intermedia. Holotypus: Traub No. 929 (TRA), 7-18-62.

Crinum x *lajolla* Traub, *hybr. nov.* (*Amaryllidac.*)

Plantae hybridae inter *C. strictum* var. *traubii* et *C. moorei*; umbella 6-flora; floribus non late patentibus; tubo tepalorum curvato; foliis tenuibus laete viridibus; cetera parentibus intermedia. Holotypus: Traub No. 938 (TRA), 8-9-62.

Nectaroscordum tripedale (Trautv.) Traub, *comb. nov.* Syn.—*Allium tripedale* Trautv. in Tr. S. P. B. Bot. Sada (A.H.P.)11: 485. 1873.

TRISTAGMA POEPP

Poeppig (1833) proposed the genus *Tristagma*, with *T. nivale* (*T. nivale* Poepp. ex Endl., 1835) as the type. This generic name has priority over *Ipheion* Raf. (1837) with a type (*I. uniflorum* (Lindl.) Raf.) which has to be transferred to *Tristagma* Poepp., on phylogenetic grounds. Baker (1871) transferred *Tristagma nivale* to the synonymy of *Milla* Cav. (1793), but such a placement is untenable on phylogenetic grounds. The species of *Tristagma* have long been recognized whereas the genus *Ipheion* Raf. has only lately (1943, 1955) been recognized to a limited

extent. The name *Gardinia* Bert. (1829) has never come into use, and thus should not be considered. Thus it would be improper to conserve the latter two over the first named. The following named species of *Tristagma Poepp.* have been described:

1. *Tristagma ameghinoi* (Speg.) Speg., in Anal. Mus. Buenos Aires 7: 172. 1902.
2. *Tristagma australe* Neger ex Dusen, in Ergebn. Schwed. Ex. Magell. 111. v. 207.
3. *Tristagma chubutense* Gandoger, in Bull. Soc. Bot. France 1919. lxxvi. 292. 1920.
4. *Tristagma dimorphopetalum* C. Gay, Fl. Chil. 6: 126.
5. *Tristagma eremerophyllum* Speg. in Anal. Mus. Buenos Aires 7: 171.
6. *Tristagma inflatum* Rendle, in Jour. Bot. 325. 1904.
7. *Tristagma nrvale* Poepp., Fragm. Syn. Pl. Chile, 9. 1833; Poepp. & Endl., Nov. Gen et Sp. ii. 28, pl. 140. 1835.
8. *Tristagma philippii* Gandoger, in Bull. Soc. Bot. France 1919. lxxvi. 292. 1920.
9. *Tristagma pulchellum* Speg. in Anal. Mus. Buenos Aires. 7: 172.

The following species described under *Beauverdia*, *Brodiaea*, *Milla*, *Nothoscordum*, or *Triteleia*, have been transferred to *Tristagma* Poeppig on phylogenetic grounds:

Tristagma violaceum (Kunth) Traub, *comb. nov.* Syn.—*Triteleia violacea* Kunth. Enum. Pl. 4: 468. 1843.

Tristagma bivalve (Lindl.) Traub, *comb. nov.* Syn.—*Triteleia bivalvis* Lindl., in Bot. Reg. 15: sub pl. 1293, in adnot. 1830.

Tristagma setaceum (Bak.) Traub, *comb. nov.* Syn.—*Milla setaceum* Bak., in J. Linn. Soc. Bot. 11: 385. 1871.

Tristagma lloydiflorum (Beauv.) Traub, *comb. nov.* Syn.—*Nothoscordum lloydiflorum* Beauv., in Bull. Herb. Boiss. ser. 2. 8: 998, fig. 2. 1908.

Tristagma vittatum (Griseb.) Traub, *comb. nov.* Syn.—*Milla vittata* Griseb., in Goett. Abh. 24: 318. 1879.

Tristagma birtellum (Kunth) Traub, *comb. nov.* Syn.—*Triteleia birtella* Kunth, Enum. Pl. 4: 465. 1843.

Tristagma felipponei (Beauv.) Traub, *comb. nov.* Syn.—*Nothoscordum felipponei* Beauv., in Bull. Soc. Bot. Geneve, ser. 2.13: 267. 1921.

Tristagma lorentzii (Herter) Traub, *comb. nov.* Syn.—*Beauverdia lorentzii* Herter, in Boissiera 7: 509, fig. 54. 1943.

Tristagma sellowianum (Kunth) Traub, *comb. nov.* Syn.—*Triteleia sellowiana* Kunth, Enum. Pl. 4: 466. 1843.

Tristagma poeppigianum (C. Gay) Traub, *comb. nov.* Syn.—*Triteleia poeppigiana* C. Gay, in Fl. Chil. 6: 117. 1853.

Tristagma porrifolium (Poepp.) Traub, *comb. nov.* Syn.—*Triteleia porrifolia* Poepp., in Fragm. synop. Phaner. Chil. 10. 1833.

Tristagma patagonicum (Bak.) Traub, *comb. nov.* Syn.—*Milla patagonica* Bak., in J. Linn. Soc. Bot. 11: 383. 1871.

Tristagma spegazzinii (Macloskie) Traub, *comb. nov.* Syn.—*Brodiaea spegazzinii* Macloskie, in Rept. Princeton Univ. Exped. Pat. 8: 305. 1903-06.

Tristagma tweedianum (Griseb.) Traub, *comb. nov.* Syn.—*Milla tweediana* Griseb., in Goett. Abh. 24: 318. 1879.

Tristagma sessile (R. A. Phil.) Traub, *comb. nov.* Syn.—*Triteleia sessilis* R. A. Phil., Linnaea 29: 72. 1857-58.

Tristagma viridor (Killip) Traub, *comb. nov.* Syn.—*Brodiaea viridor* Killip, in J. Wash. Acad. Sci. 16: 566. 1926.

Tristagma circinatum (Sandwith) Traub, *comb. nov.* Syn.—*Brodiaea circinata* Sandwith, in Hook. Ic. Pl. 5th. ser. 4: pl. 3350. 1937.

Tristagma uniflorum (Lindl.) Traub, *comb. nov.* Syn.—*Triteleia uniflora* Lindl., in Bot. Reg. 15: sub pl. 1293, in nota. 1829; 23: pl. 1921. 1837.

Tristagma gracile (R. A. Phil.) Traub, *comb. nov.* Syn.—*Triteleia gracilis* R. A. Phil., Anal. Univ. Chil. 550. 1875.

Tristagma brevipes (Kunze) Traub, *comb. nov.* Syn.—*Triteleia brevipes* Kunze, in Linnaea 20: 9. 1847.

Tristagma recurvifolium (C. W. Wright) Traub, *comb. nov.* Syn.—*Brodiaea recurvifolia* C. W. Wright, in Bull. Misc. Inf. Kew. 117. 1915.

X *Urecocharis* Mast. ex Traub, **hybr. gen. nov.** (Amaryllidac.)

Plantae inter generum *Urceolina* et *Eucharis* hybridae, habitu intermediae. Type: X *U. cibranii* Mast. in Gard. Chron. ii. 214. fig 36. 1892; and Gartenfl. xli (1892) 501.

[PLANT LIFE LIBRARY, continued from page 55.]

INTRODUCTORY MYCOLOGY, ed. 2., by C. J. Alexopoulos. John Wiley & Sons, 440 Park Av. So., New York 16, N. Y. 1962. Pp. 613. Illus. \$12.00. This second edition of an outstanding text on mycology will surely be welcomed by all students of the subject—undergraduate, graduate and interested laymen. The author has incorporated the latest findings into his discussions on morphology, systematics, physiology and genetics. Thus it is particularly refreshing to note that he has had the courage to recast the classification of the fungi along new lines in harmony with recent research. The material is presented in four parts: (a) organisms of uncertain origin; (b) the lower fungi; (c) the higher fungi, and (d) lichens. It is to be regretted that Dr. Alexopoulos had to omit the Schizophyta due to space limitations imposed by rising publication costs. This well-written, stimulating text is recommended without reservations to all interested in mycology.—*H. P. Traub.*

QUANTITATIVE CHEMICAL TECHNIQUES OF HISTO- AND CYTO-CHEMISTRY, by D. Glick. John Wiley & Sons, 440 Park Av. So., New York 16, N. Y. 1962. Pp. 470. Illus. \$14.50. This first of two volumes on small volume work in quantitative histo- and cytochemistry was written for the purpose of "gathering into a more easily available and usable form the widely scattered techniques and methods" in the fields indicated. The sections of the book are (1) preparation of biological sample; (2) measurement of sample; (3) general apparatus and manipulation; (4) gasometric techniques; (5) electrometric techniques; (6) dilatometric techniques; and (7) fluorometric techniques. There is a bibliography, list of manufacturers, buffer tables, and index. This outstanding book is highly recommended to all workers in this field.

CUCURBITS, by T. W. Whitaker and G. N. Davis. John Wiley & Sons (Interscience Div.), 440 Park Av. So., New York 16, N. Y. 1962. Pp. 250. Illus. \$11.50. This critical survey of all aspects of knowledge concerning the cultivated cucurbits by two outstanding authorities satisfies a long felt need. After considering the geographic origin of the important cultivated cucurbits—watermelon, cucumber, gherkin, muskmelon, dish-rag gourd, pumpkins, gourds, and chayote, chapters are devoted to (1) general morphology and anatomy, (2) taxonomy of cultivars, (3) cytogenetics and plant breeding, (4) effect of environmental factors on growth and development, (5) culture, (6) seed production, (7) diseases and insect pests, (8) harvesting, transportation, storage and marketing, and (9) composition and uses. There is a bibliography, table of conversion factors, subject and author index. The text is adequately illustrated, including one color plate. This attractive book is recommended to all interested in cucurbits.

THE MICROBIOLOGY OF THE ATMOSPHERE, by P. H. Gregory. John Wiley & Sons, 440 Park Av. So., New York 16, N. Y. 1961. Pp. 251. Illus. \$10.50. This first comprehensive book by an outstanding authority in this new field of research—spore dispersal and the mechanism by which this is achieved—will be of interest to those entrusted with the control of epidemic diseases, and to all interested in the distribution of bacterial, fungal and plant life. This book should contribute toward answering such questions as to how spores become air borne, how they are transported, and how and where they are deposited. There is an extensive bibliography, a subject index and an author index. The illustrations are outstanding, including color plates for visual identification. Highly recommended.

[PLANT LIFE LIBRARY, continued on page 68.]

REGISTRATION OF NEW AMARYLLID CLONES

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

This department has been included since 1934 to provide a place for the registration of names of cultivated *Amaryllis* and other amaryllids on an International basis. The procedure is in harmony with the INTERNATIONAL CODE OF BOTANICAL NOMENCLATURE (edition publ. 1961) and the INTERNATIONAL CODE OF NOMENCLATURE FOR CULTIVATED PLANTS (edition publ. 1958). Catalogs of registered names, as well as unregistered validly published names, will be published from time to time as the need arises. The first one, "DESCRIPTIVE CATALOG OF HEMOROCALLIS CLONES, 1893-1948" by Norton, Stuntz and Ballard was published in 1949. This may be obtained at \$2.50 prepaid from: Dr. Thos. W. Whitaker, Executive Secy., THE AMERICAN PLANT LIFE SOCIETY, Box 150, La Jolla, Calif. CATALOG OF HYBRID NERINE CLONES, 1882-1958, by Emma D. Menninger; and CATALOG OF BRUNSVIGIA CULTIVARIS, 1837-1959, by Hamilton P. Traub and L. S. Hannibal, were published in 1960 Plant Life, with additions to both in Plant Life 1961. In Plant Life 1961, the first edition of THE GENUS X CRINODONNA was published which serves also as a catalog of cultivars. A catalog of *Amaryllis* names and also catalogs of the names of other cultivated amaryllids, are scheduled for publication in future issues.

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

Correspondence regarding registration of all amaryllids such as *Amaryllis*, *Lycoris*, *Brunsvigia*, *Clivia*, *Crinum*, *Hymenocallis*, and so on, should be addressed to Mr. W. D. Morton, Jr., Registrar, 3114 State Street Drive, New Orleans 25, Louisiana. The registration fee is \$2.00 for each clone to be registered. Make checks payable to AMERICAN PLANT LIFE SOCIETY.

Registration of *Nerine* cultivars.—Under date of Oct. 15, 1962, Dr. H. R. Fletcher, Secretary, International Commission for Horticultural Nomenclature and Registration, writes, "I am happy to be able to inform you that at the XVIth International Horticultural Congress, held in Brussels in August-September, 1962, the Council of the International Society for Horticultural Science agreed to the American Plant Life Society acting as International Registration Authority for Cultivars of *Nerine*."

AMARYLLIS BREEDERS, 1952 TO PRESENT TIME

Edward F. Authement, *Assistant Registrar*

The following list of recent *Amaryllis* breeders (who have named and registered *Amaryllis* clones since 1952) was compiled from Plant Life, 1952 to the present time. There are other *Amaryllis* breeders who have not yet named and registered *Amaryllis*

clones. They, and others who later enter this field, will be added in the coming years in the *Amaryllis Year Book*.

The abbreviations were adopted after consultation with Messrs. W. D. Morton, Jr., Robert G. Goedert, and Dr. Hamilton P. Traub.

Abbrevia-
tion

Amaryllis Breeder

-
- Beck—Mr. Ralph H. Becker, 1823 Treasure St., New Orleans, La.
 BM—Mr. Leon Boshoff-Mostert, Kleinskuur, Balfour, Transvaal, So. Afr.
 Both—Mr. E. Both, Adelaide, Australia
 Cal.—Mr. Tim Calamari, 1623 Pauger Dr., New Orleans, La.
 Clem.—Mrs. Margie Clements, 703 Ridgewood Dr., Metairie, La.
 Cron.—Mrs. John F. Cronin, P. O. Box 207, Lutz, Fla.
 Dorr.—Mrs. H. E. Dorr, 33 Oaklawn Dr., Metairie, La.
 Dug.—Mr. R. E. Duggan, 6864 Milne St., New Orleans, La.
 HDL-G.—Harry de Leeuw Co. Ltd., South Africa. Wholesalers only. Clones registered exclusively, and sold in U. S. A., by Mr. Robert D. Goedert, Jacksonville, Fla.
 Eub.—Mr. R. W. Eubank, 1301 York St., Corpus Christi, Tex.
 Fitch.—Mr. Charles Marden Fitch, 1120 Cove Rd., Mamaroneck, New York.
 Font.—Mr. Henry P. Fontcuberta, 2717 Cleveland Av., New Orleans, La.
 Gasp.—Mr. S. P. Gasperecz, 1219 Short St., New Orleans, La.
 Har.—Mrs. H. L. Harris, 3645 S. Saxet Dr., Corpus Christi, Tex.
 Henry—Mrs. Mary G. Henry, Gladwyne, Penna.
 Kl.—Mrs. John Klein, Jr., 2504 Mistletoe St., New Orleans, La.
 Lud.—Ludwig & Co., P. O. Box 18, Hillegom, Holland.
 Mitch.—Mrs. Donald Mitchell, 1443 Arabella St., New Orleans, La.
 Mull.—Mr. Bobby Mullen, 1814 Independence St., New Orleans, La.
 Park.—Mrs. Isabelle Parker, 424 Crawford, Biloxi, Miss.
 Perr.—Mr. W. J. Perrin, 4753 Press Dr., New Orleans, La.
 Pick.—Mrs. A. C. Pickard, 1702 N. Blvd., Houston 6, Tex.
 Raa.—Mr. R. E. Raasch, 345 Deddridge St., Corpus Christi, Tex.
 Ram.—Mr. Charles Ramelli, 126 Jeff Davis Ave., Biloxi, Miss.
 Schm.—Mr. Frederick B. Schmitz, Rt. 1, Box 438, Port Sulphur, La.
 Sol.—Mr. Robert L. Solomon, 3806 42nd St., Tampa, Fla.
 St.-J.—Mrs. Harry St. John, 2614 Holly Grove, New Orleans, La.
 Terry.—Mr. J. W. Terry, 1107 Mamie St., Hattiesburg, Miss.
 Traub—Dr. Hamilton P. Traub, 5804 Camino de la Costa, La Jolla, Calif.
 VM—Messrs. G. C. van Meeuwen & Sons, Heemstede, Holland
 VW—M. van Waveren & Sons, Hillegom, Holland
 CW—C. Warmenhoven, Holland. Wholesaler only. Business was started in 1962 by Cornelius Warmenhoven II. Clones registered by Robert D. Goedert, Jacksonville, Fla.
 WSW—W. S. Warmenhoven, "Zonnewende", Holland. Wholesaler only. U. S. Agent, P. J. Komen, Anna Paulowna, Holland. Business started in 1923 by Willem S. Warmenhoven, the eldest son of Cornelius Warmenhoven I. Sells bulbs under brand name "Royal Dutch". Clones registered by Claude W. Davis, Baton Rouge, La.
 WWZ—W. Warmenhoven & Zonen, Holland. (1860-1962). Founded by Willem Warmenhoven in 1860, who was succeeded by his son, Cornelius I, who died in 1936. His two younger sons, Simon and Cornelius II, jointly carried on the business until 1962.
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HYBRID AMARYLLIS CLONES

Registered by Ludwig & Co., Hillegom, Holland:

Amaryllis clone 'Home Decorator'; reg. A-702-D5A, 7-3-62; 26"-28" high; umbel 4-fld; fls 8"-9" wide; poppy red (16/1), suffused salmon, slightly darker throat.

Amaryllis clone 'Dutch Doll'; reg. A-703-D5A, 7-3-62; 22"-24" high; umbel 4 or more-fld; fls. 7"-9" wide; picotee type—dainty red edge on each pure white seg.

Amaryllis clone 'Square Dance'; reg. A-704-D5A, 7-3-62; 26"-28" high; umbel 4-fld; fls. 9"-10" wide; picotee type—broad red edge on each white, slightly wavy seg; throat apple-green.

Amaryllis clone 'Streaking Stripes'; reg. A-705-D5A; 7-3-62; 26"-28" high; umbel 4-fld; fls. 8"-9" wide; pure white with mandarin red stripes on each seg; throat apple green; 3 inner segs slightly bearded.

Amaryllis clone 'Trixie'; reg. A-706-D5A, 7-3-62; 22"-24" high; umbel 4-fld; fls. 8"-9" wide; cherry red (722/2), changing to tyrian rose (24/1); throat slightly deeper; orange dusted in full sun.

Amaryllis clone 'Winter Carnival'; reg. A-707-D5A; 7-3-62; 25"-27" high; umbel 4-fld; fls. 9"-10" wide; pure white at first with deep green throat, segs changing to a suggestion of light yellow when the throat changes to whitish.

Registered by W. S. Warmenhoven, (by P. J. Komen), Anna Paulowna, Holland:

Amaryllis clone 'Marion'; reg. A-682-D4A; 7-8-62; 22"-23" high; umbel 4-fld; spr.; fls. 8"-8½" wide; white, shading to light creamy yellow on edges of segs; three upper segs marked with claret rose (021).

Amaryllis clone 'Blushing Beauty' (formerly Rose Queen); reg. A-683-D5A, 7-8-62; 22" high; umbel 3—4-fld; fls. 8" wide; azalea pink (618), with underlay of white.

Amaryllis clone 'Elvira Aramayo'; reg. A-684-D5A, 7-8-62; 20" high; umbel 4-fld.; fls. 7" wide; carmine red (21), overlaid with magenta rose (027), giving reddish purple effect.

Amaryllis clone 'Oasis' (formerly Snow Queen); reg. A-685-D5B, 7-8-62; 21" high; umbel 3—4-fld.; spr.; fls. 7½" wide; pure white with greenish throat.

Amaryllis clone 'Golden Triumphator'; reg. A-686-D5A; 7-8-62; 24" high; umbel 3—4-fld; spr.; fls. 9½" wide; mars orange (016), slightly blending to light golden orange, throat brick red (016).

Amaryllis clone 'Maryland'; reg. A-687-D5A; 7-8-62; 20" high; umbel 3—4-fld; spr.; fls. 8" wide; begonia (619) shading to scarlet bands on each side of upper segs; lower segs begonia with white mid-stripe.

Amaryllis clone 'Catherine Valente'; reg. A-688-D5B, 7-8-62; 23" high; umbel 3—4-fld; spr.; fls. 7" wide; frosted delft rose (020/1) with markings of geranium lake (20) toward the throat in upper segs.

Amaryllis clone 'Orange Favorite'; reg. A-689-D5A, 7-8-62; 15" high; umbel 3—4-fld; spr.; fls. 6½" wide; polychrome, Indian orange (713) with glowing red throat.

Amaryllis clone 'Orange Wonder'; reg. A690-D5A, 7-8-62; 20" high; umbel 3—4-fld; spr.; fls. 7" wide; Indian orange (713) blending to glowing capsicum (715).

Amaryllis clone 'Television'; reg. A-691-D5A, 7-8-62; 17"-20" high; umbel 4—5-fld; spr.; fls. 6½" wide; French rose (520) blended with white to give a frosted effect; upper segs marked with porcelain rose (620) on each side of midstripe.

Amaryllis clone 'Rotterdam'; reg. A-692-D5A, 7-8-62; 20" high; umbel 4-fld; spr.; fls. 7"-8" wide; currant red (822/2), deepening to (821) in throat; round form, slightly bearded in throat.

Amaryllis clone 'Brilliant Star'; reg. A-708-D5A, 7-8-62; 20" high; umbel 4-fld; spr.; fls. 6" wide; currant red (821) self, deepening in the throat.

Amaryllis clone 'Dutch Master'; reg. A-709-D5A; 22" high; umbel 3—4-fld; spr.; fls. 7½" wide, blending of rose Bengal with white base, midrib and edges white.

Amaryllis clone 'Extase'; reg. A-710-D5A, 7-8-62; 36" high; umbel 3—4-fld.; fls. 9" wide; orange red with fine white margins on each seg.

Amaryllis clone 'Florien'; reg. A-711-D5A, 7-8-62; 24" high; umbel 4-fld.; spr.; fls. 8" wide, a blend of white and rose madder (23), white band in center of segs.

Amaryllis clone 'Floriade'; reg. A-712-D5A, 7-8-62; 24" high; umbel 4-fld., fls. 9" wide, a soft blend of white and rose pink (427).

Amaryllis clone 'Little Diamond'; reg. A-714-D5A; 7-8-62; 18" high; umbel 4-fld.; spr.; fls. 8" wide; dawn pink (523) with white midrib in each seg; round, flat flower.

Amaryllis clone 'Mount Everest'; reg. A-715-D5A; 7-8-62; 22" high; umbel 3—4-fld.; spr.; fls. 8½" wide; orient pink (416) and China rose (024).

Amaryllis clone 'Pink Beauty'; reg. A-719-D5A, 7-8-62; 20" high; umbel 3—4-fld.; fls. 7" wide, rose pink (427) blending with white on upper 3 segs; lower segs white with tinge of orient pink (416/3).

Registered by Robt. D. Goedert, Jacksonville, Fla., for W. Warmenhoven & Zonen:

Amaryllis clone 'Irene'; reg. A-713-D5A, 7-8-62; 18" high; umbel 4-fld.; fls. 8" wide; Salmon pink (619) with lighter seg margins; round flower.

Amaryllis clone 'Orange Nassau'; reg. A-716-D5A; 18" high; umbel 3—4-fld.; spr.; fls. 7" wide, burnt orange (01), gold dusted in strong light; a beautiful combination.

Amaryllis clone 'Madame Curie'; reg. A-717-D5A, 7-8-62; 14" high; umbel 3—4-fld.; spr.; fls. 6" wide, shrimp pink (616), self, deeper veins, and throat.

Amaryllis clone 'Mount Blanc'; reg. A-718-D5A, 7-8-62; 18" high; umbel 3—4-fld.; spr.; fls. 6" wide; pure white, segs ruffled; greenish throat.

Registered by Frederick B. Schmitz, Port Sulphur, Louisiana:

Amaryllis clone 'Flame'; reg. A-693-D7; 4-10-62; 20"-21" high; umbel 4-fld.; fls. 6" wide, vermilion (18) self.

Amaryllis clone 'Neel'; reg. A-694-D5A, 4-10-62; 18"-20" high; umbel 4-fld.; spr.; fls. 7" wide; orient red (819) self, with greenish throat.

Amaryllis clone 'Kaye'; reg. A-695-D5A, 4-10-62; 21"-22" high; umbel 3-fld.; spr.; fls. 6½" wide, jasper red (018) with faint white streak in center of segs; light greenish throat.

Amaryllis clone 'Grace'; reg. A-696-D5A, 4-10-62; 18"-19" high; umbel 3-fld.; spr.; fls. 6" wide, white edged with orient red (819/1).

Amaryllis clone 'Miss Annie'; reg. A-697-D4A, 4-10-62; 18" high; umbel 4-fld.; spr.; fls. 6" wide; currant red (821).

Registered by W. J. Perrin, 4753 Press Dr., New Orleans, Louisiana:

Amaryllis clone 'Grand Bay'; reg. A-698-D5A, 5-6-62; 15"-18" high; umbel 4-fld.; spr.; fls. 6" wide; geranium lake (20/1), white midrib, all segs minutely dotted reddish.

Registered by Mrs. H. E. Dorr, 33 Oaklawn Dr., Metairie, Louisiana:

Amaryllis clone 'Scotty's White'; reg. A-699-D5A, 5-6-62; 16"-18" high; umbel 4-fld.; spr.; fls. 6" wide; white with greenish tint; back of segs with green midrib.

Amaryllis clone 'Otto Felix'; reg. A-700-D5B, 5-6-62; 23" high; umbel 4-fld.; spr.; fls. 6½" wide; very fragrant, greenish to white throat, with Delft rose outer half of segs.

Amaryllis clone 'Gemato'; reg. A-701-D5B, 5-6-62; 15" high; umbel 4-fld.; spr.; fls. 5½" wide, lively blood red (820) almost to throat, white rim around all segs; very fragrant.

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

Amaryllis clone 'Hong Kong'; reg. A-720-D5A, 7-8-62; 22" high; umbel 4-fld., fls. 8" wide, blood red (820) with currant red (821) throat; flower round, throat slightly bearded.

Amaryllis clone 'Mars'; reg. A-721-D5A; 7-8-62; 28" high; umbel 4—5-fld.; spr.; fls. 8" wide, currant red (821), very dark throat.

Amaryllis clone 'Osiris'; reg. A-722-D5A, 7-8-62; 24" high; umbel 4-fld.; spr.; fls. 8½" wide, orient red (819) with a blood red (820) throat.

Amaryllis clone 'Rilona'; reg. A-723-D5A, 7-8-62; 24" high; umbel 4-fld.; spr.; fls. 9" wide, light salmon (412), slightly darker throat.

Amaryllis clone 'Rose Marie'; reg. A-724-D5A, 7-8-62; 24" high, umbel 4—5-fld.; spr.; fls. 8" wide; dominating color is carmine rose (621), light mid-rib; lower segs whitish, blending with greenish throat.

Registered by Robt. D. Goedert, Jacksonville, Fla. for Harry de Leeuw Co. So. Afr.:

Amaryllis clone 'Orangedale'; reg. A-728-D5A, 7-8-62; 19" high; umbel 4-fld.; spr.; fls. 6½" wide; capsicum red (715), slightly deeper throat.

Amaryllis clone 'Rosaline'; reg. A-729-D5A, 7-8-62; 19½" high; umbel 2-fld.; spr.; fls. 7½" wide; mottled magenta rose.

Amaryllis clone 'Ruby Glow'; reg. A-730-D5A, 7-8-62; 19" high; umbel 4-fld.; spr.; fls. 6" wide, geranium lake (20), slightly darker in throat.

Amaryllis clone 'Tangerine'; reg. A-731-D5A, 7-8-62; 8½"; umbel 4-fld.; spr.; fls. 5" wide, Delft rose (020), very clear and striking in appearance.

Amaryllis clone 'Terra Cotta'; reg. A-732-D5A, 7-8-62; 8" high; umbel 4-fld.; spr.; fls. 6" wide, vermilion (18), blending into rich claret rose (21) in throat.

Registered by Robt. D. Goedert, Jacksonville, Fla., for C. Warmenhoven:

Applications received too late for inclusion of descriptions which will appear in the "Catalog of Hybrid Amaryllis Clones" in the 1964 Year Book. **Amaryllis** clone 'Apollo' (CW, 1962), reg. A-725, orange red; 'Flamboyant' (CW, 1962), reg. A-726, scarlet red; and 'Topscore' (CW, 1962), reg. A-727.

Registered by M. Van Waveren, Hillegom, Holland:

Applications received too late for inclusion of descriptions which will appear in the "Catalog of Hybrid Amaryllis Clones" in the 1964 Year Book: 'Danny Kaye' (VW, 1962), reg. A-733, scarlet red; 'David Hollestelle' (VW, 1962), reg. A-734; orange scarlet; 'Independence' (VW, 1962), reg. A-725, orange, 'Madam Van Waveren' (VW, 1962), reg. A-736, striped white; 'Pola Negri' (VW, 1962), reg. A-737, very dark red; 'Polar Light' (VW, 1962), reg. A-738, dazzling white; 'Scarlet Globe' (VW, 1962), reg. A-739, scarlet; and 'Telstar' (VW, 1962), reg. A-740, rose.

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

Applications received too late for inclusion of descriptions which will appear in the "Catalog of Hybrid Amaryllis Clones" in the 1964 Year Book: 'Albaron' (VM, 1962), reg. A-741; 'Amor' (VM, 1962), reg. A-742; 'Aphrodite' (VM, 1962), reg. A-743; 'Minerva' (VM, 1962), reg. A-744; 'Pallas' (VM, 1962), reg. A-745; and 'Thalia' (VM, 1962), reg. A-746.

HYBRID NERINE CLONES

The following additions (not registered) to the "Catalog of Nerine Cultivars" have been sent in by Emma D. Menninger, Greenoaks, 730 North Old Ranch Road, Arcadia, Calif. (See PLANT LIFE 18: 43. 1962, for additions up to 1962.)

Name	Grower/supplier	Description, etc.
'Ancilla'	Va/Va	Carmine red (HCC-623) lowest seg lighter.
'Bettina'	Va/Va	Neyron rose (HCC-623), darker nerved.
'Nereus'	deG/deG	Outside, fuchsine pink (HCC-627/2), inside (627/3).
'Rosy Queen'	deG/deG	Neyron rose (623) to center, lighter striped.
'Pontos'	deG/deG	Mutation from 'Rosy Queen', dark Neyron rose (623), lighter center, segs ruffled.
'Record'	vV/vV*	Clone of <i>Nerine bowdenii</i> ; phlox pink (625/1).
'Fenwick'	?	A clone of <i>Nerine bowdenii</i> ; see Gard. Chron. Dec. 8, 1962, p. 405.

* Additional abbreviation: vV—G. J. van Velsen, Haemskerck, Holland.

[PLANT LIFE LIBRARY, continued from page 62.]

MUSHROOMS AND TRUFFLES, by Rolf Singer. John Wiley & Sons, 440 Park Av. So., New York 16, N. Y. 1962. Pp. 272. Illus. \$10.25. This book by an outstanding authority provides a reliable, readable text on the cultivated mushrooms and truffles. This is particularly important since these are now being grown on the basis of new scientific principles, and the methods of control are being improved. After a stimulating preface, the author provides a brief general introduction to the botany of mushrooms, and chapters on the botany and culture of the important kinds, including a potentially wider range of species; weeds and weed fungi; diseases and pests; mushrooms as food, and other uses. This important text is highly recommended to all interested in this subject.

NEW METHODS OF CELL PHYSIOLOGY, by O. H. Warburg et al. John Wiley & Sons (Interscience Div.), 440 Park Av. So., New York 16, N. Y. Pp. 644. Illus. \$35.00. This outstanding volume contains 95 papers on new methods of cell physiology as applied to research in cancer, photosynthesis, and mechanism of x-ray action in the laboratory of Dr. Warburg from 1945 to 1961. There is a brief biography of Dr. Warburg, with portrait, by Dean Burk. This is followed by papers concerned with the medical problem of the origin of cancer cells, and the general biological problem of the conversion of light energy into chemical energy in green cells. The purpose of the publication of the methods at this time is to hasten the use of the new methods in cell physiology so as to enlist the collaboration of researchers generally in the solution of the problems already indicated. This book represents a landmark, and is recommended without reservations to all who are interested in these fields of research.

INTRODUCTION TO IMMUNOCHEMICAL SPECIFICITY, by W. C. Boyd. John Wiley & Sons, 440 Park Av. So., New York 16, N. Y. 1962. Pp. 158. Illus. \$8.00. This book was written to serve as an introduction to immunochemical specificity for the non-specialist, and specialist. It incorporates earlier work which has served as a foundation for recent advances. The chapters are devoted to antibodies I and II, antigens, blood groups, plant agglutinins (lectins) I and II, blood group antigens, salmonella antigens, union of antibody with antigens, and energy of antibody-antigen reactions. This stimulating text is highly recommended to the specialist and also the non-specialist.

[PLANT LIFE LIBRARY, continued on page 146.]

3. GENETICS AND BREEDING LYCORIS HYBRIDS PROVE REWARDING

SAM CALDWELL, *Tennessee*

My first attempts to cross-breed some of the several *Lycoris* species in my plantings began in 1953. A few apparently sound seeds were gathered and planted. Then in 1954 and 1955 there were opportunities to cross pollinate the *L. sprengeri* and fertile strain *L. radiata* flowers that were appearing at the same time in late summer. The crosses seemed to "take" readily both ways, and more than 100 seedling bulbs eventually resulted.

In succeeding years I tried other crosses, some failing and some producing a few to many seeds. These efforts toward *Lycoris* hybridizing were reported in the 1958 HERBERTIA and at greater length in *Bulletin No. 5* (March 1960) of the *Louisiana Society for Horticultural Research*. It was frustrating, however, to be writing about *Lycoris* hybrids when I was not at all sure that I had any. Years passed and there were no flowers to prove that actual crosses of different species had been achieved.

Thus it was a thrill in August of 1961 to find a bud pushing up in my lycoris "nursery" bed in a row labeled "*L. sprengeri* x *L. radiata*, 1955." The flowers on the scape reached peak development on August 17. Happily, two others came along into bloom later in the month—one more in the 1955 lot of seedlings and one from the same cross made in 1954.

These results were definitely worth waiting for. Not only are they beautiful flowers; they are utterly different from anything presently available in lycoris. It was a joy to find so much variation in the three scapes that appeared, from the rich dark purple-red, rather narrow segments of flowers on "Sprenrad 1" to the broader segments and lighter purplish pink coloring in "Sprenrad 3." "Sprenrad 2," is practically identical in form with No. 3 but has coloring nearly as dark as No. 1. There are still some 30-odd bulbs of this cross to bloom and well over 50 of the reverse (*L. radiata* x *L. sprengeri*) cross; so the coming years should provide plenty of excitement.

It will take years of testing to determine the adaptability to garden cultivation of these hybrids. The seed parent, *L. sprengeri*, is quite hardy outdoors in New York state, producing its foliage in spring after the coldest of winter weather is past. Unfortunately, all the "Sprenrad" hybrids seem to have inherited the fall-foliage habit from *L. radiata*. Probably they will be safe wherever that species can be grown, but they may not thrive farther north, because their fall and winter leaves will be subject to cold damage. Their leaves, incidentally, are easily distinguished from *L. radiata* foliage by a more bluish green color and less prominent mid-rib veins.

The "Sprenrad" name and numbers for the seedlings are being used for convenience at present. In time some of them will likely get clonal designations.

The appearance of these flowers furnished inspiration for a renewal of my hybridizing efforts. I should like to urge other amaryllid enthusiasts to join in this rewarding activity. It seems incredible that here we have a genus of fine garden flowers in which almost no breeding has been done. True, it is slow work but probably no slower than daffodil breeding, especially for gardeners who live in the Lower South, where most lycoris grow faster than they do in colder climates. By getting my seedlings out of their starting pots and into ground growing beds faster, I hope to speed up flowering of my own hybrids.

From my own experience I would judge that all of the lycoris which normally set seed to their own pollen will cross with other fertile types. And this is not the end; all three of my new "Sprenrad" blooms set good seed when self pollinated and also crossed back on both their parents and on *L. haywardii*. Failures come when I try to work with *L. squamigera*, *L. incarnata*, *L. caldwellii*, *L. houdyshelii*, *L. elsiae* and the common form of *L. radiata*, none of which have ever set seed in my garden. Using pollen from these seemingly sterile lycoris on fertile species I have gotten occasional questionable "takes" resulting in just one or two seeds. I fear that these may be due to parthenogenesis or to accidental selfing of the flowers but of course am growing the seedlings along in the hope that they are hybrids.

Following is a complete list of apparently successful crosses I have made, including those of the 1961 season:

- L. haywardii** X **L. sanguinea** and the reverse
- L. haywardii** X **L. "sperryi"** and the reverse
- L. haywardii** X **L. "Sprenrad"**
- L. radiata** X **L. haywardii**
- L. radiata** X **L. "Sprenrad"**
- L. radiata** X **L. traubii**
- L. radiata** X **L. sprengeri** and the reverse
- L. radiata** X **L. "sperryi"**
- L. sanguinea** X **L. "sperryi"** and the reverse
- L. sprengeri** X **L. haywardii**
- L. sprengeri** X **L. "sperryi"**
- L. sprengeri** X **L. "Sprenrad"**

The *L. "sperryi"* mentioned is an unidentified but very fine hardy golden flowered lycoris collected in hills near Huchow, China in 1925 and brought to Nashville, Tennessee by the mother of a Methodist missionary then serving in Huchow.

Some of the crosses listed were made possible by the cooperation of Mr. B. Y. Morrison, Pass Christian, Mississippi, whose lycoris bloom several weeks earlier than mine. Through the flowering season he air-mailed fresh pollen of various species for use on my flowering scapes as opportunity offered.

For those interested in *Lycoris* hybridizing, the very simple methods used for making crosses and growing seedlings are covered in the two published reports mentioned at the beginning of this article. Certainly all the crosses I have made should be repeated many times and other combinations should be tried. By saving pollen of some of the earlier flowering species, growers in the Lower South may be able to cross-breed the St. Augustine type *L. aurea*, and the hardier *L. traubii* should make an even better seed parent.

LYCORIS NOTES, 1962

T. H. JACOWAY

For several years I have been of the opinion that the genus *Lycoris* held considerable promise in the cut flower market. Ever since a friend in Hastings, Florida gave me 18 *L. aurea* bulbs in 1956, the flowers have had a special appeal. Here in Palatka they have been virtually unknown. This is only 28 miles from St. Augustine, long the "home" of this beautiful amaryllid—at least in Florida. Mrs. MacArthur reported, in Volume I of *Herbertia*, that the Oldest City has more of these bulbs than any other section of the state. This is no doubt a true statement even at the present time. In September and October the lovely golden flowers are a compelling sight all over St. Augustine. Mr. John R. Heist, who sold *L. aurea* bulbs by the hundreds many years ago, has probably the largest individual planting in that city, numbering about 1500 bulbs. He is no longer in the commercial field and is growing them strictly for enjoyment.

In the summer of 1959 I purchased 400 bulbs from a California dealer, who imported them from Japan, and advertised them as *L. aurea*. They have done well and bloomed each year since. The flowers are all yellow, but look vaguely "different". They bloom several weeks earlier than the local species. The foliage is distinctly not *L. aurea* and there seem to be at least three species or varieties, if foliage appearance alone is considered. The literature states that recent importations from Japan is the species *L. traubii*. Some of mine may indeed be *L. traubii*, but possibly there are other species also. I was able to get several dozen seed from this planting in 1959 by selfing, and these seedlings are vigorous at the present time, but still rather small.

Following up the cut flower idea, I entered into partnership with Junius Bolin, of Welaka, Florida. We started buying *L. aurea* bulbs around St. Augustine and Hastings in the early summer of 1960 and were successful in securing about 300. They flowered that fall and we gave away our entire production of flowers to churches and friends in order to stimulate interest locally.

In the early summer of 1961, I started purchasing again in the same locale. Most homeowners, I discovered, would willingly part with at least some of their stock. In this manner we accumulated another 2,000 or more bulbs.

In the process of making these door-to-door purchases, it occurred to me that it might be of interest to find out something about the soil conditions under which they were growing in each instance. The idea being that we could then grow them better in the new location if we knew what they liked and were accustomed to. Accordingly, I took soil samples in most locations. Being employed as a fertilizer salesman, I had access to our company-operated, modern, and well staffed laboratory for analysis. The results were more or less uniform, showing a pH range of 6.3 to 7.7. The calcium (expressed in pounds per acre—six inches deep) ran from 1385 to 2000. These were all in St. Augustine.

The lone Hastings location showed a pH value of 5.5 and a calcium reading of 670. Around St. Augustine it is common to find considerable shell mixed with the soil, while in Hastings there is none. There was no distinct difference in the size and general appearance of the bulbs in any instance.

In both years our purchases were made as soon as the foliage had yellowed and died, usually in May and June. We replanted in our Welaka location after liming to bring the pH up to about 6.5. We were surprised to discover that the bulbs were able to form new roots, up to three inches long, after being replanted for as short a time as two weeks.

With the view in mind that there might also be a demand for the red species, *L. radiata*, we bought 1000 bulbs from W. J. Leseman near Green Cove Springs, Florida. As reported by Wyndham Hayward in the 1959 issue of *Herbertia*, Mr. Leseman has this species growing by the thousands. Our volume of this flower was so small in 1961 as to make it not worthwhile commercially.

In September of 1961 we made our first commercial shipment of *L. aurea* flowers to a New York wholesale florist. To this day we don't know what happened to them, although we know that they were received. That dampened our spirits somewhat, in regard to long distance shipping, and we started selling the cut flowers to local retail florists. They were very well received, and the demand exceeded our small supply.

Plans are for continued effort in the cut flower field with *Lycoris* species. This will be primarily *L. aurea*, *L. traubii*, and *L. radiata*. Other species which may offer possibilities, but which we have in very limited supply, are *L. sanguinea*, *L. sprengeri*, *L. caldwellii*, and a cream which was bought as *L. albiflora*. This entire genus, in our opinion, is an extremely interesting one and deserving of wider attention.

LYCORIS HYBRIDS MADE IN JAPAN

EI-ICHI TAKEMURA, *Tokyo University of Education,*
Otsura, Tokyo, Japan

F-1 HYBRID BETWEEN **LYCORIS SPRENGERI** & **STRAMINEA**

[The following summary is taken from an article published by Dr. Takemura in *The Botanical Magazine*, Tokyo, Vol. 74. pp. 524-531. 1961.—*Editor*]

SUMMARY

1. Morphological and cytological studies were carried out on the F-1 plants raised from the cross, *Lycoris sprengeri* Comes ($2n=22=22R^*$) x *L. straminea* Lindl. ($2n=16=6V^{**}+10R$.)

2. The outer appearance of the F-1 hybrid was found to be intermediate between both parent plants, while it resembled more or less closely the pollen parent, *L. straminea*.

3. The chromosome number in somatic cells of the F-1 plant was

19=3V+16R, i.e., the sum of the numbers in gametic cells of both parents.

4. At the 1st metaphase in microsporogenesis of the F-1 plants, 3 heteromorphic triplets and 5 bivalents have been commonly observed.

5. The F-1 plants were shown to be completely sterile in all selfing experiments.

6. From the number, shape and behavior of the chromosomes in meiotic division, it is suggested that this artificial hybrid seems to be a diploid form of *L. squamigera* Maxim.

7. The synoptic behavior between V-shaped and rod-shaped chromosomes in this hybrid seems to support Inariyama's view that in the genus *Lycoris* one V-shaped chromosome is equivalent to two rod-shaped ones, and, therefore, the former might have been derived by the fusion of the latter two.

* R signifies rod-shaped chromosomes.

** V signifies V-shaped chromosomes.

HYBRIDS BETWEEN **LYCORIS** SPECIES

[The following summary is taken from an article published by Dr. Takemura in The Botanical Magazine, Tokyo, Vol. 75: 72—79. 1962.—*Editor*]

SUMMARY

1. Morphological and cytological studies were made on the inter-specific hybrids raised from the following crosses:

Lycoris sprengeri Comes (2n=22=22R) x *Lycoris radiata* Herb. var. *pumila* Hort. [= *Lycoris radiata*—type.—*Ed.*]—Hybrid (1)

Lycoris sanguinea Maxim. (2n=22=22R) x *Lycoris radiata* Herb. var. *pumila* Hort. [= *Lycoris radiata*—type.—*Ed.*]—Hybrid (2)

Lycoris sprengeri Comes (2n=22=22R) x *Lycoris sanguinea* Maxim. (2n=22=22R)—Hybrid (3)

2. The outer appearance of these hybrids was intermediate between both parent plants, and Hybrid (1) resembled rather closely the mother plant, *L. sprengeri*.

3. The chromosome number in somatic cells of these hybrids was found as 22=R, i.e., the sum of the numbers in gametic cells of both parents.

4. These hybrid plants were all shown to be fertile in selfing experiments.

5. In Hybrid (3), the color of the perigone is expressed by two anthocyanins, i.e., cyanidin and pelargonidin derivatives. These pigments are identical with those contained in both parents, *L. sprengeri* (cyanidin) and *L. sanguinea* (pelargonidin), respectively. Therefore, the general concept that cyanidin is dominant over pelargonidin does not hold in this hybridization.

BREEDING AMARYLLIDS IN NORTH GEORGIA

BECKWITH D. SMITH, 3479 *Rockhaven Circle, N. E., Atlanta 5, Georgia*

Our hybrid *Amaryllis* bulbs, which were transported from Jacksonville, Florida in the fall of 1960 have apparently become acclimatized to the Atlanta temperatures, and this spring (1962) began showing buds in the outdoor planting about May 15th, and bloomed until the end of June. Flower scapes were exceptionally long, and blossoms large, typical of the Ludwig and other Dutch strains from which they were originated. One peculiarity, however, was that the bulbs "threw" a majority of two blooms as a rule, instead of the usual normal four blooms on smaller scapes when they were grown in North Florida. At



Fig. 15. Hybrid *Amaryllis* originated by Beckwith D. Smith, Atlanta, Georgia. Seedlings grown outdoors; and lower left, 8-seged hybrid. All flowered June 1962. Photos by the originator.

first I thought that there may have been something to cause this manner of blooming in the heavy mulching required to protect the bulbs from freezing, as they were first covered with dairy fertilizer, with an additional top dressing of well rotted sawdust, thus being more deeply settled in the clay planting soil. But I am told that this has nothing to do with the 2-flowered scapes—buds are set a year or more in advance during the summer growth period and develop slowly in the bulb and then emerge a year or more later.

In Florida, we had to combat the large, multi-colored "Lubber" grasshoppers. In our planting here, we have a large striped snail, as well as the common black slug to fight, which attack the *Amaryllis*

buds at ground level, as well as the leaves when they appear. However, copious applications of Snarol pellets keep them under control when they appear in the garden.

We have taken numerous black and white photographs of the Amaryllis in flower this spring, which show the abundant growth of foliage, scapes and flowers in an area of our garden which is ringed with tall pine trees (see Figs. 15 and 16).

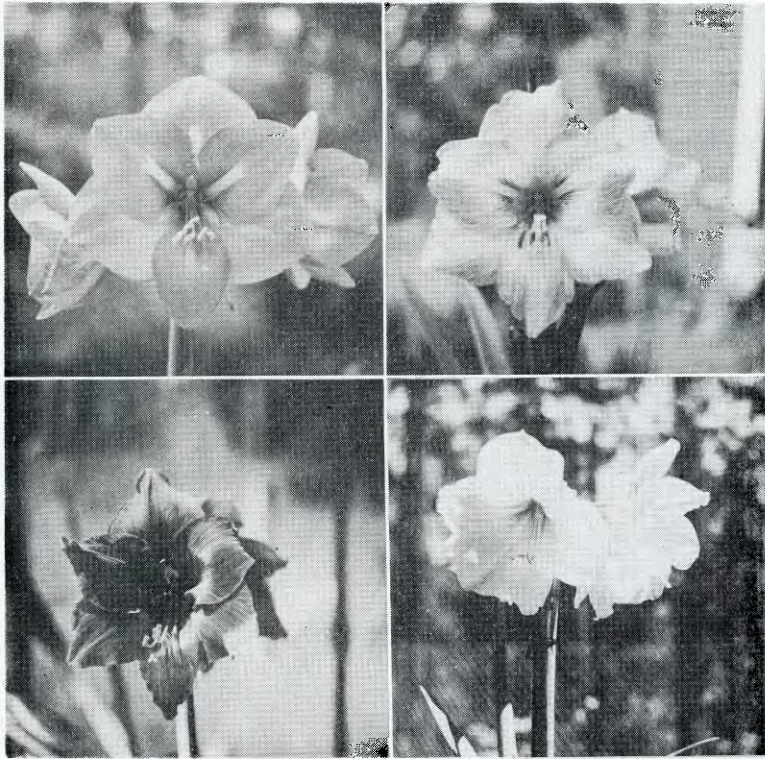


Fig. 16. Hybrid Amaryllis originated by Beckwith D. Smith, Atlanta, Georgia. Upper left, tangerine colored with white ribs; upper right, bi-color, rose and white; lower left, *Amaryllis* x *johnsonii* x *A. psittacina* hybrid, metallic red; lower right, peach-colored. All flowered April to June, 1962. Photos by the originator.

Mention has been made in a previous article submitted for *Herbertia* of trials which we have been running in the greenhouse of hybrid Amaryllis originated by Mrs. J. S. Barry, of Route 1, Box 7, Prairieville, Louisiana. Mrs. Barry has with meticulous and loving care developed some remarkably beautiful flowers from bulbs of her own crossing, using named clones, species and seedling cultivars. Our trial bulbs were received from Prairieville in the fall of 1961, most with roots intact, and were held for a period of time in cool dry storage and then

potted up and benched in the heated greenhouse. Since heat was held to a minimum of between forty-five and fifty degrees during night hours, and cut very low during daytime sunlight hours, the purpose being to establish root growth, the bulbs began to show activity around the middle of February. Then, on April 2nd, the first bulb bloomed, and thereafter in succession so that we had blooms continuously until the last bud opened in the greenhouse on April 26th. The following is the order of bloom from the most outstanding crosses of Mrs. Barry's hybrids:

(1) *A. striata* X 'Maria Goretti', 2 flowers, Orient Red, with small stripe in throat. (2) *A. striata* X 'Maria Goretti'. 3 flowers, Rose, with small stripe in throat. (3) 'Candy Cane' X 'Silver Lining'. 4 flowers, bright Red, bearded, and with green throat. (4) White Seedling X 'White Giant'. 4 flowers, brilliant White with green throat. (5) 'Ludwig's 'It' X 'Brilliant'. 4 flowers, lovely Rose. (6) *A. striata* X 'Maria Goretti'. 4 flowers, good Red, with green throat. (7) Van Meeuwen red and white Seedling X 'Five Star General'. 4 flowers, Oxblood Red. (8) White Howard and Smith Seedling X 'Maria Goretti'. 4 flowers, gleaming White, with stitched Pink picotee edging. Fragrant! (9) *A. johnsonii* X 'Ludwig's Goliath,' 4 flowers, Salmon Red miniature. Second scape two flowers. (10) 'Ludwig's Goliath' X 'Caruso'. 4 flowers, Orange Red. (11) 'Maria Goretti' X 'White Giant'. 4 flowers, clean White with green throat. Fragrant! (12) 'Salmon Joy' X 'Bouquet'. 4 flowers, Rose Pink. (13) 'Caruso' X 'Champion's Reward'. 4 flowers, Orange Red. (14) White Seedling X 'White Giant'. 4 flowers, clear White with green throat. (15) 'Margaret Truman' X 'Pink Favorite'. 4 flowers, a large, gorgeous shell Pink. (16) 'Ludwig's 'It' X 'American Express'. 4 flowers, large, attractive Red, with darker Red in throat. (17) *A. johnsonii* X 'Ludwig's Goliath'. 4 flowers, dark Red, small stripe in throat.

It can be seen from the above that Mrs. Barry has carefully selected some of the best seed and pollen parents, and the results obtained were most successful in the writer's opinion, to say the least. Others of her hybrids were also tested, but are not covered here because they did not bloom during the time of testing. Individuals who are interested in obtaining bulbs of the above crosses should communicate with Mrs. Barry direct. Hybridizers and collectors of *Amaryllis* will find much in her wide variety of hybrids for the improvement and development of their own clones.

We have now been in Georgia for two years, and during this time have made numerous appearances before Atlanta garden clubs, extolling the pleasant virtues of growing more beautiful *Amaryllis*. We have shown our colored slides to all who care to see them, giving cultural information and tips on growing from our own experience, and hope that in some measure have brought more interest to the cause of growing and enjoying them. While North Georgia is quite cold in winter, adequate mulching will protect bulbs outside, as we have found from two seasons. We are constantly urging that all Georgians and *Amaryllis*-

lidiarians everywhere become interested in better growing, hybridizing and understanding of these "beautiful ladies" of the flower garden, for here is the soul and essence of nature.

WHY NOT AMARYLLIS THE YEAR 'ROUND?

V. ROGER FESMIRE, *1170 South Xavier St., Denver 19, Colorado*

When I moved my family from Pennsylvania to Colorado many years ago, I brought with me close to a hundred Amaryllis bulbs of various sizes which had been grown in Pennsylvania by being planted in the garden in summer and stored dry over winter. However, this type of culture was not successful in Colorado, probably because of the shorter growing season, and most of the bulbs were finally lost with the exception of a red Dutch hybrid and some bulbs purchased from Mr. Houdyshel under the label of "Rutila hybrids".

When a small greenhouse was secured several years ago, I promptly returned to growing Amaryllis, and in the greenhouse their performance has surpassed all expectations. Kept in the greenhouse all year around, grown in pots and well fertilized, and with partial shading from the brilliant sunshine, the bulbs make luxuriant growth. The temperature ranges in summer from about 60 degrees to 90 degrees, and in winter from about 55 degrees to 75 degrees. The bulbs are rested in the fall by decreasing the amount of water given. This past season, flower buds began to appear in December, and there were Amaryllis in bloom from January 1 to about May 1, 1962, the majority of the bulbs sending up two or three flower scapes. These bulbs included Dutch, Indian, Japanese, and American hybrids, my original Striata (Rutila) hybrids, and what is apparently a form of Amaryllis Belladonna. Acquired too late to bloom were some South African and Howard and Smith hybrids.

From comments in the Amaryllis Year Books, it is evident that those who raise Amaryllis in large numbers enjoy some flowers all through the year. This is not possible of course with only a small greenhouse, although it would be very desirable. Therefore, I have embarked upon a three-point program designed to achieve the same results in other ways than mere quantity.

First, by planned management it should be possible to spread out considerably the blooming period of whatever bulbs one may possess, enlarging upon the suggestions of Luyten in Volume 12 of *Herbertia*. Accordingly, this coming fall of 1962 those bulbs which were the first to send up new growth last winter will be dried off several months in advance of the bulk of my bulbs, in the hope that they will come into bloom several months sooner than the others. Another phase of this experiment will be to keep some bulbs at a lower temperature during the winter months, which may delay their blooming somewhat, perhaps until early summer.

In the fall of 1961, an experiment was performed with three bulbs which were offsets of one original Striate hybrid. One bulb was dried off completely, one watered every other week, and one not rested at

all. Although the bulb which was completely dried off bloomed only two weeks sooner than the bulb which was not rested at all, the new foliage of this bulb was fully developed by May, at which time new growth was just beginning with the bulb that had not been rested. Hence it appears probable that one of these bulbs can be brought into bloom again several months before the other one. In time it may be possible to have these *Striata* hybrids in bloom all through the year, particularly since I have a number of these bulbs.

Second, by breeding of species or hybrids which have a tendency to bloom more than once in a year, it may be possible to develop strains which will be recurrent bloomers. Such hybrids will probably be ever-green as to foliage, and with flowers in the small to medium size range, which would make them quite desirable for the small greenhouse and the home. If the foliage could also be reduced in size, the plants would be ideal in a small greenhouse. At present I have three *Amaryllis* which display a tendency to recurrent blooming: the *Striata* hybrids, a form of *Amaryllis Belladonna*, and a hybrid from India which this year sent up new foliage and a flower stalk both in January and again in June. Therefore, my breeding program so far has primarily been along this line, and has involved crosses between these three *Amaryllis* and other hybrids which I possess, although it would be very desirable to acquire more breeding stock of this type. Since this program was only developed about one year ago, no seedlings have as yet come into bloom, but they are growing vigorously.

Third, by breeding present hybrids with species which bloom naturally in the summer, or fall, or winter seasons, hybrid strains should be produced which will bloom naturally at these various seasons. Here of course the primary difficulty is the fact that very few such species are available.

This three-point program has opened up entirely new avenues of interest and enjoyment for me. Perhaps worthwhile results may be obtained eventually, and I look forward with keen anticipation to the future. All suggestions will be most welcome.

BREEDING BRUNSVIGIAS AND X CRINODONNAS

MRS. KENNETH B. ANDERSON, *California*

September is a wonderful month for those who love the fall blooming amaryllids. Even tho the most of them bloom entirely without foliage, they are very bright, pert and cheerful on these very hot days when nearly everything else is wilting.

Brunsvigias come up in the driest of places, having had no watering whatever since spring. I can't help but wonder what triggers the growth mechanism, what set of circumstances cause it to know that it is time to bloom! It certainly isn't a change in temperature or in length of day or in earth moisture, yet they unfailingly push up their buds at the same time each year—the common cape belladonna first in mid August, follwed shortly by all the hybrids and lastly the Brun-

vigia *Rosea minor* which finishes the season. Incidentally those *Brunsvigias* which happen to be planted in beds which are watered all summer, have the same time schedule, and seem to bloom the same as those that have remained dry all summer.

I've had a few more variations this summer among the new seedlings, but it is probably going to take years of breeding to get much more variation than there already is. We now have pure whites thru pink, rose, cerise, raspberry and coppery tones. We have pattern variations and pure self colors in all these shades. We have whites with yellow throats, with green throats and apricot throats, whites with picotee edges of pink or red, whites with wide rims of pink or red, whites with delicately pencilled rose or red markings on the tips and whites with brilliant fingernail polished tips. The color on many of these flowers, as they age, suffuses into the white and becomes a deep rosy color thruout, while others keep the original pattern almost till they wither. There are pink flowers with candy stripes of red down the rib or with just a blotch of the red near the tip and then there are deep rose flowers and deep raspberry flowers with throats suffused with apricot or copper color which also shows thru on the outside of the flower.

Shapes vary from thin spidery segmented ones, to wide rounded overlapping petalled ones, from trumpet shapes to flat open faces and chalice cups. There are formal, crisp, pointed petals or relaxed looking twisted ones, gently waved ones and very ruffly ones, reflexed tips and non-reflexed ones.

Sizes vary too; we have a whole race of small dainty flowers on slim stems and we have giants, chest high with large and sometimes gross flowers, and many sizes in between.

The number of flowers in each head varies too, some have as few as 4 or as many as 28. Those with fewer flowers generally face in one quarter of the circle toward the Southwest, while most of the whites and many of the multifloras open in a full circle with flowers facing all 380°. They certainly love the sun, those under trees or bushes bend so far to the South that they're finally lying on the ground, but with heads up reaching for light.

The weather certainly does affect them. In changeable weather I find I have to change the description on the labels frequently. On several dull days in a row I labeled some newly opened flowers "white with crimson tips, throat remains white on aging" or "small dainty white with pink pencilled edge." Suddenly out comes the sun and 90° heat and the first one changes to "white with rose edge becoming all rose on third day" and second one with its small dainty white flowers all of a sudden produces in its umbell a giant pink blossom looking ludicrous in amongst its tiny sisters. No wonder one of the bulbs *Les Hannibal* gave me is labelled "Variable".

About mid September the *Crinodonnas* (crosses between *Crinum* and *Brunsvigias*) come into flower. These are particularly lovely because they have their deep green, neat clumps of foliage to set them off.

The majority of these from my first cross of *Crinum Moorei* (pink form) on *Brunsvigia Rosea minor*, are in the soft shades of pink and rose, and two quite deep raspberry colored ones. These flowers do not have much variation in pattern as the *Brunsvigias* do. My other cross, *Crinum Moorei*. (light form) on the white *Brunsvigia x Parkeri* (multiflora alba) is giving lighter flowers; one pure white, one white with narrow picotee edge of pink, others in shades of light pink.

The white one, 30" high, has 10 flowers (+ 7 aborted ones) large trumpet shape, petals slightly twisted but fairly open faced nonetheless.

Another, white with picotee edge, has 8 flowers (+ 7 aborted) has a pink bud, opens with the narrow rose picotee edge and brilliant rose tipped pistil. If the day is sunny all color fades to pure white except the pistil tip.

Another white opens with very deep carmine tips, fairly wide petals and the red fades into the white as it ages and becomes a wholly rose colored flower.

The deep colored *Crinodonnas* tend to have more flowers, I've counted up to 28 buds. Two of these have flowers which open up very nicely into an open faced trumpet shape. One of these I consider my best result in breeding so far; 48 inches tall and of a color close to that of *Ellen Bosanquet*.

It is strange that some seedlings never have bloomed. Those which have bloomed took only 4 or 5 years from seed. I expected the rest to bloom within the next few years, but one is 16 years old now and hasn't bloomed, others are 11 years old with no bloom. The others bloom regularly year after year, with several stalks and many increases. They are large clumps now of deep green foliage, quite erect and of good substance.

The fact that the *Crinodonnas* are sterile, makes me wonder if the bees are aware of this. I watched a huge black bumble bee visiting the *Brunsvigia* flowers and he'd occasionally fly to the *Crinodonna*, buzz all around it a bit, then fly back to the *Brunsvigias*. Evidently the *Crinodonnas* smelled good but just didn't have what it takes.

After the first thorough deep watering of beds which have been left dry all summer, the rest of the little amaryllids of my garden push up their heads for September bloom. *Habranthus brachyandrus* and *Rhodophiala spathacea* come up immediately the second day after watering and within 5 days are in full bloom. Shortly after, the oxblood lily, *Rhodophiala bifida* (red form) appears and then in rapid succession come *Lycoris radiata*, *Habranthus texana*, *Zephyranthes candida*, *Leucojum Autumnale* and a few early *Sternbergia luteas*, and hybrid nerines.

Meanwhile the *Crinums* have been blooming all summer and are still sending forth more scapes to compete with the other amaryllids. *Ellen Bosanquet*, both pink and light Mooreis, continue to tempt me to make more *Crinodonna* crosses in order that another September can bring forth more surprises and more pleasure and more hopes for the future.

[GRUBBS—AMATEUR'S GROWING PAINS, continued from page 131.]

nursing them there will eventually be healthy plants. None of these have bloomed yet but seedlings of 'Violetta' self-pollinated produce off sets freely.

I have two clones of *Amaryllis belladonna* (syn. *equestris*), bright scarlet, which I would call a miniature. I bought one under the name of Barbados Lily, and the other was called "equestris". They are alike. These crossed readily with *Amaryllis evansiae*. It will be two or three years before these are ready to bloom.

Two other amaryllis I wish to use for hybridizing are *A. ambigua* and *Amaryllis* x *johnsonii*. You already know the trouble I am having getting these to grow and bloom, therefore about all I can say is: I have grown some remarkably beautiful flowers, have had an enjoyable experience and have some hybrids that, while not outstandingly different from others that are available, are a definite improvement over the Meade strain and other cheaper bulbs sold in garden stores. Many of them have one or more of the following traits: large size, good substance, good form, good color and rapid propagation. By combining the best of these traits by further crossing I have some hopes of having a very good collection of my own amaryllis. Perhaps when they are more readily available I can acquire other species to add some new trait to the strain.

My increasing success with outdoor culture is facilitating my hybridization program because I cannot handle any more plants in the greenhouse. I have had to discard a considerable number of bulbs grown in my outside beds because they appeared to have the Mosaic disease. I am very much inclined to believe that this diseased condition is either caused or carried about by spider mites. They are the most plentiful and persistent insect pests in this area. One other pest that is very destructive in the outside beds is the *Narcissus* bulb fly. Thanks to Dr. Traub's *Amaryllis* Manual I now have this pest under control, at least for the present.

PALESTINE (TEX.) AMARYLLIS SOCIETY FOUNDED

As we go to press word has been received that The Palestine (Tex.) Amaryllis Society was organized on February 5, 1963. It is affiliated with the American Amaryllis Society. The officers are: Miss Lucy Woods, Pres., Mrs. Arcala Harrington, Secy., and Mrs. J. H. Handorf, Treas. We all extend our congratulations.

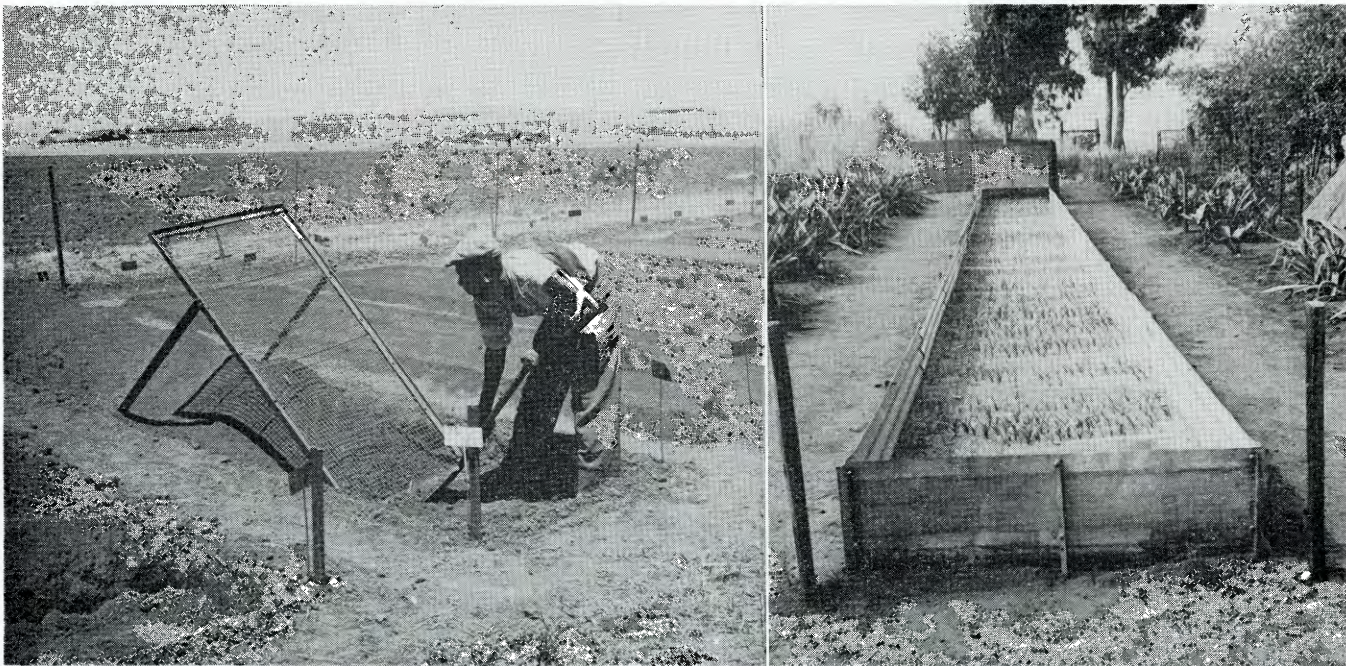


Fig. 17. Left, Wire screen in $\frac{3}{4}$ inch-mesh set in steel frame for sifting soil used in the initial preparation of the beds. Right, seed bed inclosed on the sides with corrugated steel sheets cut lengthwise in half and bolted on the angle iron standards firmly planted in the ground.

4. AMARYLLID CULTURE

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

AMARYLLIS CULTURE & BREEDING IN SOUTH AFRICA

LEON BOSHOFF-MOSTERT

'Kleinskuur', Balfour, Transvaal, South Africa

INTRODUCTION.

When I asked your Editor what he wished me to write about in my promised article for the next Year Book, he left me a wide open field embracing breeding and culture in almost all their aspects related to the practical approach as applied by me here at Kleinskuur. Paradoxically, such a mandate is both easy and difficult to discharge. Easy, because it amounts to a mere narrative of daily and seasonal activities and yet, difficult, because of charishness that dogmatism might inadvertently be ascribed to personal methods of procedure where it is not intended.

Other than in basic principles, it is imprudent and may even be harmful to lay down hard and fast rules. Just as in the field of medicine and dietetics divergent treatments may have equally beneficial results, so also in the field of horticulture different circumstances, conditions and climatic variations call for divergent methods in culture. It must, therefore, be appreciated that this article is not to be seen as an attempt pedantically to tell the reader what he should do, but rather as an endeavour to tell the reader what someone else is doing according to the dictates of conditions applying to his particular geographic sphere of operation. As an example, let us touch very briefly on the question of potted bulbs.

The thought will never occur to me to submerge potted bulbs in open beds during Spring and Summer and then to retrieve them in Autumn for Winter storage in the warm cellar, awaiting the return of favourable climatic conditions for the repetition of the cycle. And yet, this is exactly what I witnessed during my visit to your Mid-West with its extreme Winters.

With the application of some degree of common sense, however, much of what is being done on the Eastern Transvaal Highveld where I live, can be put into practice in other regions without much or perhaps any modification.

Let us not concern ourselves with what comes first, the seed or the bulb, but let us commence somewhere in-between, namely, with the bloom from which we intend gathering seeds for natural propagation of new varieties.

CHOICE OF PARENTS.

(a) *Colour*: It is axiomatic that parents will be selected only from bulbs displaying those attributes which in the eyes of the breeder hold potentialities of producing that which will lead ultimately to the apex

of perfection as seen in the light of present-day standards. I repeat "in the eyes of the breeder", since, fortunately, tastes vary and consequently we have the spice in variety. Having regard to the element of taste, I shall not venture on the dangerous terrain of preference, bias or prejudice. I would, therefore, advise that irrespective of your neighbour's opinion on the matter, you just go for your own colours. Since it is the first thing to catch the eye, colour is of utmost importance. As one considers the progress left to us as a legacy by students, breeders and writers during the past century or more, one cannot but conclude that the ultimate in perfection is in sight in many aspects of breeding and that the scope for active endeavour lies more in the direction of evolving new colours and enhancing their beauty as regards clarity, shading and depth and the creation of attractive blends and combinations of colours.

(b) *Texture*: In the textural field, the scope is not as expansive as in the case of colour. It must be obvious, however, that texture plays an important role in the presentation of a bloom and can become an additional instrument in the creation of variety, even in blooms with identical colouring. A glossy texture portrays a radiant glow, whereas the seer-sucker or crepe texture stirs up a feeling of sympathetic warmth. Boldness, on the other hand, is inherent in the bloom with heavily veined texture, more especially in the monochromes where the veining stands out in deeper tones. Then again, a leathery texture brings an illusion of increased size, whereas the velvety texture creates different shades or tones of colour depending on the angle of reflected light. These variations in texture are latent in the general cross-section of the hybrid we have to-day and it lies in the hands of the hybridist to bring these characteristics into prominence.

(c) *Substance*: The importance of the lasting properties of a bloom should not be overlooked. This applies in particular to the fancier who wishes to display on the show bench. Nothing can be so distracting as a wilting floret next to a later one just in the process of unfolding to the full glory of its beauty. Through selective breeding by the introduction of pollen from stronger parents, such shortcomings can eventually be overcome.

(d) *Size and Form*: During the past few decades hybridists have conscientiously been concentrating on form and size as much as on any other aspect of the Amaryllis. Much of the crane neck and trumpet shape has been outbred. Wider and rounder segs remain the target and the flat open face will continue to allure the breeder.

(e) *Vigour of Plant Growth*: A vital consideration in planned breeding is vigour. In your pollination programme do not play around with the runts, with short and weak scapes, unless you have one with some singular property worthy of perpetuation. In that event, by all means concentrate on the introduction of such property in one or more of your presentable vigorous specimens lacking in that enviable attraction. The majority of the offspring will, no doubt, also be runts but the possibility is always present that you may strike it lucky with the right mutation of genes which no man can forecast.

In the foregoing paragraphs I have listed the basic factors for consideration in breeding. It now rests with you to formulate your own creative aims and choose the parent plants accordingly, bearing in mind that the possibility of the combination of the attractive attributes of the respective parents in their issue is always present. Results, alas, are such that one often becomes disheartened by failures. But just think of the encouraging consolation that in our common heterogeneous make-up of humanity, beauty contest winners are born regularly in

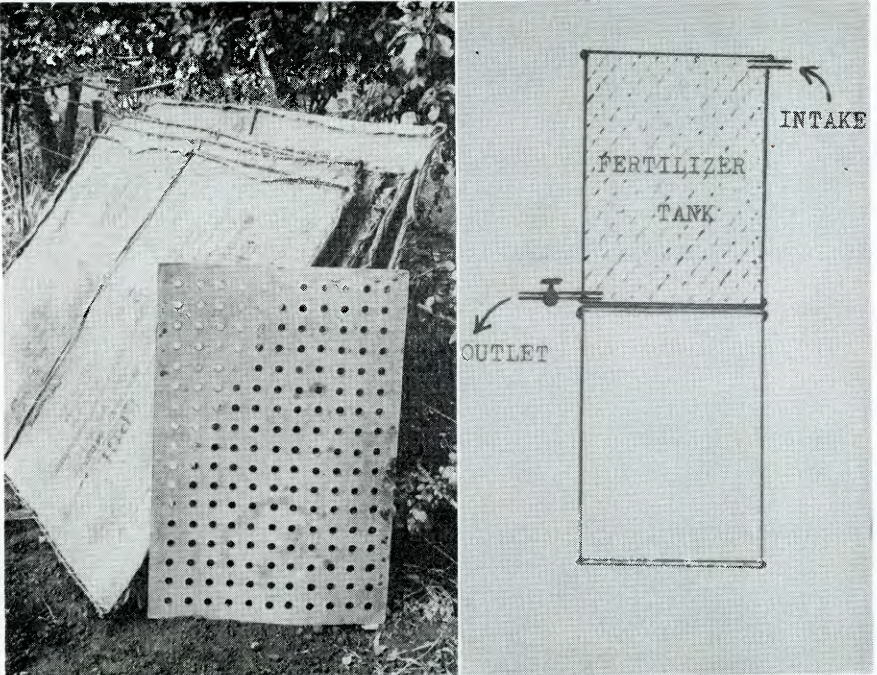


Fig. 18. Left, pressed-wood planting board with holes spaced 2 inches apart; behind this are stacked some of the steel framed hessian covers used for protection against frost and hail. Right, mobile fertilizer tank on empty drum which serves as a tank stand.

every country, whilst even the generous crop of runners-up remains the envy of many a male heart!

Whilst writing this, I lay no claim to being a student of genetics and neither do I profess to be an authoritative hybridist. I have learned from others, from the writing of others and, particularly, from the experience of my own few successes and countless failures over the past fourteen years during which my attention and energies have been devoted almost entirely to my Amaryllis.

Whilst in the U. S. A., I had the singular privilege of extensive talks

in La Jolla, California, with a man whom everyone knows to be an expert on *Amaryllis* and whom I, personally, regard as the greatest of all time in that sphere. It was from Dr. Traub that I l

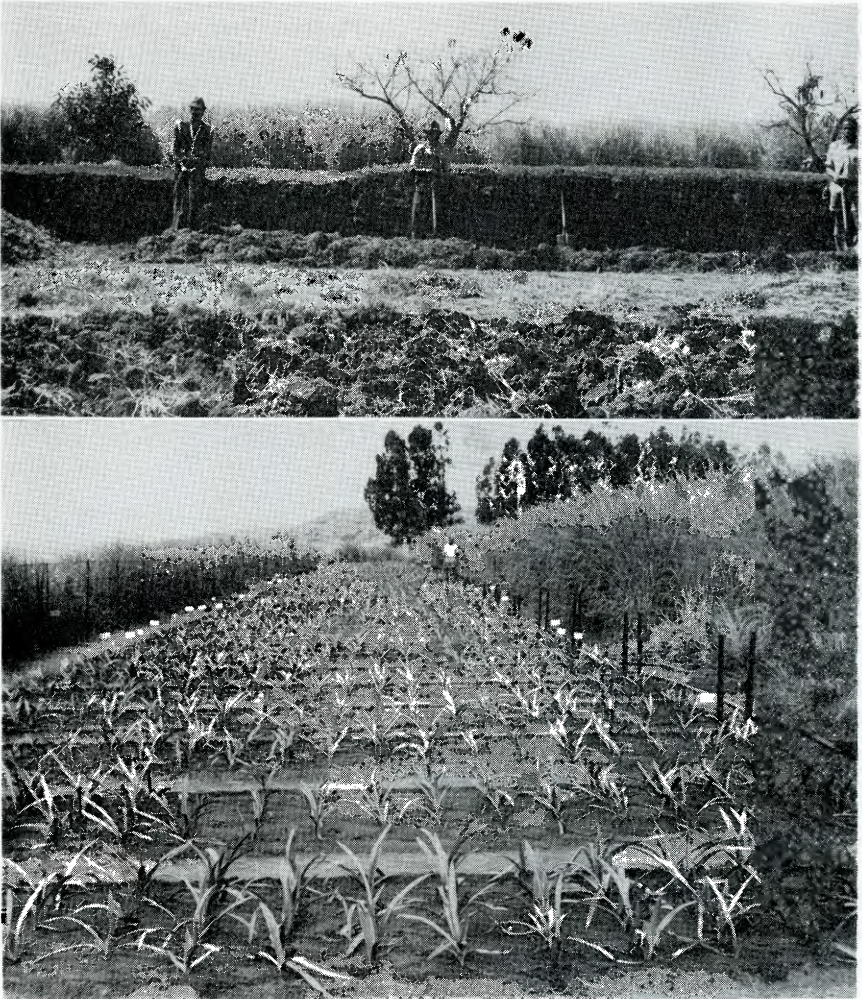


Fig. 19. Upper, farm helpers commencing with first turning over of heap 50 ft. long, 4 ft. high and 6 ft. wide. Lower, center, young bulbs season growing in open beds; right, a fine stand of Tamboekie grass covering of open *Amaryllis* beds.

amongst many other things, about the storage of pollen in capsules in the refrigerator. Consequently, over the past tw I have successfully applied pollen to blooms up to eight weeks paternal bulb had finished blooming.

A further valuable breeding hint given me by Dr. Traub was the collective gathering of pollen from chosen parents in a common capsule and the application of this admixture of pollen to the chosen mothers. All the breeders I have thus far met have a common regret, viz. the short span of their lives. But in this advice I find a short cut in breeding which to a large measure defeats the obstacles presented by the limitations of the allotted "three score and ten years". It is with keen anticipation that I await the first blooms from the results of my collective pollination.

PLANTING OF SEEDS

A suitable medium for the seeds is essential and seed pans and seed beds should be prepared even before the pollination programme commences, so that the seeds may be planted as soon as possible after maturity. My experience is that the longer the seeds are kept after maturity, the smaller the percentage of germination. As for suitable media, so much has already been written and literature on this subject is readily available in abundance. I shall, therefore, confine myself for the purpose of this article to my own methods of propagation.

Since I propagate from seeds on a relatively large scale for a one-man outfit, and personally have to attend to all the planting and after-care, I seldom make use of seed pans. With very rare exceptions the seeds are planted in beds in the nursery. Efficient drainage must be ensured whilst at the same time the beds must remain sufficiently moist to ensure optimum germination and speedy initial development.

Our soil here is of a heavy, tight, texture which quickly dries with a hard upper crust and proper preparation of the beds becomes necessary. In the intended seed beds are worked in liberal applications of coarse sharp river sand, peat moss, vermiculite and well decayed compost prepared from vegetable matter and animal manure. These four ingredients are applied in equal proportions in bulk, i.e., a layer of two inches of each, one on top of another, is spread over the entire surface of the bed. It is then thoroughly worked through with garden forks and subsequently screened to a depth of fourteen inches through a portable upright sieve of $\frac{3}{4}$ inch mesh (see Fig. 17).

To afford protection against frost and hail, the beds are enclosed in sides of metal sheeting. For this purpose corrugated steel or aluminum sheets, lengthwise cut in half, are used (see Fig 17). These sheets are rigidly attached to and supported by angle iron sections firmly planted into the soil along the sides of the beds, thus giving a complete substantial structure. As the entire erection is set up with bolts, it lends itself readily to dismantling and conveyance to other locations later on.

For the provision of top covering, portable frames constructed of $\frac{3}{8}$ inch round mild steel bars are covered with $\frac{1}{2}$ inch mesh wire netting and over this is stretched and sewn on a covering of hessian (see Fig. 18).

The seedlings not only survive our Winter frosts in these seed beds but they continue growing, provided they are covered at night with the hessian frames which are easily handled by one man and, during the day, when the seedlings enjoy full sunshine, are conveniently stacked

close to the beds. Since we live in a summer hail belt, the covering can also be quickly applied in the event of hail storms. Incidentally, I have a special patch of 7 beds of mature bulbs, each bed being 4 feet by 45 feet, completely covered under fine mesh wire netting as a permanent protection against hail (see Fig. 20). In these beds I have bulbs representing all my varieties and the unit is virtually a show window for visitors in the event of the open beds being damaged by hail during the blooming season, when visitors from all parts of the country come here by the hundreds.

It has already been stated that the seed beds are prepared well in advance. They are then regularly watered to induce germination of any weed seeds that may be in the soil and compost. These are soon under control and the subsequent weeding, by the time the *Amaryllis* seeds germinate, is relatively insignificant.

The beds are carefully levelled with a plank and are now ready to receive the seeds. This past season I planted just over 12,000 seeds and planting commenced when the first seeds were ripe. The seeds are planted to a depth of about $\frac{3}{8}$ inch and for this purpose a light board of pressed wood is used. It is cut to the width of the seed bed and the length may vary to taste or to the requirements of practical handling. I find a square board suitable for my purpose. Horizontal and vertical lines are drawn on the board at distances of 2 inches and holes of $\frac{3}{4}$ inch diameter are drilled at each intersection of the lines, i.e. the holes are spaced at 2 inches in all directions (see Fig. 18).

An additional planting instrument is a simple 4 inch length of dowel cut from $\frac{3}{4}$ inch diameter round wood. This is inserted in one of the holes in the board and pushed through a distance of $\frac{3}{8}$ inch on the under-side of the board, whilst a pencil mark is made on the dowel, level with the upper side of the board. A nail is driven through the dowel at the pencil mark and this prevents the dowel protruding more than $\frac{3}{8}$ inch to the under-side when it is thrust through the holes in the board.

We are now ready to start planting and the board is laid flat on the seed bed. The seeds are placed singly into the holes and pressed into the soft friable medium, all to an equal depth of $\frac{3}{8}$ inch, without damage to the seeds. It will be found that a slightly moist medium works best. After seeds have been pressed into all the holes, these are then filled up with a covering of a moisture retentive mixture of vemiculite peat moss and sand, level with the upper surface of the board. The board is then carefully lifted and shifted forward along the bed to receive the following batch of seeds. A liberal sprinkling of water is applied by means of a soft spray from a watering can equipped with a fine hose. The little round mounds of covering medium left by the holes in the planting board are soon washed level with the bed. This operation is repeated till all the seeds have been planted.

This method can also be applied in planting in seed pans. In that case, naturally, the board is cut much smaller to fit the pan. The advantages of this method of planting are manifold. It is a time saver. The seeds are all planted to an equal depth. The emerging seedlings are

spaced at equal distances which simplifies subsequent weeding. Furthermore, the bed gives a neat and orderly appearance which is pleasing to the eye.

It will have been observed that chemical fertilizers were not introduced in the seed beds before planting and I do not propose to offer technical reasoning for this procedure. My own practice is to allow the seedlings to develop some measure of leaf and root growth and after six weeks or so from the time of germination, during all of which time the beds are constantly kept moist, I commence with applications of liquid manure or liquid fertilizer at 10 to 14 day intervals. Care is exercised to avoid an over-strong solution and the liquid feeding is always applied after a regular watering.

Your garden requisite stockist should be able to supply a suitable balanced fertilizer for liquid application and the strength of the solution is normally indicated on the container.

Since the plants are spaced at 2 inch distances, the bulblets may be left undisturbed in the seed beds for a year or longer and with proper care and feeding development is rapid and continuous. I have already had blooms from seedlings 23 months after planting but these, however, are rare exceptions. Normally, they start blooming from the third year onwards and, in slow maturing varieties, sometimes produce their blooms as late as in the sixth year. It is advisable not to remove the seedlings to their permanent beds until they have grown to a size of at least one inch in diameter. When lifting, handle with utmost care and endeavour to disturb or damage the roots as little as possible. Do not let them lie around but plant in the new location as quickly as possible after lifting and give a liberal initial watering.

PERMANENT BEDS.

The size and the shape of the beds depend upon ones own taste, convenience and garden lay-out. Here at Kleinskuur all the beds are now 4 feet wide with five bulbs in the row and rows spaced one foot apart. The bulbs are spaced ten inches apart in the rows. Hand weeding and cultivation are done from both sides of the bed which means a maximum stretch of two feet to the centre of the bed. At present, there are 141 beds, all 4 feet wide and ranging in length from 20 to 45 feet. If all the beds were placed in one continuous line, it would extend over a distance of almost a mile.

Kleinskuur is a commercial undertaking and, consequently, there is a bigger than normal turnover of beds as a result of annual lifting and shipment of bulbs. But if a bed is well prepared in the first instance, there should be no reason for lifting and transplanting of bulbs for many years. The necessity for transplanting will be determined by the extent and speed of natural increase. For the best blooming results the bulbs should be lifted for division and transplanting only when overcrowding becomes evident and they start pushing one another out of the soil.

Extensive use is made here of compost prepared from green vegetable matter and cow manure which is in plentiful supply. This is

prepared in the orthodox method of layering above ground and turning over at normal intervals (see Fig. 19).

In the initial preparation of a permanent bed, an even sprinkling of 5:13:5 is applied over the surface of the entire bed at the rate of 6 ounces per square yard and then lightly worked in with a garden fork. Then comes a 4 inch thick layer of well decayed compost thoroughly worked into the bed to a depth of 12 to 14 inches. At this stage my beds are sifted from end to end through the $\frac{3}{4}$ inch mesh screen. This, of course, is not essential provided the compost is equally distributed in the soil by repeated working with forks. The beds are then levelled off and the bulbs are planted.

Whereas in the case of potted plants in a sheltered location the bulb is set into the medium with up to half its 'body' above ground, this method is not advocated in the open beds. Here the bulb is planted to the depth of the curve of its 'shoulder' with the whole of the 'neck' protruding above ground.

With these beds additional application of fertilizers will not be necessary during the first season. With regular and sufficient watering, growth will be vigorous. As soon as the upper crust of the beds is sufficiently dry to permit of cultivation after each watering, the soil around the bulbs is lightly cultivated with suitable hand tools to a depth of 2 inches. This practice ensures better retention of moisture besides affording regular aeration of the upper layer of soil.

Throughout the growing season the beds are regularly irrigated. Here again, hard and fast rules must not be prescribed. Climatic and weather conditions alone will determine the frequency of watering. During the rainy season we are often not required to irrigate for a few weeks on end.

With the advent of Winter and the fall of the first frost, the bulbs enter the dormant period and all watering is discontinued. The beds are covered then with a thick layer of grass which serves as a Winter blanket. For this purpose and to eliminate transport, I have planted stretches of suitable perennial indigenous Tamboekie grass adjacent to the beds (see Fig. 19). In early Spring the grass is removed and neatly stacked and the beds are again irrigated. Much of the food in the soil has by now been consumed after the first year of luscious growth of bulbs and the need for fertilizing must be considered.

There are so many proved methods of fertilizing established beds, such as mulching with rich compost or spreading of fertilizer between the bulbs and then working into the top layers of the soil. My mind, however, is continuously exercised in the direction of labour-saving methods and devices. Although I can say nothing against the proved conventional methods of provision of additional plant foods, I find it easier and more convenient to apply liquid feeding. I am also convinced that liquid fertilizer is more readily assimilated and since irrigation is done here by an open hose-pipe laid on the beds and continuously shifted along the length of the beds, the liquid fertilizer is introduced in a similar manner.

Two fertilizing tanks have been constructed which operate in conjunction with each other. Whilst the one dispenses liquid fertilizer, the other is at the same time being filled up with water. The tank is made from a regular 44 gallon oil drum with an open top. It has a short piece of 1 inch piping welded into the side just below the upper open brim and this acts as the water intake pipe. Another piece of similar pipe is welded into the side at the bottom end and this is the outlet pipe which is fitted with a stop-cock (see Fig. 18). The bottom stop-cock is closed and the tank is filled with water almost to the top by means of a hosepipe attached to the upper inlet pipe.

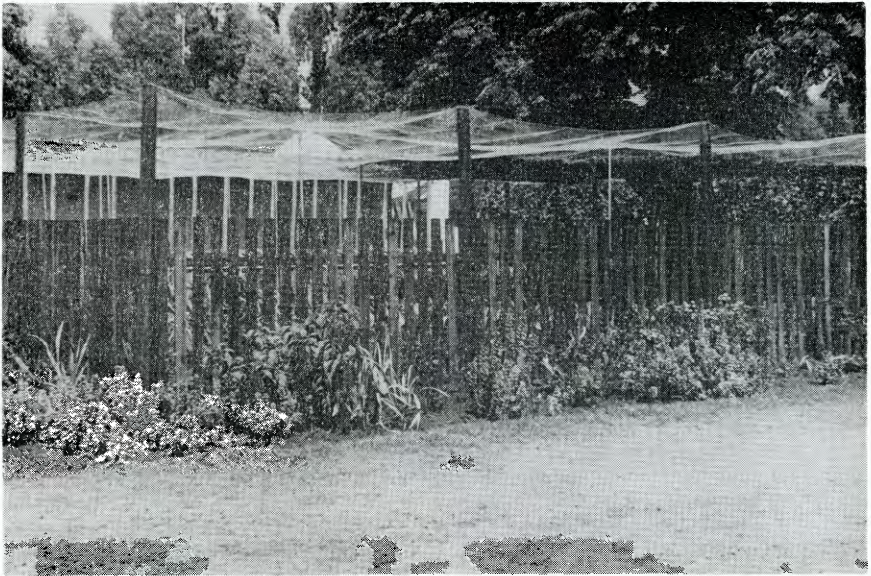


Fig. 20. *Amaryllis* display beds completely covered under fine mesh wire netting as permanent protection against hail.

The correct amount of fertilizer for a 44 gallon solution is measured off and dissolved in a bucket of water. The strong solution is then added to the water in the tank. A second hosepipe is attached to the bottom discharge pipe, the stop-cock opened and the beds irrigated in the normal manner. Whilst this is being done, the complementary tank is filled through another hosepipe attached to the water main. By the time the one tank has discharged its liquid fertilizer, the other is full and so the process is continued until all the beds have been watered and, in the process, fertilized.

To provide sufficient pressure (not much is required for an open 1 inch hosepipe), the tank is placed on top of another drum. These units are portable and can be handled by one man. Water is laid on along all the beds and standpipes with hose connections are provided at suitable intervals. The hosepipes are long enough to do quite a series

of beds before the tanks have to be removed to new positions. This method of watering involves very little more time than direct watering from the pipelines and fertilizer is introduced to the bulbs simultaneously. These operations are carried out at fortnightly intervals throughout the growing season. Regular ordinary water, as and when required, is attended to in between.

Whilst on the subject of watering, here is some sound advice: Well established bulbs with fully developed root systems and healthy leaf growth can take a lot of watering. This, however, does not apply to newly planted bulbs. These should, during the establishing and developing stages, be kept reasonably moist at all times to stimulate growth, but please be very careful about over-watering because, at this stage, the possibility of rot is always present.

In the next issue of this publication I hope to give further information on the cultivation of *Amaryllis* in our part of the world. Meanwhile, letters from readers desirous of obtaining further specific information on activities at this end will be very welcome. Kleinskuur has a worldwide circle of friends and correspondents and we love receiving letters from them. In conclusion, I wish to thank my many friends I have made during my visit to the U. S. A. for their regular letters which are greatly appreciated.

BOSHOFF-MOSTERT HYBRID AMARYLLIS

MRS. B. E. SEALE, 4036 Prescott, Dallas, Texas

Amaryllis growers, enthusiasts and importers of *amaryllis* bulbs had the pleasure of meeting, entertaining and hearing the interesting and informative lectures of Mr. and Mrs. Leon Boshoff-Mostert from Balfour, South Africa, when they were on a tour of the United States in the Spring of 1960.

They lectured to Men's Garden Clubs, Women's Garden Clubs, *Amaryllis* Societies and groups of just plain lovers of flowers in many cities. We were especially fortunate in Dallas to have them as our guests for five days. They were presented to members of The Dallas *Amaryllis* Society and two hundred invited guests at the North-Wood Country Club for a Luncheon meeting, followed by a Lecture—Tea, in the afternoon. They spoke to The Men's Garden Club of Dallas, Dallas Iris Society and the Dallas *Hemerocallis* Society at their evening meetings.

The lectures were illustrated by many exotic color slides of the *Amaryllis* grown at Kleinskuur, Balfour, Transvaal, South Africa; and the pictures of their home and plantation of several thousand acres were beautiful.

In June 1960, I sent an order to South Africa for some of his *Amaryllis* bulbs. The carefully packed parcel of bulbs was received by me on September 8, 1960. To my surprise, most of the flower scapes were well advanced upon arrival. I potted them immediately and in about a week, one short scape with four beautiful blooms opened on one

bulb. The other eight bulbs bloomed in rapid succession, except one bulb and it waited for almost a month before sending up two scapes; one scape had four blooms and the other one had three blooms. They were exquisite and the foliage grew right along with the blooms. Most all of the bulbs had two scapes with three and four blooms per scape; one bulb had three scapes.

The foliage that grew a little ahead of the bloom scapes was very beautiful. I kept the bulbs growing in the Garden-room of my home during the Winter months and we enjoyed the green foliage as Potted Plants. After danger of frost was over in the Spring of 1961, I planted them in the garden in partial shade under a large pecan tree. They grew in the garden all summer, until early October, when I took them up and stored them for three months.

In early January, I potted them and growth started immediately. First the foliage showed and by the time the scapes that followed were in bloom, there was sufficient foliage to make a beautiful potted plant, not just a bare *Amaryllis* bulb in a pot. I believe one of the most rewarding and outstanding things about these *Amaryllis* from South Africa is the growth of the foliage along with the bloom scapes.

It has been remarkable how these South African *Amaryllis* have adjusted to our northern hemisphere time of blooming. The extra months of growing time (13 months in all) were well spent, because they made a magnificent showing this Spring (1962). They are growing this Summer in "The Amaryllis Circle" in my garden. The size of the bulbs is increasing, (no shrinkage after blooming), and the foliage is very heavy. Some have small off-sets and all of the clones were good self-seeders and they crossed well, also.

This past spring I entered all of the South African *Amaryllis* in two Spring Flower Shows; some as Potted Plants and some as Specimens; each entry was awarded a Blue Ribbon and one, 'Kathleen Dobson' was given an Award of Merit for "The Best of The Show" in the Horticultural Division. In the same Shows, I entered 'Rose Queen,' 'Dido' and 'Zenith' (van Meeuwen hybrids) and they won Blue Ribbons also.

The following notations on the South African *Amaryllis* were made while they were in bloom in the Spring of 1962:—

'Cathedral Peak' is a blood red self, almost a purple hue; produced two scapes of four blooms each, about seven inches across the face (see Fig. 21).

'Eastern Glory' is a very dark mandarin red, with blood red influence; two scapes, four blooms each. Very striking in the sunshine with a glowing sheen; extra long and wide foliage.

'Kathleen Dobson' is a snow white with faint broken pencil lines of cardinal red on upper petals; frilled edges; two scapes with four blooms per scape and both were in bloom at the same time (see Fig. 21).

'Kismet' is a very large white, shaded with carmine veining; it has an iridescence or mother of pearl reflection in the blooms; produced two scapes with four blooms on each scape. It is a "must" in any *Amaryllis* grower's collection. The seed pods matured well.

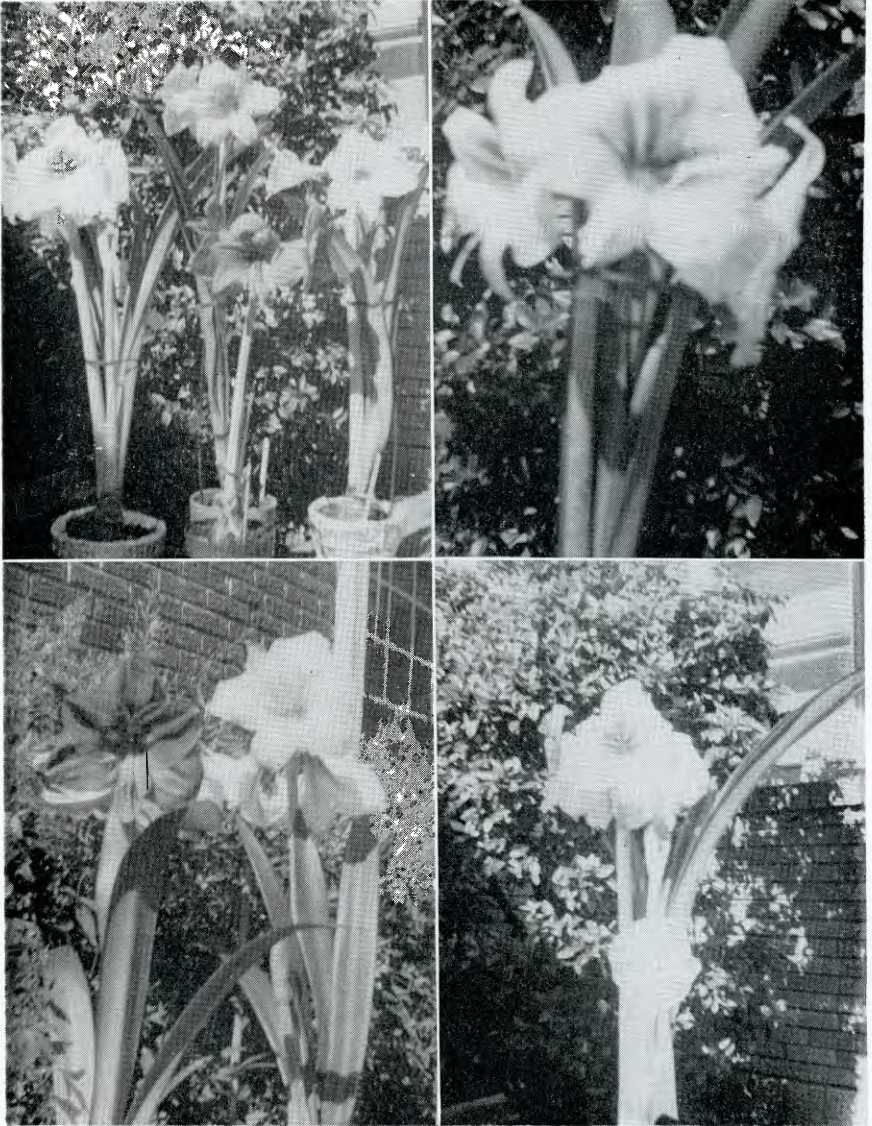


Fig. 21. Boshoff-Mostert South African hybrid *Amaryllis* clones as grown by Mrs. B. E. Seale (spring 1962), at Dallas, Texas.—Upper left, (left to right), 'Mandarin's Joy', 'Schooner', 'Cathedral Peak' and 'Magnolia'. Upper right, 'Kathleen Dobson'. Lower left, (left to right), 'Wisley' and 'White Belle'. Lower right, 'Dixie'.

'Mandarin's Joy' is a dark mandarin red self; very beautiful, with large round flat blooms; three scapes—two scapes had four blooms and one scape had three blooms; the scapes were extra long (see Fig. 21).

'Magnolia' is a large creamy white; green flushing toward the center; produced only one scape with four blooms; seed pod was very small (see Fig. 21).

'Schooner' is azalea pink, flushed white—has almost definite stripes; very large and decorative; it is a beautiful Amaryllis and had two scapes, with four blooms per scape; did not set seed (see Fig. 21).

'White Belle' is an exquisite, large (8-inch), flat faced, pure white Amaryllis; produced two scapes of four blooms per scape; good seed setter; foliage was luxuriant and is an exotic plant (see Fig. 21).

'Wisley' is a deep azalea pink; very large blooms of fine form and clear color; produced two scapes—one had three blooms and the other had two blooms; I am hoping that it will do better next year; I am giving it extra food for better growth (see Fig. 21).

Most all of these Amaryllis made large, full seed pods. As soon as the seed pods were mature. I planted them in one pound coffee cans. I have twenty cans with seedlings about four inches tall—they are growing in semi-shade and I can hardly wait to see how some of the crosses will result.

The one year old seedlings from the first blooms in September 1960 are very sturdy and strong in growth, with straps 14 to 18 inches in length. I am hoping to have excellent results from these since the Boshoff-Mostert Amaryllis are based on selections of the Buller strain given to him by Mr. Buller prior to 1952, and Mr. Boshoff-Mostert has apparently been improving his own strain since that time.

EXPERIENCE WITH HYMENOCALLIS VELARDEI

JOSEPH D. SMITH, *California*

Two years ago bulbs of an *Hymenocallis* species were obtained from Dr. Vargas that he had collected in the Department of La Libertad, Province of Trujillo, locality Trujillo, Peru. The general appearance of these bulbs was quite a bit different from that of other *Hymenocallis* species. They were tear drop in shape and tapered into a long thin neck. They were about an inch and a half in diameter, and their thin blackish brown skins were a beautiful thing in the bulb line.

They were planted and when the foliage appeared it was tapered to an acute point. It arched over gracefully from a pseudostem much like the foliage of a Pamiante. Bloom was anxiously awaited but did not occur until the beginning of the second growing season which followed a dormant period in which the foliage disappeared completely, as with the members of the *Ismene* group of *Hymenocallis*.

When the spathe valves had separated enough for the buds to be seen it was obvious that this was a new species of *Hymenocallis*. The striking thing noticeable at this stage was the extremely short tube and a very short pedicel. This arrangement places the flower in close to the umbel with only the ovary between the two parts. The length of

the pedicel is 0.5 cm. and that of the tube 0.6 cm. Four flowers to the umbel have been noted as so far.

When the flowers opened more new features were observed. It was at once obvious that this was in the *Elisena* group due to the deflection of the cup. The over all flower color was a light greenish yellow. The stamens were 8 cm. long and straight. The cup was small, 1.5 cm. long by 1.5 cm. wide at the brim, with a tightly rolled lip, and the whole cup was so flattened that there remained very little space within. No odor was noted from the flowers. The petals extend well beyond the cup and are narrow and heavily undulated. They are characteristically curled as in *Hymenocallis longipetala*. The over all effect is quite odd and at the same time very attractive. This species could lend several new features to the hybrid *Hymenocallis*. It might be possible to intensify the greenish coloring, and to shorten the tube length of new hybrids.

This species has been named for Dr. Velarde, a Peruvian botanist instead of Dr. Cesar Vargas, its discoverer, because there is already a *Hymenocallis* named *vargasii* which was named for Dr. Vargas by Dr. Velarde. So it seemed only fair that Dr. Vargas' discovery should be named for his friend. More bulbs of this species have been promised from Peru. The original two bulbs now in their third growing season are starting their reversal of season from that of the southern hemisphere to ours and have started growth and flowered in August this year. By another season they should start in May and flower along with the other *Hymenocallis* of the subgenera *Ismene* and *Elisena*. Apparently it would be possible to maintain these bulbs on a fall flowering schedule with winter growth by lifting them in spring and replanting in fall each year thereby having two seasons of bloom each year—from different batches of bulbs of course.

MOVING AMARYLLIS FROM ILLINOIS TO FLORIDA

MRS. FRED TEBBEN, *Florida*

Box 281, Lake Hamilton, Florida

In November 1961, my husband and I moved our residence from Northern Illinois to Central Florida, and all my amaryllis were moved down here too. Some were moved in 1960 and were planted in a friend's yard where they carried on as best they could without any care at all. These were almost all seedlings, some having bloomed and proved to be most interesting, while others have never bloomed even though they are probably ten or more years old. Of this lot I think I lost a considerable number, but there are still over a hundred that I have moved from my friend's yard to a bed prepared for them in my own back yard. Next spring I shall hope for bloom from a great many of these and those not up to standard will be discarded and replaced with others.

A second lot of bulbs were moved to Florida in the spring of 1961, and these I had intended to plant on our own lots, but our builder

was afraid they would be plowed up or plowed under before the lawn was completed, so he planted them for me in his own garden. I moved them home last November when we first arrived here. They were Howard & Smith, African, Australian, and unnamed Dutch bulbs, and I am afraid I lost quite a number of these too. I thought all one had to do was to put amaryllis bulbs in the ground and they grew here in Florida without much care, but I find there is one dreadful pest that cannot be ignored and must be watched for all the time. This is the huge "lubber grasshopper" that is referred to in the Nehrling report written so many years ago when Henry Nehrling lived here in Florida. These huge grasshoppers measure three and one-half inches in length, and the tender center leaves of the amaryllis are their favorite food. Indeed they can make short work of any and all amaryllis leaves, although the blooms are nearly all gone by the time these grasshoppers appear. They can be knocked off easily and killed with a stick. In fact that is the best way to deal with them for unless one dusts and sprays all the time the frequent rains wash off the insecticides and leave the grasshoppers a clean garden to feast on. It is best to plant the bulbs completely covered up to the neck. If any part of it is left exposed the grasshoppers will eat that too.

I had kept all my named Dutch bulbs in the pots they grew in up North and I did not bring them down here until we came last November. I removed them from the pots, shook all the dirt off and packed them carefully in a box with wood shavings between and around them to insulate them and keep them dry. These I did not plant out till late January, and while all lived, not all of them bloomed. Those that did bloom attracted a good deal of attention and received lots of admiring comment for not many Dutch bulbs are grown around here. These have done quite well so I hope for more bloom from them next February. I am fortunate to have quite good soil in this section of the Florida Ridge Country so have had good growth with only the addition of good bulb fertilizers. None of the nurseries or seedsmen know anything about mulches, and since all I could get would be peat, I have not used any mulch so far. The bulbs that were planted here last fall remained green all winter and withstood temperatures down to 28 degrees, without being damaged by the cold. They were not protected in any way. I have planted the named Dutch amaryllis in a bed protected from the cold north winds and shaded somewhat by a large oak tree, so I hope they will withstand the cold. I do not want to dig them each year unless it is absolutely necessary.

There is still much to be learned about growing amaryllis in Florida and I would certainly welcome advice and help from any who might be willing to help an amateur. Before closing this brief article which Dr. Traub has asked me to write, I thought you might be interested in hearing about the "native" amaryllis that grow in abundance hereabouts.

There seem to be four species that do remarkably well here in spite of the lubber grasshoppers. First, there is the *Amaryllis striata* var. *fulgida*, which blooms in March and seems to want to go to rest imme-

diately after it has bloomed. This is the same old variety that used to be such a popular pot plant up north and did well when it was rested in the summer and grown in a sunny window in the winter. It has a deep orange (nasturtium red) bloom with the central greenish yellow star, slightly ruffled tepalsegs and flaring somewhat. It offsets rapidly and soon makes a fine clump of bulbs. The second I noticed is much like this one in color, but it has a less flaring bloom and has a round center spot of greenish yellow. At first I thought this smaller, daintier bloom must be *Amaryllis striata crocata*, but I am told that it is the true "*Amaryllis belladonna* L.," found everywhere here in old dooryards and gardens. Then, too, there are many *A. x Johnsonii* bulbs which produce their lovely red flowers with the white lines, and grow to huge height with long strap leaves, but do not increase as rapidly by offset bulbs as the two first mentioned. The fourth species grown here I have been so far unable to identify. It may be a different *johnsonii*, although it is lighter in color, and a daintier bloom with its white lines radiating from the center of the flower. It increases much more rapidly than the taller ones and I have seen clumps of at least twenty bulbs with as many as fifteen scapes per clump. I am most anxious to know what this species may be but as yet have been unable to find anyone who can tell me.

There are many rows of "Milk and Wine Lilies" as they are called here, a *Crinum*, the true name of which I have so far not learned. There are also large clumps of a *Crinum* they call the "Christopher Lily" that I must also learn the proper name for as time goes on [either *C. giganteum* or a hybrid of it.—Editor] There are many *Eucharis* lilies grown in pots here for they do not do well unless they are confined and crowded in a pot. I have found this true also of the *clivias*. They can not be grown out of a pot. My *Amaryllis forgetii* is doing excellently down here but I shall not try to put it out in the soil for I am sure it would not survive the cold even here in Florida.

Perhaps after I have lived in this state longer I shall know all the correct names for the bulbs I have described above, but I have not found any gardeners really interested in the true names. They "just grow them for their flowers." What's in a name anyway?

GROWING AMARYLLIDS IN NORTH GEORGIA

BY BECKWITH D. SMITH, 3479 Rockhaven Circle, N. E.
Atlanta 5, Georgia

My last contribution to *Herbertia* on growing Amaryllids is contained in the 1960 issue, at which time the article was headed "Growing Amaryllids in North Florida". When the article was written, I was living in Jacksonville, Florida, with no thought that I would ever be elsewhere. It will be noted from the above heading that I am now (in 1961) "Growing Amaryllids in North Georgia", more specifically, Atlanta, Georgia. My employers, the American Oil Company, moved us in September of 1960. We had the gargantuan task of digging my

hybrids out of their Florida soil, packing and transporting in a trailer to our new location. We first settled at a location on Elmwood Drive, N. E., where the bulbs were duly planted after being spread out over a basement floor for more than a month. After the winter was over, we relocated to our present address, where the bulbs were again planted on a broad hillside in back of our new home. It was a surprise that any of the bulbs bloomed after the shock of being transplanted twice, but some of them did, regardless, while others blasted shortly after the bud tips emerged from the bulb tissue.

The clay soil in our present location contains little or no nourishment, other than iron, aluminum and some trace elements. So to provide the proper nourishments for the bulbs, each planting row was lined heavily with dairy fertilizer and further fortified with commercial 6-8-6, bone meal and liberal applications of Capco soluble fertilizer. Bulbs are responding well, although they seem to resent the full sun treatment, and are slower to grow. We are now in the process of mulching all planting rows with well rotted dairy fertilizer, and when leaves die down will further mulch with rotted sawdust. We know that North Georgia weather is cold, because last winter the temperature went down several times to 12 and 14 degrees in the Atlanta area, and there were two severe sleet and ice storms which left a blanket of ice on the ground for a week each time. This was at the location where the bulbs were first replanted, but fortunately all rows had been covered heavily with leaves, and somehow they carried through with but few freezing losses.

During the winter, indoors, trials were run on named clones of Ludwig, Van Meuwen, Van Waveren and Warmenhoven Amaryllis which had been brought along in cellophane bags and repotted. Response was very good insofar as blooms were concerned, but scapes were shortened, no doubt due to having lain in the cool basement.

Trials have begun on hybrid *Amaryllis* raised by Mrs. J. S. Barry, of Route 1, Box 7, Prairieville, Louisiana. Mrs. Barry is hybridizing many Amaryllis from the major Dutch suppliers of named clones, and is meeting with great success in producing healthy, robust and hardy bulbs from crosses which she has made. Red, pink and white seedlings were furnished the writer the early part of the year, and bulbs forced inside produced remarkably beautiful flowers. Mrs. Barry is also producing many seedlings from named clones and from her own hybrids. We will continue trials on these bulbs this winter and hope to have some interesting material to report in a future issue of *Herbertia*. Meantime, we will expect a profusion of blooms from our own bulbs growing here in Atlanta next spring, and since the bulbs should have become better acclimated by that time, excellent color pictures should result. Now that we are in Georgia for what seems a number of years, we hope ultimately to meet all of the hybridizers and growers in the state. We have found that strains of Dutch *Amaryllis* do well for us out of doors in Georgia. We hope more Georgians will grow them.

[Mr. Smith's 1961 article above was received too late for inclusion in the 1962 issue and had to be held over to this 1963 edition. See

also Mr. Smith's 1962 article which appears under the Genetics and Breeding heading earlier in this issue.—*Editor*]

NOTES ON THE BLUE AMARYLLIS

MRS. ADDA ABENDROTH

In July 1961 I sent seven bulbs of the Blue Amaryllis to Sr. H. J. Eipper, Corupá, Sta. Catarina. On June 14, 1962 he sent me a kodachrome of *Worsleya rayneri* in flower. In his letter of Feb. 1, 62, Sr. Eipper wrote that 2 of his bulbs had flowers, one 3 and the other 4, of the loveliest lavender blue. On July 8th he wrote that all except the smallest of the 7 bulbs had flowered, the last one to bloom being the one on the picture he sent, with 5 individual flowers, some time late in April. In its native habitat on mountain cliffs around the town of Petrópolis *Worsleya* blooms late in January, as far as I can tell from sporadic trips to that town.

Petrópolis is situated at about 700 meters above sea level in the coastal mountain range along the Atlantic, an hour and a half bus ride from Rio. The only spot I have seen *Worsleya* growing wild is on the rocky slope facing east back of Orquidario Binot in the suburb Retiro. The rock rises abruptly to over 100 meters. Using binoculars I could make out large clusters of curved leaves and lavender-pink flowers nestling in crevices along transverse folds and steps of the rock among weeds and some shrubbery. Incidentally, a forest fire late last year destroyed all vegetation on that slope. In December the decline was quite naked and the crosswise folds were brown. On a visit to Binot on January 30th 1962, however, I could detect some green here and there with my glasses. Despite the overcast sky I also saw, I believe, an occasional patch of lavender. Only on a sunny morning would flowers there be plainly visible.

In Petrópolis, and also in our town, several *Worsleyas* grow in private gardens. Friends in Petrópolis tell me the plant is at home high up on mountains in their vicinity, and that once in a while bulbs are brought to the public market for sale. My friend's son said he knew where the plants grow not very far from their home in the outskirts of town. Attempts to persuade the young man to take me there failed, but during the July holidays he obligingly undertook a hike to the place and brought back as many plants as he and a helper could carry. They were huge, vigorous specimens. Part of them were then shipped to Corupá in the State of Santa Catarina, where they appear to be doing fine. Two isolated bulbs of the lot that are being cultivated in Teresópolis don't look happy and have not flowered in season.

Florists in Petrópolis know the lavender-flowered Amaryllis, but put no store by it "because it does not thrive in cultivation" they say. According to late Dr. Hoehne, (S. Paulo), however, a couple of bulbs imported in 1932 adapted well in the gardens of the Instituto de Botânica where they flower regularly. On March 5th 1952 Dr. Hoehne wrote me: "Our *Worsleya* bulbs have flowered time and again and just

now a large specimen growing on a rock in front of the glass house has a stalk with eight flowers. The plant takes an inclined position and the inflorescence protrudes almost horizontally while the leaves curve like the feathers in a portly rooster's tail."

The curved shape of the leaves inspired one of the popular names of the plant down here: "rabo-de-galo", meaning "cock's tail". (Hoehne in "As Plantas Ornamentais da Flora Brasílica, S. Paulo 1936). Pio Correa (Diccionario das Plantas Uteis do Brasil e das Exóticas Cultivadas, Vol. I) registers *Worsleya rayneri* syn.—*Hippeastrum procerum* under "Açucena" and "Flor da Imperatriz". Petrópolis being the summer resort of the Imperial family up to 1888, it may well be that this outstanding flower captivated the fancy of the Empress Theresa Christina, an Austrian princess, and that the inhabitants named it in her honor. Açucena is the popular name given to any Amaryllis-like flower here and in Portugal. Nowadays the name most used is "amarilis-de-flôr-azulada". Occasionally flowers are offered for sale in Rio Flower Market.

Hoehne thought "plenty of sunlight and altitude and lots of breeze seem to be the ingredients that bestow such exquisite loveliness on the large blue flowers, and that may be why cultivation in hot houses in Europe has met little success." (Plantas Ornamentais).

Worsleya is practically unknown in Teresópolis. Neither its looks nor its various names strike a familiar note among the country people and hunters and plant collectors. Carlos Toledo Rizzini does not include it in his *Flora Organensis* (Rio, 1954).

Theresópolis, Brasil,
July 20, 1962

AMARYLLID CULTURE IN MARYLAND

WILLIAM W. ZORBACH, *Maryland*

The writer resides in a suburb removed 11 miles north of downtown Washington, D. C. A prime consideration in the outdoor culture of amaryllids in this area is the nature of the soil, especially in the newer developments where the contractors have been careful to remove completely any top soil as did exist, or to bury same. Thus, most homeowners must contend with either hardpan or heavy clay or a combination of both. The writer recommends strongly the following procedure which he adopted late in 1959 when he moved into his present location.

Along the south wall of the house he removed completely the clay soil from a section 20'x3'x1' in depth, save for about 3 inches from the top which was returned to the trench to impart substance. Along with this was added 2 bales of sphagnum peat moss, 20 small disposal cans of thoroughly decayed oak leaf compost to which ground limestone had been added, 25 pounds of Bovung, 10 pounds of bonemeal, and finally one ton of sand. The soil mix was turned over repeatedly until

thorough mixing was effected, and it was then tamped by foot. The bed is, fortunately, slightly elevated with respect to the yard, and the drainage is absolute. Owing to the fact that the yard is in full sun, a lath shade 5' high was constructed over the bed. Plantings in the bed have been in general most successful, and the writer has been using it in particular as an experimental bed for wintering over various genera, inasmuch as the location is well protected in the winter.

A young bulb of *Crinum powelli album* was obtained in 1957 and was grown at the writer's former residence under unsatisfactory conditions without success. It was replanted in the late fall of 1959 in the newly prepared bed but during 1960 made leaf growth only. In 1961 the bulb divided, making several small offsets; leaf growth was excellent. In June 1962, the main bulb bloomed for the first time in five years and threw up four scapes in rapid succession (this was well worth waiting for!). Excellent bulbs of *C.* 'Cecil Houdyshel' and *C.* 'Ellen Bosanquet' were obtained from Wyndham Hayward in the fall of 1960 and were planted immediately. Each was covered with 6-8 inches of soil as measured from the neck of the bulb. Leaf growth began in the spring of 1961 as soon as the freezing weather was over. *C.* 'Ellen Bosanquet' appears to be somewhat more tender and is slower in starting. Both bloomed during the summer of 1961 and did even better during the present summer (1962). 'Cecil Houdyshel' produced 5 scapes, each 4½-5' high, whereas "Ellen Bosanquet" came through with 4 scapes, not so tall as the former.

In a row along the front of the bed are planted some 35 *Rhodophiala bifida*. They are perfectly hardy in this location and even with the severe winter here in 1960-61 made excellent bloom in late August of the following summer. As this is being written (September 1962) they are again in bloom but have been doing so more or less sporadically. A likely reason for this is the fact that this past August has been the driest one in Washington weather history with only 0.055 inches of rain recorded. In Kensington 0.000 inches fell. Recently a little rain has fallen and the *R. bifida* have been doing somewhat better.

Six bulbs of *Brunsvigia rosea* (Cape Belladonna) were obtained from a seed company in 1958. The bulbs were planted at his former location without success, and along with the other amaryllids were dug and replanted at the present location in the fall of 1959. The leaves in cross section have the shape of a flattened "V", and tend to emerge in the late winter during warming spells. This is unfortunate because freezing weather invariably sets in again and kills "down" the emergent leaves. As spring advances the bulbs make leaf growth once more but the leaf growth is anything but luxurious, with the straps attaining a length of around one foot. Such was the case in 1959-60 and in 1960-61; consequently no scapes appeared. The last winter (1961-62) was quite mild, however, and spring came earlier. Leaf growth appeared early but was not set back, and the bulbs made excellent growth until early June when they went into dormancy. This August the writer was rewarded with 4 scapes, red-brown in color and about 30" in height.

Each produced on the average ten orchid-colored trumpets, rather similar in appearance to *Lycoris squamigera*. In contrast to the latter which has an unpleasant odor and a rough texture, the subject flowers were smooth and had a delicate lemon odor (the editor's comments here are welcome). Other Amaryllidaceae which have been handled successfully as hardy bulbs here are: *Habranthus brachyandrus* and *H. robustus*, *Sternbergia lutea* and various *Zephyranthes*.

Of especial interest in the recent Amaryllis Year Book was Sam Caldwell's delightful article on *Lycoris*. Indeed, Mr. Caldwell's request for information on *Lycoris* from other "nuts" was chiefly responsible for this article, and he will no doubt be heartened by the information that the writer enjoyed a similar "success" with *L. traubii*. In the fall of 1960, six bulbs were obtained from Wyndham Hayward; four of these bloomed shortly after being planted. Leaf growth appeared but the cold weather which followed stunted the leaves. No blooms appeared in 1961 but during the fall of that year, leaves again pushed up. This time, the growth was even poorer than before with the result that no blooms were obtained. It is clear that the winter weather in this area is too severe for this species. Perhaps a cold frame would be the answer? *L. squamigera* offers no problem here, but in view of the desert-like conditions here in August, only five scapes appeared in spite of what might be considered heavy watering. It is my impression that *Lycoris* does best during periods with adequate rain. In this respect the writer cannot help but recall a letter of two years ago from Wyndham Hayward who remarked at how the hurricane rains in Florida that year had brought up the scapes of his *Lycoris* in abundance. *L. albiflora* are perfectly hardy here and are now in bloom.

The writer obtained a single bulb of *L. caldwelii* from Wyndham Hayward in the fall of 1960 and planted it five inches deep. Nothing happened and when the first of the year arrived the prognosis was indeed poor. December had been extremely severe and January was even worse. The weather was very cold and on one occasion, 16 inches of snow fell in the yard. Occasionally, a sunny, somewhat warmer day would appear and the writer would take advantage of this to remove the snow from the bed by hand especially for the sake of the *Rhodophiala* which is making growth at this time. On one such day late in January, the writer was greeted by an extraordinary sight. At a position where *L. caldwelii* had been planted a cluster of straps projecting about one inch from the soil surface showed. These maintained steady growth during the cold weather which persisted through March and the leaves appeared to be completely unaffected by the cold. Growth continued until late June, the bulb going into dormancy somewhat later than did *L. squamigera*. In mid-September of last year (1961) the writer was rewarded with a scape some two feet high. The flowers, on opening, were a pale yellow but after a day or two changed to near-white. This is truly a beautiful *Lycoris*. Leaf growth began around the first of February (1961) and showed that the bulb had divided. Two scapes appeared recently, confirming this observation.

Approximately one dozen *L. radiata* (red) were transplanted in 1959 but were placed in an ordinary and not so well protected location in soil consisting chiefly of clay, with some sand added. The bulbs did absolutely nothing for one year and it was decided that they had rotted. In November of 1961, leaves miraculously pushed up and reasonably good growth was made during the winter of 1961-62. Four scapes have pushed up to date; the failure of the others might be due, conceivably, to the dry conditions here this year. The writer's experience with the latter *Lycoris* certainly supports the contention that *Lycoris* takes a long time in becoming established.

In addition to wintering over hardy amaryllids, the subject bed is also employed for several tender genera. *Haemanthus multiflorus* blooms and grows well under the lath; in general this is found to be more satisfactory than growing them in pots. They are remarkably resistant to cold weather and one year one of the larger bulbs did not rest off until mid-December. Prior to this time there had been some hard frosts and even a few sub-freezing nights. The leaves were only slightly affected and the bulb, which was covered with about one-half inch of soil, was in perfect condition when dug. Obviously this is applicable only to bulbs making full growth. Last year the writer was careless and delayed for about two weeks in digging them after the leaves turned yellow. By this time some rot had already set in, but by removing the rot and treating with an antifungal agent, he was able to salvage most of his stock which this year is somewhat diminutive.

Sprekelia formosissima grows well here and the bulbs are dug after the first frost. Considerable difficulty has been encountered in obtaining satisfactory blooms in the spring, and the explanation for this is that the bulbs, especially the larger ones, tend to sprout in storage before the weather attenuates enough to permit their planting. Even if they are planted early enough, the buds tend to "blast" under the soil or rot altogether, and it is becoming increasingly apparent that *Sprekelia* handled as tender bulbs require warm soil for root growth to start. Perhaps one should handle those bulbs which show evidence of early bloom in pots in the house, and after blooming they could easily be transplanted to the open soil.

A single bulb of *Amaryllis immaculata* was obtained and was planted outside. It has made excellent leaf growth but has not bloomed to date. *Cyrthanthus sanguineus*, which are carried over indoors in a planter, are transplanted to the bed outdoors. They make good growth here and bloom in the early fall.

Finally a word about one of the amaryllid enthusiast's most trusted friends—*Hymenocallis narcissiflora*. Five years ago the writer started with 18 bulbs; he now has around 80 most of which are blooming size. In addition there have been produced some 100 small offsets which were given to friends. The *Hymenocallis* are not grown in the "amaryllid bed" but along the east wall of the house in light clay to which much sand and some peat moss have been added. They grow very well here as tender bulbs giving excellent bloom in late June some

14-20 days after they are planted. As with *Sprekelia*, they are dug after the first hard frost and are stored, as suggested, in a warm basement.

In conclusion, the writer strongly recommends his procedure for soil preparation for growing amaryllids outdoor in this area. Admittedly it is a great deal of work to accomplish initially, but in the end will save in time and minimize failures. Not only does the soil thus prepared make amaryllid culture practicable, but serves admirably for growing other plants of a tropical nature, such as *Gloriosa* and *Achimenes*.

ACCELERATED INCREASE OF AMARYLLIDS

L. S. HANNIBAL

The normal development of offsets in amaryllids can be accelerated by a number of simple horticultural techniques. The best known way has been employed by daffodil growers for fifty years or more, namely planting the bulbs quite shallow in a rich clay loam. This practice is particularly conducive to rapid bulb division or even splitting. The converse, deep planting, reduces offset development, but encourages large sized bulbs with blossoms suitable for the show bench. The writer has found that the same practices can be applied to many other bulbs, and that heavy fertilization in combination with shallow planting is particularly effective.

Secondly, we have the bulb cuttage technique where the bulb can be simply split with a knife or cut up into a number of pie like sections. Each has its merit. A bulb split at right angles vertically to the leaf axis without disturbing the roots will soon form two full sized bulbs. In contrast those cut up like a pie form a number of leaf axis bulblets along the leaf scale base adjacent to the basal plate. But since the segments from the original bulb have had the growth center split up or cut away, and since the roots are often lost, the rate of growth of the leaf axis bulblets is not as rapid as is normal for offsets. The growth rate is more comparable to that of seedling bulbs. This delay factor represents quite a disadvantage.

It was more by chance that the writer learned how to circumvent these delays. Leaf axil bulblets can be grown as rapidly as offsets. While digging some *Crinum* bulbs several had their basal plates partially torn loose. The bulbs were thrown into a leafy litter under an oak tree and forgotten. The following spring several clumps of eight to ten offsets were noted. Investigation showed that the intact portion of the basal plate had re-rooted and that scores of leaf axis bulblets had formed along the margins of the bulb scales where they had torn free from the basal plate. Some bulblets were growing up through the bulbs like normal offsets, others had reversed and were growing out direct from the face of the bulb scales where cut or torn.

Later experiments indicate that in early growing season cutting or notching away a portion of the bulb base would always produce axial bulblets along the margins of the cut leaf bases, and that this was par-

ticularly true if the bulb is planted shallowly or laid on the side. The best results were obtained when the cut area was kept above the ground level, but under a ground cover. In no instance should the growth center of the bulb be disturbed since the vigor of this portion of the plant is needed to accelerate the leaf axial offsets. Several notching patterns have been tried like those used on hyacinths but the preferred method appears to be a 30 degree pie shaped notch extending into the basal plate and lower leaf scale area about one-fifth the diameter of the bulb. Four or five notches can be cut in a single bulb without disturbing too many roots or the growing center. If planted shallowly each notch will yield from two to five leaf axis bulblets and often the notched pieces will yield an offset or two. The technique has been employed on *Crinum* without digging the bulbs with particularly gratifying results.

Plants like *Clivia* or *Haemanthus* can have the individual leaf margins notched to a depth of one eighth inch at the point of attachment to the basal plate or root stem. Bulblets will usually form in the cut margins in a matter of weeks. These should be left intact until roots have formed.

Another means of offset production was noted while experimenting with the sprouting of seeds and small bulblets with colchicine and acenaphthene. These mutagens cause an excessive number of bud sports to form in both the leaf axials and margins. These bud sport offsets are often tetraploid in character like the treated parent.

MORE ON LYCORIS IN NEBRASKA

VIVIAN BARNICA GRAPES

My garden is in western Nebraska about eight miles from the northeast corner of Colorado, an elevation of 3369 feet. We have cold winters with lots of freezing weather from November until April, and usually several days of sub-zero weather in January, the average lowest 20 degrees below zero.

My planting of *Lycoris* growing under the sheltering branches of a large cottonwood tree includes: *L. squamigera*; *L. incarnata*; *L. haywardii*; *L. sprengeri*; *L. sanguinea*; *L. caldwellii*; the one sold as *L. "cinnabarina"*; *L. houdyshelii*; *L. traubii*; *L. aurea*; *L. albiflora*; the one sold as "*L. albiflora carnea*" and some selections of *L. radiata*. I hope to add, for testing in Nebraska, bulbs of the later *Lycoris* discoveries as soon as they are available.

Lycoris squamigera opens the blooming season each fall around August 10. *L. "cinnabarina"* bloomed August 18, 1961, after two years in my garden. *L. sanguinea* blooms regularly each season around August 22. *L. haywardii* August 23—this one is irregular in blooming for me. *L. incarnata* is usually in full bloom by August 28. *L. caldwellii* bloomed for the first time September 11, 1960 after two years in the garden. The foliage of *L. squamigera*, *L. incarnata* and *L. caldwellii* appears around March 18th and the foliage of *L. haywardii* and *L. sanguinea* about two weeks later. The bulbs of all are planted four inches deep to the base of the bulb.

So far none of the *Lycoris* in Subgenus 2 have bloomed here after wintering in the garden, but the bulbs live over, some show increase and the foliage seems to be coming stronger on several this fall (1961) so I hope they are getting acclimated and will bloom later.

Crinum bulbispermum and *C.* 'Cecil Houdyshel' have been growing in the open since 1957 and they bloom each summer, *Galtonia candicans* planted at the same time, and *Arum italicum* in my garden since 1941, also bloom and set seeds. The Crinums and *Galtonia* lose their foliage in the fall and new foliage comes up in late spring, but the lovely foliage of *Arum italicum* appears in October and lasts through the winter and does not die away until after the blooming season.

The soil in this part of the garden is a sandy loam underlaid with gravel and has perfect drainage. I cover the bulbs each winter with three to four inches of wheat straw, I find that a heavier covering causes soft growth on the lycoris foliage which is more subject to freeze injury.

My grateful thanks are due to Mr. Hayward, Mr. Morrison and Dr. Traub for making it possible for me to grow some of the newer *Lycoris* species.

ARTIFICIAL LIGHT FOR AMARYLLIS CULTURE

RICHARD J. SUDD, *Illinois*

During the summer of 1960 my patience with the elements here in Northern Illinois was just about exhausted. Being able to have control over the wind, light, watering, etc., prompted my experimenting with the growth of *Amaryllis* under artificial light, in complete absence of sunlight. With the available space and electricity being one of the cheapest services in our area, I commenced my experiment.

In the past ten years I have been able to collect some hundred hybrids and species. This size collection made it impossible for me to grow all the bulbs under artificial light, but with those *Amaryllis* growing under artificial light the experiences and the knowledge obtained has been both enlightening and rewarding. Before I mention my experiences I think it would be worth while to give a picture of the environment and lighting arrangement.

All the *Amaryllis* species and hybrids are grown in the basement of our home, which is below ground level, and there the temperature range very seldom falls below 65 degrees F. in winter and above 75 degrees F. in summer. Even with the prolonged below zero weather during the winter of 1961-1962 the temperature seldom fell below 65 degrees, even when heat was not supplied. When heat was supplied, by a forced air heat plant, a temperature of 70 degrees with a humidity of 60% was maintained, if possible. During the summer months there is a rise in temperature and humidity, but with the added circulation of outside air, this was found to be beneficial. In the winter the forced air circulated by the heating plant was sufficient for ventilation.

The choice of fixtures is a matter of preference and in my case industrial fluorescent fixtures were used because of easy handling. I

obtained three fixtures with porcelain coated reflectors approximately twelve inches in width and each containing two forty watt fluorescent tubes (cool white). Having a little knowledge of electricity, I connected the three fixtures parallel on a fifteen amp line, which was added for this specific purpose. On the line the fixtures were connected to an outlet which was controlled by a switch and automatic timer. With the automatic timer the light source can be limited to any number of hours and at present I have limited this to fifteen hours for *Amaryllis* growth.

All three fixtures are suspended from the ceiling by dog chains, above a platform four feet by seven feet. The fixtures are arranged parallel to each other with a space of twelve inches between the reflectors. Arriving at the proper height of the fixtures was governed by the light energy measured in foot-candles, from the fixtures to the platform. Depending upon the type of fluorescent tubes and reflectors used, there will be a variation in illumination.

On the market to-day are a number of fluorescent tubes under which *Amaryllis* will grow. They contain blue, red, green and yellow parts of the visible color spectrum and for plant growth it is best to strive for a balanced lighting. For balanced lighting, obtaining the highest quantities of the blue and red visible color parts of the spectrum will give the best plant growth, as it is the blue and red rays that the plant utilizes for vegetative and bud formation. At the start of my experiment with artificial light, trying to achieve a balance of red and blue rays brought about the use of incandescent light bulbs and various types of fluorescent tubes. The incandescent bulb is a good source of red rays, but its use is hampered by the heat energy, which will burn foliage that comes in contact with it. Approximately eighty per cent of the energy of the incandescent bulb is heat whereas in the fluorescent tube only twenty per cent of the energy emitted is heat and this amount has no effect on *Amaryllis* foliage. Also it will be noticed that the fluorescent tube has an abundance of blue rays and sufficient red rays, so for a practical source of artificial light the fluorescent tube is adequate.

Any type of fluorescent tube may be used, but in my case I have found the best results are obtained with the use of the cool white fluorescent tube. This type of tube was used primarily for its brightness and to obtain an illumination reading of 200 foot-candles at the greatest distance between the *Amaryllis* bulb and the fluorescent tube. Using a light meter it will be found that a 200 foot-candle reading will fall approximately twelve inches beneath the fluorescent tube. All *Amaryllis* bulbs vary in size and to allow for the various sizes in the containers being used, an added twelve inches was needed to maintain the vegetative growth within the 200 foot-candle illumination. If the *Amaryllis* bulb had to be raised to maintain the vegetative growth within the 200 foot-candle illumination, empty flower pots were used. This method eliminated the raising and lowering of the fluorescent fixtures and the two feet spacing between the plant platform and fixtures I have found to be adequate.

The life of the fluorescent tubes used varied and to utilize the greatest efficiency of the tubes, I have replaced old tubes every six month

period. As the fluorescent tubes become older there is a considerable drop off in illumination. If the *Amaryllis* is receiving sufficient illumination the leaves at the neck of the bulb take on a dark lavender appearance and the remainder of the leaves become a dark green.

As mentioned previously the fluorescent fixtures were placed parallel to each other with a twelve inch spacing between the reflectors to help control the bending of the vegetative growth (phototropism). At present the position of the fixtures has worked satisfactorily, especially when the *Amaryllis* are in a budding stage. The *Amaryllis* is allowed to continue its growth and bud development directly beneath the fixture until the scape has reached the fluorescent tube. At this stage the *Amaryllis* bulb is placed between the fixtures with the leaves beneath the light and the scape continuing to develop between the fixtures. If the *Amaryllis* in bud is placed between the fixtures before the developing scape has reached the fluorescent tube there will be a considerable bending of the scape towards the greatest source of light energy. If the bulb has not developed a strong root system the bulb will not support the weight of the scape and flowers. Continued development of the scape above the fixtures was normal and bending of the scape ceased to a large degree. About the only bending of the scape will be caused by the reflected light from the surrounding area.

The flower development above the fixture was also normal. There was no noticeable change in the flower color or texture, but the lasting qualities of the flower seem to be prolonged more than those *Amaryllis* grown under outdoor conditions.

The growth of seedlings under artificial light with sufficient illumination shows great promise of bringing seeds into bloom within a two year period. During the winter of 1961 a few seeds from crosses among the *Striata* Group were planted and leggy or weak growth was not apparent under sufficient illumination. I was even surprised to see offsets produced after six months growth.

At the end of this year's flowering and growth, all fluorescent tubes I now have, are going to be replaced with a fluorescent tube made especially for plant growth. This tube is available under the trade name "Gro-Lux." (GRO-LUX is manufactured by Sylvania Electric Products, Inc., Salem, Mass.) It contains the blue and red rays, which cast a lavender glow and this is the closest to a balanced lighting yet available. From all reports plants growing under "Gro-Lux" are superior to those grown under other sources of light energy. What effect this new source of light energy will have on *Amaryllis* growth, I hope to discuss at a later date.

For those individuals who wish to experiment with *Amaryllis* growth or other forms of plant life under artificial light, there are many articles that have been written and which are available to the public. The U. S. Department of Agriculture, Agricultural Research Service has available many articles on the subject of light effect on seed germination, plant growth and plant development. I would like to recommend one article (Publication No. 879) available from the U. S. Government Printing

Office, Superintendent of Documents, Washington 25, D. C. This article titled "Light and Plants" gives general information and a series of experiments demonstrating light effects on plant life.

WINTERING AMARYLLIS IN THE NEW ORLEANS AREA

W. J. PERRIN, *Louisiana*

This article has to do with the average home garden and not the commercial grower planting large plots. The record breaking freeze of January 10, 11, 12, 1962 in which we experienced a low of 10 degrees, may not happen in years to come; however, the safe way is to plan and be prepared for the worst at all times. Much bad publicity was given *Amaryllis* immediately after this severe freeze. Some would have you believe *Amaryllis* cannot stand a three day freeze in this area. The Men's Amaryllis Club of New Orleans Show, staged April 7th and 8th, in which an abundant number of flowers were shown, best proves that *Amaryllis* is well capable of taking care of itself in cold weather.

Those planting *Amaryllis* in this area should keep three things in mind: 1. Drainage; 2. Mulch; and 3. Location and Exposure.

Drainage and mulch are a must for without these the normal winter will damage bulbs. Location and exposure, not much heard of until the late freeze, now becomes No. 1 in importance. It has been proved that *Amaryllis* will not take the strong north icy winds blowing in their "face."

Figures 22 and 23 show the effects of proper back wall protection and exposure. We see no damage whatever in Fig. 22, upper left and right. The back stucco wall and large roof overhang with westerly exposure giving full protection. Fig. 22 lower left, with direct north exposure results in total loss. Partial damage will occur where exposed to the north wind, however small, as in Fig. 22, lower right. A highly elevated, well mulched bed is seen in Fig. 23 left. This bed, totally exposed, suffered heavy damage. Back wall protection is exemplified in Fig. 23, right. The south wall of garage gave 100% protection.

Many will say, "Conditions are such in my yard I cannot protect from the north winds." In such cases it is very convenient to dig and store the bulbs during the winter months. This is an old practice which has been going on for years by many hobbyists. About November 1st, or before danger of freeze, dig all bulbs, wash and cut old foliage. Disinfect and let bulbs dry about one week, then place bulbs in pasteboard cartons. Fill cartons to a depth of $\frac{1}{2}$ to 1 inch with horticultural Perlite, lay bulbs on Perlite, then cover with Perlite. Bulbs may be stored easily and kept in good condition. The cartons must then be kept in some protected location where temperatures will range from 50 to 60 degrees. March 1st, or after danger of frost, bulbs are again planted. You will experience normal bloom. The bulbs will root well and you will find the rest did them good. There is another advantage in this. We all know *Amaryllis* are heavy feeders. By stripping the beds

we have an excellent opportunity to work the soil and add missing ingredients during winter months.

Potted *Amaryllis* stored for winter rest should be placed in locations where temperatures will not go below freezing—80 Dutch bulbs were stored in closed garage. All bulbs froze. No heat was provided.



Fig. 22. Effects of January 1962 freeze on *Amaryllis*, New Orleans Area—upper left & right, no frost damage. Lower left, north exposure, total loss. Lower right, partial damage. See text for further explanation. Photos by W. J. Perrin.

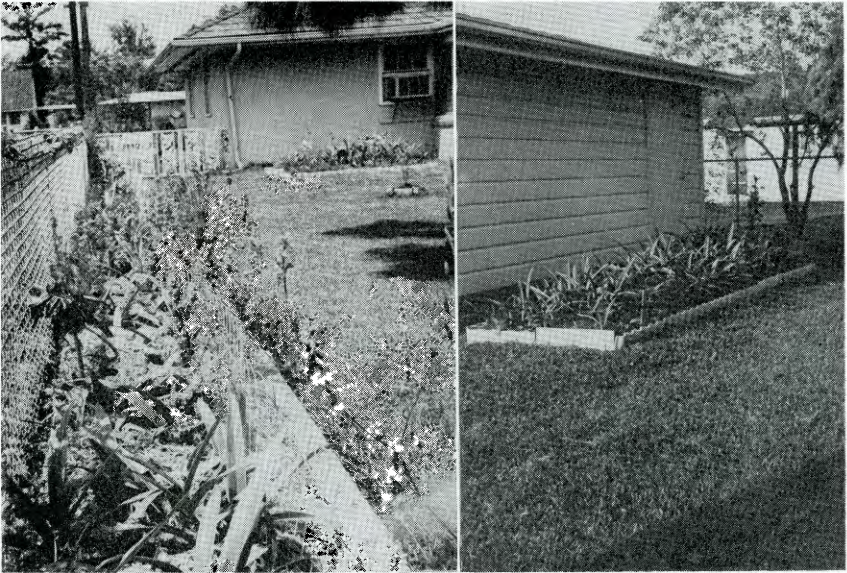


Fig. 23. Effects of January 1962 freeze on *Amaryllis*, New Orleans Area—Left, well-mulched highly elevated bed fully exposed suffered heavy damage. Right, south wall of garage gave full protection and no damage was suffered. See text for further explanation. Photos by W. J. Perrin.

WINTERING AMARYLLIS IN OPEN GROUND

WALTER R. LATAPIE, *New Orleans, Louisiana*

Most of our Dutch and American hybrid *Amaryllis* survived the three-day severe cold spell last winter, when the temperature went as low as 10° F., on January 10, 11, and 12, 1962.

Some of the beds that were saved had been mulched during the summer with sugar-cane bagasse and then in December a 6-inch layer of pine needles was scattered over the ground. However, there was one bed with only the bagasse mulch, where none of the bulbs suffered any damage, but this was in a Southern exposure.

The bulbs that were lost had been planted on the Northern side of the house, with only a little of the bagasse mulch left around them.

From my observation of other gardens throughout the city, the deeper the *Amaryllis* bulbs were planted, the better chance they had to survive the severe cold when no mulch was used.

Mulching *Amaryllis* beds is very helpful in New Orleans. In the summer it cuts down on the need for weeding, and it conserves moisture. In the winter it protects the bulbs against frost and cold.

Regarding other *Amaryllis* planted in the open ground, the following *Crinum*s survived the 10° F.: 'Cecil Houdyshel,' 'Ellen Bosan-

quet, *moorei*, and *americanum*. The cold did not affect the *Zephyranthes* and *Sprekelia*. Last Spring I planted some *Haemanthus multiflorus* about 2 inches deep. During the winter these bulbs had sunk down about 6 inches into the soil, which is probably why they survived. They sprouted during the month of May.

LESSONS FROM THE 1962 FREEZE

EDWARD F. AUTHEMENT, *Louisiana*

Amaryllis fanciers of the Gulf Coast area were caught in a record freeze in January 1962 which will be remembered for quite a long time. Our customary mild winter weather in New Orleans was far from mild. When the forecasters predicted temperatures down to 12 and 13 degrees F., there was skepticism because such low temperatures were unheard of except in weather records of 100 years ago. It is good news then that so many plants were saved in spite of these low temperatures. There is no doubt that if the freeze had continued 2 or 3 days longer, the damage to vegetation in this area would have been tripled.

In the New Orleans area, *Amaryllis* are grown in a fashion that makes them very vulnerable to low temperatures. Some are planted with 1/3 to 1/2 of the bulb out of the ground. The American clones are so prolific that sometimes the offsets force the mother bulb entirely out of the ground. In such a condition, the bulb is completely exposed to the elements. Under these conditions, a great number of *Amaryllis* bulbs were lost in the severe freeze.

Amaryllis bulbs planted in raised beds or even at ground level, can survive a severe freeze if properly mulched. Hay, processed sugar cane fibers ("Serval"), grass clippings, peat moss, or any suitable material can be used to good advantage. If the freeze is prolonged, a layer of soil over the mulch gives a better protection. The labor involved in applying the mulch properly should be weighed against the surer method of lifting the bulbs and storing them till spring.

A sure method of saving potted *Amaryllis* bulbs from freezing, is the cold frame-saw dust arrangement. This is merely an enclosure with boards to accommodate any number of pots. One was built to take care of 65 7" pots. It was intended to make unnecessary bringing the potted plants inside during mild freezes. The construction is of boards with the back about 4" higher than the front. The top of the end boards is tapered to the front so that when window sashes are placed on top, a fairly neat fit is obtained. The enclosure was built to take four window sashes laid on top side by side. These were loose and could be removed at any time for ventilation. The 7" pots were placed inside and sawdust was packed firmly between the pots up to the rim. As a precaution, DDT wettable powder was sprinkled generously over the pots and sawdust and watered thoroughly.

This arrangement was satisfactory for mild freezes which we are accustomed to. When the temperature dropped to the low 20s the first

day of the severe freeze, 30# felt was tacked all around the box. Two sheets of plastic film was then tacked on to the top of the box and the window sashes were placed on top of this. As an added precaution, a 100-watt light was placed inside and left on throughout the freeze. The success of this arrangement was proved when only the leaf of a small offset froze. This leaf had been resting against the boards on the north side of the box. The foliage, sawdust, and pot soil never froze.

It was also noted that bulbs planted with 2" or 3" of soil above the neck, were not damaged. Some of the bulbs planted with part of the bulb above the soil, suffered damage to the outer scales. The stem was not damaged and these bulbs are now growing back. In some cases, the stem froze and left the scales and basal plate in fair condition. It was found that these bulbs could be cored and replanted. These cored bulbs produced a fair number of offsets. Cored bulbs are those that have a round hole through the center of the bulb and the basal plate—a rim of the basal plate is left on for new roots to form on. Bulblets will be formed on the inside of this rim. The bulb is planted in the usual manner and a wide-mouth jar is placed over the bulb. This keeps the water from getting inside the bulb. When leaves from the bulblets are seen growing out of the neck of the bulb, the jar is removed. This method can be used with uninjured and damaged bulbs.

The blooms which followed in the spring from bulbs apparently not damaged by the freeze, were not quite up to expectation. Some were twisted or deformed to some extent. Others were small and did not last very long.

Reports from growers and personal experience showed that the seeds did not fully mature. Only about 1/3 to 1/2 of the seeds were fertile. Of those that were good and planted, germination was only about 50%.

So, at the expense of some high priced *Amaryllis* bulbs, we gained knowledge about freeze damage that may be very valuable in the future.

ADAPTABILITY OF HYBRID AMARYLLIS

MRS. A. C. PICKARD, *Houston, Texas*

The never-to-be-forgotten freeze of January 1962 took its toll in the blooms of Dutch hybrid *Amaryllis*. The freezing of so many of the buds, leaving only a small percentage of a normal season of bloom was quite a catastrophe in ways other than just loss of bloom. It cancelled *Amaryllis* shows, as all gardens were damaged to the same degree. Newly acquired or recently transplanted *Amaryllis* were also damaged to the extent of bulb deterioration. The bloom of the lesser damaged bulbs were below average in quality. The scapes were crooked, with flowers of poor form and colors hardly recognizable for the clone. The damage to foliage varied. It seemed to depend how far it had progressed.

The *Amaryllis* growers that made provisions as to protection with a heavy mulch found with Spring weather, a lush comeback of a great

percentage of the bulbs. It seems that a bountiful crop of offsets are in the making from the basal plates of damaged bulbs. This record breaking freeze put the Amaryllis Dutch hybrid in the front for endurance and tolerance of abnormal weather conditions in the Gulf Coast area.

The chief difference between garden *Amaryllis* of today and those of a generation ago is that most modern ones are of the hybrid origin and have been worked into a flower more beautiful and more adaptable. From the hybridizers gardens it is a safe forecast that new frontiers are still ahead in the work with these flowers, unlocking new treasures of form and color to bring distinction and richness to gardens and homes.

There might be something of value to be gained by studying the performance of seedlings grown and developed within the area, as to their tolerance of climatic conditions.

To the many new hybridizers, my advice, based on past experience is to select carefully the varieties you wish to cross. They should have clear color, good texture, pleasing form and sturdy scapes. I have found it most helpful to walk along the garden path when the *Amaryllis* blooming season starts and with a "seeing eye" look for color, form and substance. Later in the day I make a return trip to see how those stood the test of rain, sun and wind and find it quite helpful to have a critical eye for marking the outstanding clones. These are saved for future observation until the final decision.

A hybridizer should not be in a hurry to name and introduce a new seedling that at the moment seems perfect. It should be tested for at least two years, so that one can observe the actual color and size. Seedlings should be compared to see if it is really different in color and is well behaved according to number of blooms per scape.

In looking back over my hybridizing it seems as if I have been reasonably successful in carrying out my theories of breeding. However, there have been disappointments but there is no thrill quite equal to seeing a beautiful seedling unfold and show that you have helped to create a new and beautiful flower for others to enjoy with you.

The basic policies, upon which the "Houston Amaryllis Society" (affiliated branch of the American Amaryllis Society) was organized in 1957, are to develop a greater knowledge of "knowing, "growing," "showing" and "sharing." This has been demonstrated by the rapid strides of varied activities that have been made in the Society.

We have those who strive to show the best garden display. Others make the best arrangements. Then, there are those who work all winter planning crosses on paper and then—come Spring—rush out each morning to beat the bees to gather pollen. They also spend some time looking and comparing blooms of seedlings to see if the plants merit further watching or the compost heap. These are some of the individual activities that occupy our time.

Our most important service to Amaryllisarians is to assist the show chairmen in proper classification and regulations for judging Official

Amaryllis Shows in order to insure fairness of competition in a maximum of classes. We also compile show schedules and supply official judges. We advise clubs and horticultural organizations on various aspects of culture and propagation of *Amaryllis*

The services are available to all Amaryllisarians and the membership continues to lend assistance and promote the highest standards far beyond the realm of Society Membership.

ZERO WEATHER AND AMARYLLID SURVIVAL

CLAUDE W. DAVIS, *Baton Rouge, La.*

During the period of January 9th to 12th, 1962, the Lower Mississippi Valley experienced the coldest spell of weather of record for the past fifty years. For four successive nights the temperature at Baton Rouge, Louisiana was 10° F., with daytime temperatures never getting above 20° F. Night temperatures at New Orleans were down to 12° F., and North Louisiana and North Mississippi had near zero weather.

Gardeners generally were unprepared for such severe cold in an area where the winters are normally mild and as a result losses of tender and half-hardy plants were heavy. This was especially true of the Dutch Hybrid *Amaryllis* which were being grown in the open ground with the bulbs partially exposed. All forms of seedling Amaryllids and mature bulbs which were left outside in pots and flats were killed completely. This included seedling *Amaryllis*, *Zephyranthes*, *Habranthus* and *Crytanthus*, all of which were a complete loss.

There is a brighter side to the picture, however, because from this experience we learned something which will be of value in the future. The most important is that hybrid *Amaryllis* growing in the open ground were not injured where the bulbs were completely covered with soil up to the neck of the bulb and the bed was then mulched with leaves, straw or sugarcane bagasse which kept the ground from freezing. Growers in Shreveport and in Ferriday, Louisiana report carrying their *Amaryllis* through zero weather under these conditions.

In the garden at Baton Rouge established plantings of *Crinum*s, *Hymenocallis*, *Zephyranthes*, and *Crimodonna corsii* survived 10 degree weather in the open ground without damage, but a report from Ferriday, Louisiana indicates that the various forms of *Zephyranthes* were killed by zero weather, whereas the *Crinum*s survived this much cold.

Habranthus robustus came through the cold in Baton Rouge with a light mulch of bagasse around the plants, but mature bulbs of *H. brachyandrus* and the hybrid, *H. x floryi* were killed even though partially protected by a mulch around the plants.

NOTES ON AMARYLLIDS IN MICHIGAN, 1962

DONNA N. SCHUMANN

After four summers of growing Amaryllids in Michigan we now feel that while most of our various species can be grown here some are

more successful than others and we should plan our future plantings accordingly.

For our first attempts at growing our plants in this new climate we planted them in full sun with a southern exposure. The results were described in *Herbertia*, 1961. Since then we have varied the locations and found that a garden area that is shaded by an adjacent woods all morning with increasing sun exposure through the afternoon has been most favorable for our species. Soil moisture has probably been an important factor in this area since it does not dry out as quickly after rains or waterings as the area in full sun.

Zephyranthes citrina, *Z. brozosensis*, *Z. sp.* (Clint; "Valles"), *Habranthus robustus*, and, especially, *Z. smallii* have improved markedly in the new area. They have all multiplied nicely and have bloomed repeatedly from the time of planting in early May throughout the summer.

Z. sp. (Clint M-375), *Z. sp.* (Clint M-292) and *Z. grandiflora* have done equally well in both the full sun and the shade-sun areas. In fact *Z. grandiflora* has been the most rewarding of the small bulbs and has maintained nearly continuous bloom.

Habranthus brachyandrus, *Z. insularum*, *Z. macrosiphon*, and *Z. drummondii* have been very reluctant to bloom although the foliage growth appears good. *H. cardenasiana* has completely failed to blossom in the new area although it did in the full sun area. Perhaps a modification of the full sun area would improve the blooming qualities of the above plants.

Chlidanthus fragrans and *Z. x ruthiae* clone 'Ruth Page' have proved to be enigmas. Their foliage is excellent. They have multiplied many times their original number. But they won't bloom. I fear they must be considered unsuitable for growing in Michigan.

The larger bulbs of the *Hymenocallis* (subg. *Ismene*), *Sprekelias* and *Crinum*s have continued to put on their lovely displays. They have all proved to be fine garden flowers regardless of where they are planted. They have not suffered in the slightest from the long winter storage to which they are necessarily subjected.

Crinum clone 'Cecil Houdyshel' and *Crinum x powellii* var. *album* have survived three winters next to the house foundation and are now of tremendous size. This summer 'Cecil Houdyshel' rewarded us with four stalks of lovely pink flowers and *C. powellii* var. *album* produced three stalks of its white flowers. Since these plants have been so unexpectedly successful we have now planted *C. kirkii* and *C. erubescens* and will try a hardiness test on them this winter.

The only small amaryllid to survive a hardiness test was a clump of *Z. candida* which was also planted next to the house foundation. A similar clump planted away from the house in an open garden failed.

A *Brunsvigia rosea* (Cape Belladonna) bulb which was planted next to the *Crinum*s last summer survived the winter but has to date failed to flower. It will be left in place and tried again through another winter.

Rhodophiala is known to be somewhat hardy so we were especially pleased to receive some seeds from Dr. Traub so that we might try them in our climate. We have a pot of them growing now and they will probably be ready for a permanent garden location by next summer with a hardiness test following in the winter 1963.

3021 Fleetwood Drive, Kalamazoo, Michigan

THE 1961-1962 AMARYLLIS SEASON

ROBERT D. GOEDERT

Box 6534, Jacksonville 5, Florida

The 1961-62 season was marked by the most severe cold spell in the deep south in many years. Most of the Gulf states were seriously hit by a cold wave that lasted several days with temperatures well below freezing. Many reported that they lost large numbers of bulbs and some even lost their entire collections. Many placed their potted plants in closed frames or in their garages which normally provided protection. The cold lingered long enough so that this protection was inadequate. When the cold weather was over many of the potted amaryllis were frozen. Bulbs in the open that were mulched came through in good condition but where they were not protected many were lost.

Peninsular Florida escaped most of the cold. The only apparent damage was a reduction in flower spikes. In the northern section of the state the scarlet *Amaryllis belladonna* (species) made only an occasional bloom this season. Damage in Texas was so great that some shows were canceled and even in Brownsville severe damage was reported.

The interest in amaryllis has not waned and many started making plans to rebuild their collections practically before the weather cleared. As these collections are rebuilt it appears we may be entering a new era in amaryllis culture. Many are replacing their border plants with the Dutch, Tunia's Australian, Tunia's X Dutch and other improved strains. This should stimulate more interest in amaryllis as these better hybrids are seen by the public.

The ardent show exhibitor is being more discriminating and is trying to be very careful to replace with only the truly good named clones. Some are buying only the newer clones; others are purchasing several of the older tried and truly worthy ones. Many have learned that it is better to have several of a good clone than many of those that are not reliable bloomers. The Dutch strain is still most popular but others like the African strains are gaining in popularity and surely will compete with the Dutch hybrids in the future.

As the quality of our garden clones improves, greater interest in exhibiting will surely take place and there should be rapid improvement in the number and quality of unnamed hybrids at the shows. The general public should increasingly be encouraged to participate in the

shows. Greater participation will expand interest and generally promote improvement in the clones offered to the public.

There is one thing I would like to suggest to those rebuilding their collections. Do not get over enthusiastic about the new ones even if you can afford it. There are a number of older clones that will be with us long after some of the new ones are forgotten. The true evaluation of a clone can not be made for several years. Do not get the idea that I am saying all new clones are not worthy for only in the new ones can we look for improvement. We surely need to purchase the new ones to encourage the hybridizers. My point is—don't overlook those clones you know are good just to buy something new. It is better to purchase three or four bulbs of a good clone than just sheer numbers of clones. It is always exciting to grow new clones and I am sure most of us can hardly wait to read the descriptions of the new ones each year. Opinions of the previous season are always welcome. By this means we often make up our minds for which of the new and higher priced introductions we will go overboard, and try next season.

Amaryllis appear to have an inherent weakness and one should understand this in judging new clones. Many clones grow vigorously until they reach maturity, make a wonderful or even spectacular display and then decline or become difficult to maintain in a flowering condition. You will note this among beds of seedlings and among your named clones. In certain cases possibly this one outburst of flowers may justify purchasing bulbs of certain ones. There are a few clones, I feel sure, that after reaching maturity you might as well cut up and start new plants. The young plants from such cuttage will grow vigorously to maturity only to decline again after flowering one or two seasons. I am sure you have observed this but many do not want to recognize it and want to blame their failures with these clones on some cultural defect. I do not mean to say that every clone that fails has this characteristic for there are many pitfalls in the culture that contribute to poor flowering.

The two most exciting newer varieties of the past season appear to have been 'Rilona' and 'Pink Beauty.' 'Rilona,' a light salmon buff with very dainty ruffling in the throat, is different, beautiful and appears extremely vigorous. Even the bulbs are beautiful to me being very uniform. It should become a leading variety and is the first one to challenge 'Bouquet' for first place among the salmon colored ones. You will surely hear more about this variety. 'Pink Beauty' is more a novelty in white flushed pink. The petals are so wide the flower appears double. It made many friends and will be extremely popular this coming season.

In commenting on the previous season one can not omit making remarks about the older clones; however, my main purpose is to comment on the newer ones and if I forget to mention one of your favorites forgive me for I can not in this small space evaluate all varieties. This year I would like to comment on the varieties by color and shade as I get many requests for this or that shade and this may help some in determining the particular shade you may be seeking.

WHITE CLONES

The whites are always popular having many old and worthwhile varieties among them such as 'Maria Goretti,' 'Ludwig's Dazzler,' 'White Christmas' and 'Queen of the Whites.' These and others are still popular and worthy. Another older one I fall in love with each time I see it flower is 'Mount Tacoma.' It has an ivory cream color that sets it aside from others. I may be unduly fascinated by this variety but I do feel it deserves your attention. Most whites can not be distinguished from another unless you read the name tag on it but 'Mount Tacoma' is an individual. Ludwig's 'Christmas Gift' is a fine standard late variety and 'White Favorite' gains in popularity each year. Warmenhoven's new variety, 'Oasis' (Snow Queen) is acclaimed by many as the top white. It is large and performs well and is worth watching. Warmenhoven's 'Mount Blanc' is a large ruffled white clone that will become more popular now that it is more reasonably priced. Van Meeuwen's 'White Christmas' gains in popularity each season and their new clone as yet unnamed was made available to a few this past season. It was well received and appears to be free flowering. Being fragrant it will become very popular. 'White Crane,' another new tall white, is large and robust and will make its self felt at the shows. It is a good performer and will surely become popular. Only a few bulbs were available this past season and it will be scarce for a number of years.

Of all the whites to date 'Maria Goretti' has possibly the best reputation. It is a good shipper, fairly easy to flower, is fragrant and just a good all around variety. It also sets seed and many others do not. Many that hybridize often write that this or that one will not set seed. You will find the following varieties set seed easily: 'Maria Goretti,' 'Christmas Gift,' 'Nivalis,' and 'Leading Lady.' These should not fail you.

WHITES WITH COLOR

A fleck of color or a faint penciling, in my opinion, lends character to the white flower. Two in this class, Ludwig's 'Peppermint' and Warmenhoven's 'Marion' are available. Van Meeuwen expects to introduce a third, 'Siren,' in a few years. 'Peppermint' was liked by many but some complained of too much color. 'Marion,' a very large ruffled one with faint penciling, was well accepted. As light has a great deal to do with the amount of color in this type flower the grower will have to find which one does best in his area. An ideal clone with just the right amount of color will surely be developed. Mr. Rice of Valdosta, Georgia, has many seedlings of this type that are excellent. Possibly some day he will be able to offer named clones.

WHITE FLUSHED

'Apple Blossom' is the indisputable leader in this class and this year became the most popular amaryllis in the world without a doubt. It is a wonderful variety and one that will be around for many years. 'Love's Desire' is beautiful and has more pink in it. It gains popularity

each year and is a vigorous free flowering variety. Both clones give excellent results from small sized bulbs and make beautiful border plants in the south. 'Pink Beauty' is a new sensation in this color. Its petals are so wide it appears double. It has good color and will become popular. 'Floridade' is much lighter and needs quite a bit of shade to give it the white blush pink color that is so popular. It is large and very beautiful when well grown. 'Little Diamond' possibly belongs here also and is really more of a pin stripe pink and white that appears pink. It is very large and has that perfect round flat flower. It possibly has the best color and form of any pink amaryllis. 'Golden Triumphator' is much like 'Floriade' except for the color being in a beautiful golden orange on white. This one also takes shade for best coloring. It is extremely large and under proper cultural conditions is exquisite.

PICOTEE TYPES

The picotees introduced by Ludwig & Co. are very popular. With the introduction of the named clones 'Dutch Doll' and 'Square Dance,' this type should become even more popular. The picotee type is relatively free flowering, has a loose airy form and is most artistic. They are without a doubt one of the most beautiful forms of amaryllis and especially deserve your attention.

WHITE STRIPED

The leading show clone in this color is 'Zenith.' It is extremely popular in the Texas area and often takes the best in the show. 'Silver Lining' is large and very popular in the Mobile area. More in this color are needed; however this has never been a popular color. Considering this it goes without saying that 'Zenith' can be spectacular to win best in the show with this handicap.

BICOLORS

'Beacon' is the only salmon pink and white. It is large and an exceptionally nice clone. 'Verona' similar in salmon orange and white is a very nice addition. It has a clean appearance and grows rather vigorously. 'Candy Cane' still remains popular with many. 'Fantasy' still ranks among the best in rose and white. 'Royal Dutch' with similar color was introduced last season. 'Five Star General' is a very handsome clone when grown well but appears to have cultural difficulties that may eventually eliminate it. Van Meeuwen's Rostenlii in red and white is prized by quite a few. It apparently is becoming more popular each year but is still not extensively known.

BLENDS

'Sweet Seventeen' and 'Pinksterflower' are possibly the leaders of this type. 'Sweet Seventeen' is a beautiful large shrimp pink. 'Pinksterflower' is similar in form but more in the orange tone (referred to as Azalea pink) and is a most robust plant that does well in the border in the south. 'Floriade', 'Golden Triumphator' and 'Little Diamond' might be included, however they were discussed under the white flushed varieties.

ROSE PINKS

Possibly the lightest in color is 'Flora Queen'. It is a beautiful soft light rose pink with slightly lavender caste. It is very scarce and is much in demand and is a truly beautiful clone. 'Daintiness' is still liked by many—a light rose pink with green throat. It is large, round and a good grower. 'Sight Show', new last year, has nice coloring but appears to be less robust. In the medium rose pinks 'Queen of Sheba' is becoming very popular. It has a lavender cast that many like, is large and grows vigorously. Ludwig's 'Pink Favorite' and 'Pink Perfection' still remain popular.

ROSE REDS

'Bella Vista', a medium rose red, is a strong contender for the ranking place. It has good color, size and grows very vigorously. 'Queen of the Pinks', 'Doris Lilian' and 'Diamond' are also popular. 'Elvira Armayo' is a large flowering clone with a lavender-purple caste. It is becoming very popular as many rave about its color. 'Violetta' still remains popular with some collectors as it has that classic round flat form.

In the darker rose red color the Warmenhoven varieties 'Moreno', 'Mysterie' and 'Bordeaux' pretty well dominate this color. Bordeaux is the darker. All have fine coloring. 'Beau Jolais,' a small flowering clone, has beautiful coloring. It is a most worth while plant and one that more should try.

WINE REDS

'Red Master' still leads this class and is still one of the most popular amaryllis being second only to 'Apple Blossom'. 'Mohawk' appears to be as large though it may be a little lighter in color. It makes 4 flowers per spike whereas 'Red Master' seldom makes more than two. From one season's performance 'Mohawk' appears to be a challenger. 'Red Master' however has been popular for many years and will be one hard to displace. 'Blazing Star' is of similar form. The color is generally lighter but I consider it a contender in this color. It is a very worthy clone being large and beautiful. 'Tristan' still remains popular. 'Aleyone' is a fine clone with beautiful color but flowers are not as large as the others in this group.

PURPLISH-RED

Three amaryllis are generally considered in this group; 'Purple Queen', 'Charlemagne' and 'Superba'. Many make claims for 'Purple Queen' as the leader in this color. 'Charlemagne' is very similar and is becoming very popular. Now that 'Purple Queen' is more popularly priced these two clones will slug it out. Both are good plants. 'Superba' is small and generally darker under ideal conditions. It can be truly beautiful and its admirers will surely not give up pressing it for 1st place in this color. Some may consider 'Tristan', 'Aleyone' and 'Red

Master' in this color. Cultural conditions influence color a great deal and some will be much darker in one area than in another.

DARK REDS

This is a popular color and new clones are introduced each year as the search goes on for the truly black red. 'Queen Superiora' has been around for many years. It is one of those old classic dark reds that is still popular. It has some new contenders. 'Hades' and 'Rotterdam' are two clones that are very similar and are nice dark reds with a fiery sheen in their throats. Both are beautiful and exceptionally nice plants. 'Franklin Roosevelt' is very popular with many. 'Red Majesty' and 'Royal Ruby' are two other nice dark reds.

MEDIUM REDS

The medium reds include many popular ones. The most popular is 'Ludwig's Goliath'. It is a huge one and always scarce. One that is nearly as large but seldom seen is Warmenhoven's 'Red Champion,' a huge flower that is relatively easy to bloom. This is an old clone that is little known because of its high price. Now that the price has been reduced it will become better known and surely will become a leading show clone. 'Giant Goliath', another large one, is very popular in the north and is well liked by many. 'Wyndham Hayward,' 'Ludwig's Scarlet' and 'Scarlet Beauty' are other popular reds in this shade.

LIGHT REDS

Few are available in this color. 'Red Emperor' is a nice bright red that makes new friends each year. This is a neglected color and one to which the hybridizers should give more attention.

ORANGE REDS

This is a color that is becoming more popular. 'Traffic Stop', 'King Gustav', 'Lucifer', 'Don Camillo', 'Cherokee' and 'Friendship' are among the more popular ones. 'Halley' is an easy growing burnt orange red.

ORANGES

Many of these may be classed orange red or salmon. The following appear orange to me and I like to think of them in such a group. 'Orange Wonder' is without a doubt the leader. Though high priced it out sells most other amaryllis and possibly is among the top five most popular amaryllis. It is a beautiful bright orange with a darker throat. The flower has exceptional form and the plant is a fine vigorous grower. Ludwig's 'Deli'ah' is a light orange and the only one in this particular color. It is a beautiful soft orange that makes a wonderful show flower or border plant in the south. You will find 'Delilah' an exceptionally faithful clone. 'Camellia' is a new beautiful salmon orange when flowered in full light; leaning to salmon if given a bit of shade. It is a worthy new clone. 'Salmonetta' is another free flowering amaryllis

and has beautiful dark green foliage. There are a number of other good ones in this group and all command their admirers.

SALMONS

'Bouquet' has been the leader in this class for a number of years. It is a truly beautiful clone of begonia pink with purple midrib. It is very vigorous and does well at the shows as well as being an excellent garden plant. 'Rilona' is a sensational new one in this color. It is a light salmon buff and apparently has everything; color, form and vigor. It is slightly ruffled and has a dainty ruffling in the throat. It will fast become a leading clone—a different shade from 'Bouquet'. Both will remain popular for many years. 'Queen's Page', 'Salmonea' are other popular clones in this color.

SPECIES

The species still command quite a bit of interest. Possibly the most noteworthy introduction this past season was one received as *Amaryllis cybister* from Brazil. At this writing the plants I have growing of this species are very vigorous and it appears from the different coloring in the leaves that there may be more than one color or type among them. Gathered at the same time was another species (unidentified). The foliage is lanceolate-elliptic. Both were gathered by an experienced collector using the habitat information in Dr. Traub's Manual. Both collections were found growing to a depth of as much as 6". I have written my collector asking him to furnish more information regarding these species and we plan another collection trip into the area in the near future.

Another form of *A. aulica* was received from Matto Grosso, Brazil this season which I numbered 11/62. This is the sixth form of *A. aulica* I have obtained from Brazil. Each is said to be for a different habitat and it will be interesting to see these flower. Species No. 1/59 flowered last season and I should have at least a dozen to flower this season in October. It is definitely in the *A. aulica* group and has very narrow tepalsegs—possibly it is variety *stenopetala*. All the *aulica* group grow well here. I have found a mixture of peat and perlite to be best. I mix a good portion of dolomite lime and bone meal in the potting mixture. They are planted several to a 6 or 7" pot. The largest bulbs are now 3" or more in diameter. I find planting several bulbs to a pot helps their environmental condition considerably. *A. aulica* appears to take temperatures down to freezing without losing foliage and grow best during cool weather. They usually go dormant in June or July and start growth again in September and usually flower in October.

Species are becoming more difficult and more expensive to obtain. This is possibly due to the unrest in the South American area.

NEXT SEASON

This coming season you will see many new clones. The first five named clones of the HDL-G (see Fig. 24) African strain will be in-

troduced. 'Rosaline', a new blend of brick pink and white, is a beautiful large flowered clone and a new color in amaryllis. 'Tangerine,' 'Orangedale' and 'Terro Cotta' are nice clear orange reds. These three are not quite as large as the average Dutch hybrids but are of very nice form and color. 'Ruby Glow' is a free flowering dark red with a ruby throat. It also is smaller than most Dutch but a clone that should make a fine pot plant. These are all raised from off sets so should make vigorous border plants in the south. Some clones on trial the first year have made as many as five offsets. These five clones to be introduced were picked from 20 tested last season. This coming season 10 additional clones will be tested. These will be in the white-flushed-pink and wine red colors. The best of these will be introduced next season. The HDL-G Company expects to eventually introduce a full line of colors in the named clones.

Van Meeuwen has released several new clones this coming season in very limited quantities; 'Aphrodite', deep red with white throat; 'Belinda', dark velvet red; 'Cupido,' salmon pink; 'Hellas', stone red; 'Minerva', white with red border; 'Mars', blood red; 'Parsifal', bright red; 'Rembrandt', blood red; 'Rose Mary', rose. The Van Meeuwen Company has made great improvement in their amaryllis and are widening the range of color considerably. In the past few years such clones as 'Camellia', 'Hades', 'Queen of Sheba', 'Rilona' and 'Zenith' have been introduced. This year's introductions, if of the same quality will surely be excellent additions.

W. S. Warmenhoven is not offering any new varieties this season. Their recent introductions: 'Floriade', 'Golden Triumphator', 'Little Diamond', 'Marion', 'Oasis', 'Pink Beauty', 'Rotterdam' and 'Sjoukji Dykstra' are worthwhile additions.

The firm of W. Warmenhoven & Zonen has split up. C. Warmenhoven is offering this firm's named clones and three new ones; 'Top-score', red; 'Apollo', orange red; 'Flamboyant', scarlet red. The prices of this strain have been reduced so more people will become familiar with them. This is a very worthwhile strain.

Ludwig this season is offering six new varieties. Two picotee types, 'Dutch Doll' and 'Square Dance', will without a doubt be fine additions and most welcome. Two reds; 'Home Decorator', 'Poppy', red and 'Trixie', cherry red, are to be introduced. These two reds appear in particular shades that should be a fine addition. One new striped clone, 'Streaking Stripes', is being offered. The striped ones are picking up in popularity. Many will want to try this clone. 'Winter Carnival' is a new large white with a suggestion of yellow. New whites are always welcome.

Other clones from different growers are appearing. The Van Waveren clones are again being offered retail. They are offering many new ones unknown to the American market. 'Bon Ton', rose; 'Clown', striped; 'General Eisenhower', salmon; 'Kathleen Ferrier', white; 'Red



Fig. 24. Part of the Amaryllis field of Harry de Leeuw Company [HDL-G] in Transvaal, South Africa. Originators of a new strain; the first five named clones registered and introduced in 1962 by Robert D. Goedert, Box 6534, Jacksonville 5, Florida.

Lion', red; 'Royal Velvet', dark red; 'Salmonea', salmon and 'Scarlet Beauty' are some of their older clones of merit.

Other small growers are introducing their new and best named originations to the American market through American dealers. 'Mohawk' and 'White Crane' are two fine clones from one of these companies registered and introduced last season. From this same company comes another interesting novelty, 'Personality', an orange red and yellow striped variety. I have seen similar colored amaryllis from India and they are rather pretty and interesting. Many of these small companies want only to sell their very best clones on the American market. They feel the American customer is a very sophisticated buyer and that only by introducing worthy ones will they be accepted.

The absence of comment on the Boshoff-Mostert strain from South Africa is due to my lack of knowledge of these amaryllis; otherwise I would discuss them. These amaryllis have more than likely been picked by a little different standard than we are used to with the Dutch hybrids. It takes one some time to get used to new styles and it goes without saying that many of these clones will be welcomed by the American fancier. It is generally considered that this strain is a rather vigorous one.

[See Mrs. Seale's article on the Boshoff-Mostert strain in this issue of the Year Book.—*Ed.*]

Great progress is being made in hybridizing and new colors and forms are being introduced each year. Generally we are forgetting the smaller and medium size sorts as the larger ones are more spectacular show flowers. The smaller kinds are especially suitable for house plants and should become popular for this use. The show people would be of great help in popularizing this type if they would give them a more prominent place in the shows.

AN AMATEUR'S GROWING PAINS

ANDREW H. GRUBBS, *Washington*

My interest and experience with amaryllis goes back to a childhood in Minnesota and forward to the present day. Considering the foregoing statement, I ought to be a mine of amateur information on amaryllis, but strangely enough I did not have a single success with an *Amaryllis* until the year 1947. Before that I had only seen those old fashioned *Amaryllis*, that two or three times a year would push up a bud, and in time there would be pale orange or brick red flowers.

A neighbor woman had a clump of these relatively small bulbs growing in a large pot, and seeing my interest in these flowers would from time to time give me a cluster of bulbs cut from the edge of her pot full. They would grow well during spring, summer and fall only to succumb to freezing at some time during the cold winter nights, when wood fires would get too low or go out, as they sometimes did. I then tried growing them during the warmer weather and wintering them in the vegetable cellar. Why they did not bloom with this treatment, I

do not know, unless the winters were too long or they didn't survive long enough without mishap to become of flowering size.

It was some years later, in 1947, that I chanced upon just one huge *Amaryllis* bulb in a store in Missoula, Montana. Its price was fifteen cents. It was spring time and I was planting a flower garden, and so I bought the bulb and planted it in my garden. Here I made a mistake right at the start. I planted it deeply, well below the surface of the ground. I waited, not too patiently, for it to come up, when I thought it should be up I would dig down until I could see the top of the bulb, I would feel that the bulb was still firm and I would cover it again and after a couple of weeks would repeat the performance. Cold weather came in the fall and I dug the bulb and found it exactly as it was when it was planted. Not even a root had formed. Disgustedly I rolled the bulb in a thick tube of newspapers, pinned the ends shut and stored it in a warm closet. I do not know how long it was before I thought of the bulb again. When I did and unrolled the paper I was amazed to find that the bulb had long foliage and a fully developed flower scape on which were the remains of the withered flowers. I potted the bulb and fortune smiled upon me. It sent up another scape and flowered beautifully. The flowers were larger than any I had seen and were white striped with red. I thought to myself, surely these are something new in *Amaryllis*. Perhaps a mutation or a sport. Imagine my surprise when I began telling people about my unusual *Amaryllis* only to learn that that was the only kind they had ever seen. They were then more common than the old orange ones of my childhood.

Noticing the large pistil of this amaryllis and the copious supply of pollen, I pollinated it with its own pollen. It produced a large, healthy seed pod. When the pod opened and I saw the hundreds of tissue paper thin seeds I thought there was not body enough to them to contain a viable embryo and were therefore too immature to grow, however I took the seeds with me and left the bulb behind when I left Missoula.

Some months later, I planted the seeds and was surprised at the large number of seedlings and their rapid growth. This pleasing experience started me to seeking more information about *Amaryllis* and the colors that were available.

My next bulb was given to me by a friend in Minneapolis. It had not bloomed for her but she said that the person, who gave it to her, told her that it was not an *Amaryllis* being greenish white and more beautiful than an *Amaryllis*. When it bloomed it was just like the Missoula bulb. My seedlings were also like their parent.

The third bulb added to the collection was scarlet red with faint stripes of a slightly different shade. This I assume to be one of the bulbs sold as the Meade strain. Later I bought three bulbs advertised as the famous Meade strain and the three of them were very similar to bulb number three.

Bulbs #2 and #3 were crossed both ways and all of the resultant seedlings were reds very similar to each other. The next find was a

red Dutch hybrid called a Royal Dutch, though not named. When it bloomed, it was indeed a fine flower and I thought at the time that probably no better and not much different ones could be found. An answer to an advertisement brought me Mr. Houdyshel's catalog and the subsequent purchase of the two named clones, 'Violetta' and 'Moreno', dispelled this notion as well as the one about the prices of top quality imported bulbs. This catalog also made me aware of the American Amaryllis Society which is affiliated with the American Plant Life Society.

After I had received two issues of *Herbertia* and purchased Dr. Traub's Amaryllis Manual I fully realized the magnitude of the subject of *Amaryllis* and my limitations. Any hope of ever being more than a good amateur grower and breeder of just some of the members of the very large family quietly faded away. Be this as it may, there still remains the educational and cultural values of the pursuit. Some of these values are acquired by searching for information as one tries to grow with his hobby or avocation. Some of the interesting bits of knowledge consist of facts from geography, science, photography, soil management, and the like.

When a small greenhouse was added to our garden, I had visions of its being full of bright blooming plants the year around. This could not work with the kinds of plants I wanted because always part of the plants were dormant, part not ready to bloom and some just being started and all of them had to be housed at proper temperatures. It seems to me that at least three greenhouses or one with three separated parts would be needed for the collection I had, but it is certain that a large part of my troubles could be a lack of know-how.

My first collection consisted largely of gloxinias and they did very well but I was not satisfied because the plants were very large and I could not have as many as I wanted. Also as soon as hot weather came the blossoms were ruined by excessive heat.

Along with the gloxinias I had the several *Amaryllis* that I have already discussed. Their blooming was over before hot weather set in and the heat in no way prevented them from growing luxuriant foliage during the summer. Upon the basis of this, I conceived the idea that I still might achieve my original desire for continuous bloom by collecting only within the huge order of amaryllids, and so I began adding these, hoping that their needs would be nearly the same as those of *Amaryllis*. I knew nothing about most of these bulbs and selected them from book and catalog descriptions. Needless to say many of them were a disappointment. I bought more named Dutch *Amaryllis*, some species, American hybrid amaryllis, Oriental strains, Belladonnas and then for variety I added *Vallota*, *Nerine*, *Lycoris*, *Clivia*, *Eucharis*, *Hymenocallis*, *Agapanthus*, *Zephyranthes*, *Habranthus*, and crinums, as well as some others.

I feel sure that most of the readers of *Herbertia* already know that I did not achieve my goal. I will tell briefly what happened and perchance some experienced grower of these plants will write, in some

future issue of *Herbertia*, more specific directions for their culture, than a catalog gives.

There is no reason for me to complain about the performance of the hybrid *Amaryllis*. Good cultural directions were available for them and they grew perfectly from the beginning, and each year since have made a splendid display. Many people come each year to see them when they are in bloom.

Clivia miniata grows well, blooms and is beautiful enough with about the same culture as *Amaryllis* except it has no dormant period. *Clivia* has the following disadvantages as a plant for small greenhouse. It requires a very large container and therefore takes more room than one can afford to give to it. It had scale insects when it came from the nursery and any treatment for them that I have found leaves the plant spotted and disfigured.

Sprekelia formosissima superba bloomed once in January and this last season in June. The catalog described this plant as evergreen, however I believe that it requires almost complete dormancy to bloom. I have only had blooms twice out of six years. It is a beautiful and interesting plant when in bloom. During the rest of the year its ragged, shaggy appearance does nothing for the appearance of the plant collection. I pollinated *Sprekelia* with pollen from an *Amaryllis* and got a seed pod but the seeds were shriveled and sterile.

Agapanthus longispathus rates about the same as *Sprekelia* though it is not as strikingly beautiful as *sprekelia*. It blooms once each year and its foliage is more erect and neat than that of *Sprekelia*. It thrives outside in the summer time. One other thing I can say in its favour is that the blooms last a much longer time. The larger *Agapanthus orientalis* (blue form), erroneously called Blue Lily of the Nile, grew well for a time but died before it bloomed. I know of no reason unless I used the watering can too generously. I often water too much during hot weather because I am away from home most of the time and get fearful, lest they dry up while I am gone.

Nerines—of these the catalog said, "The only reason more people do not grow nerines is, they do not know how easy they are." For me they are exceedingly contrary. Instead of growing and resting in the seasons specified by the books, they grow off and on in any season without rhyme or reason it seems. They have produced good foliage and multiplied until they are root bound, as the book says they should be to get blooms. They are now four or five years old and have yet to bloom. They have grown all of this past summer and now, in early October they are still growing. It was my impression that they were supposed to die back in late summer and bloom in the autumn.

Lycoris aurea did not respond at all to pot culture. I then tried them in the outside garden where they were destroyed by the *Narcissus* bulb fly. Since they are not hardy I doubt that they could be brought to bloom out-of-doors.

Lycoris squamigera was planted outside from the start. It grows weakly and has small weak blooms, which soon fade away in our hot

summer sun. Perhaps in a partial shade bed it would adapt itself to our climate.

Eucharis—that I haven't had success with this as yet is partly due to accidents and partly to unfamiliarity with its needs and habits. I still have a feeling that *Eucharis grandiflora* will be a desirable plant when I have mastered its culture. It grew well from the beginning and multiplied freely. I separated the bulbs and repotted them five to a pot. I kept them moist all the time, thinking that they would continue growing without resting but instead of doing that they all rotted except one bulb, which is now doing fine.

Amaryllis ambigua has grown at various times regardless of season. This year (1961) it has not begun to grow at all and it is now October. I repotted it during the past winter and let it remain dry until spring. When the weather got hot and it had not started growth I sank the pot in a shaded bed out of doors.

Brunsvigia rosea (Cape Belladonna) is often advertised as a good pot plant. Mine grew luxuriantly in the greenhouse, but never bloomed. Outside it neither grows well, nor blooms.

The *Crinum* 'Cecil Houdyshel' has proved hardy here and grows well but its flowers have been consistently very small and short lived. The plant is growing in full sun for two thirds of summer days and it is quite possible that our desert sun is too hot and the plant would do better in partial shade.

Hybrid *Amaryllis*—when one amaryllis blooms it is beautiful but when a large number of them are in bloom at the same time they are almost breathtaking in their beauty and one thinks of the Master's saying, "Not even Solomon in all his glory was arrayed like one of these".

Aside from their beauty when blooming, the thing that makes *Amaryllis* growing so intriguing is the ease with which they can be hybridized, leaving no doubt that a genuine cross has been made. I now have seedlings from 31 successful pollinizations. The first ten crosses have bloomed and each year there will be several new ones to look forward to. The first ones are all red but some variations are beginning to show up now.

Most of my crosses have American hybrids as the seed parents and Dutch hybrids as the pollen parents. The reason for this is that I used my first three Dutch hybrids to bear seed and they were so weakened that it took them several years to get strong enough to bloom again.

When I wish to cross two fine Dutch hybrids I pollinate one and when the bloom starts to fade or sometimes after the pod has begun to grow I cut the scape and place it in a jar of water or plant it in a pot of clean gravel or sand and keep it saturated with a "Hyponex" solution. Normal seed pods form and grow well for a time but usually before maturity the pods shrivel and the seeds are also immature and wrinkled but usually I can get three or more of these, out of a pod full, to germinate. The resultant seedlings are also weak but by carefully

SOME AMARYLLIS SEEDLING RECORDS

BURR CLOUETTE, *California*

In April 1962, 20 seeds of *Amaryllis calyptrata* were received from Mr. Quinn Buck. Germination started on April 22, and 15 seeds in all sprouted. By the end of 6 weeks from planting all of the seedlings had made the first leaf; the second leaf soon followed. By the end of July, the third leaf had formed. Each succeeding leaf was broader and longer, with the third and fourth leaves measuring $\frac{1}{4}$ inch wide, and 8 to 10 inches in length.



Fig. 25. Left, *Amaryllis calyptrata* seedlings five months from seed planting; Right, various *Amaryllis* seedlings. Snapshot by Burr Clouette.

On August 1, the seedlings were transplanted to 3-inch plastic pots. No setback was noted. At this writing (Sept. 15, 1962), all plants are growing well, and some of the bulbs are $\frac{1}{2}$ inch in diameter (see Fig. 25).

The seeds had been planted on edge in "Black Magic Planting Mix", and were transplanted to the pots in the same mix. The seedlings were watered often enough to keep the soil moist, but not too wet. They have been fertilized with liquid fish solution at least every 10 days. Since transplanting outdoors, they were given part shade at first, but now are growing in full sun along the south facing wall. There they, and other *Amaryllis* require nearly daily watering.

I obtained 16 seedlings of *Amaryllis psittacina* from seeds given to me by Dr. Traub. At least 75 seedlings were obtained from a Peruvian

[CLOUETTE—AMARYLLIS RECORDS, continued on page 159.]

TRANSMISSION OF A VIRUS INCITING AMARYLLIS
MOSAIC SYMPTOMS

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Virus-like symptoms in Amaryllidaceae have been observed in field- and greenhouse-grown plants by many amaryllid enthusiasts. Some growers have attributed these symptoms to nutritional imbalance, whereas others have implicated viruses. However, *observation* of virus-like symptoms *per se* does not constitute proof of virus infection because many virus-like symptoms may be of physiologic or genetic origin. Symptoms incited by virus are distinguished from those caused by physiologic and genetic factors by establishing the infectious nature of the virus on the basis of transmission tests.

The objective of this paper is to report positive transmission of a virus from *Amaryllis* to *Amaryllis* and from *Amaryllis* to tobacco to *Amaryllis* and thus establish that *Amaryllis* mosaic is caused by at least one virus. We also wish to show photographs of symptoms known to be incited by virus for reference by amaryllid growers and recommend control measures.

LITERATURE REVIEW

The scientific literature of amaryllid viruses was reviewed in 1942 by Hannibal (4), in 1948 by Brierley (2), in 1958 by Traub (12) and in 1960 by the senior author (7). These literature surveys revealed no reports of actual virus transmission from *Amaryllis* even though the *Amaryllis* mosaic disease has been known for at least 30 years. *Amaryllis* mosaic symptoms have been observed by many amaryllid growers, particularly under field conditions in the South. The pattern of spread of virus-like symptoms under field conditions suggested that an insect vector of a plant virus was involved. However, apparently no one had actually demonstrated transmissibility of an infectious agent from *Amaryllis* by isolating a virus from *Amaryllis* with symptoms and then transmitting this isolate back to healthy *Amaryllis*. Although an insect vector was suspected, none had been reported in the literature.

In 1959, Anderson (1) reported that "mottled *Amaryllis* sp. yielded CMV" (cucumber mosaic virus) in a survey of Florida weeds and cultivated plants that might act as reservoirs for pepper viruses. Although Anderson isolated Cucumber mosaic virus from *Amaryllis*, he did not report transfer of this isolate back to healthy *Amaryllis*.

Amaryllis mosaic disease (previously referred to as *Hippeastrum* mosaic) is not listed in 3 compilations of recognized virus diseases (5, 6, 11). Apparently, the failure in the past to report transmissibility of a virus was sufficient grounds for omission from these compilations even though virus-like symptoms of *Amaryllis* were frequently observed.

A virus, not associated with the mosaic symptoms, has been isolated from *Amaryllis* (3, 10). This virus, known as the tomato spotted wilt

virus, is transmitted by sap-transfer and by thrips.

METHODS AND MATERIALS

Virus source plants. The amaryllid source plants, i.e. plants with virus-like symptoms, from which leaves were detached for virus assay or indexing are listed in Table 1.

Table 1. Sources of Amaryllids with virus-like symptoms used in virus transmission tests.

Accession number	Genus and species	Collector	Location
700-705	<i>Amaryllis</i> hybrid	Eugene Griffith	Takoma Park, Md.
706-709	<i>Amaryllis</i> hybrid	William Preston	Glenn Dale, Md.
710-716	<i>Amaryllis</i> hybrid	Eugene Griffith	Takoma Park, Md.
717-720	<i>Amaryllis</i> hybrid	Curtis May	Beltsville, Md.
783	<i>Amaryllis evansiae</i> Traub & Nelson	Ira Nelson	Lafayette, La.
785	<i>Amaryllis</i> hybrid (detached leaves)	R. G. Greenler	Waukesha, Wis.
786-787	<i>Crinum macowanii</i> Baker, seedlings	H. P. Traub	La Jolla, Calif.
796-797	<i>Amaryllis</i> sp. (received as <i>Hippeastrum velutinum</i>)	Longwood Gardens	Kennett Square, Pa.
802	<i>Nerine flexuosa</i> (Jacq.) Herb. var. <i>alba</i>	Leo Brewer	Orinda, Calif.
803	<i>Narcissus</i> clone 'Grapefruit'	Leo Brewer	Orinda, Calif.
804	<i>Lycoris incarnata</i> comes ex Sprenger	Leo Brewer	Orinda, Calif.
805	<i>Brunsvigia rosea</i> (Lam.) Hann. var. <i>pallida</i>	Leo Brewer	Orinda, Calif.
807-809	<i>Amaryllis</i> hybrid	A. H. Grubbs	Richland, Wash.
810-815	<i>Amaryllis</i> hybrids	P. N. Musgrave	Huntington, W. Va.

Indicator plants. Indicator plants, which are known by extensive testing to produce conspicuous symptoms when inoculated with a particular virus, were as follows: (1) *Amaryllis belladonna* L. seedlings or *Amaryllis* hybrid seedlings; (2) tobacco, *Nicotiana tabacum* L. 'Ky 35' 'Samsun'; (3) wild tobacco, *N. glutinosa* L.; (4) Jimson weed, *Datura stramonium* L.; (5) cowpea, *Vigna sinensis* (Toner) Savi 'Black'; (6) *Chenopodium amaranticolor* Coste & Reyn.; and (7) beans, *Phaseolus vulgaris* L. 'Pinto' and 'Refugee.' These indicators were utilized to ascertain whether the source plants were infected with a transmissible virus.

Greenhouse facilities. All source plants and indicator plants were grown in a greenhouse (Vegetables and Ornamentals Research Branch, Crops Research Division, U. S. Department of Agriculture) at Beltsville, Maryland. The greenhouse was heated in the winter (60 to 75°F) and cooled in the summer (usually less than 80-85°F). Plants were grown in a compost-soil mixture and fertilized with a complete soluble fertilizer when necessary. The greenhouse was fumigated once each week, usually with Parathion.

Mechanical transmission. Mechanical- or sap-transmission tests were conducted by standard virological procedures. Leaves from source plants were ground with a pestle in a mortar containing 1 percent potassium phosphate (K_2HPO_4) solution. The juice was then expressed through cheese cloth and then rubbed with cheese cloth pads on leaves of indicator plants which had been previously dusted with 600 mesh Carborundum. (Carborundum is believed to facilitate infection by pro-

viding microscopic wounds through which viruses enter plant cells). After inoculation, the plants were rinsed with water to remove excess plant juices that might cause direct injury.

Insect transmission. Insect transmission tests were conducted in the greenhouses of the Entomology Research Division, U. S. Department of Agriculture, Beltsville, Maryland. Approximately 25 non-viruliferous green peach aphids, *Myzus persicae* (Sulz.) (reared on collards) were starved for 2 hours and then placed in a small cage on an *Amaryllis* leaf showing virus-like symptoms. After a 10-minute feeding period on these leaves, the aphids were transferred with a camel's hair brush to indicator plants and allowed to feed for 30 minutes. Then the aphids were killed by immersing the indicator plants in nicotine sulfate. Finally, the indicator plants were returned to the greenhouse and observed for symptoms.

RESULTS

Transmission of a virus from Amaryllis. We have transmitted virus from amaryllid source plants to healthy *Amaryllis* seedlings, and also from amaryllids to tobacco and then to healthy *Amaryllis* seedlings by sap and aphid transmission. To our knowledge, this paper constitutes the first report of transmission from diseased *Amaryllis* to healthy *Amaryllis* of a virus that will incite *Amaryllis* mosaic symptoms.

Sap transmission. Symptoms were produced on virus-free Samsun tobacco plants and *Amaryllis* seedlings whose leaves were rubbed with the juice from amaryllid source plants that showed typical mosaic symptoms ranging from mild to severe. These tests, which were replicated 2 to 4 times for each source plant during 1960 and 1961, demonstrated that a virus was present. We have transmitted this virus from each of the following sources as listed in Table 1: 700-711, 713-720, 783 (Figure 26), 785, 799, and 807-809. In addition, we have transmitted virus from 802, 805, and 810 to tobacco but have not yet tested these sources on *Amaryllis*. We have not yet transmitted virus to *Amaryllis* seedlings on tobacco from the following source plants: 712, 786 (Figure 26), 787, 796, 797, 803, 804, and 811-815. However, we are in the process of repeating these tests.

Aphid transmission. A virus was transmitted by green peach aphids, *Myzus persicae*, from amaryllid or tobacco source plants to healthy tobacco *Amaryllis* seedlings. We have obtained aphid transmission from the following amaryllid source plants: 705, 713, 714, 716, 786, and 809. In addition, virus transmission occurred from source plants 703, 713, 714, 715 and 719 when the virus in amaryllid source plants was first transferred to tobacco by sap transfer methods and then the tobacco used as a source plant for aphid transmission tests. The other amaryllid source plants have not yet been tested by aphid transmission.

Seed transmission. The virus apparently was not transmitted through the seed to any of approximately 2000 *Amaryllis* seedlings grown from seed harvested from plants known to be virus-infected. None of the seedlings developed symptoms at the end of 2 to 2½ years

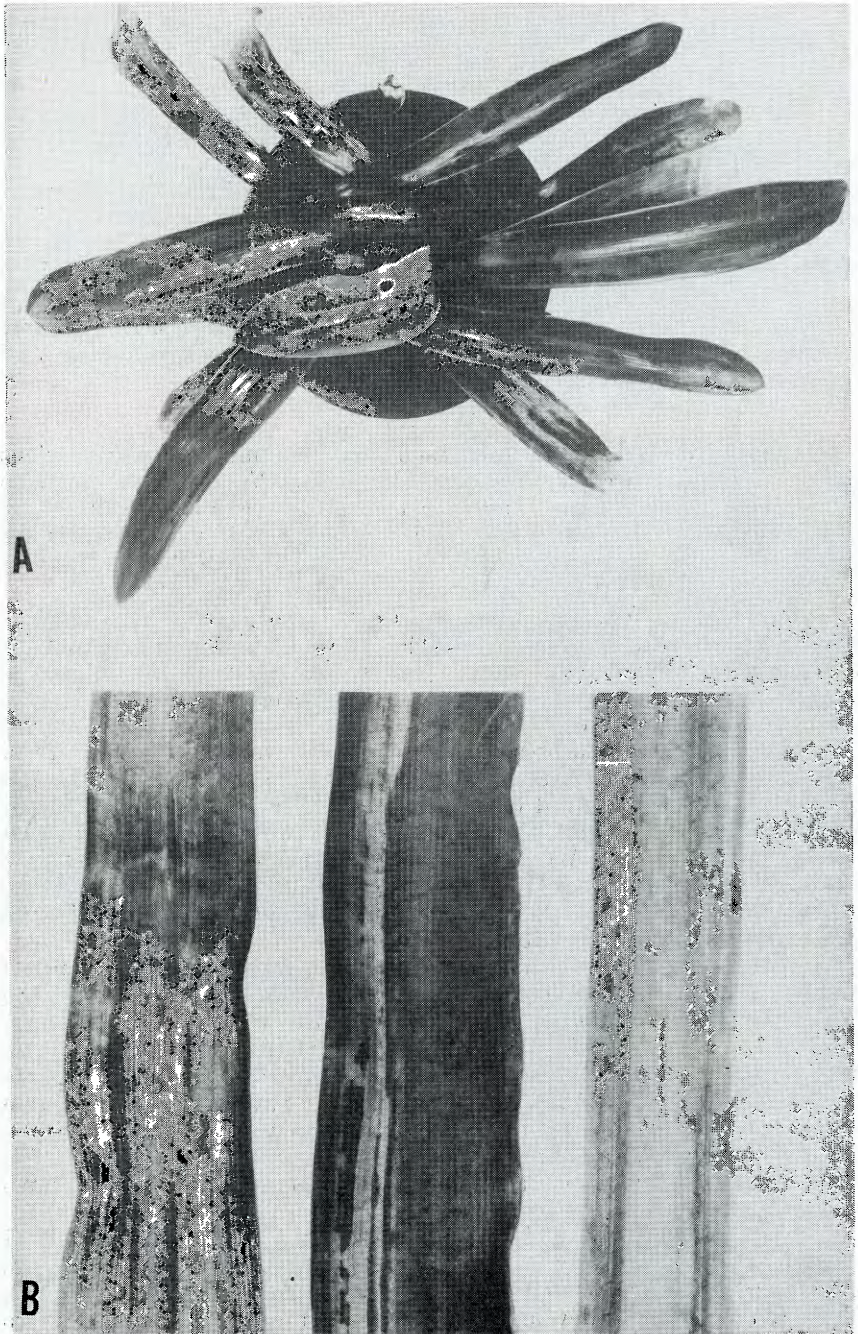


Fig. 26. A. *Amaryllis evansiae* showing typical mosaic symptoms. A virus was isolated from this plant that would incite symptoms on *Amaryllis* seedlings but not on tobacco. B. Detached leaves from *Crinum macowanii* showing virus-like symptoms. A virus has not yet been isolated from this source plant but the tests are currently being repeated.

under greenhouse conditions. To determine whether any latent strains of the virus might be present in a random sampling of symptomless seedlings, we used 20 symptomless seedlings as source plants in sap transfer tests. However, virus was not transmitted from the symptomless seedlings.

These tests, under controlled experimental conditions, demonstrate that the virus is apparently not seed-borne, and confirm reports in the literature (2, 7, 12) and experience of *Amaryllis* growers.

Identification of the Virus. The virus which was transmitted by sap transfer and by aphids was identified as the Cucumber mosaic virus (CMV) (*Marmor cucumeris* H). This identification was based on symptomology, thermal inactivation, dilution-end point, longevity *in vitro* determinations, and on the methods of transmission.

As far as symptoms are concerned, the amaryllis virus isolates that could be maintained in tobacco (701, 703, 713, 714, 715, 719, 785, 802, 805, 810) all incited the same symptoms as 3 type cultures of CMV, (CMV-Y strain; CMV-1, Doolittle strain; and CMV-6, Price's indicator strain) on the following indicators:

Datura stramonium—mottle

Cowpea, primary leaves—pin-point reddish-brown necrotic local lesions.

'Samsun' and 'Ky 35' tobacco—vein-banding without necrosis on inoculated leaves followed by mosaic on newly formed leaves, occasionally white necrotic rings.

Nicotiana glutinosa—mosaic without necrosis

Chenopodium amaranticolor—systemic chlorotic spotting

Beans—no symptoms

Amaryllis seedlings—mosaic or occasionally concentric chlorotic rings or line patterns followed by mosaic.

The *Amaryllis* isolates and known CMV cultures have similar characteristics as follows: (1) thermal-inactivation point (temperature which inactivates the virus during a 10-minute exposure of sap from infected plants in test-tubes immersed in a controlled temperature water bath), (2) dilution end-point (the greatest dilution of sap that will still retain infectivity), and (3) longevity *in vitro* (longest time period that the virus in plant sap remains infectious when stored at room temperature). The thermal inactivation point was between 60 and 65°C, the dilution end-point was in excess of 1:100,000 (1 volume of sap from infected plants in 100,000 volumes of water), and the longevity at room temperature (about 20°C) was 3 to 4 days.

The final characteristic upon which the identification of the virus was based was that both the *Amaryllis* isolates and known CMV isolates are sap- and aphid-transmitted. CMV has been reported by other investigators to be transmitted by several other species of aphids (11).

Symptoms. As we have pointed out, "observation" of virus-like symptoms does not constitute proof of virus infection. Nevertheless, most amaryllid growers do not have facilities to conduct sap-transfer or aphid-transmission tests to determine whether the symptoms in his plants are of virus origin. Consequently, the amaryllid grower must rely on visual observation. In doing so he may condemn plants with virus-like symptoms that may not actually be infected.

We have photographed *Amaryllis* mosaic symptoms from some amaryllid source plants listed in Table 1 (Figure 27). We have also photographed symptoms from healthy plants infected with the *Amaryllis* isolates and known sources of cucumber mosaic virus (Figure 28).

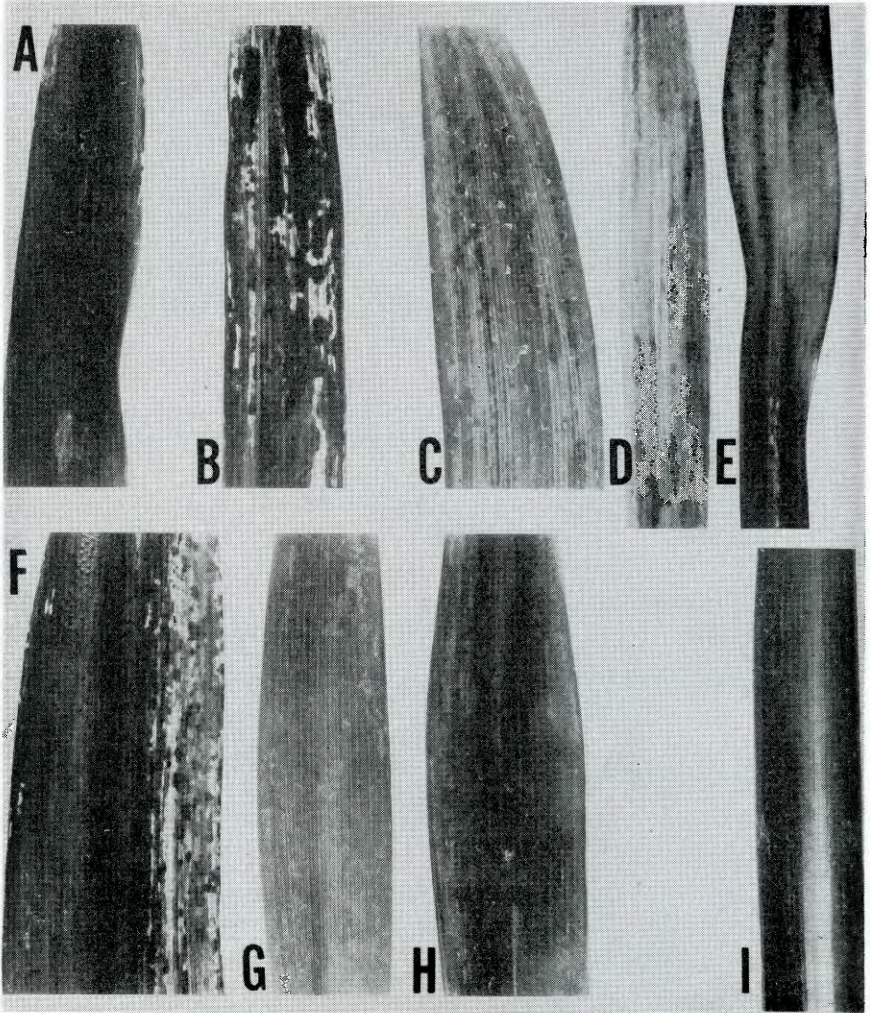


Fig. 27. A-H. Leaves from naturally infected *Amaryllis* source plants showing typical symptoms of Amaryllis mosaic. A virus was transmitted from each of these symptom types to *Amaryllis* and tobacco seedlings. I. Leaf from comparable healthy *Amaryllis* plant.

Amaryllis mosaic symptoms are characterized by light and dark green areas which may be scattered irregularly over the leaf. These

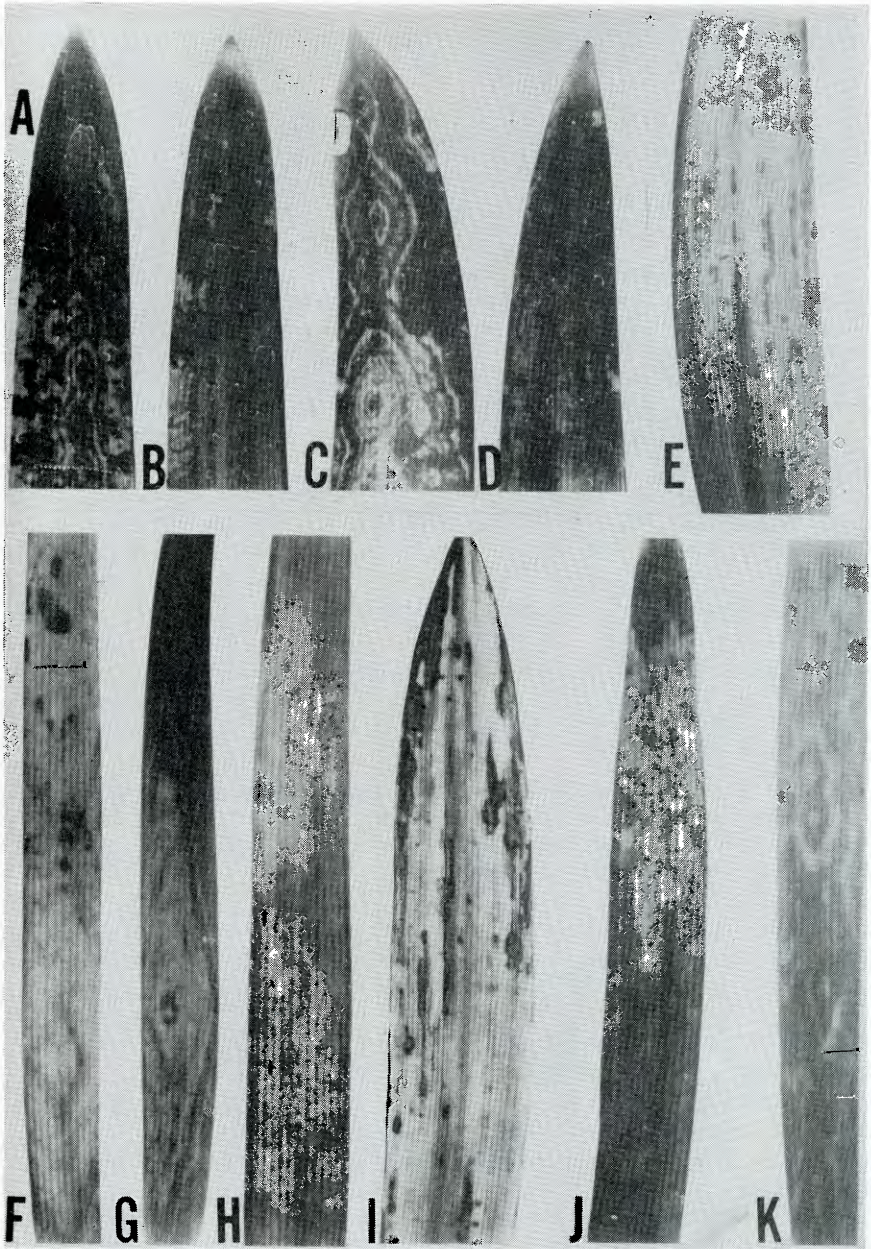


Fig. 28. A-K. Leaves from artificially infected *Amaryllis* indicator plants showing typical symptoms incited by amaryllid virus isolates and known cultures of cucumber mosaic virus as a result of aphid or sap-transmission inoculations. A, C, G, K. concentric chlorotic rings or diamonds observed on inoculated plants but not yet observed on naturally infected plants.

discolored areas may also consist of large patches of yellow-green, white, or pale-green stripes. In addition, when virus is inoculated into healthy *Amaryllis* seedlings, chlorotic concentric rings or diamonds, line pattern or "chevron" striping may be observed. In contrast, symptoms incited by the tomato spotted wilt virus (2, 3) consist of numerous yellow or white spots in association with necrotic or red spots on the leaves. These lesions may remain solitary or coalesce to form irregular areas scattered over the leaf. The leaves may turn yellow and die as a consequence of infection by the tomato spotted wilt virus.

We do not have photographs of symptoms that are known to be induced by nutritional deficiencies or excesses. However, since our source plants and indicators were grown under optimal conditions with respect to light, temperature, watering, soil and fertilizer, we are certain that symptoms shown here are not of physiologic origin. None of our non-inoculated *Amaryllis* control plants ever showed any type of symptom during the 3-year period in which we conducted our tests.

We are not in a position, on the basis of our experimental studies, to conclude that nutritional imbalance might not result in symptoms in some other *Amaryllis* plantings which would be similar to those we have presented for virus-induced symptoms. However, we are of the opinion that nutritional imbalance symptoms would be more likely to be expressed as general chlorosis, or as necrosis, reddening and chlorosis along tips, margins, or veins.

Similarly, we can not say that the symptoms which we have pictured may not, in some other plants, also be induced by a genetic factor. However, none of our non-inoculated seedlings (almost 2000) developed such symptoms.

Therefore, we are concluding that the photographs in this paper show symptoms of naturally infected plants from which a virus has been isolated or of plants artificially infected with *Amaryllis* virus or known cucumber mosaic virus isolates.

We are not in a position to state that *all* plants which produce symptoms similar to those we have photographed are virus-infected. However, it is our opinion that there is little likelihood that these symptoms are induced by nutritional or genetic factors. Consequently, for practical purposes in controlling the disease, we would advise amaryllid growers to consider all symptoms similar to those shown in the photographs as virus-induced.

Recommendations for Control. Control of virus diseases is generally directed towards preventing infection rather than curing a plant already infected. Chemicals that have been tested so far which would inactivate a virus already established in a plant have also been detrimental to the plant. Heat treatments (growing plants at 100-102° F for 30 to 90 days) have been effective for such plants as citrus, rose, chrysanthemum, and carnation in providing an environment where the virus does not keep pace with the growing point. Consequently, virus-free tip cuttings

may be propagated. However, the heat treatment does not cure the mother plant.

Since effective control measures must be based on preventing infection, they should be geared to preventing transmission from infected to healthy plants. We now know that a virus which incites *Amaryllis* mosaic is spread by sap transfer and by aphids.

Although we have used the sap transfer method experiment to prove the infectious nature of the causal agent, the amaryllid grower may unintentionally transmit virus by this method on his cutting implements. Sap-transmissible viruses are often spread on cutting knives if the virus attains a high concentration in the plant sap. We have not attempted to demonstrate transmission of an *Amaryllis* mosaic virus by knives or other implements. However, experience with other sap-transmissible viruses leads us to concur in the recommendations of Traub (12) for the sterilization of knives used in propagation by bulb cutting, especially that such implements be sterilized if they have been used on bulbs with symptoms before use on symptomless plants. Sterilizing could be accomplished by any of the following methods: (1) dip the implements in alcohol and flame, (2) boil them for 5 minutes, (3) dip them in washing soda, trisodium phosphate, or in electric dish-washing compound and rinse in water (use of rubber gloves recommended), or (4) wash them in strong soap.

Destruction of infected plants has been recommended as the principal control measure (2, 7, 12). We would strongly concur with this recommendation since infected plants serve as a source of inoculum for spread by the aphid vector. Commercial growers should carefully rogue infected plants to prevent dissemination of virus in bulbs sold to the public. If *Amaryllis* collectors possess infected plants too valuable to destroy, these plants should be isolated from other amaryllids.

Amaryllis collectors who already have expensive virus-free collections should isolate new acquisitions for a period of at least one growing season to ascertain virus infection and to avoid contamination.

In addition to sterilization of implements and roguing, we would recommend application of insecticides (9) in field and greenhouse plantings. In the field, however, we would not expect that infection could be prevented because it would not be economically practical to apply insecticidal deposit. However, frequent applications would tend to keep down the aphid population. In a properly screened greenhouse we would recommend regular application of insecticide since aphid control in the greenhouse is feasible.

The following control measures are recommended:

In the greenhouse:

- (1) Install screens (20-mesh or finer) on all vents and doors.
- (2) Spray or fumigate (9) regularly to control greenhouse insects (especially aphids and thrips).
- (3) Isolate valuable infected plants in fine-mesh cages in the greenhouse or isolate them outdoors.

- (4) Remove all inexpensive plants showing virus-like symptoms.
- (5) Keep amaryllids outdoors (whether they are symptomless or not) if they have been growing outdoors near vegetables or weeds rather than move any into a greenhouse containing symptomless amaryllids.
- (6) Propagate from infected plants by seeds rather than cuttings if progeny will come true from seed.
- (7) Isolate new acquisitions until the foliage can be examined for symptoms if a virus-free amaryllid collection has been established in a greenhouse.
- (8) Plant resistant species or hybrids if these are available.
- (9) Ramets of vegetatively propagated clones should be widely distributed to insure against possible loss by total infection of all stock (a recommendation by Dr. Traub to which the authors subscribe).

In the field or garden:

- (1) Destroy all members of the Amaryllidaceae with virus-like symptoms if cost of plants is not a factor. Isolate from other symptomless amaryllids all infected plants that are too valuable to destroy.
- (2) Keep weeds under control and destroy *any* cultivated or wild plants showing virus-like symptoms as a general phytosanitary practice.
- (3) Apply insecticides to amaryllids as often as practical with a variety of insecticides (9) if insecticides are applied as a routine practice in the field or garden. These insecticide applications will tend to reduce insect populations but cannot be expected to eliminate virus-vectors.
- (4) Grow resistant species or hybrids if available.

Cucumber mosaic virus is one of the most difficult viruses to control under field conditions since there are over 200 known hosts and 48 species of aphid vectors. Reservoir plants from which the aphids could transmit virus to amaryllids include weeds, ornamentals and vegetables.

DISCUSSION

We have established that cucumber mosaic virus can be isolated from *Amaryllis* and transmitted back to healthy *Amaryllis* by sap transfer and aphid transmission methods. We wish to emphasize that this identification refers to those amaryllid isolates which we can maintain in tobacco. (Sources 701, 703, 713, 714, 715, 719, 785, 802, 805, 810).

More than one virus may be associated with the *Amaryllis* mosaic disease. Evidence supporting this hypothesis is that we do have some source plants that yield virus which we can transmit only from amaryllids to *Amaryllis*, whereas we have other source plants from which we can isolate a virus that will infect tobacco as well as *Amaryllis*; yet, all source plants show typical *Amaryllis* mosaic symptoms. In addition, some isolates will incite concentric ring and line pattern symptoms as well as mosaic symptoms, whereas other isolates incite only mosaic symptoms. We are currently engaged in research to elucidate this problem.

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MOSAIC IN AMARYLLIS CALYPTRATA

W. QUINN BUCK, *Los Angeles State and County Arboretum,
Arcadia, California*

The bulbs of *Amaryllis calyptrata* which were described in the 1962 Amaryllis Year Book, PLANT LIFE, Vol. 18, during the whole year of 1962 produced flower spikes at intervals. Some of the bulbs had as many as three and four spikes. The most important development in their history, however, has been the appearance of mosaic.

These fine species bulbs were benched alongside a large group of imported hybrid *Amaryllis*, all of which showed marked mosaic patterns in the foliage, but with no reduction in vigor of growth or quality of flowering. Along in the year the *Amaryllis calyptrata* plants nearest these imported hybrids began showing typical mosaic symptoms in the leaves, and after a few months their vigor was so markedly reduced (Fig. 29) that it seemed wiser to discard them, rather than risk infecting the remaining healthy stock. The root systems of some of the discarded bulbs appeared to be in fine shape, whereas part of the bulbs had few roots left.

Hereafter it will be necessary to keep a close watch on this species, as it would seem that mosaic, which apparently does not harm some hybrids, does damage *Amaryllis calyptrata* drastically.



Fig. 29. Upper, showing weakened bulbs of *Amaryllis calyptata* due to Amaryllis mosaic on each side of a healthy, normal bulb.

Lower left, and right, showing Amaryllis mosaic patterns on the leaves of *Amaryllis calyptata*. Photos by Jack V. McCaskill.

GROWING AMARYLLIS CLONE 'MRS. GARFIELD'

BURR CLOUETTE, *California*

Most amaryllisarians who have attempted to grow hybrid *Amaryllis* clone 'Mrs. Garfield' report that they have difficulty in getting it to grow properly. When I moved to San Diego, Calif., in Sept. 1961 from Salinas, Calif., I brought my one bulb of 'Mrs. Garfield' with me. This bulb was among those imported from India by Mr. Goedert, and had been grown at Salinas since Dec. 1960. The pot was placed in a sunny south window which was covered with a piece of plastic thus cutting down the light somewhat. It had only one leaf which soon withered and the bulb was leafless for some weeks, when new growth started. Soon there were three bright green white-banded leaves. Some mottling apparently due to mosaic was noted. Then two more leaves were formed, and an offset started to grow. The oldest leaf died, leaving three on one side, and one on the other.

While cleaning the window one day, the pot containing the plant was set in full sun. It was forgotten and it was left out for most of the day. The result was that the leaves of 'Mrs. Garfield' were badly burnt. Two of the leaves died, and one of the remaining leaves showed burning in the middle section. Soon a new leaf on the bulb and offset formed. Now on Sept. 15, 1962, the original bulb and offset each have three leaves. The important lesson from this experience is that 'Mrs. Garfield' needs some shading.

'Mrs. Garfield' seems to be nearly evergreen, and is leafless for only very brief periods of two to three weeks. Apparently the soil has to be kept moist most of the time, and when growth is active it should be given liberal waterings. I have found that growth is stimulated by frequent weak liquid fertilizing.

The bulb has increased in size and it is now over 1¾ inches in diameter, and one offset has been made. Although no flowers have been obtained as yet, the healthy plant which is increasing in size should possibly reward the care given it with flowers in the fall of 1963.

CONTROL OF AMARYLLIS RED LEAF SPOT

MRS. BERT WILLIAMS, *California*

I have had trouble with mildew and red spot of *Amaryllis* this season (1962). Experiments with the use of "Bactine"—used for athlete's foot—has given good results. A bulb imported from Holland was disfigured with red spot. Having nothing else on hand, I soaked it in "Bactine" and it is growing nicely now.

AMARYLLIS ROUND ROBIN NOTES, 1962

MRS. FRED FLICK, *Chairman,*
Amaryllis Round Robins, *Carthage, Indiana*

[The following notes were extracted from Round Robin letters by the Chairman of the Amaryllis Round Robins.—*Editor*]

Lydia Pahls, Miami, Fla.—I had my first look at the *Amaryllis evansiae*. It is lovely!—a small, pale yellow flower, with a nice shape. I left my *Amaryllis striata* with Mr. C., and he gave me some pollen from the *Amaryllis evansiae*. I had one other *A. striata* in bloom, and used the pollen on it. I have about fifteen seedlings of this cross.

Helen Elias, Conn.—The *Crinum* 'Cecil Houdyshel', which was planted out three years ago, came through the past winter (an extremely cold one) very well. There are now two offsets, and they sent up at least a dozen stems of lovely clear pink flowers, up to 36 inches tall, with at least two dozen flowers per stem. It was the conversation piece of our garden this year.

Opal Flick, Carthage, Indiana.—We have purchased twelve acres of land seventy miles from here. It is in a scenic hill section of Indiana. However, we have a four to five acre level area, with fertile, sandy loam. I set all my bulbs of the Amaryllidaceae there this past summer. These included *Amaryllis*, *crinum*s; *sprekelias*; *Hymenocallis*; *pancratium*s; and *Zepheranthes*. The land had not been cropped for many years; and we had the weed growth disced in twice. Then I used some 12-12-12 fertilizer broadcast; with some bone meal worked into soil before the bulbs were set out. The growth made in this new soil was amazing; and several of the bulbs bloomed during the summer. On digging the bulbs in the fall, I found that the most of them had started to increase.

My extra special bulbs were planted out here at home. Len Woelfle's hybrid *Hymenocallis* 'Pax' was one of these. It was divided into two bulbs in the spring. Only the mother bulb bloomed. Both bulbs increased in size; and the mother bulb produced another bulb.

[PLANT LIFE LIBRARY, continued from page 68.]

THE COMPLETE GUIDE TO BULBS, by P. M. Synge. E. P. Dutton & Co., 300 Park Av. So., New York 10, N. Y. 1962. Pp. 320. Illus. In this guide (manual) to a selected number of plants with bulbous, cormous, tuberous or rhizomatous rootstocks, the author has condensed a vast amount of information. In an introduction the cultural practices in general are briefly summarized. This is followed by an alphabetical arrangement by genera under which the species and varieties are briefly described and cultural directions indicated. The guide is written from the standpoint of English climatic conditions and due allowances have to be made for the widely varying climates of the United States. It should be noted that in some instances outmoded names are applied to plants—*Hippeastrum* is used for *Amaryllis*, and *Amaryllis* is used for *Brunsvigia*. He includes the species of *Rhodophiala*—*advena* and *pratensis*—under *Hippeastrum*. He uses *H. rutilum* in place of *Amaryllis striata*, etc. There are 24 black and white, and 32 colored plates, some are not true to nature: for instance, *Sternbergia*, *Zephyranthes grandiflora*, *Narcissus serotinus* in plate 32.

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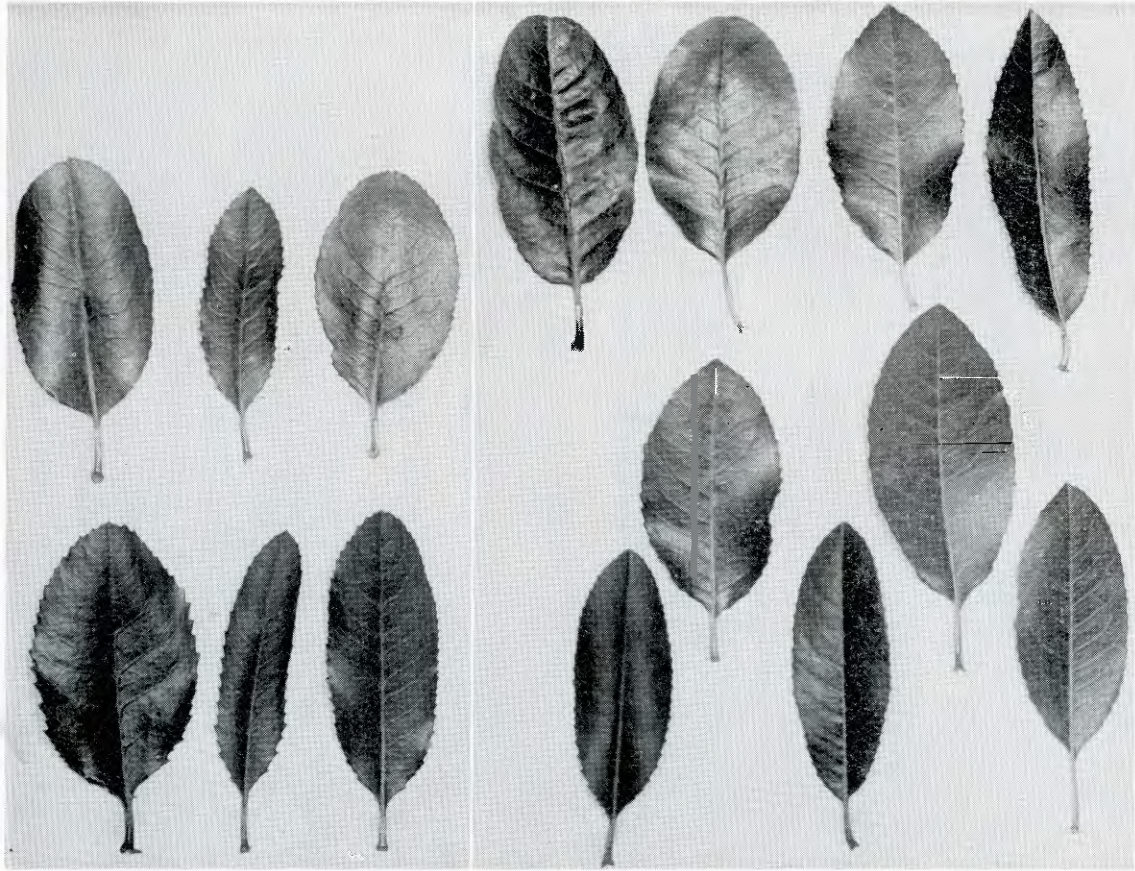


Fig. 30. Leaves of *Photinia arbutifolia* Lindl. Left, from seedlings of *macrocarpa* on quince root. Right,—top row, from three scattered plants growing in the Santa Clara Valley; middle row, from *macrocarpa* plants on quince root; bottom row, from individual multi-cotyledonous plants. NOTE—The two center leaves are from plants producing berries similar to those produced by the plants from which the leaves in the middle row were taken.

VARIATION IN PHOTINIA ARBUTIFOLIA

W. M. JAMES, *California*

Photinia arbutifolia, Lindl. (*Heteromeles arbutifolia* Roem. *H. saliscifolia* Abrams., *Crataegus arbutifolia* Ait. not Lam.) is an attractive, well-known evergreen shrub found only in California and Lower California. It grows below 4000 feet in the Coastal ranges from Humboldt County through Southern California into Mexico and in the Sierra Nevadas from Shasta to Tulare Counties. *P. arbutifolia* var. *macrocarpa* Munz grows only on Santa Catalina and San Clemente Islands off the Southern California Coast. A yellow-berried form, *P. arbutifolia* var. *cerina* Jeps., is found in San Luis Obispo County. The type was first discovered or noted by Menzies in 1792 near the present site of San Francisco. He considered it a *Crataegus* and introduced it to cultivation in England, where it has been grown sparingly ever since under the name of California Maybush, "May" being an English synonym for the Hawthorn.

Extensive casual observation made by the writer for several years indicated a rather uniform shape and serrulation of the leaves on the plants growing on the mainland. Size of leaf can be influenced by varying light and soil conditions. He has never seen the varieties *macrocarpa* and *cerina* growing in their natural habitats. Seeds of *macrocarpa* were received annually from Catalina Island for several years. Leaves accompanying these fruits were always a little shorter, more rounded on the ends, the serrulations not quite so deep, and in general appeared to be about as uniform as those found on the type. The berries on the *macrocarpa* plants are about twice the size of those from the plants on the mainland.

Photinia arbutifolia is often difficult to grow in gardens because there is generally more water applied than it requires. Scions from two plants from the San Jose area were grafted on quince root, hoping to get plants that would do better under general garden conditions. These grafts made a good union and several plants sent out for trial have done well, although the quince root has a dwarfing effect. Twigs received with the fruits of *macrocarpa* from Santa Catalina Island also made a good union on the quince root and are growing and fruiting satisfactorily. As the bushes are not very large, this form also probably shows some dwarfing effect from the new root.

In transplanting seedlings of both the island and mainland forms, fifteen to twenty multi-cotyledonous plants per thousand were noted. Most of these had four, a few had three or five, cotyledons. Some of these were isolated to grow on for observation.

Two of these selected plants have produced fruits that outwardly appear to be the same as those from *macrocarpa* and the leaves are also similar. Another plant is very different. In one season it grew three times the height of the two just mentioned. The limbs are very stiff and straight. The leaves are longer, narrower and more sharply serru-

lated than any the writer has seen. The berries are the same as those of the type, but the cluster is larger and somewhat stiff and open. Seedlings grown from seed produced by the *macrocarpa* form on quince root show some variation in the leaves. The difference shows clearly in Fig. 30.

Cuttings from all forms are being grown and it is hoped to have plants of the entire group on their own roots growing side by side under the same conditions. If the present difference in foliage and berries is still apparent, then an examination for polyploidy might be interesting.

EASY METHOD FOR ROOTING CUTTINGS

BURR CLOUETTE, *California*

With a little variation, the following method of rooting cuttings may be applied to various types of plant material. The basic materials are some sort of container—pots, or even milk cartons cut in half with drainage holes at the corners; vermiculite; rooting hormone such as “rootone”; complete soluble or liquid fertilizer, and a little patience.

If half milk cartons are used, these are washed clean, and small triangular holes are made at the corners. They are filled with vermiculite, either grade although the coarser is better, especially for cuttings taking a long time to root. The coarser grade does not pack and become soggy as the finer does in time. Before cuttings are planted, water is applied so that it runs out of the drainage holes freely. It is a good plan to place some gravel in the bottoms of the containers used which prevents the vermiculite from washing out.

The cutting material should be fresh, and the cut is made at the node. The lower leaves are trimmed off, and the lower half inch of the base of the cutting is dipped in rooting powder. With tender subjects, it is worth while to rub the powder on leaf scars also. This will control rotting below the soil line. A hole is made in the vermiculite and the cutting is inserted to about $\frac{1}{4}$ of its length. The vermiculite is firmed around the cutting. Water is applied lightly by sprinkling so that foliage is wet. The cuttings are set in the shade, and are watered slightly daily by sprinkling to wet the foliage. Material that will take the sun is moved gradually to the proper sun exposure.

Cuttings from such subjects as geraniums and cacti, are set in the shade for a time before planting—geranium cuttings for a day or two, and cacti for as long as two weeks. For most cuttings, it is better to plant at once. For very tender cuttings, and tip or leaf cuttings, a plastic bag is placed over the container. After the cutting stops wilting, holes are cut in the bag for ventilation, and then it is later finally removed.

The advantage of using half milk cartons as containers is the ease of transplanting. The carton is cut open and the rooted cutting is removed for planting.

After the first week, the cuttings should be watered weekly with any soluble or liquid complete houseplant fertilizer, using reduced strength

at first. Many cuttings are ready for transplanting in three or four weeks.

PLANT SCIENCE FOR THE LAYMAN

NATHAN WILLIAM EASTERLY,

Bowling Green, State University, Bowling Green, Ohio

A college freshman would define botany as the study of plants. The more daring ones might amend the definition to read "pickled plants", or the study of lifeless colored slides, or even the study of dry hay. The implications here are exaggerated but by how much? More mature students in their junior and senior years realize that botany encompasses all studies of plant life whether it pertains to the pure science or to the applied sciences of medicine, agriculture, forestry and horticulture. Much could be discussed concerning the interrelationships or the lack of interrelationships of these sciences. However, I would like to focus attention on those who should benefit from the study of botany rather than on the subject matter of botany.

There are at least five groups who may take courses in college botany: (1) graduate students and undergraduate majors in biology or botany, (2) undergraduates who take botany as an elective, (3) undergraduates who take botany as a science requirement, (4) returning secondary school teachers who renew their certificates, and (5) interested lay people.

There is no question in my mind concerning the education of the first group. These people are being trained for research activities or a combination of teaching and research. They have very definite goals outlined for themselves and they go where adequate facilities and research opportunities exist. But we still have the remaining four groups left. What do we do for them? Should they be trained along the same lines as the first group? Should not more attention be focused on the avocational possibilities of botany as well as the vocational aspects?

The major word that was left out in the definition of botany by the freshman was *life*. Botany is a living science. If I can show the freshman that living plants make up the farmer's agricultural crops and the relationship of biological phenomena to these crops, I have advanced a long way in making botany a meaningful science course to this student. Going a bit further, if I can show him how living plants can broaden his interests in our day to day living, I have made a contribution in his behalf. This approach should strengthen the objectives of groups (2) and (3).

The secondary school teachers should be given up-to-date scientific information. Since they are working with a younger generation, these teachers also need to know the practical applications or even the aesthetic qualities of botany. To give them the impression that botany is a pure science devoted only to scholarly research activity is deadly.

The last group of people represent somewhat of an anomaly according to some of the scientific personnel. They are much interested in

living plants. Yet, they are led to believe that botany and horticulture do not mix. One of the most significant contributions botanical educators could make would be to correct this false notion. Many botanists bristle at the term "popular botany". The science of botany ceases to be a science. This need not be the case if the instructors have been thoroughly trained in plant science.

The study of herbarium specimens, of prepared slides and even adequately preserved specimens is essential but often the love of living plant life and how plants live among their cohorts is overlooked in basic botany courses. The above remarks should not be construed to be derogatory. The need for more research is evident. The need for more educational activity on all levels should be just as evident. Even in the first group of people, i.e. the trained scientist, the broadest training in botany is needed to give them an understanding of their student's needs. For the remaining four groups of people, the study of botany, or plant science, as an avocation should broaden and enrich their existence.

PLANT LIFE LIBRARY

SEED PRESERVATION AND LONGEVITY by Lela V. Barton, John Wiley & Sons, Interscience Division, 440 Park Av., South, New York 16, N. Y. 1962. pp. 216. \$9.50. Illus. Individuals curious about the facts concerning the perennially recurring story of Egyptian mummy wheat, or the reported extreme longevity of lotus seeds can find authoritative answers to their questions in SEED PRESERVATION AND LONGEVITY. Dr. Lela V. Barton of the Boyce Thompson Institute for Plant Research has brought together an enormous quantity of documented information about seeds in this book. She is probably one of the best qualified persons in the country, if not in the world, to author a book on seeds. The Bibliography indicates that Dr. Barton published a paper on seeds as long ago as 1930, and a continuous flow of published material about seeds has issued from her experimental work since that time.

The book has evidently been designed as a reference and text, particularly for seed technologists, seedsmen, and others connected with the seed industry. The subject matter is so important, however, that the book should be attractive to agronomists, horticulturists, foresters, and those who work in other applied fields of botanical science.

Besides chapters on "Records of old seeds", "Life-span of seeds buried in the soil", "Moisture effects", and "Other factors affecting longevity", there are separate chapters on the longevity of the economically important classes of seeds such as vegetable, flower, field, tree, etc. Two interesting and significant chapters on "Methods of testing for viability" are followed by chapters with the titles "Plants from old seeds" and "Causes of deterioration". There is a final chapter on "Practical considerations".

A glossary of just over 130 terms will be useful to those unacquainted with the technical jargon of seed technology. Accurate indexes, both subject and author, add to the book's reference value. Slightly more than 31 pages are devoted to a Bibliography of about 850 citations. In spite of its length there are some surprising omissions in the Bibliography; for example, the valuable reference work, VEGETABLE AND FLOWER SEED PRODUCTION by Hawthorne and Pollard is not cited. There are 22 tables, 13 plates, and 13 text figures. The plates are well reproduced, but the legends for some plates seem a little cumbersome.

The reviewer has noted a few typographical errors, but there are almost inevitable in the production of any book. The writing tends to be pedestrian, but this is to be expected, since present knowledge about seeds is not easily phrased in sprightly language. SEED PRESERVATION AND LONGEVITY should be

required reading for anyone even remotely connected with the seed industry. Furthermore, those biologists who are occasionally troubled with problems relating to seeds, could well afford to have this book on their reference shelf.—*Thomas W. Whitaker.*

PLANT TAXONOMY: METHODS AND PRINCIPLES, by Lyman Benson. Ronald Press, 15 E. 26th St., New York 10, N. Y. 1962. Pp. 494. Illus. \$11.50. Dr. Benson is to be commended for his evolutionary approach to the subject of taxonomy which is in harmony with the best work in this field now being carried on. In addition he does not neglect nomenclature, and the presentation of the data obtained. The book is in five parts: (1) exploration for data, including data from various fields; (2) classification—principles, and the higher categories; (3) choice of names; (4) description and documentation, and (5) treatises and monographs. This stimulating text is highly recommended.—*H. P. Traub.*

PLANT LIFE IN PALESTINE: ISRAEL AND JORDAN, by M. Zohary. Ronald Press, 15 E. 26th St., New York 10, N. Y. 1962. Pp. 262. Illus. \$8.00. This book by *the* authority on the subject is a welcome addition to the other important texts which he has produced in the past. After considering the topography, soil, climate and plant life of the region, he discusses the structure and development of the vegetation classes, and the biogeographical areas, and the continuing influence by man on the structure of the vegetation. This outstanding book is highly recommended.

REGENERATION, edited by D. Rudnick. Ronald Press, 15 E. 26th St., New York 10, N. Y. 1962. Pp. 272. Illus. \$9.00. The discussions in this symposium by eight authorities deal with new and special aspects of the subject: (chapters 1—3) regeneration in invertebrates—sponges, hydra and flatworms; (chapters 4—5) regeneration in plants stimulated by tumor producing agents, and by excision and culture of parts; (chapters 6—8) application of new methods to the study of the amphibian eye. This stimulating book is highly recommended.

THE FLOWER ARRANGEMENT CALENDAR, 1963, by Helen Van Pelt Wilson. M. Barrows & Co., 425 Park Av. So., New York 16, N. Y. 1962. Illus. The publishers sponsor an annual flower arrangement calendar contest. In this little book some of the outstanding photographs of floral arrangements accepted by the publishers are reproduced in calendar form for 1963. The Calendar will be useful to those interested in flower arranging.

A BOOK ABOUT SOILS FOR THE HOME GARDENER, by H. S. Ortloff and H. B. Raymore. M. Barrows & Co., 425 Park Av. So., New York 16, N. Y. 1962. Pp. 189. \$3.95. This popular treatise is in two parts: (1) the nature of soils—how formed, physical properties, composition, habitability, chemical fitness, fertilizers, acidity, soil organisms, and how plants grow; (2) soil management—appraisal and evaluation, supplying water, excess water, tillage and cultivation, tools, soil distribution by geographical regions.

BIOLOGY: ITS PRINCIPLES AND IMPLICATIONS, by Garrett Hardin. W. H. Freeman & Co., 660 Market St., San Francisco 4, Calif. 1961. Pp. 682. Illus. in two colors. \$8.00. This attractive text by an outstanding authority will be welcomed by the student. The book is in four parts: (1) introductory principles—the ways of science, cells and cell division, the molecular world of cells, chemical basis of life; cybernetic equilibria, mechanisms of evolution and mutations; (2) our plant dependent world—autotrophs and heterotrophs; (3) animals, including man; and (4) heredity and nature and origin of life. This is a stimulating book such as only Dr. Hardin can produce. It is highly recommended.

BOTANICAL HISTOCHEMISTRY: PRINCIPLES AND PRACTICE, by W. A. Jenren. W. H. Freeman & Co., 660 Market St., San Francisco 4, Calif. 1962. Pp. 408. Illus. \$10.00. The purpose of this important book is to present about 200 histochemical procedures, and to give examples for their use in the investigation of botanical problems. The text is in four parts: (1) general considerations—quantitative and microscopic histochemistry; (2) preparation of the tissue; (3) tissue and cell analysis; and (4) histochemical techniques. This excellent new text fills a definite need, and is highly recommended.

LIFE BEYOND OUR PLANET, by D. Q. Posin. McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y. 1962. Pp. 128. Illus. \$3.25. The author believes that intelligent beings have evolved not only on earth but also on other planets, and he offers what he considers as compelling arguments in support of his viewpoint. This fascinating book stimulates the imagination and will appeal to all—teenagers and adults.

LIFE: ITS NATURE, ORIGIN AND DEVELOPMENT, by A. I. Oparin (trans. by Ann Synge). Academic Press, 111 Fifth Av., New York 3, N. Y. 1962. Pp. 207. Illus. \$4.50. An outstanding authority in this field points out that the problem of the origin of life, formerly considered on the metaphysical basis, and the problem of the essential nature of life, are really one. This book is an attempt to consider the subject from this unitary approach: (1) the nature of life; (2) the origin of life; (3) the earliest period of the development of life; (4) the further evaluation of life, and (5) conclusions. This book will be read by all who are interested in the nature and origin of life.

ADVANCES IN AGRONOMY, Vol. 14, edited by A. G. Norman et al. Academic Press, 111 Fifth Av., New York 3, N. Y. 1962. Pp. 432. Illus. \$13.00. Nineteen authorities have contributed papers to this volume devoted to reviews and research progress in soil and crop science and developments in agronomic practice. This rich harvest is arranged under eight chapters: (1) laterite; (2) rice improvement and culture in the U. S.; (3) rainfall erosion; (4) soybean genetics and breeding; (5) fertilizers and the efficient use of water; (6) evaluation of fertilizers by biological methods; (7) isotopes methods and uses in soil physics research; and (8) management of soybeans. Highly recommended.

A SYNTHESIS OF EVOLUTIONARY THEORY, by H. H. Ross. Prentice-Hall, Englewood Cliffs, N. J. 1962. Pp. 387. Illus. \$10.00. This outstanding new book by an eminent authority was written, for those having a background in the natural sciences, to integrate knowledge from various fields into a unified theory of evolution, "from cosmic dust to biomes." The sections of the book are concerned with the expansion of evolutionary concepts, the evolution of the universe, origin and nature of life, sources of variability, natural selection, species and species change, increase in number of species, evolution of communities, origin of biome and succession, comparative evolution of biomes, the geotectonic factor, the organization of matter and life. This stimulating book is highly recommended.

NON-PROFIT CORPORATIONS AND ASSOCIATIONS, by H. L. Oleck. Prentice-Hall, Englewood Cliffs, N. J. 1956. Pp. 460. \$12.50. With the increase of non-profit organizations in the United States, there has arisen a need for this excellent book which explains how they are organized, how they are managed, and how they are dissolved. The treatise provides lawyers and laymen alike with an exposition of the American system of procedures, rights, and liabilities of such organizations. This comprehensive book fills a long felt need and will be welcomed by all who are involved in the management of non-profit organizations. Highly recommended.

FOSSILS: AN INTRODUCTION TO PREHISTORIC LIFE, by W. H. Matthews III. Barnes & Noble, 105 Fifth Av., New York 3, N. Y. 1962. Pp. 337. Illus. Paperback. \$5.75. This introductory book is designed primarily as an amateur collector's handbook. However, it should prove helpful to students of paleontology and historical geology. It provides a general background in earth history, and a survey of the types of plants and animals that inhabited the earth in prehistoric times. Dr. Matthews is to be congratulated on his attractive book which is highly recommended.

PREHISTORIC LIFE ON EARTH, by Kai Petersen et al. E. P. Dutton & Co., 300 Park Av. So., New York 10, N. Y. 1961. Pp. 163. Illus. \$4.95. This is an adapted and supplemented version of Petersen's brief summary of evolution of life on earth with emphasis mostly on animal life. The evolutionary processes are illustrated by means of descriptions of actual reconstructions of the types of creatures and environments that have succeeded one another through the millions of years of earth's prehistory. The text illustrations are outstanding. This charming book is recommended to all readers, and is a bargain at the price indicated.

THE AMERICAN PLANT LIFE SOCIETY

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

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[AMERICAN AMARYLLIS SOCIETY, continued from page 2.]

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III. PUBLICATIONS OF THE AMERICAN PLANT LIFE SOCIETY

BOOKS

1. **AMARYLLIDACEAE: TRIBE AMARYLLEAE**, by Traub & Moldenke (including the genera *Amaryllis*, *Lycoris*, *Worsleya*, *Lepidopharynx*, *Placea*, *Griffinia*, and *Ungernia*; Manila covers; 194 pages, incl. 18 illustrations. \$5.00 postpaid.

This is required reading for every amaryllid enthusiast.

2. DESCRIPTIVE CATALOG OF HEMEROCALLIS CLONES, 1893—1948, by Norton, Stuntz, and Ballard. A total of 2695 Hemerocallis clones are included and also an interesting foreword, and explanatory section about naming daylilies. Manila covers; 100 pages (1—X; 1—90), includes a portrait of George Yeld. \$2.50 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 brief descriptions of all the genera. Manila covers; publ. 1963; 85 pages. \$5.00 postpaid.

PERIODICALS

(A) **HERBERTIA** [First series, 1934 to 1948, incl.], devoted exclusively to the amaryllids (Amaryllidaceae), and the workers concerned in their advancement. A complete set of these volumes is indispensable to all who are interested in the amaryllids. Libraries should note that this may be the last opportunity for complete sets.

COMPLETE SETS OF HERBERTIA:

Vols. 1-5 (1934-1938), \$20.00, postpaid.
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Box 150, La Jolla, Calif.

[CLOUETTE—AMARYLLIS RECORDS, continued from page 132.]

hybrid *Amaryllis*. Five seeds of *Amaryllis blumenavia* from Dr. Traub planted over a month ago shows only one has sprouted up to the present, but others may sprout later. Four seeds of *Crinum gouwsii* from Dr. Traub have all sent out roots, and apparently will send up sprouts later. Many other amaryllid seeds from Dr. Traub have sprouted. Seeds from my own *Amaryllis* crosses have been planted and germination has been good in some cases and less so in others. All of these hybrids are making good growth.

[CORRIGENDA, continued from page vi]

REVISION OF "THE PHYLA OF ORGANISMS"

HAMILTON P. TRAUB

The summary entitled, "The Phyla of Organisms" (Traub, 1962) was prepared in 1961 and published in 1962. In the same year, Stanier and van Niel (1962) published a valuable contribution synthesizing the knowledge about the blue-green algae and the bacteria. The outstanding new concept advanced is that the blue-green algae and the bacteria have a similar cellular structure, the *procaryotic*, as contrasted with the *eucaryotic* cellular structure of the rest of the cellular organisms (plants, heteroplants (fungi) and animals). On the basis of this contribution, the phyla are slightly rearranged with appropriate group name changes as shown in Table 1.

TABLE 1.

Kingdom 1. PROCARYOTAE	Kingdom 2. EUCARYOTAE
Subkingdom 1. AUTOPROCARYOTAE	Subkingdom 1. AUTEUCARYOTAE
Superphylum 1. AUTOCHEMOBACIAE	(autophototrophic plants)
PHYLUM 1. AUTONITROBACAE	Superphylum 1. ANEMBRYOPHYTIAE
PHYLUM 2. AUTOHALOBACAE	PHYLUM 9. RHODOPHYTA
PHYLUM 3. HYDROGENOBACAE	PHYLUM 10. PYRROPHYTA
PHYLUM 4. CARBOXYBACAE	PHYLUM 11. CHRYSOPHYTA
Superphylum 2. AUTOPHOTOBACIAE	PHYLUM 12. PHAEOPHYTA
PHYLUM 5. CHROMATOBACAE	PHYLUM 13. EUGLENOPHYTA
PHYLUM 6. CHLOROBACAE	PHYLUM 14. CHLOROPHYTA
PHYLUM 7. CYANOBACAE	Superphylum 2. EMBRYOPHYTIAE
(ex blue-green algae)	PHYLUM 15. BRYOPHYTA
Subkingdom 2. HETEROPROCARYOTAE	PHYLUM 16. TRACHEOPHYTA
PHYLUM 8. HETEROBACAE	Subkingdom 2. HETEROPLANTAE
(heterotrophic bacteria)	PHYLUM 17. RETICULOMYCOTA
	(Labyrinthula)
	PHYLUM 18. MYXOMYCOTA
	PHYLUM 19. EUMYCOTA
	Subkingdom 3. ANIMALIA
	(Phyla nos. 20 through 43, incl., remain
	the same as in Traub, 1962)

"The Phyla of Organisms" (1962) will be revised in Traub,—
"Lineagics", to be published in 1964.

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